1.0 INTRODUCTION

Marathon Gold Corporation (Marathon) proposes to develop an open pit gold mine near Valentine Lake, located in the central region of the Island of Newfoundland, southwest of the Town of Millertown, Newfoundland and Labrador (NL) (Figure 1-1). The proposed Valentine Gold Project (the Project) will consist primarily of two open pits, waste rock piles, crushing and stockpiling areas, conventional milling and processing facilities (the mill), a tailings management facility (TMF), personnel accommodations, and supporting infrastructure including roads, on-site power lines, buildings, and water and effluent management facilities.

The Project is located in a rural region, with a history of mining exploration and development activities and other land and resource uses, including commercial forestry, hydroelectric developments, outfitting, and recreational land use. The mine site is accessed by an existing public access road that extends south from Millertown approximately 88 kilometres (km) to Marathon's existing exploration camp (Figure 1-1). Marathon will upgrade and maintain the access road from a turnoff approximately 8 km southwest of Millertown to the mine site, a distance of approximately 76 km.

On April 5, 2019, a document serving as a Project Description pursuant to the *Canadian Environmental Assessment Act*, 2012 (CEAA 2012) was submitted to the Impact Assessment Agency of Canada (IAAC), previously known as the Canadian Environmental Assessment Agency. Based on a review of this document, IAAC determined that an environmental assessment (EA) would be required. Given the timing of the Project Description submission, and the ongoing transition between CEAA 2012 and the new *Impact Assessment Act* (IAA), Marathon was able to continue the EA review under CEAA 2012.

On April 16, 2019, the same Project Description serving as a Registration document of an undertaking pursuant to the NL *Environmental Protection Act* (NL EPA), was submitted to the provincial government for review. On June 21, 2019, the Minister of Environment, Climate Change and Municipalities (NLDECCM) announced the Project would require the preparation of an Environmental Impact Statement (EIS). Project-specific guidelines for the preparation of an EIS were issued by IAAC in July 2019 (Federal EIS Guidelines; Appendix 1A) and final EIS Guidelines were issued by the Environmental Assessment Committee (EAC) on behalf of the Minister of Environment, Climate Change and Municipalities in January 2020 (Provincial EIS Guidelines; Appendix 1B). Although the two EA processes are not legislatively coordinated, this EIS document has been prepared to satisfy both guidelines documents. Tables of concordance with both the Federal EIS Guidelines and the Provincial EIS Guidelines are provided in Tables E.1 and E.2.

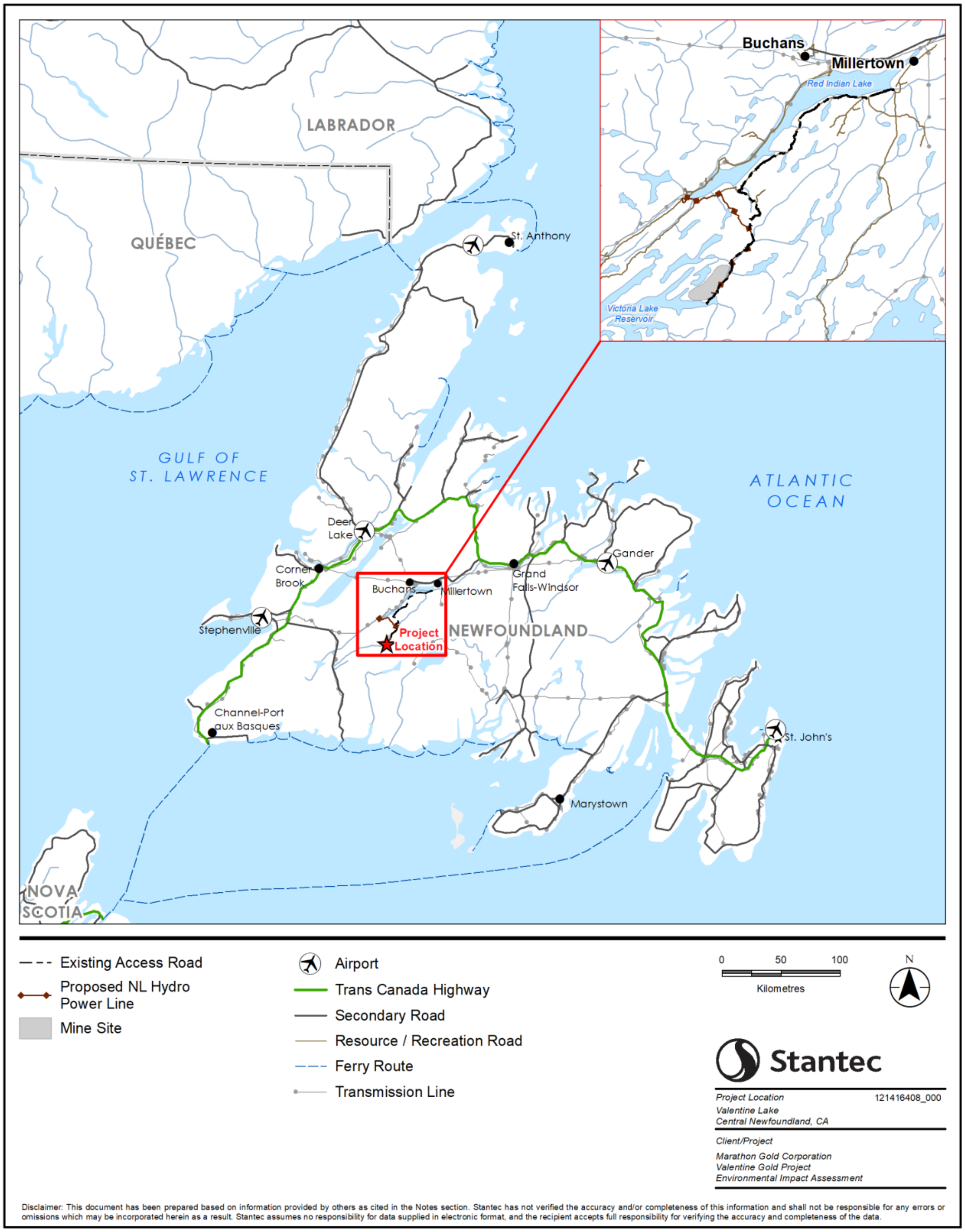

Figure 1-1 Location of Valentine Gold Project

1.1 PROJECT OVERVIEW

The Project is comprised of two mining areas, the Leprechaun and Marathon deposits. Standard surface mining techniques will be used to mine gold ore from two open pits. Ore material will initially be mined and processed at a nominal rate of 6,850 tonnes per day (tpd), increasing to 10,960 tpd in Year 4. Ore will be processed through the mill, where it will be crushed, milled and put through floatation and cyanidation processes to recover the gold. High-grade and low-grade ore materials will be stockpiled for mixing and for processing later in the mine life. Tailings will be treated in the process plant area to remove the cyanide and subsequently deposited in an engineered TMF, where effluent will be monitored for compliance with the Metal and Diamond Mining Regulations (MDMER). Gold will be formed into doré bars, which will be shipped from site to market in secured trucks.

The construction of the Project is expected to take place over a period of approximately 16 to 20 months, followed by an estimated mine operation life of 12 years. The Project will operate 24 hours a day, seven days a week on a 12-hour shift basis. Upon cessation of mining, the operation will be closed, and the site components will be rehabilitated and monitored in accordance with applicable regulations at the time of closure.

Other Project components and activities that are associated with the primary mining, milling and processing activities include site and haul road construction and maintenance, waste rock management, electrical power supply and distribution, process and potable water supply and distribution, site wide stormwater and effluent management including: monitoring; treatment and discharge; fuel storage and fueling stations; mine and plant workshops and services; administrative office; personnel accommodations and lunchrooms; and security. A power line connected from nearby NL Hydro's Star Lake Generating Station to the mine site will be required to supply power to the Project and will be constructed and operated by NL Hydro. The power line will be subject to separate environmental approvals with NL Hydro as the proponent; however, it has been considered within this assessment as a contributor to potential cumulative effects. The Project components and activities associated with construction, operation, and decommissioning, rehabilitation and closure are further defined in Chapter 2 (Project Description).

1.2 PROPONENT INFORMATION

1.2.1 Proponent Contact Information

Marathon is a Toronto-based gold exploration company that was incorporated in 2010. Marathon has 100% ownership of the Project and is the entity that will develop, manage and operate the 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 also has satellite offices in Grand Falls-Windsor and St. John's, 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	Matt Manson, Ph.D. 36 Lombard Street, Suite 600 Toronto, ON, Canada, M5C 2X3 Phone: +1 (416) 855 8200 mmanson@marathon-gold.com
VP Regulatory and Government Affairs	James Powell, M.Eng. P.Eng. P.O. Box 4006, Pearlgate PO, Mt. Pearl, NL, A1N 0A1 Phone: +1 (709) 730-5046 jpowell@marathon-gold.com
Principal Contact for the Purposes of the EA	Tara Oak, B.Sc. Manager, Environmental Assessment P.O. Box 4006, Pearlgate PO, Mt. Pearl, NL, A1N 0A1 Phone: +1 (902) 266-3157 toakl@marathon-gold.com

1.2.2 Marathon Gold Corporation's Management Structure

Since 2010, Marathon's work has been focused on its Valentine Gold property, which is currently accessible year-round by public road. Marathon maintains a fully permitted, 50-person, all-season exploration camp at the 240 km^2 property. Marathon's Board of Directors has the overall responsibility of supervising the management of the business and affairs of the Company. Marathon's team of Executive Officers is responsible for the day-to-day management of the business and executing the Company's strategic objectives.

Marathon maintains appropriate insurance coverage for the current stage of Project development, including workers' compensation insurance, automobile liability insurance, commercial general liability insurance, and directors' and officers' liability insurance. As the Project progresses into construction and operation, Marathon will acquire additional insurance coverage in scope and value commensurate with requirements and industry best practice.

Marathon is in the process of developing an Environmental Management System (EMS) to support the execution of site development in an environmentally responsible and safe manner. The Project will also be aligned with the following Marathon operating policies related to the environment, communities, Indigenous groups, health and safety, and business governance:

- Health and Safety Policy
- Indigenous Relations Policy
- Environmental Management Policy
- Diversity Policy
- Community Relations Policy

- Code of Business Conduct and Ethics
- Procurement Policy
- Whistleblower Policy

The complete policies are provided in Appendix 1C.

1.2.3 Project Team

The EIS was prepared by Stantec Consulting Ltd. and Marathon. Most of the supporting studies were prepared by Stantec Consulting Ltd. The qualifications and roles of the Project Team are provided in Appendix 1D.

1.3 PROJECT LOCATION AND SETTING

1.3.1 Project Location

The mine site (Figure 1-3) is approximately 49 km south (straight line distance) of the nearest community of the Town of Buchans, and approximately 60 km southwest of the Town of Millertown (straight line distance) (Table 1.2). The Project Area (Figure 1-4) consists of the mine site and the portion of the existing public access road to be upgraded and maintained by Marathon, with a 20 metre (m) buffer on either side of the access road to account for activities associated with upgrading, where required.

Table 1.2 Communities Near the Project

Community Name	Type	Distance by Road (km)		Straight Line Distance (km)	
		To Mine Site	To Project Area	To Mine Site	To Project Area
Buchans	Municipality	119	46	49	10
Millertown	Municipality	82	9	60	8
Buchans Junction	Local Service District	89	16	66	13
Miawpukek First Nation reserve at Conne River	First Nations	327	254	113	113
Title held near Badger	Federal Lands	130	57	97	45
Title held in Pasadena	Federal Lands	336	263	76	62

The center of the mine site is located at Universal Transverse Mercator 490055 m Easting and 5358023 m Northing, Zone 21, North American Datum 1983 (NAD83 Zone 21). It is located within National Topographic System map sheets 12A/06. The Project Area is located with National Topographic System map sheets 12A/06, 12A/10, 12A/11, and 12A/15. Table 1.3 provides coordinates for the boundary of the mine site, as shown on Figure 1-4. Table 1.3 also provides coordinates of the start and end points of the access road that will be upgraded, where required, and maintained by Marathon, along with coordinates at 10 km intervals along the road, as shown on Figure 1-4.

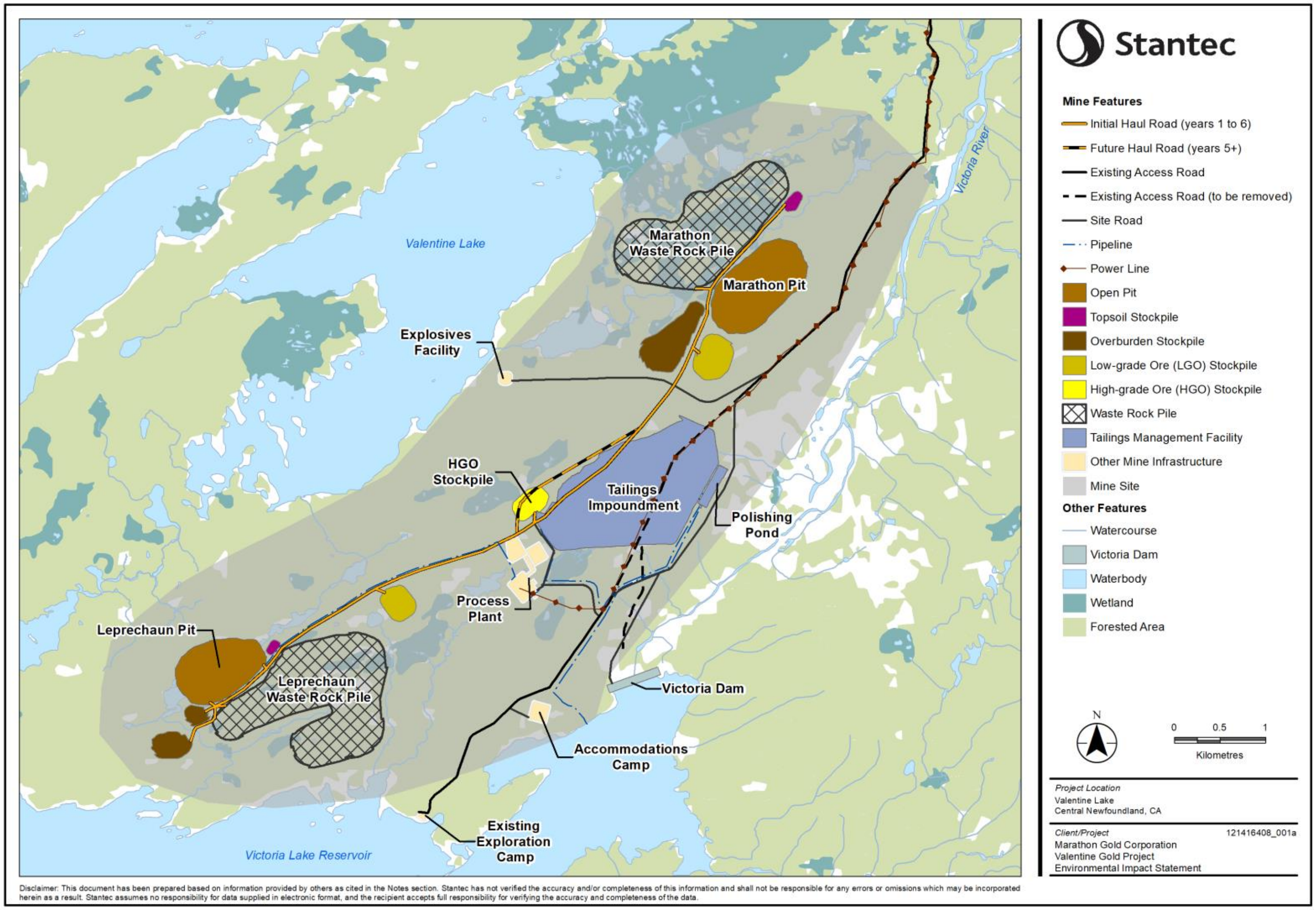

Figure 1-2 Mine Site

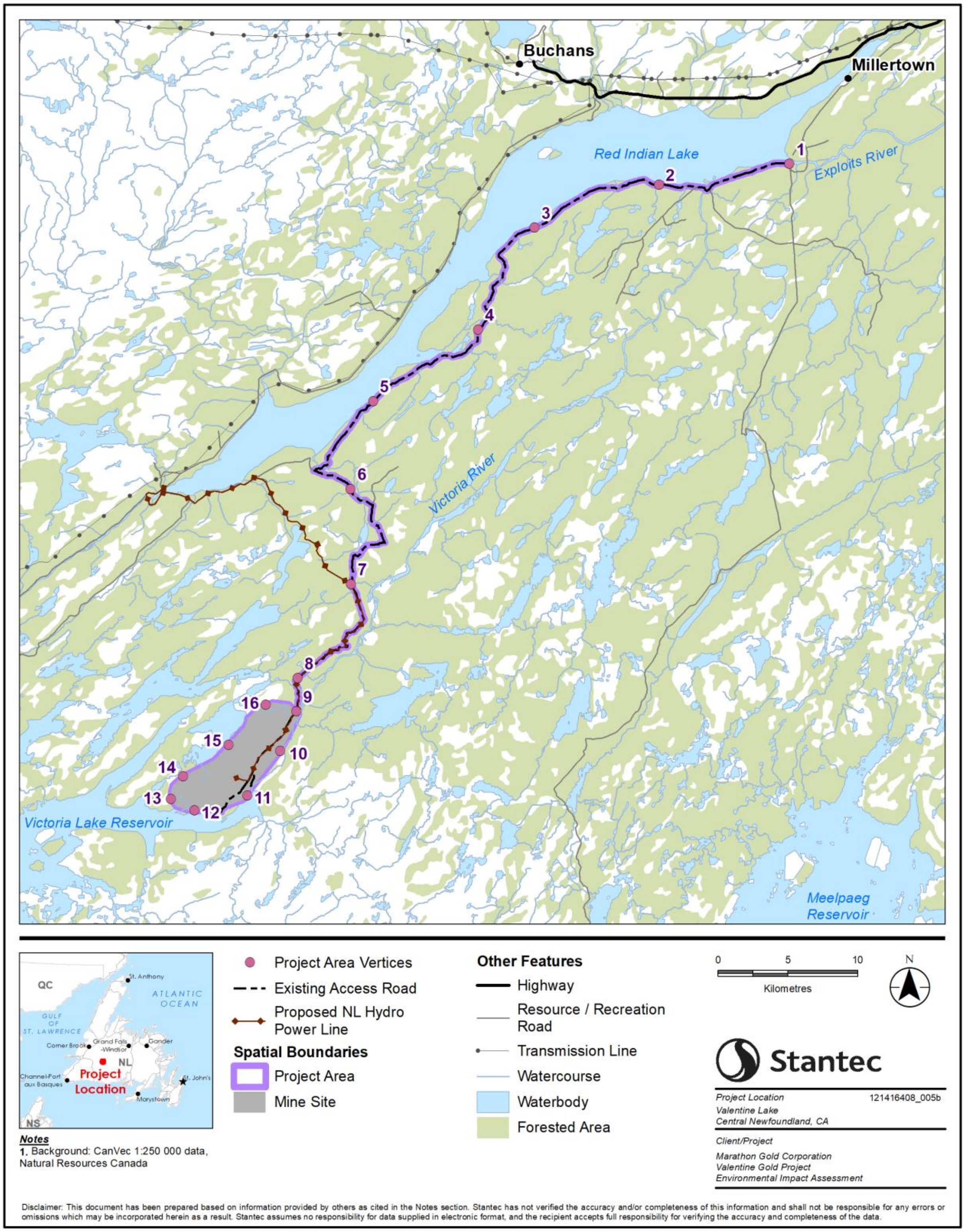

Figure 1-3 Project Area

Table 1.3 Mine Site Boundary and Access Road Coordinates

ID (as shown on Figure 1-4)	Latitude UTM	Longitude UTM
1	5400765.004	529480.275
2	5399279.632	520156.0912
3	5396216.043	511269.215
4	5388921.112	507242.6041
5	5383805.915	499743.7854
6	5377533.818	498123.9331
7	5370719.997	498169.2424
8	5363997.285	494348.3653
9	5361615.793	494254.1106
10	5358803.709	493100.9922
11	5355602.51	490750.2869
12	5354543.511	486986.264
13	5355341.676	485281.976
14	5356991.394	486171.6078
15	5359241.984	489409.9001
16	5362090.283	492083.8983
Coordinates in NAD_1983_UTM_Zone_21N		

The mine site is located within 14 contiguous mineral licenses (Figure 1-5; Table 1.4), for a landholding of 240 km^2. These mineral licenses are 100% controlled by Marathon and are reportedly held in good standing. The Project Area hosts two gold deposits, namely Leprechaun and Marathon, which are the focus of this Project. Other gold prospects have been identified within Marathon's mineral claims area; however, substantial exploration work is required to determine if any additional, viable gold deposits exist there. The collective deposits and occurrences are located within an approximately 11 km long northeast-southwest trending zone (Figure 1-5).

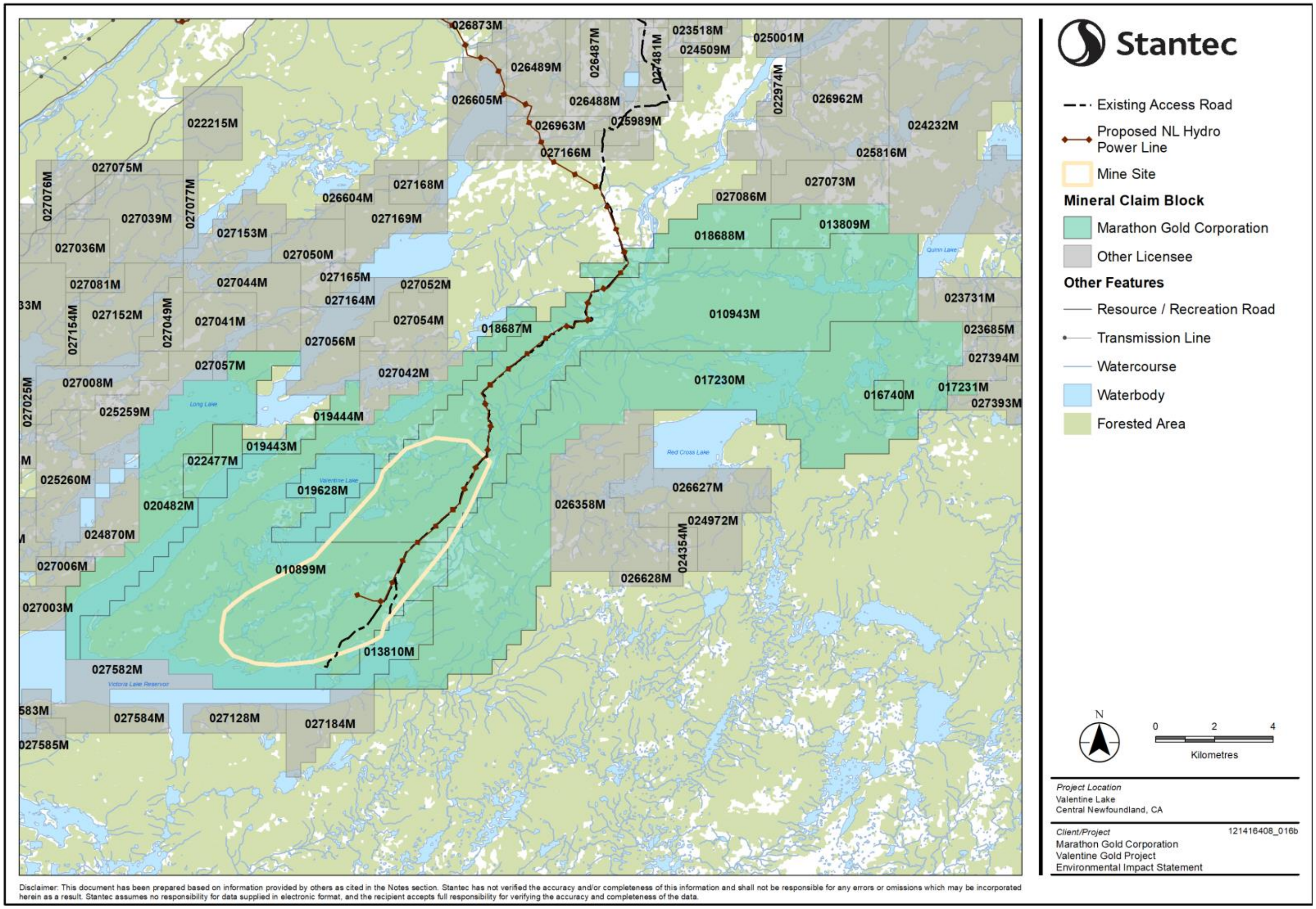

Figure 1-5 Marathon Mineral License Boundary and Adjacent Claims

Table 1.4 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						

The Project is accessed by public 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 mine site by public road from larger communities on the Island of Newfoundland, such as Grand Falls-Windsor and Gander. Materials are typically brought to the Island of Newfoundland via Marine Atlantic-operated ferries, which connect North Sydney, Nova Scotia with Port-aux-Basques on the west coast of the Island, approximately 540 km distance by road from the Project, and Argentia on the Avalon Peninsula, approximately 480 km by road. Other nearby, smaller ports may be considered for the Project, including South Brook, Botwood, and Lewisporte. The Project is also located approximately 210 km from the airport in Gander and approximately 320 km from the airport in Deer Lake. The Project Area is 113 km (254 km by road) from the Miawpukek First Nation reserve at Conne River (Table 1.2). There are no federal lands located within 45 km of the Project Area. The environmental setting, including the environmental importance and value of the geographical setting of the Project Area, is described in Section 1.3.2.

1.3.2 Environmental Setting

The Project is located in a rural region in central Newfoundland, with a history of exploration and mining activities. Other land and resource use in the area include commercial forestry, multiple hydroelectric developments, mineral exploration, outfitting, cabins, harvesting (e.g., trapping, hunting and fishing), and recreational land use (e.g., hiking, boating, snowmobiling and all-terrain vehicle (ATV) use). Adjacent land uses are fully described in Section 16.2.2. The following sections summarize the physical, biological and socio-economic environments (Chapters 5 to 19) near the Project Area and are based on literature reviews and baseline surveys carried out in support of the Project.

1.3.2.1 Physical Environment

The Project is located within the Central Newfoundland Forest (CNF) Ecoregion (Newfoundland and Labrador Department of Fisheries and Land Resources [NLDFLR] 2019a). This ecoregion typically consists of rolling hills, dense forest and organic deposits occurring in valleys and basins (PAA 2008). The CNF Ecoregion has the warmest summers and coldest winters on the Island of Newfoundland, with the potential for night frost year-round (NLDFLR 2019b). Terrain (i.e., topography and landforms) varies and includes boggy areas, thin to thick glacial till layers, and bedrock outcrops. Scattered wetlands, specifically patterned fens and bogs are common in the Project Area and surrounding areas. Elevations range from 270 to 437 m above sea level (masl) across the mine site and from 160 to 437 masl across the Project Area.

There are no historical baseline records for air quality or noise in the Project Area, however, given its rural nature, the concentrations of air contaminants are likely to be low and close to average background concentrations for similar rural areas in NL at most locations, most of the time. Ambient air quality monitoring was conducted within the Project Area over the period from June 15 to 19, 2020, with measured concentrations being below the regulatory standards (for contaminant, with applicable standards). Occasionally, the concentration of an air contaminant, such as particulate matter, may be temporarily elevated and localized for a short period of time due to dust from traffic on nearby unpaved forestry and hydroelectric project access roads. Overall, ambient air quality is expected to be very good most of the time in the Project Area.

Similarly, the sound levels in a rural environment are likely to be dominated by natural phenomena or activities, such as wind, rain, and wildlife. Sound pressure levels depend upon the distance from the source and the acoustic characteristics of the area in which it is located. In the Project Area, these are expected to be low as well most of the time. Local sources of sound may include forestry and exploration activities, vehicles, generators, snowmobiles / all-terrain vehicles, or recreational boat engines. These activities and sources are not likely to exceed regulatory thresholds. Baseline sound pressure levels were measured at one location in the Project Area in June 2020 and the results were representative of a quiet rural to quiet suburban area, with limited to no existing sources of noise.

The Project is situated along a boundary between the Exploits River Watershed and the Bay d'Espoir Watershed. The Victoria Lake Reservoir, to the south of the Project Area is the headwater system for the Bay d'Espoir Watershed, which includes multiple hydroelectric projects downstream. The head of the Victoria River (altered in the 1960s by hydroelectric development) to the east of the Project Area, and Valentine Lake to the northwest, feed into the Exploits River, one of the most important Atlantic salmon rivers on the Island in terms of numbers of salmon returning. The Exploits River Watershed is the largest watershed on the Island of Newfoundland, with a total area of 10,241 km^2.

Water discharge from the Exploits River is highly regulated by three dams located in Millertown, Grand Falls-Windsor 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, however, with the construction of the Victoria Dam in 1967, to create the Victoria Lake Reservoir, 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, the Victoria Lake Reservoir has contributed very little flow to the Victoria River because the Victoria Dam operates as an overflow spillway, and spilling occurs infrequently.

1.3.2.2 Biological Environment

The CNF Ecoregion, where the Project is located, is primarily inland, and has a more continental climate than other surrounding ecoregions. Balsam fir, paper birch and black spruce are dominant tree species. No vascular plant species at risk (SAR) were observed during surveys conducted in support of the Project. Three species of conservation concern (SOCC) were observed, including short-scale sedge, nodding water nymph, and perennial bentgrass. Additional information on vegetation and wetland communities, including SAR and SOCC, is provided in Section 9.2.2.

The region includes a variety of wildlife mammal species commonly found in the boreal forest on the Island of Newfoundland (Sections 11.2.2 and 12.2.2). Species confirmed in the Project Area include woodland caribou (*Rangifer tarandus*), moose (*Alces alces*), black bear (*Ursus americanus*), Canada lynx *(Lynx canadensis)*, coyote (*Canis latrans*), red fox (*Vulpes vulpes*), American marten (*Martes americana atrata*), muskrat (Ondatra zibethicus), river otter (*Lutra canadensis*), southern red-backed vole (*Myodes rutilus*), meadow vole (*Microtus pennsylvanicus)*, snowshoe hare (*Lepus americanus*), and American red squirrel (*Tamiasciurus hudsonicus*) (Sections 11.2.2 and 12.2.2). While not detected in the wildlife baseline studies conducted, mink (*Neovison vison*), ermine (*Mustela erminea*), northern long-eared bat (*Myotis septentrionalis*), and little brown bat (*Myotis lucifugus*) are expected to occur in the vicinity of the Project. Caribou on the Island of Newfoundland have been assessed as Special Concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC 2014). COSEWIC was established by the federal *Species at Risk Act* (SARA) as an independent body of experts responsible for identifying and assessing wildlife species considered to be at risk. The Project Area overlaps or is in proximity to the ranges of caribou herds including the Buchans, Grey River, Gaff Topsails, and La Poile herds. Animals from the Buchans herd migrate through the mine site biannually, while resident caribou (Grey River herd) occur year-round within the Project Area. The La Poile herd has no overlap with the Project Area, and only a small portion of the winter range of the Gaff Topsails herd overlaps with the Project Area (less than 1 km^2 overlaps with the access road). Wildlife mammal SAR with potential to occur near the Project Area include the American marten (Newfoundland population) and bats. The Newfoundland population of marten are listed as Threatened and are protected under SARA (COSEWIC 2007) and the provincial *Endangered Species Act* (NL ESA), while the northern long-eared bat and little brown bat are designated as Endangered under SARA (COSEWIC 2013).

The region includes a variety of avifauna species commonly found in the boreal forest on the Island of Newfoundland (Section 10.2.2). Broadly, the avifauna groups present in this area include passerines, waterfowl, upland gamebirds and raptors. Some common species found in the Project Area include boreal chickadee (*Poecile hudsonicus*), black-and-white warbler (*Niotilta varia*), Canada jay (*Perisoreus canadensis*), Lincoln's sparrow (*Melospiza lincolnii*), northern waterthrush (*Parkesia noveboracensis*), and yellow-bellied flycatcher (*Empidonax flaviventris*) (Section 10.2.3). Three avifauna SAR were identified during field surveys in the vicinity of the Project Area: olive-sided flycatcher (*Contopus cooperi*), common nighthawk (*Chordeiles minor*), and rusty blackbird (*Euphagus carolinus*). Three avifauna SOCC, Caspian tern (*Hydroprogne caspia*), Nashville warbler (*Leiothlypis ruficapilla*), and bay-breasted warbler (*Setophaga castanea*), were also encountered in the Project Area during field surveys (Section 10.2.3).

With respect to waterfowl, a Sensitive Wildlife Area along the Victoria River has been identified by the Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture (NLDFFA) and the Newfoundland and Labrador Eastern Habitat Joint Venture (NL-EHJV) as containing important waterfowl habitat (NL-EHJV 2008). This area was established for the protection of wetland habitat used as breeding, brood rearing, and staging grounds for waterfowl. While this area overlaps with the Project Area (Section 10.2.2), NLDFFA has indicated that the waterfowl habitat that was likely the focus of this designation are “steadies” on the Victoria River system located well to the north of the mine site (B. Adams, pers.comm, 2020). A larger area was likely designated to highlight the need for continued drainage of the Victoria River watershed from Victoria Lake Reservoir to Red Indian Lake, to maintain wetland habitat for waterfowl species.

Within the region, sea-run and landlocked Atlantic salmon (*Salmo salar*), brook trout (*Salvelinus fontinalis*), Arctic char (*Salvelinus alpinus*), American eel (*Anguilla rostrata*), and threespine stickleback (*Gasterosteus aculeatus*) are known to occur (Cunjak and Newbury 2005; Porter et al. 1974). For both sea-run Atlantic salmon and American eel, their migratory habitat is interrupted by several hydroelectric dams which provide upstream passage but may not facilitate optimal downstream migratory passage. The sea-run Atlantic salmon are part of the Northeast Newfoundland Atlantic Salmon population and are designated as *Not-at-Risk* by COSEWIC (COSEWIC 2010). Victoria Lake Reservoir and Valentine Lake are not accessible to sea-run Atlantic salmon. American eel is designated as Threatened by COSEWIC (COSEWIC 2012). American eel is known to occur along the access road on the south side of Red Indian Lake, however, it is not known to occur in Victoria Lake Reservoir or Valentine Lake. Fish sampling conducted in support of the Project captured brook trout, landlocked Atlantic salmon and threespine stickleback within the ponds, lakes and streams of the Aquatic Survey Area. Arctic char was not captured.

1.3.2.3 Socio-economic Environment

The Project is located in a rural region and not within the boundaries of a municipality; the closest communities are the Town of Millertown, the Town of Buchans and the Local Service District of Buchans Junction (Table 1.2). These nearby communities, along with Badger, Grand Falls-Windsor and Bishop’s Falls, have been shaped primarily by natural resource-based industries, including mining, forestry and hydroelectric developments. Logging has taken place in the region since the turn of the twentieth century, however, with the closing of Abitibi-Bowater Inc.’s pulp and paper mill in Grand-Falls-Windsor in 2009, forestry in the area has decreased. Buchans and Millertown were founded in support of mining and forestry 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.

The region is also used for recreational activities, including hunting, fishing, hiking, backcountry camping, snowmobiling, ATV use and boating. There are a number of private cabins in the region, primarily around ponds, lakes, and rivers. Additionally, there are 21 outfitters / lodges that operate within a 35 km radius of the mine site. 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). A variety of furbearer species that are subject to trapping activity are also found in the area.

Angling occurs on a number of waterbodies in the region. There is an active recreational salmon fishery on the Exploits River, which flows northeast from Red Indian Lake. The Exploits River (including tributaries) is a scheduled salmon river, regulated by Fisheries and Oceans Canada (DFO) under the *Fisheries Act* and the *Canada Wildlife Act.* Based on 2016 population surveys, the returns of Atlantic salmon to the Exploits River system have declined compared to previous five-year means (2011 to 2015), and the egg density was 37% of the conservation requirement (Veinott et al. 2018). Subsequently, 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).

Currently, most salmon anglers fishing on the Exploits River use the lower river and tributaries from Grand Falls down to the river mouth. The middle river is used less often, and there is little access and angler activity at the upper river above Red Indian Lake Dam (SCNL, pers. comm. 2020). Brook trout, arctic char and land-locked Atlantic salmon (ouananiche) are also commonly fished in the region. Outfitters in the region reported salmon angling occurring at the Exploits River near Grand Falls-Windsor and Bishop Falls, occasionally at the mouth of Victoria River near Red Indian Lake (Snow Shoe Lake Hunting and Fishing, pers. comm. 2020) and the head of the Exploits River (near Exploits dam). One outfitter also identified areas for ouananiche and brook trout angling along the route between Victoria Lake Reservoir and Bay d’Espoir, including Victoria River, Granite Lake, Meelpaeg Lake, Cowy Lake, Snowshoe Pond, Hospital Pond, Blizzard Pond, and Wilding Lake (Snow Shoe Lake Hunting and Fishing, pers. comm. 2020).

The province manages 55 protected areas, including 31 provincial parks, 16 ecological reserves, three wildlife reserves, two wilderness reserves, and three other protected areas (NLDFLR 2019b). There are three provincial protected areas in the area, including Little Grand Lake Ecological Reserve (~27 km from the mine site and ~23 km from the Project Area), Little Grand Lake Wildlife Reserve (~28 km from the mine site and ~23 km from the Project Area), and T’Railway Provincial Park (~76 km from the mine site and ~26 km from the Project Area).

A Historic Resources Overview Assessment for the Project was completed in 2017. Although no known archaeological sites were identified within the mine site, a review of regional archaeological data indicates that the area surrounding the Project has broad theoretical potential for archaeological resources, particularly those pertaining to the pre-contact period (especially late pre-contact), and the historical Beothuk and Mi’kmaq occupations of the southwestern Newfoundland interior.

The Federal EIS Guidelines identify Qalipu Mi’kmaq First Nation (Qalipu) and Miawpukek First Nation (Miawpukek) as Indigenous groups that may be affected by the Project. The Miawpukek Reserve is located at the mouth of the Conne River on the south coast of the Island of Newfoundland, approximately 113 km from the Project Area. The area of the reserve is approximately 620 ha. The total registered membership of Miawpukek is 3,063, of which approximately 33% live on reserve. Qalipu was registered as a band under the *Indian Act* in 2011. Although a registered band, Qalipu does not manage any reserve lands. Its members reside within 67 communities across the Island, with the nearest community to the Project being Buchans (straight line distance) located 49 km to the mine site (direct route) and the nearest community by road being Millertown (Table 1.2). Qalipu maintains satellite administrative offices in Glenwood, Grand Falls-Windsor, Stephenville and St. George's with a head office in Corner Brook. Qalipu currently has approximately 22,000 members. Profiles for each group are provided in Chapter 17 (Indigenous Groups) in accordance with the requirements under subsection 5(1)(c) of CEAA 2012.

1.4 REGULATORY FRAMEWORK AND THE ROLE OF GOVERNMENT

This section outlines the approvals and authorizations under the pertinent regulatory processes required for the Project. This information is indicative for planning purposes and is not intended to present an exhaustive list of legal and regulatory requirements.

1.4.1 Environmental Assessment Requirements

Marathon plans to develop and operate an open pit gold mine with a nominal throughput of 6,850 tpd, increasing to 10,960 tpd in Year 4. It is therefore subject to legislative requirements under both CEAA 2012 and the provincial NL EPA, as follows:

- The Project is captured under section 16 (c) of the *Regulations Designating Physical Activities*, as a gold mine, other than a placer mine, with an ore production of 600 tpd or more and therefore requires an EIS to be submitted to IAAC
- The Project is captured under section 33(2) of the provincial *Environmental Assessment Regulations*, 2003 and therefore requires an EIS to be submitted to the EAC

On August 28, 2019, the IAA came into force, repealing CEAA 2012. Section 181 of the IAA contains transitional provisions that apply to projects undergoing an EA under CEAA 2012 before the day the IAA came into force. As the Notice of Commencement for the Project was posted by the IAAC on May 31, 2019, the Project will continue under CEAA 2012 as if it had not been repealed.

Although there is no formal harmonization agreement between the province and the federal government, a single EIS that addresses the requirements of both levels of government has been prepared. A Project Description / Registration was submitted on April 5, 2019 to the federal and provincial governments. Based on the Project Description / Registration, federal and provincial governments determined that an EIS is required and Project-specific guidelines were issued under CEAA 2012 and the NL EPA. The purpose of this EIS is therefore to satisfy the federal and provincial regulatory requirements and the requirements of the Federal EIS Guidelines (Appendix 1A) and the Provincial EIS Guidelines (Appendix 1B).

1.4.2 Other Required Environmental Approvals and Permits

The primary environmental regulatory requirement of the provincial and federal governments is the EA, as discussed in Section 1.4.1. In addition to EA approval under CEAA 2012 and NL EPA, the Project is subject to other federal and provincial legislation, including:

- *Canadian Environmental Protection Act* (CEPA): CEPA relates to pollution prevention and the protection of the environment and human health to contribute to sustainable development. Among other items, CEPA contains a wide range of measures to manage toxic substances, and other pollutant and waste.
- SARA and NL ESA: Both federal and provincial governments regulate species at risk and their protection through specific legislation. SARA is intended to protect species at risk in Canada and their "critical habitat" (as defined by SARA). Under SARA, proponents are required to demonstrate that no harm will occur to listed species, their residences or critical habitat, or identify adverse effects on specific listed wildlife species and their critical habitat, followed by the identification of mitigation measures to avoid or reduce effects. Activities must comply with SARA, with prohibitions against 1) the killing, harming, or harassing of endangered or threatened SAR (sections 32 and 36); and 2) the destruction of critical habitat of and endangered or threatened SAR (sections 58, 60 and 61). The NL ESA also provides special protection for native plant and animal species considered to be endangered, threatened or vulnerable in NL.
- *Fisheries Act:* Amendments to the *Fisheries Act*, in 2018, reintroduced provisions for the protection of fish and fish habitats, notably the prohibition against harmful alteration, disruption or destruction (HADD) of fish habitat. The Act also prohibits activities that cause the "death of fish" (other than permitted fishing activities), considers the cumulative effects of development activities, and provides improved protection of highly productive, sensitive, rare or unique fish and/or fish habitats. These prohibitions are limited through authorization of the project, compliance with all conditions established by the Minister, and/or other exceptions within the *Fisheries Act* and regulations.
- *Migratory Birds Convention Act* (MBCA): The MBCA prohibits killing or destroying of the eggs or young of migratory bird species not listed as game birds. Through the EIS, adverse effects to migratory birds are assessed and mitigation measure proposed for migratory birds which are protected under the MBCA, along with their eggs, nests, and young.
- *Canadian Navigable Waters Act* (CNWA): The CNWA, which came into force in August 2019, replaces the former *Navigable Protection Act* and applies to anyone planning activities that will affect navigation in navigable waters. The CNWA has been developed to regulate major works and obstructions on navigable waters, even those not listed on the schedule of navigation, and creates a new category for "major" works. "Major works" are those likely to substantially interfere with navigation and will always require approval from Transport Canada. Transport Canada administers the CNWA through the Navigation Protection Program.

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 authorizations, emissions, and effluent discharge approvals, approvals for placement of some Project components (e.g., tailings management, water control structures), and other Project development related items. Significant among these is the required Certificate of Approval pursuit to the NL EPA to operate a mine and tailings facility. These permits or authorizations are applied for separately with relevant information included in the applications. Permits are issued after the Project is released from EA.

Marathon will also apply for surface rights to site infrastructure pursuant to section 33 of the *NL Mineral* Act. This section entitles Marathon, as the holder of a relevant mining lease, to obtain from the NL Government such surface rights as may be reasonably necessary to carry out mining operation.

Table 1.5 provides a list of approvals, authorizations, and permits that may be required from various provincial and federal agencies for the Project. It is not considered exhaustive. Note that municipal approvals, authorizations, and permits are not anticipated, as the Project is not located within a municipality. Marathon currently has mineral licenses and a range of permits in place for their existing exploration activities and accommodations camp. The mine site is located fully within 14 contiguous mineral licenses, for a landholding of 240 km^2 (Table 1.4). These mineral licenses are 100% controlled by Marathon and are reportedly held in good standing.

Table 1.5 Environmental Approvals, Authorizations, and Permits that May Be Required

Environmental Permit, Approval or Authorization Activity	Issuing / Approval Agency
Provincial	
Release from EA Process	NLDECCM – Minister
Approval of Environmental Protection Plan	
Monitoring Plan for Certificate of Approval	NLDECCM – 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	
Permit to construct a Non-Domestic Well	NLDECCM – 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	NLDFFA – Crown Lands Division
Permit to Control Nuisance Animals	NLDFFA – Wildlife Division
Operating Permit to Carry out an Industrial Operation During Forest Fire Season on Crown Land	NLDFFA – Forestry and Agrifoods Agency
Permit to Cut Crown Timber	
Permit to Burn	
Surface and Mining Leases	NL Department of Industry, Energy and Technology – Mineral Development and Mineral Lands Division
Development Plan	
Rehabilitation and Closure Plan	
Financial Assurance	
Mill License	
Quarry Development Permit	

Table 1.5 Environmental Approvals, Authorizations, and Permits that May Be Required

Environmental Permit, Approval or Authorization Activity	Issuing / Approval Agency
Blasters Safety Certificate	Department of Digital Government and 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	IAAC
Fisheries Act Authorization permitting serious harm to fish	DFO
Tailings Impoundment Area Designation	Environment and Climate Change Canada
Initiate Metal and Diamond Mining Effluent Regulations (MDMER) authorization and reporting processes with Environment and Climate Change Canada (ECCC) including notification, identification of final discharge point, and all required components of effluent monitoring, and environmental effects monitoring (EEM)	
Approval of MDMER Emergency Response Plan	
Approval to Interfere with Navigation	Transport Canada
License to Store, Manufacture, or Handle Explosives (Magazine License)	Natural Resources Canada

1.4.3 Applicable Policies, Guidelines, and Resources

In addition to the Federal EIS Guidelines (Appendix 1A) and the Provincial EIS Guidelines (Appendix 1B), the EIS preparation also considered other guidance documents prepared by IAAC and the federal government, including:

- Various Health Canada guidance was consulted in considering the effects of water and air quality and noise on Indigenous health including:
  - Useful Information for Environmental Assessments (Health Canada 2010)
  - *Guidance for Evaluating Human Health Impacts in Environmental Assessment: Human Health Risk Assessment* (Health Canada 2019)
  - *Guidance for Evaluating Human Health Impacts in Environmental Assessment: Country Foods* (Health Canada 2018)
  - *Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise* (Health Canada 2017)

  - *Guidance for Evaluating Human Health Impacts in Environmental Assessment: Air Quality* (Health Canada 2016a)
  - *Guidance for Evaluating Human Health Impacts in Environmental Assessment: Drinking and Recreational Water Quality* (Health Canada 2016b)
- *Technical Guidance for Assessing Physical and Cultural Heritage or any Structure, Site or Thing that is of Historical, Archaeological, Paleontological or Architectural Significance under the Canadian Environmental Assessment Act, 2012* (CEA Agency 2015a) was consulted with respect to the consideration of effects on heritage and culture
- *Technical Guidance for Assessing the Current Use of Lands and Resources for Traditional Purposes under the Canadian Environmental Assessment Act, 2012* (CEA Agency 2016a) was consulted with respect to the consideration of effects on Indigenous Peoples
- The Operational Policy Statement, *Addressing "Purpose of" and "Alternative Means" under the Canadian Environmental Assessment Act, 2012* (CEA Agency 2015b) was consulted with respect to the assessment of Project alternatives (Section 2.9)
- The Operational Policy Statement, *Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012* (CEA Agency 2016b) was taken into consideration during the development of the cumulative effects assessment scope and methods
- The Operational Policy Statement, *Determining Whether a Designated Project is Likely to Cause Significant Environmental Effects under the Canadian Environmental Assessment Act, 2012* (CEA Agency 2015c) was considered in defining criteria or established thresholds for determining the significance of residual adverse environmental effects

The IAA came into effect on August 28, 2019, and while this Project remains under CEAA 2012, new guidance documents related to the IAA were also reviewed and considered as appropriate for this EIS. Additional policies, guidelines and resources considered in the assessment of specific environmental components are referenced in Chapters 5 to 21.

Other pertinent guidance that influenced the EA process with respect to Indigenous engagement include:

- *Aboriginal Consultation and Accommodation - Updated Guidelines for Federal Officials to Fulfill the Duty to Consult* (Aboriginal Affairs and Northern Development Canada 2011)
- *Considering Aboriginal Traditional Knowledge in Environmental Assessments Conducted Under the Canadian Environmental Assessment Act, 2012* (CEA Agency 2015d)
- The Government of NL's *Aboriginal Consultation Policy on Land and Resource Development Decisions* (Government of NL 2013)

1.4.4 Non-Governmental Participants in the Environmental Assessment

Other non-governmental participants involved in the EA include Indigenous groups, local communities, stakeholders, and the general public. Indigenous, community and stakeholder engagement is described in detail in Chapter 3 (Regulatory, Indigenous and Stakeholder Consultation and Engagement). In addition to the engagement activities that are being conducted by Marathon, Indigenous groups, stakeholders, and the general public have been provided opportunities to review and comment on the

Project Description and the draft Guidelines and will also have the opportunity to comment on the EIS and the draft EA Report to be prepared by IAAC.

Under CEAA 2012, a proponent is required to identify potential project-related environmental effects. With respect to effects on Indigenous groups in Canada, subsection 5(1)(c) of CEAA 2012 requires that the environmental assessment consider:

> *(c) with respect to Aboriginal peoples, an effect occurring in Canada of any change that may be caused to the environment on:*
> - *(i) health and socio-economic conditions,*
> - *(ii) physical and cultural heritage,*
> - *(iii) the current use of lands and resources for traditional purposes, or*
> - *(iv) any structure, site or thing that is of historical, archaeological, paleontological or architectural significance."*

Subsection 19(3) of CEAA 2012 also indicates that community knowledge and Indigenous traditional knowledge may be considered. As described further in Chapter 3, Marathon has engaged with both the Qalipu and Miawpukek First Nations. Additional information on these Indigenous groups on the Island of Newfoundland is provided in Chapter 17 (Indigenous Groups). Marathon has also engaged with local town councils, outfitters and environmental organizations.

1.4.5 Other Registrations

No other registrations pursuant to the NL *Environmental Assessment Regulations* have been previously submitted in relation to this Project or are planned to be submitted in the future as a result of this Project. Environmental assessment registrations previously submitted in relation to past and on-going exploration activities are not considered a part of the currently proposed Project.

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2.0 PROJECT DESCRIPTION

This chapter describes the infrastructure and construction, operation, and decommissioning, rehabilitation and closure activities that comprise the Project. These form the basis for the environmental assessment (EA), defining the design parameters and scope that inform the evaluation of potential effects on valued components (VCs). This chapter also includes a summary of changes to the Project since it was originally proposed; an overview of Marathon's overall environmental management; the purpose and need for the Project; and an analysis of alternatives, including alternatives to the Project and alternative means of carrying out the Project.

Additional information related to this Chapter is provided in the following appendices:

- Appendix 2A – Water Management Plan
- Appendix 2B – Prefeasibility Study for Tailings Disposal at the Valentine Gold Project
- Appendix 2C – Pre-feasibility Geotechnical Investigation: Marathon & Leprechaun Pits
- Appendix 2D – Stream Crossings Along Access Road
- Appendix 2E – Site Photographs

2.1 CHANGES TO THE PROJECT SINCE ORIGINALLY PROPOSED

As part of the planning phase for the Project, aspects of the Project concept and engineering design have been modified, refined, and adapted in response to feedback during consultation and engagement and to reduce potential adverse effects. These changes have been made during the Project Pre-Feasibility Study (Ausenco 2020) and in consideration of discussions with regulators, stakeholders and Indigenous groups, and in response to input received during public, Indigenous and regulatory review of the Environmental Assessment Registration/Project Description Valentine Gold Project, Newfoundland and Labrador (Marathon Gold 2019) and the Federal EIS Guidelines (Appendix 1A) and Provincial EIS Guidelines (Appendix 1B).

Throughout the consultation and engagement program (see Chapter 3), Marathon has actively responded to feedback, and has incorporated this feedback into the Project design so as to improve the overall Project, and alleviate or reduce Indigenous, stakeholder, public and regulatory concerns. The following substantive Project design changes have been made since submission of the Environmental Assessment Registration/Project Description (Marathon Gold 2019) in April 2019:

- The heap leach process and associated infrastructure are no longer part of the proposed Project scope
- The Tailings Management Facility (TMF) has been relocated to avoid known fish habitat and to be downstream of the Victoria Dam and Reservoir
- The tailings deposition method has changed from a conventional slurry to thickened tailings
- Following operation Year 9, all remaining tailings produced from the milling process will be deposited into the mined-out Leprechaun pit instead of to the TMF
- Mining of the Victory deposit and Sprite deposit is no longer part of the proposed Project scope

- The process plant area has been relocated
- The waste rock piles have been reconfigured, primarily to avoid fish habitat and to avoid sterilization of potentially economical resources
- Ore stockpiles have been added due to the removal of the heap leach process
- Locations of topsoil and overburden stockpiles have been identified on the site plan

Table 2.1 describes key refinements made to the Project and provides a summary of resulting benefits to the environment, Indigenous groups and stakeholders. Section 2.11 (Alternative Means of Carrying out the Project) provides more detail on the below and provides rationale for rejecting and selecting alternatives.

Table 2.1 Key Refinements

Originally Proposed Project Design[1]	Revised Project Design	Benefits to the Environment, Indigenous Groups and Stakeholders
Heap Leach Process and Infrastructure		
Heap leach process was proposed to extract gold from low-grade ore. Crushed, low-grade ore would be stacked on a large, lined pad, and a weak cyanide solution pumped through perforated pipes laid within the ore material. The solution would collect gold by draining through the ore, then the solution (now containing gold) would be collected by the drainage pipe system at the bottom of the pile, above a double-lined containment system. The solution would then be sent to a leach reactor system, then to the elution circuit in the process plant for gold extraction and carbon / solution recycling.	The heap leach process and associated infrastructure (heap leach pad, heap leach crusher and crusher pad, conveyor / stacker system, heap leach solution ponds, and carbon in circuit process infrastructure) are no longer part of the Project plan. Cyanide use will now be entirely enclosed within the process plant in a conventional gold process circuit. With removal of the heap leach process, most of the low-grade ore that would have been processed via heap leach will now be stockpiled and processed within the milling process later in the mine life. A relatively small percentage of the lowest grades may not be processed at all and will end up mixed in with waste rock. Ultimately, this percentage will depend on a number of factors, including market prices for gold and operating costs at any stage of the mine life.	• Reduces the overall project footprint. • Eliminates the open-air cyanide component of the project, thereby eliminating the risk of a leak or release of the weak cyanide solution from the heap leach pad containment system, or the solution ponds. • Substantially reduces the amount of cyanide needed for processing over the life of the project, thereby reducing risks associated with cyanide transportation and storage.
Tailings Management Facility Location		
The proposed TMF was to be located to the east of Leprechaun Pit, up-gradient of Victoria Dam and Reservoir, and would take in a small pond and stream in the central area of the site.	A detailed siting/location assessment for the TMF was completed as part of the PFS, which assessed a total of 14 potential locations up to 12 km from the previous TMF location. After reviewing the environmental, engineering and economic factors of the potential locations, the TMF was relocated to the north of its originally proposed location. The updated TMF footprint avoids fish-bearing and/or navigable waterbodies.	• Reduces adverse effects on fish and fish habitat. • Eliminates potential interaction and risks associated with the Victoria Dam and Victoria Lake Reservoir.

Table 2.1 Key Refinements

Originally Proposed Project Design[1]	Revised Project Design	Benefits to the Environment, Indigenous Groups and Stakeholders
Tailings Deposition Type		
Tailings were to be pumped / piped to the TMF and deposited as a conventional slurry, at approximately 45% solids by weight.	Based on engineering assessment of the tailings properties and tailings delivery system, it was determined that tailings could be pumped/piped and deposited in the TMF as a thickened tailings, at approximately 65% solids by weight.	• Increases water recycling at the mill prior to tailings discharge to the TMF. • Increases tailings stability within the TMF and therefore decreased dam height. Also reduces the risk of TMF failure due to piping in the dam or tailings liquefaction. • Substantially reduces water storage within the tailings impoundment (storage component of the TMF), thereby reducing risk of a TMF failure due to piping or overtopping. • Reduces tailings effluent (water), improving the general water quality within the TMF as direct precipitation acts to dilute. • Reduces water within the TMF, decreasing the risk of groundwater infiltration, and reduces the potential inundation area (the area impacted by tailings and/or water) in the unlikely event of a dam failure. • Increases the deposited density of the tailings, which should improve settlement with time and aid in mine rehabilitation and closure, as well as the longer term, post-closure stability of the facility.
In-Pit Tailings Deposition		
All tailings produced from the Project were to be deposited within the TMF.	Based on a revised mine production plan, the Leprechaun open pit will be mine out by Year 9 allowing for tailings to be deposited into the exhausted Leprechaun pit.	• Reduces the footprint of the TMF as well as the required height of dams required for tailings storage. • Reduces dam heights resulting in improved stability and a reduction in risk of instability during operation and post-closure of the mine. • Reduces the risk and extent of potential inundation in the unlikely event of a dam failure at the TMF. • Tailings deposited within the exhausted open pit do not pose a risk of release due to dam failure. • The size of the Leprechaun open pit provides additional storage volume in the event that additional tailings are generated by the Project.

Table 2.1 Key Refinements

Originally Proposed Project Design[1]	Revised Project Design	Benefits to the Environment, Indigenous Groups and Stakeholders
Victory Deposit and Sprite Deposit		
The Victory deposit, a relatively small deposit based on exploration completed to date, located 5.5 km northeast of the Marathon deposit, was to be mined. The Sprite deposit was also identified as a potential part of the Project scope.	Based on regulatory consultation, ongoing exploration activities and further environmental and engineering assessment, mining is no longer proposed for the Victory deposit nor for the Sprite deposit.	• Reduces the overall footprint of the Project with the removal of the proposed open pit and waste rock pile. • Eliminates drilling, blasting, and loading activities at the Victory deposit and the Sprite deposit. • Eliminates haul truck activity between the Victory deposit and the Sprite deposit and the ore pad / mill area. • As per consultation with the Wildlife Division of the NL Department of Forestry, Fisheries and Agriculture (NLDFFA), the elimination of mining at the Victory deposit avoids having activity on both 'sides' of the Buchans herd caribou migration path, and therefore may reduce potential impacts, and provide a greater zone for migrating caribou to move past the Project.
Process Plant Location		
The process plant area was to be located immediately to the south of Marathon pit.	The original process plant location has been impacted by the change in location of the TMF and associated infrastructure. Based on re-assessment of environmental and engineering considerations for the process plant, it has been relocated further west / southwest of its originally proposed location.	• Reduces potential effects on caribou, by increasing the distance between the process plant area (and its associated noise, light emissions, and activity) and the primary caribou migration path.
Waste Rock Piles		
Four waste rock piles were originally proposed: two adjacent to Leprechaun pit (to the northwest and southeast of the pit); one immediately west of Marathon pit; and one to the north of Victory pit.	As noted above, the waste rock pile associated with the Victory deposit has been eliminated, and the remaining waste rock piles redesigned with only one for each pit.	• Reduces the overall footprint of the Project. • Redesigned to avoid fish habitat and to reduce effects to water balance within sub-watersheds. • Pile design now considers aesthetic features for closure (revegetation). • Note that current designs include ditching and ponds to manage and treat water runoff prior to release.

Table 2.1 Key Refinements

Originally Proposed Project Design[1]	Revised Project Design	Benefits to the Environment, Indigenous Groups and Stakeholders
Ore Stockpiles		
A run-of-mine (ROM) pad was to be used to stockpile low- and high-grade ore destined for the heap leach and process plant circuits, respectively.	Removing the heap leach process reduced the size of the ROM pad, however, it necessitated the addition of small low-grade ore stockpiles and a high-grade ore stockpile to manage ore materials during mine operation.	• Reduces the overall footprint of the Project – the reduction in footprint associated with the removal of the heap leach infrastructure is significantly larger than the added stockpiles. • The stockpiles added are temporary as the materials will be processed in the mill; therefore, the stockpile areas can be completely rehabilitated after use, whereas the heap leach pile would have simply been covered and revegetated.
Topsoil and Overburden Stockpiles		
The topsoil and overburden stockpiles were described however, their locations had not been determined.	Organics and overburden stockpiles have been added to the Project site plan. Stockpile footprints shown on the site plan represent the maximum storage that would be required for all organic and overburden over the life of mine. Actual footprints will be smaller, as portions of the overburden material will be used in site construction. In addition, progressive rehabilitation of waste rock piles and other areas of the site during operation will further reduce actual storage requirements.	• Topsoil and overburden materials will be stockpiled for use in progressive rehabilitation and future site closure rehabilitation.
Note: [1] The originally proposed design was developed as part of Marathon's September 2018 Preliminary Economic Assessment (PEA), which is considered the initial, high-level engineering and economic assessment of a mining project's feasibility. The PEA-level engineering and overall project concept was carried in Marathon's EA Registration / Project Description submitted in April 2019		

Project design is an iterative process, with refinements made throughout the EA process, resulting in the designs and configurations presented in the EIS. As part of the normal engineering progression for mining projects, and in consideration of input from regulators, Indigenous groups and stakeholder, Project design optimizations may occur as detailed design proceeds.

2.2 SUMMARY OF PROJECT DEVELOPMENT AND PHASES

The Project is in the Central Uplands of Newfoundland, at the northeast of Victoria Lake Reservoir, which is a hydroelectric reservoir. The Project Area is characterized by gentle to moderately steep hilly terrain, with several small ponds and a northeast trending ridge crossed by ephemeral streams (Figure 2-1). Marathon's Mineral Licenses (the 'Property') comprises 14 contiguous mineral licenses, for a landholding of approximately 240 km^2, and includes four identified gold deposits: Leprechaun, Marathon, Sprite and Victory, 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). Further information on the geological formation of the deposits is provided in Section 2.3.1.

The updated Project scope includes mining the Leprechaun deposit and Marathon deposit. The Victory deposit was originally included in the Project description; however, the deposit as currently delineated is small and Marathon has decided against mining the Victory deposit, in part to reduce potential adverse effects on caribou. The Sprite deposit was also identified as a potential part of the Project scope; however, exploration work conducted to date has not identified sufficient resources to be considered a viable deposit. Therefore, it has been removed from the Project scope.

Figure 2-1 Project Area (looking southwest towards Leprechaun Pit area)

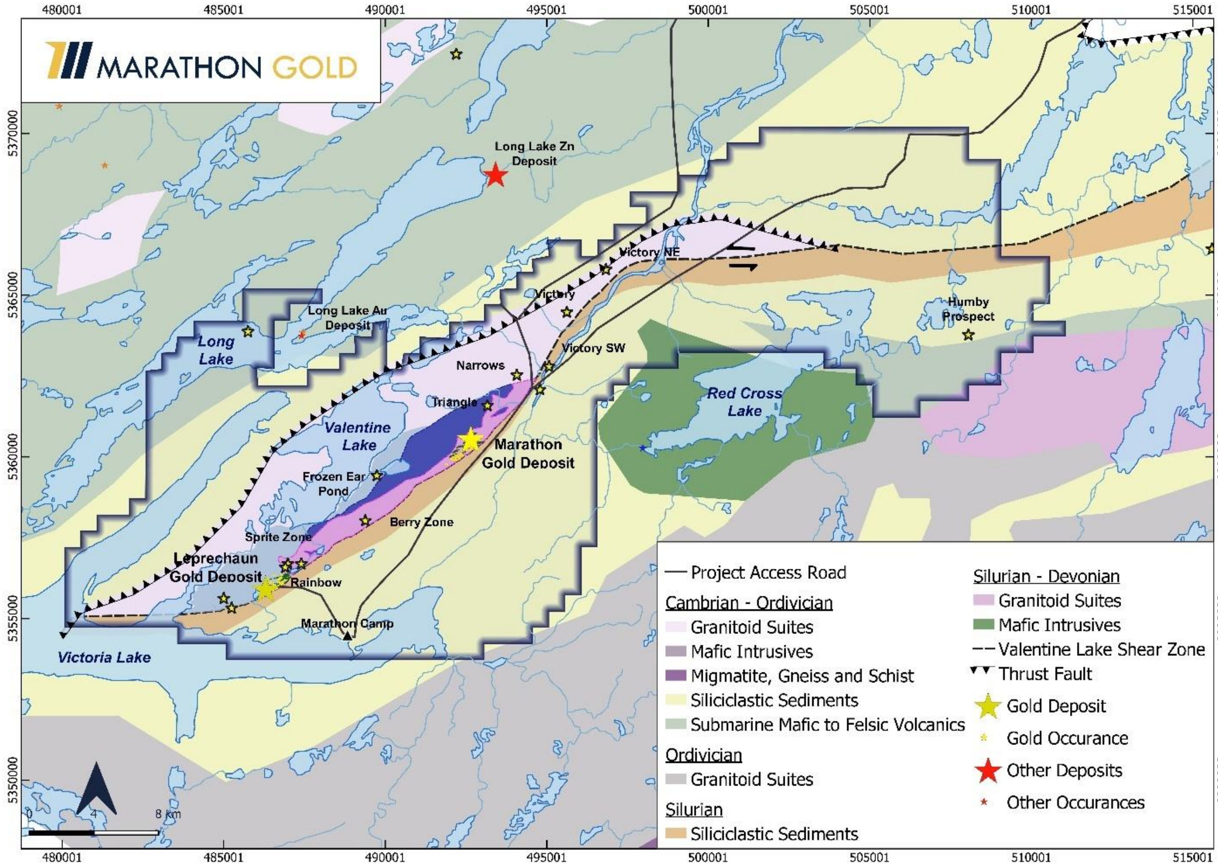


Figure 2-2 Geology and Deposits in the Vicinity of the Valentine Gold Project

The Project will consist primarily of open pits, waste rock piles, crushing and stockpiling areas, conventional milling and processing facilities, a TMF, and supporting infrastructure. 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 (Water Management Plan, Appendix 2A), fuel storage and fueling stations, mine and plant workshops and services, administrative office, personnel accommodations and lunchrooms, and security.

Construction of the Project is expected to take place over a period of 16 to 20 months, followed by an estimated operational life of 12 years. The Project will operate 24 hours a day, seven days a week on a 12-hr shift basis. Rehabilitation and closure planning is a requirement under the NL *Mining Act*. A plan will be developed as part of the EA and permitting 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.

It is anticipated that most materials, equipment, and supplies will be brought to the Project site by road from larger communities 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, NL, approximately 480 km by road. Smaller ports in closer proximity to the Project (South Brook, Botwood and Lewisporte) will be considered as Project planning proceeds. The Project is located approximately 210 km from the airport in Gander and approximately 320 km by road from the airport in Deer Lake.

The mine site is accessed by an existing public access road that extends south from Millertown approximately 88 km to Marathon's existing exploration camp. Access to the mine site is from the northeast side of the property via the existing access road. Future site access will be via a main security gate near the process plant. Marathon will upgrade and maintain the access road from a turnoff approximately 8 km southwest of Millertown to the mine site, a distance of approximately 76 km. The component of the access road that will be a part of the Project commences southwest of the Exploits River Bridge, just below the Millertown Dam on Red Indian Lake. The Town of Millertown is situated approximately 6 km off the Buchans Highway, which provides reliable road access to the Trans-Canada Highway, transecting the Island of Newfoundland from east to west and connecting the major populated centres, airports and seaports.

This Project is anticipated to create over 19,000 full-time equivalents (FTE) of total employment (direct, indirect, and induced) with nearly 11,000 FTEs in NL. This equates to approximately $1.3 billion in income to works and business in Canada including $750 million to workers and business in NL. The Project will also generate $292 million in revenue to the federal government, and almost $400 million ($27 million annually) of incremental revenues to the treasury of NL (Strategic Concepts 2020). 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, and summarized in Section 2.9.

2.2.1 Site Layout

The overall site plan (Figure 2-3) shows the major Project facilities, including the open pits, TMF, waste rock piles, polishing pond, mine services, access road, accommodations camp, and water treatment plant. Figure 2-4 is a 3-dimensional visual rendering of the process plant area, with other site infrastructure in the background.

Note that the Project components were sited to avoid fish habitat to the extent practicable. In particular, the site plan was developed to avoid the deposition of mine waste in fish-bearing waters. During detailed design, the location of watercourses will be verified with results of ground-truthing and final siting of components will be adjusted as needed.

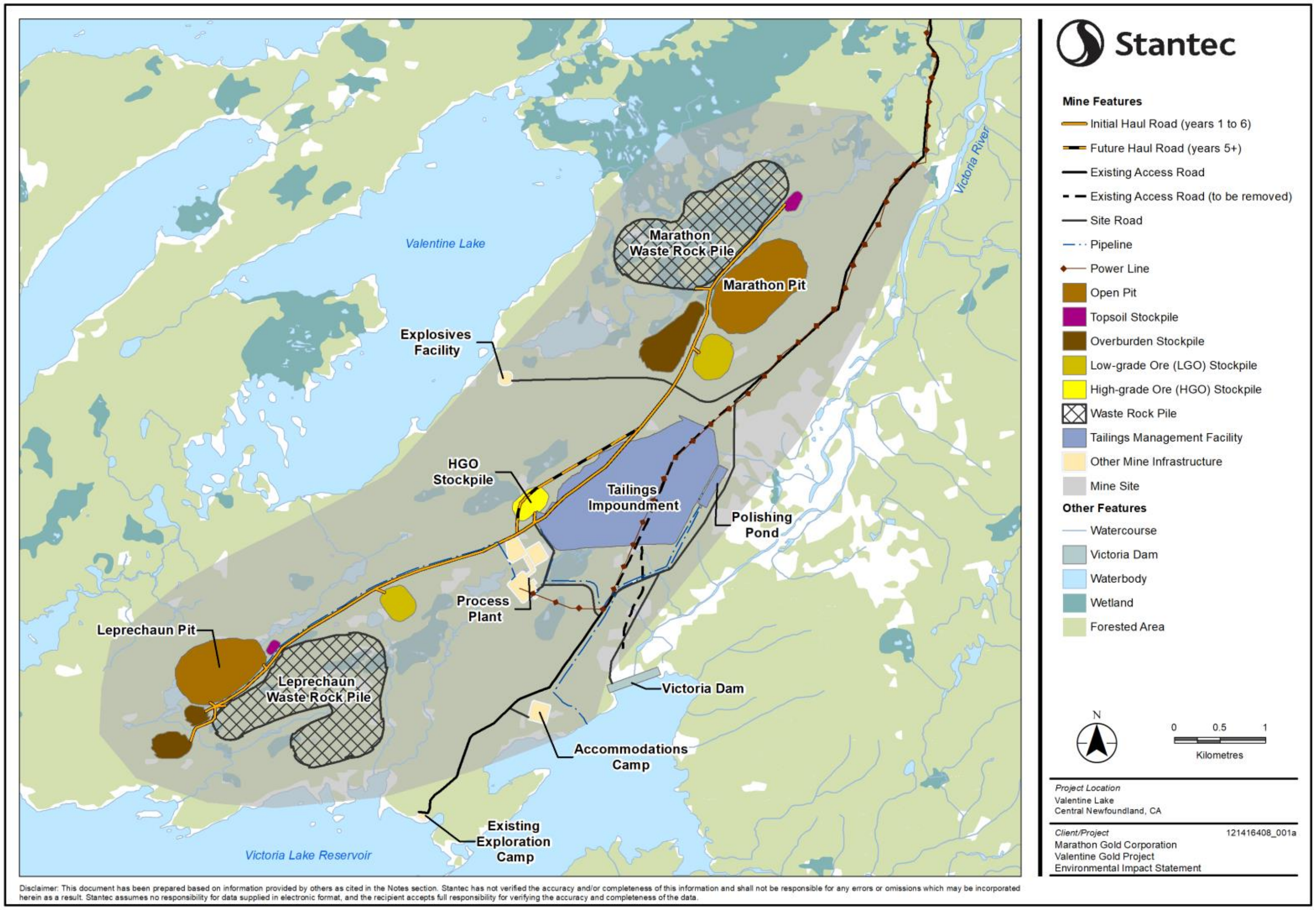


Figure 2-3 Project Site Plan

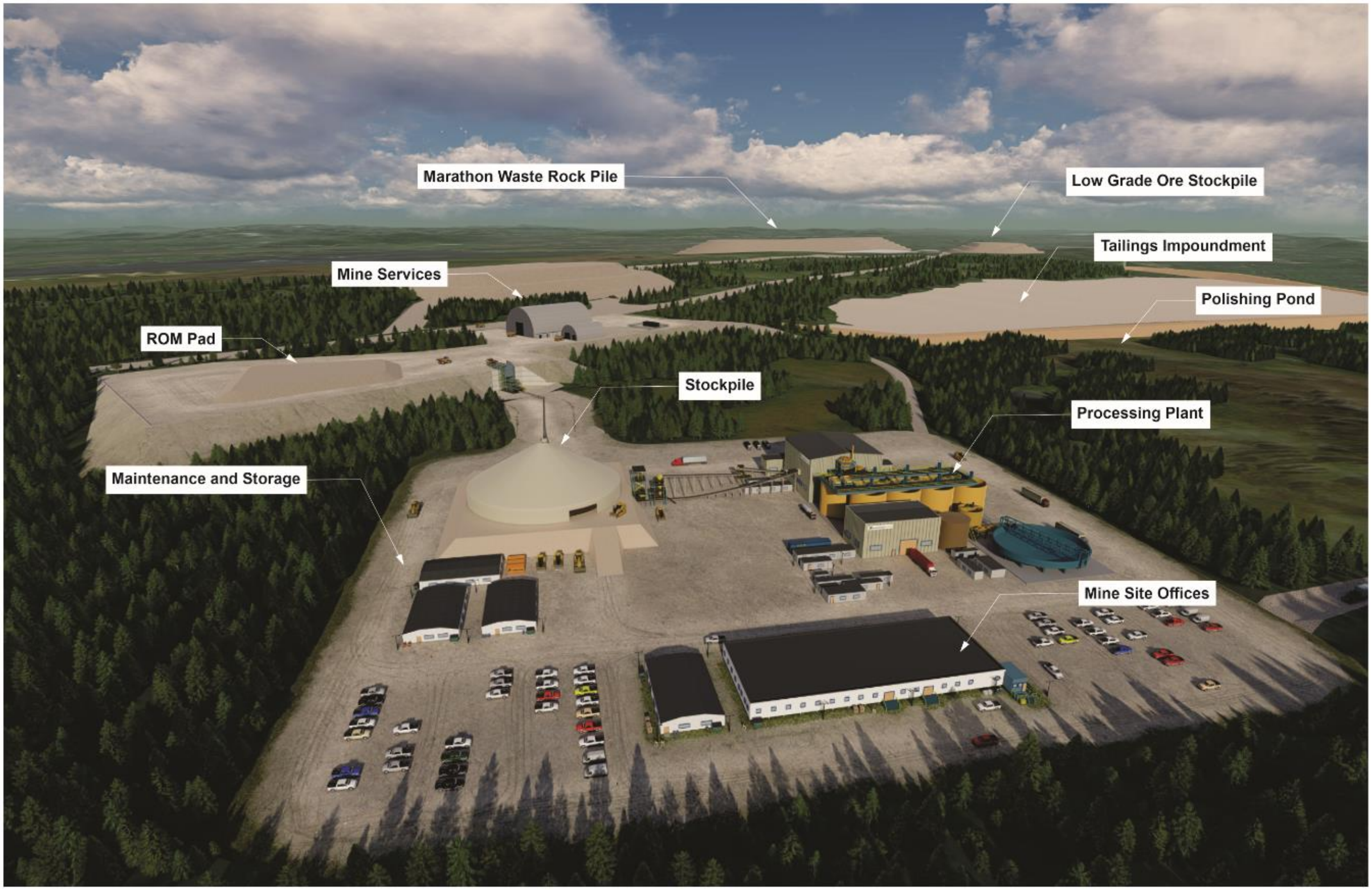


Figure 2-4 Processing Infrastructure Site Rendering

Access to the facility is from the southeast side of the mine site from the existing access road. Main access will be via a security gate. An additional gated site road will branch off the access road to the explosives storage area. The process plant is located between the Marathon and Leprechaun deposits, south of Valentine Lake. This location is primarily dictated by the location of the TMF, which is positioned to avoid overlap with fish and fish habitat, and potential interaction with the Victoria Dam (see Appendix 2B).

Development of the site layout took into consideration numerous factors that affected the location and design of the major mine components as detailed in the Project Alternatives section (Section 2.11).

2.2.2 Construction Phase Overview

Following release from EA and issuance of regulatory permits and authorizations, Project construction is anticipated to begin in late 2021 with upgrading the access road, constructing site roads, removing vegetation for site infrastructure, and pre-stripping the open pits. Civil earthworks including for the TMF, foundations and subsurface utilities, and mill and infrastructure construction will occur over a 16 to 20 - month period, with commissioning and start-up anticipated for mid-2023.

2.2.3 Operation Phase Overview

Standard surface mining techniques will be used to mine material from the Marathon and Leprechaun open pits, including blasting, loading, hauling ore from the pit to the mill or stockpiles, processing ore, tailings deposition, hauling and placement of waste rock on the waste rock piles, and phased development of the TMF dams. Both the Marathon pit and the Leprechaun pit will be mined simultaneously, with blasting occurring on alternating days. The final layout plans for the open pits are illustrated in Figure 2-5 and Figure 2-6, respectively. Progressive rehabilitation will be conducted during operation as further described in Section 2.6.2. Note that Figure 2-6 shows the Leprechaun waste rock pile overprinting water management infrastructure. During summer 2020 field work, it was determined that the NL 1:50,000 mapping contains an error in relation to the extent of Stream VIC-15, which extends eastward approximately 200 m farther than mapped. The Leprechaun waste rock pile has been adjusted to avoid this fish habitat, however, the design of the water management infrastructure design could not be updated in time for the EIS submission. The water management design will be updated as part of the Feasibility Study that is scheduled to be completed in early 2021.

For the first three years of operation, ore will be processed through the mill where it will be crushed, milled and processed through gravity and cyanidation processes to recover the gold. Initially, 6,800 t of ore will be processed daily, with this quantity anticipated to increase to 11,000 tonnes per day (tpd) in Year 4 through the addition of the flotation process. Tailings will be treated to remove cyanide prior to disposal in an engineered TMF. Gold doré will be shipped from site to market in secured trucks.

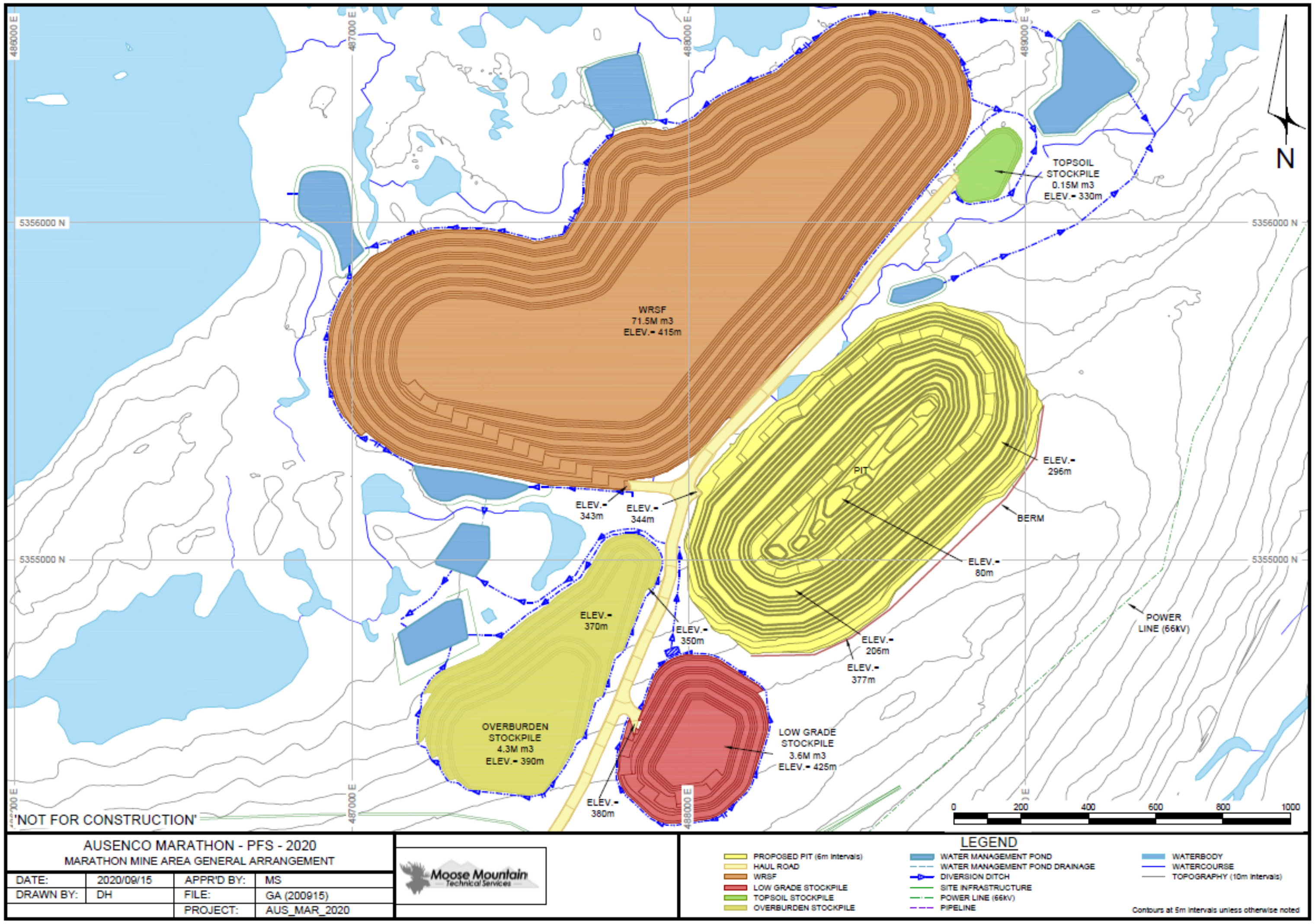


Figure 2-5 Marathon Pit Area Layout Plan

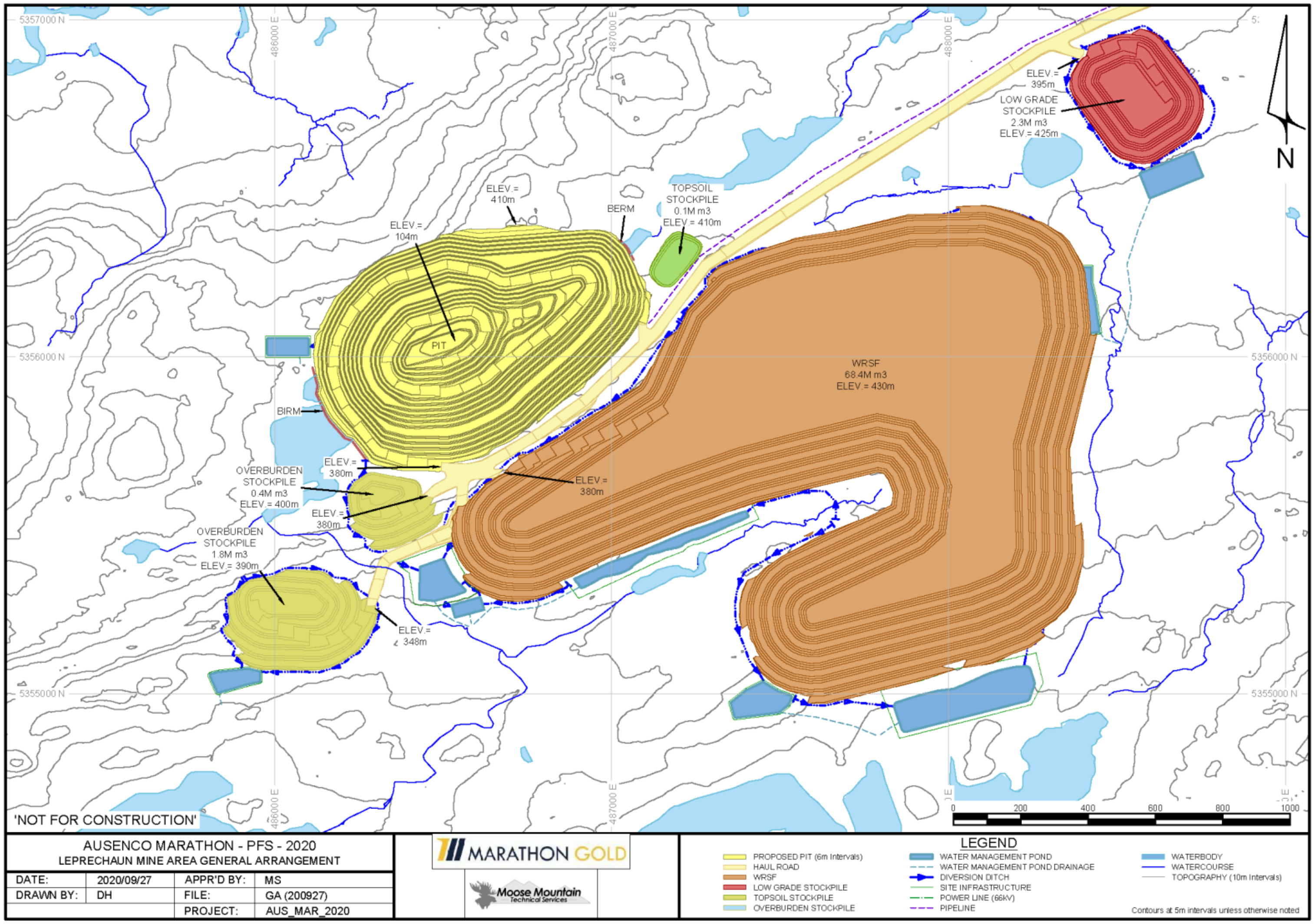


Figure 2-6 Leprechaun Pit Area Layout Plan

2.2.4 Closure Phase Overview

Once mining has ceased, site buildings and infrastructure will be dismantled and removed, sedimentation ponds will be breached (following water quality testing for regulatory compliance) and graded to reestablish drainage patterns, and disturbed areas will be graded, covered with overburden and organic materials, and seeded to promote natural revegetation. The open pits will be flooded with surface water runoff, precipitation and groundwater seepage, with excess site contact water directed to the pits where practicable to expedite this process. The site will be rehabilitated to as close to pre-development conditions as practicable, or to a suitable condition for an alternate use upon Project closure. The Rehabilitation and Closure Plan will detail methods to be used for progressive and closure rehabilitation and post-closure monitoring.

2.2.5 Occupational Health and Safety

Marathon is developing a Corporate Health and Safety Management System, including a comprehensive Occupational Health and Safety Program with safe work policies, procedures and practices, to be implemented prior to Project construction. In addition to adhering to legislated occupational health and safety requirements in compliance with the NL *Occupational Health and Safety Act* and *Occupational Health and Safety Regulations*, 2012, Marathon's Occupational Health and Safety Program will provide for safe work policies, procedures and practices covering construction, excavation and demolition, excavation, rock crushing, general blasting, fire prevention and control, general mining matters, explosives and blasting operations, and open cut workings in mining operations.

Marathon is committed to preventing incidents and accidents and reducing health and safety risks by implementing best practices, including the following:

- Actively identifying and addressing hazardous conditions and health and safety risks
- Conducting mandatory site orientations for employees, contractors/consultants and visitors, and providing specialized safety training, as applicable
- Providing adequate supplies of personal protective equipment (PPE) appropriate to the task
- Incentivizing near miss reporting
- Developing, measuring and reporting on Key Performance Indicators (KPIs) that include both leading and lagging indicators
- Focusing on continuous improvement

The program will also include industry standard elements, such as maintaining and supporting the Occupational Health and Safety Committee; incident reporting and investigation including determining the root cause and identifying and implementing corrective actions; conducting internal audits and regular workplace inspections; appropriate use of PPE; and requiring daily toolbox talks and mandatory pre-job safety checklists.

2.2.6 Project Schedule

Construction of the Project is expected to take place over a period of 16 to 20 months as generally shown in Table 2.2. A summary of Project activities and anticipated schedule is presented in Tables 2.2 and 2.3 below. These timelines have been developed using assumptions and best estimates for various components of Project development (e.g., EA duration, permitting timelines), construction, operation and closure. The schedule is subject to change / revision as the Project advances.

Initial construction activities (e.g., site preparation and earthworks, transportation along access road) are anticipated to begin in 2021, while others (e.g., construction of infrastructure, mining, water management) are scheduled to begin in 2022. Ore milling and processing are anticipated to occur from 2023 through 2034. Project construction would be followed by an estimated operational life of 12 years, including nine years of pit operations, plus three years of processing stockpiled ore materials. The Project will operate 24 hours per day, seven days a week, on a 12-hr shift basis. The Project schedule up to and including commencement of operation is shown in Table 2.3, and preliminary life of mine[1] schedule shown in Table 2.10. Anticipated timeframes, frequencies and durations of main Project activities are summarized in Table 2.4.

[1] The time in which, through the employment of the available capital, the ore reserves, or such reasonable extension of the ore reserves as conservative geological analysis may justify, will be extracted.

Table 2.2 Estimated Project Development Schedule

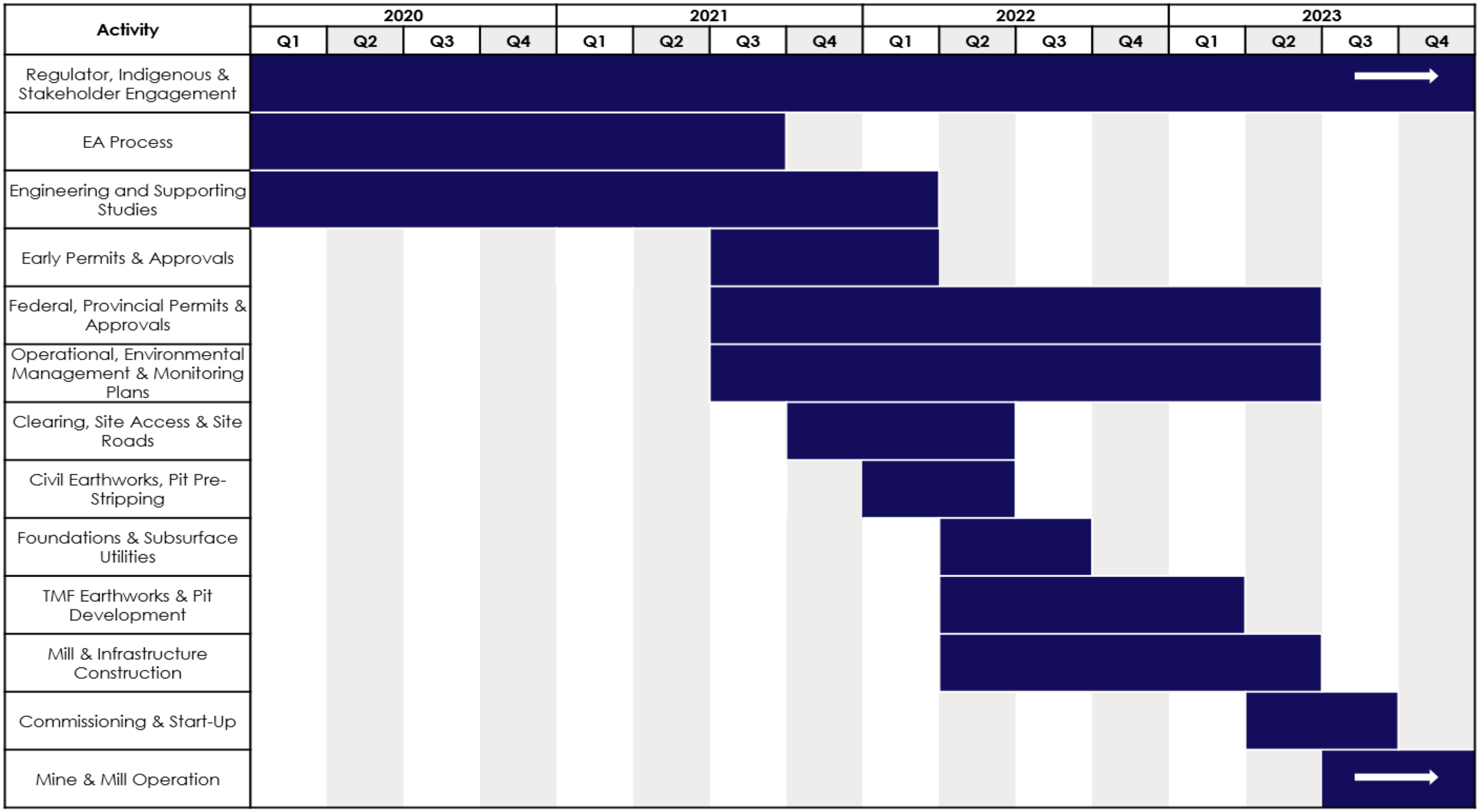


Table 2.3 Estimated Project Schedule

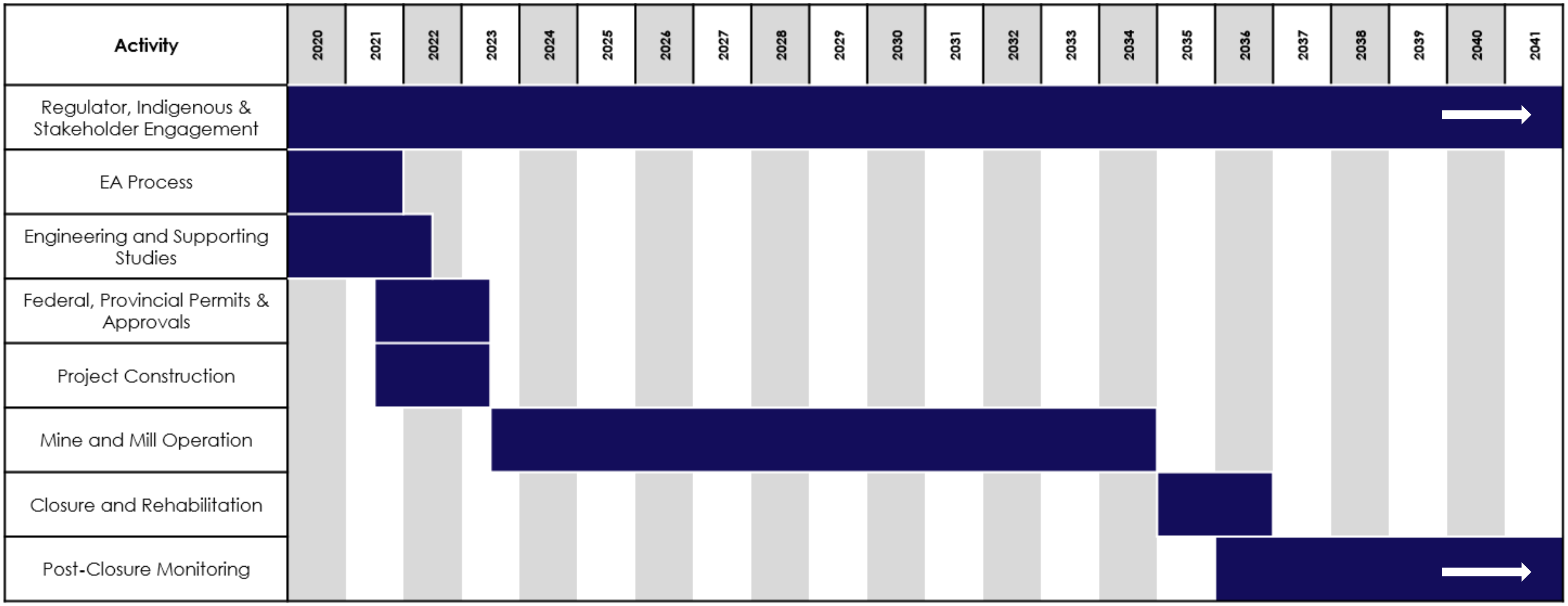


Table 2.4 Anticipated Timeframes, Frequencies and Durations of Main Project Activities

Project Activity	Anticipated Timeframe, Frequency, Duration
Mine Site Preparation and Earthworks Clearing and cutting of vegetation, removal of organic materials, development of roads and excavation, preparation of excavation bases within the mine site, grading for infrastructure construction, earthworks for open pits	• Approximately 9-month period commencing late 2021 through 2022 (Y-1), and again in 2026 (Y4) (haul road relocation) • Year-round; avoiding breeding bird season for clearing and cutting of vegetation, where feasible
Construction, Installation and Commissioning of Infrastructure and Equipment Placement of concrete foundations, construction of buildings and infrastructure, installation of water control structures, installation and commissioning of utilities on-site	• Commencing 2022 (Y-1) through 2023 (Y1) • Year-round, continual for approximately 18-month period (overlapping activities as shown on Table 2-2): – Foundations and subsurface utilities: 6 months – TMF earthworks: 12 months – Mill and infrastructure construction: 15 months – Commissioning and start-up: 6 months
Transportation along Access Road	• Commencing with construction in late 2021, continuing through 2036 (Y14) (closure and rehabilitation) and beyond (post-closure and long-term monitoring) • Year-round, continual throughout life of Project; sporadic during post-closure monitoring (2037 and beyond)
Open Pit Mining Blasting, excavation and haulage of rock from the open pits	• Commencing in 2022 (Y-1) through 2031 (Y9) • Year-round, continual
Ore Milling and Processing Ore excavated from the open pits is crushed and processed to extract gold via gravity/leach (Phase 1) or gravity/flotation/leach (Phase 2) processes	• Commencing in 2023 (Y1) through mid-2026 (Y4) for Phase 1; 2026 (Y4) through 2034 (Y12) for Phase 2 • Year-round, continual
Tailings Management Facility (TMF) Operations Process waste (tailings) are pumped to the engineered TMF, then to exhausted Leprechaun Pit	• Commencing in 2023 (Y1) through 2031 (Y9) (to engineered TMF) and 2032 (Y10) through 2034 (Y12) (to exhausted Leprechaun Pit) • Year-round, continual
Water Management Site contact water and process effluent managed on site and reused (where practicable) or treated prior to discharge to environment	• Commencing in 2022 (Y-1) through 2036 (Y14) (closure and rehabilitation), possibly longer if required post-closure to allow water quality to improve • Year-round, continual
Operation of Utilities, Infrastructure and Other Facilities Camp and site buildings operation; vehicle maintenance facilities; explosives storage; access road and site roads maintenance and site snow clearing; power and telecom supply; fuel supply	• Commencing as applicable in 2021 and 2022 (Y-1), extending through 2036 (Y14) (end of closure rehabilitation) and beyond (post-closure and long-term monitoring) • Year-round, continual (as applicable)

Table 2.4 Anticipated Timeframes, Frequencies and Durations of Main Project Activities

Project Activity	Anticipated Timeframe, Frequency, Duration
Progressive Rehabilitation Demolishing and rehabilitating construction or exploration -related infrastructure; grading and revegetating completed tailings areas (where practicable); erosion stabilization and re-vegetation of completed waste rock piles; infilling or flooding of exhausted mining areas; completing re-vegetation studies and trials	• Sporadically throughout the life of the Project, as use of individual components / infrastructure ceases (e.g., TMF decommissioning commencing in 2031 (Y9) when tailings disposal moves to mined-out Leprechaun Pit) • May be any time of year, seasonally where appropriate (e.g., revegetation)
Closure Rehabilitation Similar activities as for progressive rehabilitation	• Commencing in 2035 (Y13) through 2036 (Y14) • Year-round, seasonally where appropriate (e.g., revegetation)
Post-Closure and Long-Term Monitoring	• Commencing following closure rehabilitation in 2036 (Y14), with anticipated duration of 6-10 years for post-closure monitoring, may be shorter as major infrastructure (pits, TMF) will start closure in 2031 • Monitoring plans to be developed once design and operation activities have been sufficiently advanced • Anticipate closing and rehabilitating some key components prior to the end of the Project life

2.3 PROJECT COMPONENTS

The key Project components are shown in Figure 2-3 and further described below. An overview of the construction activities associated with these Project components is provided in Section 2.4 and a general description of operational aspects is provided in Section 2.5. Further, a preliminary Project schedule is provided in Section 2.2.6.

The key components of Marathon's Project are as follows:

- Open Pits
- Waste Rock Piles
- Topsoil and Overburden Stockpiles
- Ore Stockpiles
- Process Plant Facilities
  - Crusher and Mill Feed Stockpile
  - Grinding Circuit (Mill)
  - Gravity Recovery Circuit and Intensive Cyanidation Reactor
  - Flotation Circuit
  - Carbon in Leach (CIL) Process
  - Cyanide Destruction

  - Carbon Acid Wash, Elution, and Regeneration Circuit
  - Electrowinning and Gold Room
  - Reagent Storage
- Tailings Management Facility (TMF)
- Stormwater Management Infrastructure
- Substation and Power Distribution
- Other Plant Site Buildings
  - Plant Administration, Workshop, and Warehouse
  - Laboratory
  - Administration and Lunchroom
  - Mine Services and Workshop
  - Security
- Water Intake and Distribution
- Water Treatment Plant
- Plant Site Stormwater Pond and Sanitary Effluent
- Roads
  - Access Road to Site
  - Plant Site Roads
  - On Site Access and Haulage Roads
- Fuel Storage and Fueling Stations
- Accommodations Camp
- Explosives Storage and Production

Marathon considered alternatives (e.g., locations, equipment, techniques, methods) for numerous Project components and activities. These are detailed in the alternatives analysis (Section 2.11), which identifies and describes alternative means of carrying out the Project and Project components, with consideration of technical and economic feasibility, market conditions, regulatory factors, and socio-economic implications that could affect the selection of the preferred alternative.

2.3.1 Open Pits

2.3.1.1 Gold Mineralization

The mine site is underlain by five major lithological units including, from northwest to southeast, the Victoria Lake Supergroup (Tulk's Hill Volcanics and clastic sediments), the Valentine Lake Intrusive Suite, the Rogerson Lake Conglomerate, the Victoria Lake Supergroup (metasedimentary, gabbroic and mafic volcanic rocks) and the Red Cross Lake Intrusion (Figure 2-2).

The area hosts structurally controlled, orogenic gold deposits consisting of dominantly shallow southwest-dipping, en-echelon stacked extensional and lesser shear parallel gold-bearing quartz-tourmaline-pyrite veining and recently identified orthogonal quartz vein sets. The gold-bearing QTP-veining is hosted within the Valentine Intrusive Suite as well as the Rogerson Lake Conglomerate. The Valentine Lake Intrusive Suite constitutes an elongate northeast trending body of Upper Precambrian igneous rocks consisting of dominantly fine to medium grained trondhjemite and quartz porphyry units with lesser aphanitic quartz porphyry, gabbro and minor pyroxenite units. The Silurian Rogerson Lake Conglomerate forms a narrow linear unit extending NS-SW for 160 km through central Newfoundland, lies unconformably (overturned) on the southeast margin of the Valentine Lake Intrusive Suite, and is interpreted to have in-filled a fault bounded paleo-topographic depression. An unsorted, pebble- to cobble-sized, polymictic conglomerate dominates the unit.

Five gold deposits and numerous gold prospects and occurrences at earlier stages of exploration have been discovered to date. The Leprechaun, Marathon, Sprite, Berry and Victory gold deposits are the most advanced within the property, with other gold prospects at the Frank, Rainbow, Triangle, Victoria Bridge, Narrows, Victory SW, Victory NE and located intermittently proximal to the contact between the VLIC and the Rogerson Lake Conglomerate.

All gold occurrences share similar general characteristics, where gold mineralisation is associated with dominantly extensional and lesser shear parallel QTP veins hosted within trondhjemite and quartz porphyry sub-units of the VLIC. The gold occurs within the quartz-tourmaline-pyrite veins with lesser amounts in alteration selvages. The gold-bearing QTP veins have been observed over the 20-kilometre strike length along the contact between the Valentine Lake Intrusive Suite and the Rogerson Lake Conglomerate. Gold-bearing QTP veining is also exposed in the VLIC up to 500 and 1000 m from the VLIC-conglomerate contact in the Steve Zone and Scott Zones, respectively.

The QTP veins occur as a variety of dominantly shallow southwest-dipping, en-echelon arrays orientated at high angle to the regional penetrative L1, lesser steeply northwest dipping to subvertical veins parallel the regional S1 shear fabric, and as localised zones of intense stockwork veining shown in Figures 2-7a and 2-7b. In outcrop and trench exposures, the gold-bearing quartz-tourmaline-pyrite veins range from a few millimetres and centimetres to metres in thickness, however, are typically 2 to 30 cm thick. Both extensional and shear-parallel QTP veins, ranging up to 1.5 m thick, have been traced in trenched outcrop exposure for over 280 m continuous strike length, although observed strike lengths in the range of metres to decimetres is the norm.

The visible gold in QTP veining occurs as grains, ranging in size from <0.1 mm to 1-2 mm, hosted by quartz, tourmaline masses, within and along the margins of pyrite, or associated with minor tellurides. Highest gold grades are commonly associated with large (1-10 cm), euhedral and occasionally sub-rounded cubic pyrite in QTP veining. In weathered surfaces, the gold is observed in limonite patches derived from the weathering of pyrite. Other sporadically observed sulphides, in decreasing order of abundance, include chalcopyrite, pyrrhotite, sphalerite and galena. These minerals form minor components to the overall mineralisation.

The individual characteristics of mineralisation at the Marathon and Leprechaun deposits are described below. The information in the following sections has been summarised from Murahwi (2015), Dunsworth et al. (2017), and Capps and Dunsworth (2019).

Marathon Gold Deposit

The Marathon deposit is located 7 km northeast of the Leprechaun deposit and consists mainly of shallow, southwest-dipping en-echelon stacked QTP gold veins that intrude dominantly into quartz-porphyry and lesser aphanitic quartz-porphyry and mafic dikes of the VLIC. The gold-bearing QTP veining occurs up to 250 m to the northwest of the Valentine Lake Shear Zone. The Main Zone of gold-bearing QTP veining forms a north-eastern trending sub-vertical mineralised corridor of intense QTP gold veining that ranges between 50 to 200 m in width, occurs over a strike length of more than 1.5 km, and has been drill-observed to a depth of over a 1,000 m.

A central core of intense QTP veins has been identified from drilling and is likely structurally controlled (Dunsworth et al., 2017; Capps and Dunsworth, 2019). The zone forms an upright, elongate corridor containing a lenticular series of shallow, SW-dipping, gold-bearing QTP veining and is open at depth.

Leprechaun Deposit

The Leprechaun deposit consists of QTP gold-bearing extensional and lesser shear-parallel veins that intrude the variably sheared and fractured trondhjemite, as well as sheared mafic dikes of the VLIC.

Mineralisation at Leprechaun occurs over a strike length of over 900 m and has been identified in drilling up to 400 m below surface, within a zone up to 400 m wide. The Main Zone contains most of the known gold mineralisation at Leprechaun, hosted in trondhjemite and comprising of shallow-dipping extensional QTP veins, as well as lesser steeply northwest-dipping shear parallel QTP veins. The dominant en-echelon stacked, southwest-dipping extensional QTP veins occur at high angle to the penetrative regional L1 stretching lineation, while the lesser shear parallel QTP-Au veins strike sub-parallel to slightly oblique to the Valentine Lake Shear Zone (Dunsworth, 2011; Dunsworth et al. 2017; Lincoln et al., 2018).

Mineralisation at the Leprechaun deposit is hosted in three zones from west to east: the Hanging Wall, Main, and Footwall zones (Lincoln et al., 2018) The Main Zone is open at depth and is constrained to the southeast by the Valentine Lake Shear Zone. To the northwest, the Main Zone transitions to the Hanging Wall Zone. A high-grade core exists within the Main Zone, bound by mafic dykes to the northwest and the Rogerson Lake Conglomerate to the southeast, forming a lenticular body of dense QTP veining that is open at depth.

The Hanging Wall Zone occurs transitionally west of the Main Zone and consists of a series of variably shallow-dipping and stacked en-echelon extensional QTP tension gashes, as well as minor steeper-dipping QTP veins that extend up to 350 m northwest into the hanging wall of the deposit. The vein density and concentration of vein arrays increases toward the east, proximal to the Main Zone, and the zone remains open to the northwest.

The Footwall Zone is a minor component of the Leprechaun deposit and comprises localised extensional QTP veins that extend into the structurally underlying Rogerson Lake Conglomerate. Toward the southern part of the deposit, the Main Zone appears to peel slightly further away from the fault contact which spatially coincides with a marked increase in the volume of wide, discontinuous mafic dikes observed near the contact in this area. The gold-bearing mineralising fluids appear to have locally dammed up against, as well as occasionally breached and brecciated, the mafic dikes.

The QTP gold mineralisation occurs as visible gold grains, up to 2 mm in size, occurring in quartz and along the margins as well as within tourmaline masses and pyrite.

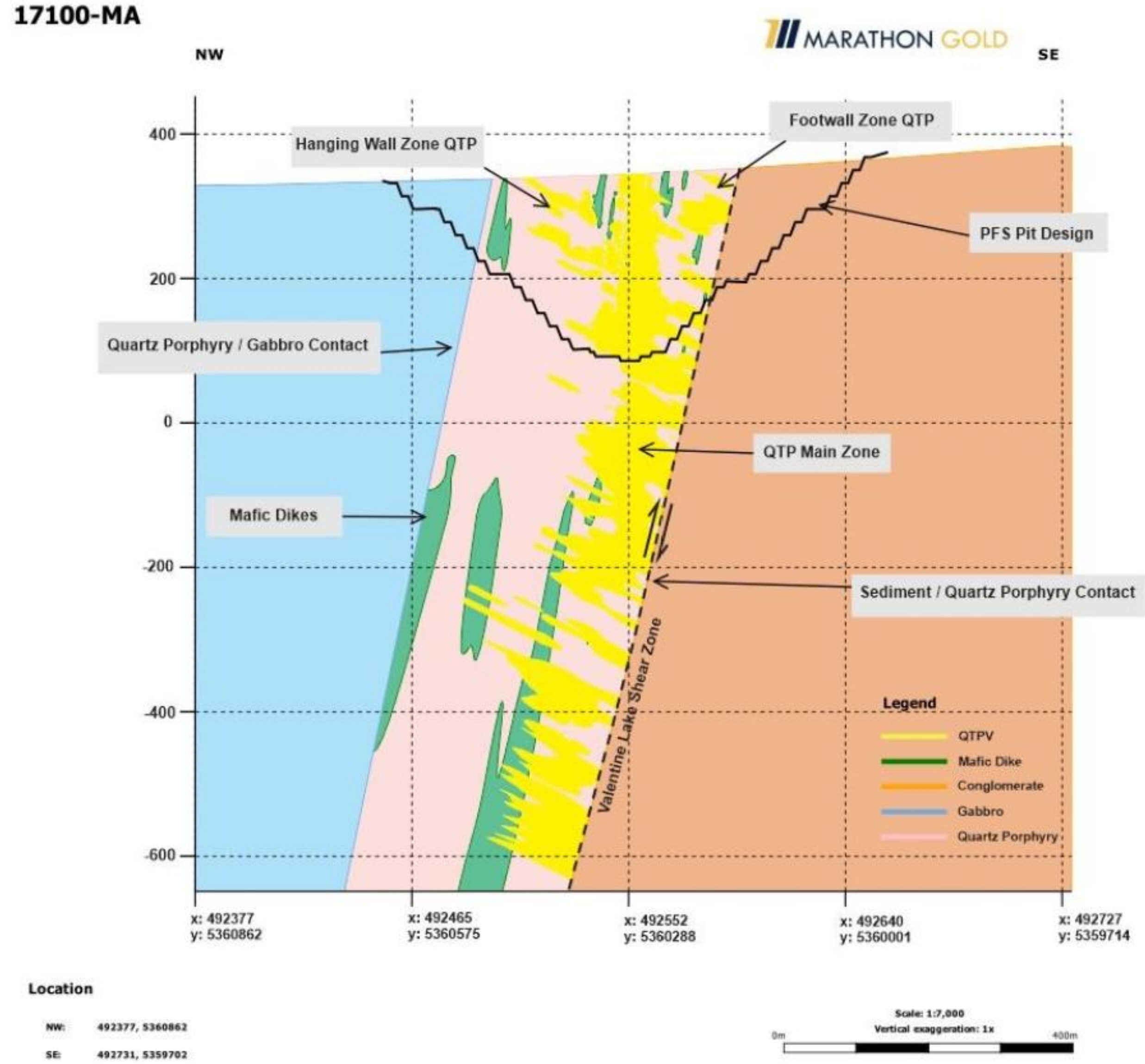


Figure 2-7a Geological Cross-Section, Marathon Deposit

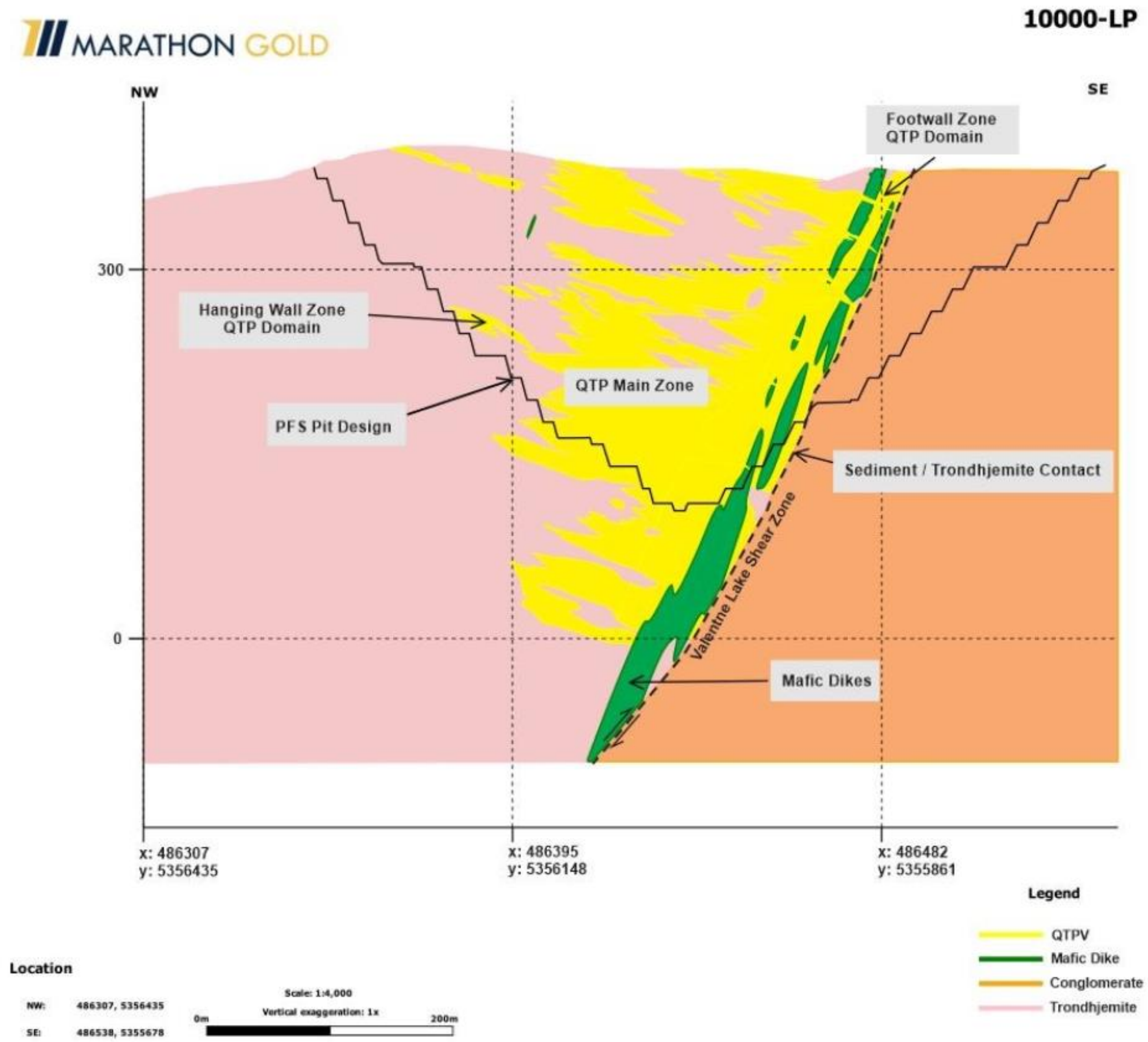


Figure 2-7b Geological Cross-Section, Leprachaun Deposit

2.3.1.2 Pit Designs

The Project comprises two mining areas: the Leprechaun deposit in the southwest and the central Marathon deposit. The open pit design and ultimate pit limits were developed using a pit optimization process, and in compliance with the open cut workings in mining operations requirements of the *Occupational Health and Safety Regulations*, 2012. The key parameters used in the pit optimization are summarized as follows:

- A mining block size of 6 m x 6 m x 6 m
- A breakeven economic cut-off grade of 0.33 g/t gold
- Pit designs are configured on 6 m bench heights, with 8.1 m wide berms placed every three benches, or triple benching. Bench face angles, and subsequent inter-ramp angles, are varied based on prescribed geotechnical zones.
- Bench face and inter-ramp slopes in defined zones are listed in Table 2.5 for Marathon and Table 2.6 for Leprechaun. Defined geotechnical zones are illustrated in Figure 2-8a and Figure 2-8b for Marathon pit and Leprechaun pit, respectively (Terrane 2020, in Appendix 2C).
- In-pit haul roads and geotechnical berms (25 m wide) are added to the pit designs and flatten the inter-ramp slopes out to shallower overall slopes. Geotechnical berms are placed on 90 m vertical spacing at Marathon, and 126 m vertical spacing at Leprechaun, wherever in-pit ramps are not present.

Table 2.5 Marathon Bench Face and Inter-Ramp Angle Inputs

Domain	Zone (Figure 16-1)	Bench Face Angle (°)	Inter-Ramp Angle (°)	Overall Slope* (°)
Overburden	All	18	18.0	18.0
Southwest	7 to 9	75	54.3	45.0
Northwest (NW) and Southeast (SE)	1 to 6	71	51.5	42.0
*Overall slope angles are inputs for pit optimisations only				

Table 2.6 Leprechaun Bench Face and Inter-Ramp Angle Inputs

Domain	Zone (Figure 16-1)	Bench Face Angle (°)	Inter-Ramp Angle (°)	Overall Slope* (°)
Overburden	All	25	25.0	18.0
Southwest	5 to 6	65	47.4	40.0
NW and SE	1 to 4, 7 to 9	75	54.3	46.0
*Overall slope angles are inputs for pit optimisations only				

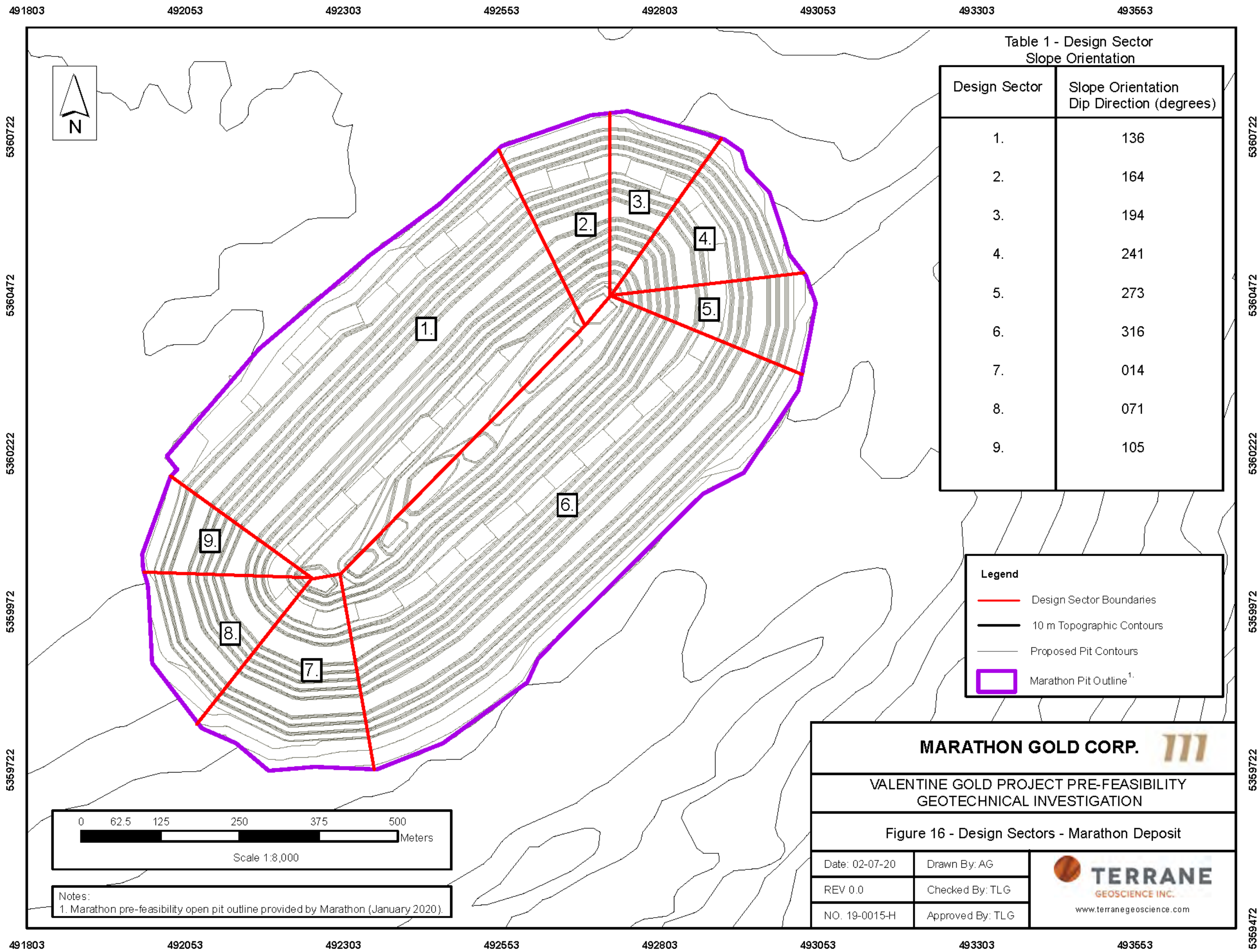


Figure 2-8a Marathon Pit Slope Zones

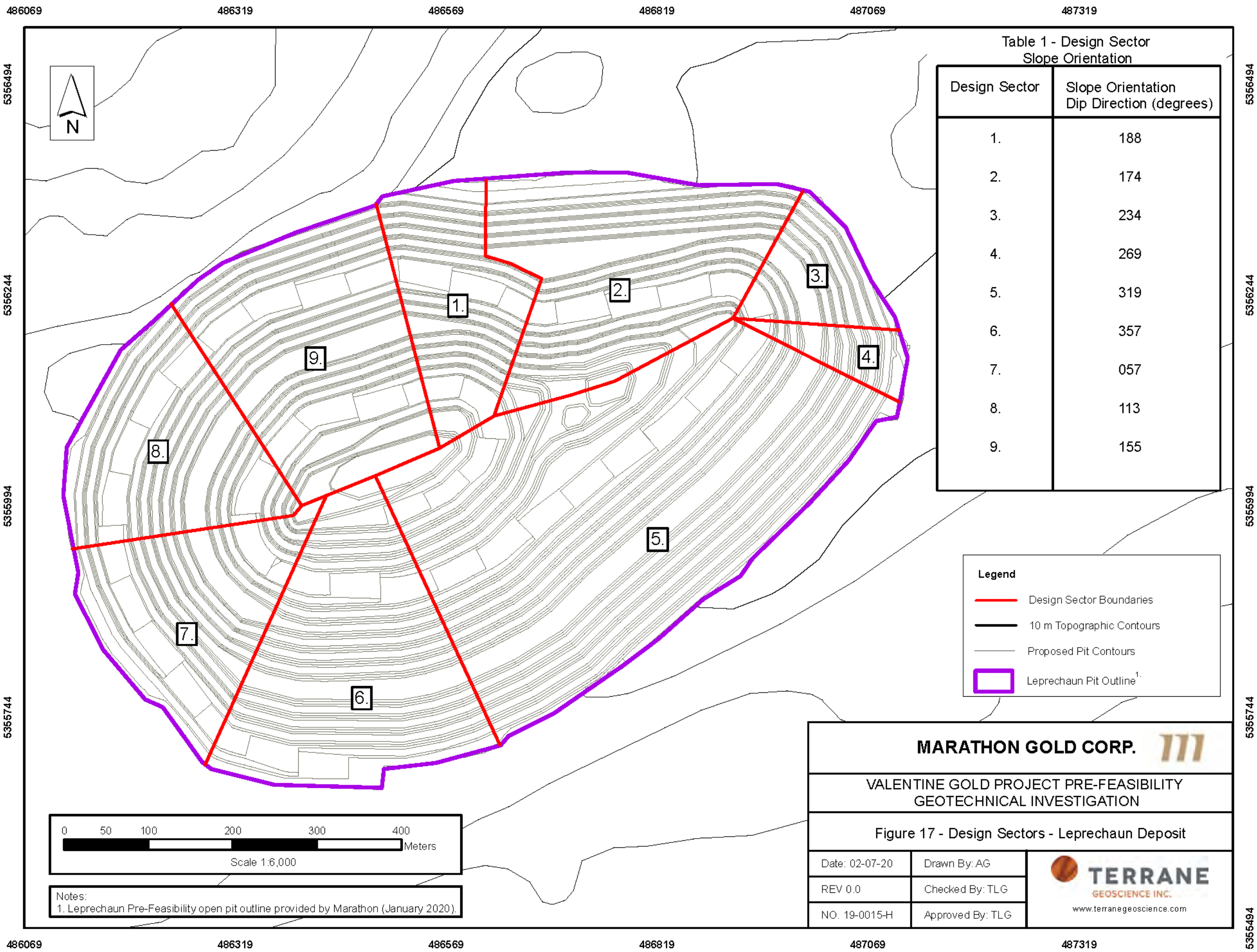
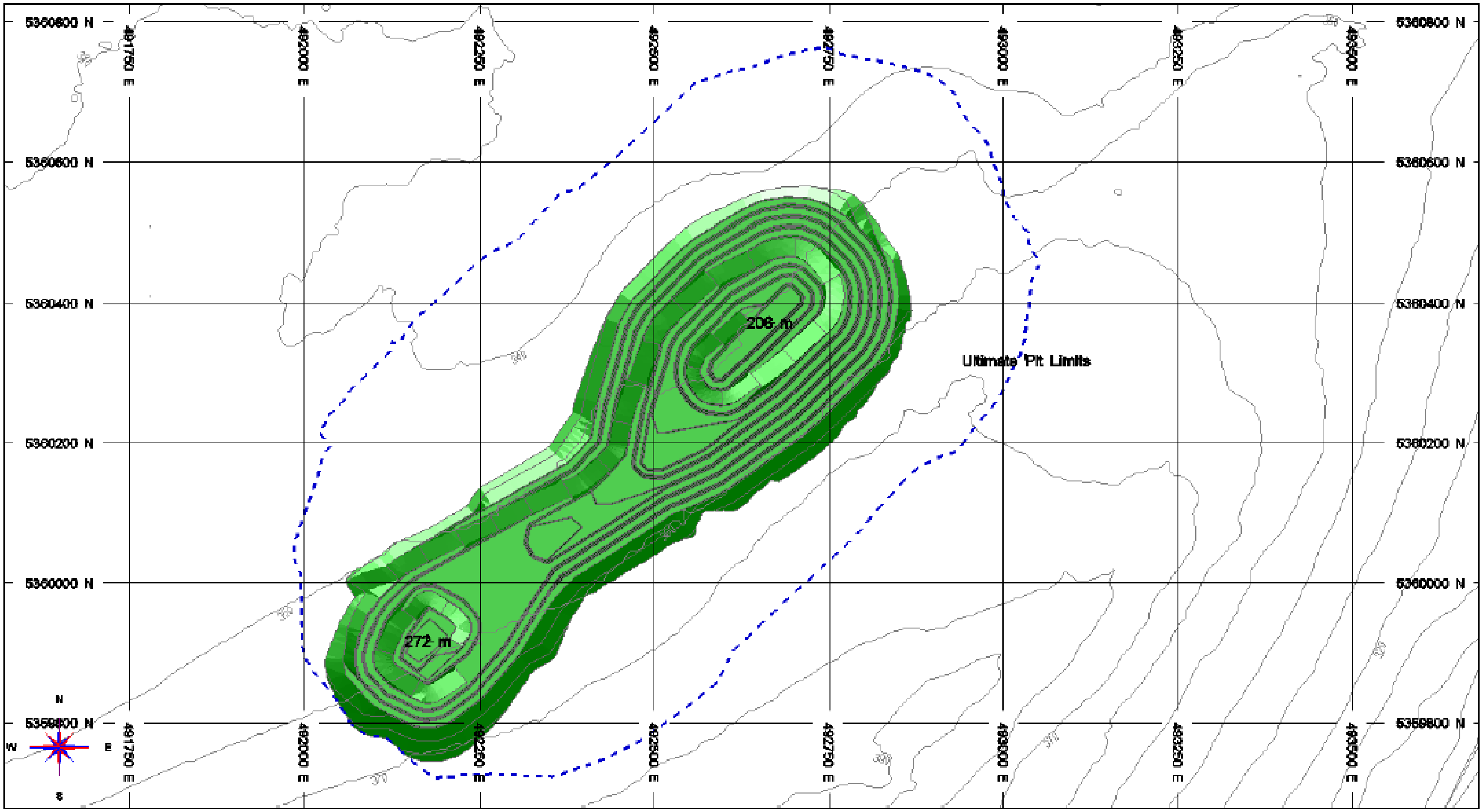


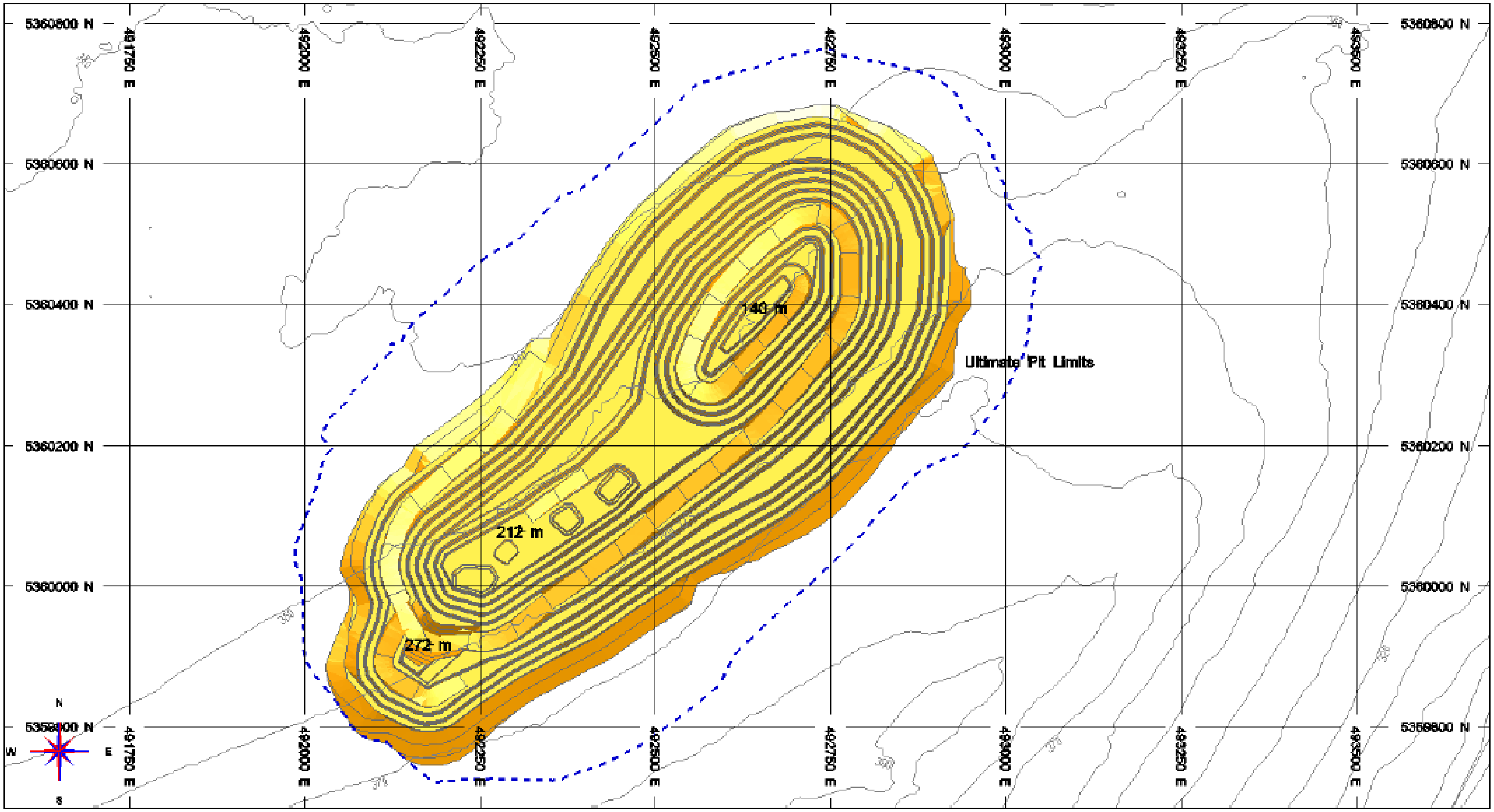
Figure 2-8b Leprechaun Pit Slope Zones

Ultimate pit limits are generally split up into phases or pushbacks over the mine life. Minimum pushback distances of 50 m are maintained. The Marathon pit is split into three phases and has approximate dimensions of 1,250 m southwest to northeast by 670 m southeast to northwest and a maximum depth of 270 m below current ground level. The pit phases are shown in plan in Figures 2-9 through 2-11, and in section in Figure 2-12. The Leprechaun pit is split into three phases and has maximum approximate dimensions of 1,010 m southwest to northeast by 660 m southeast to northwest, and a maximum depth of 285 m below current ground level. The pit phases are shown in plan in Figures 2-13 through 2-15, and in section in Figure 2-16.



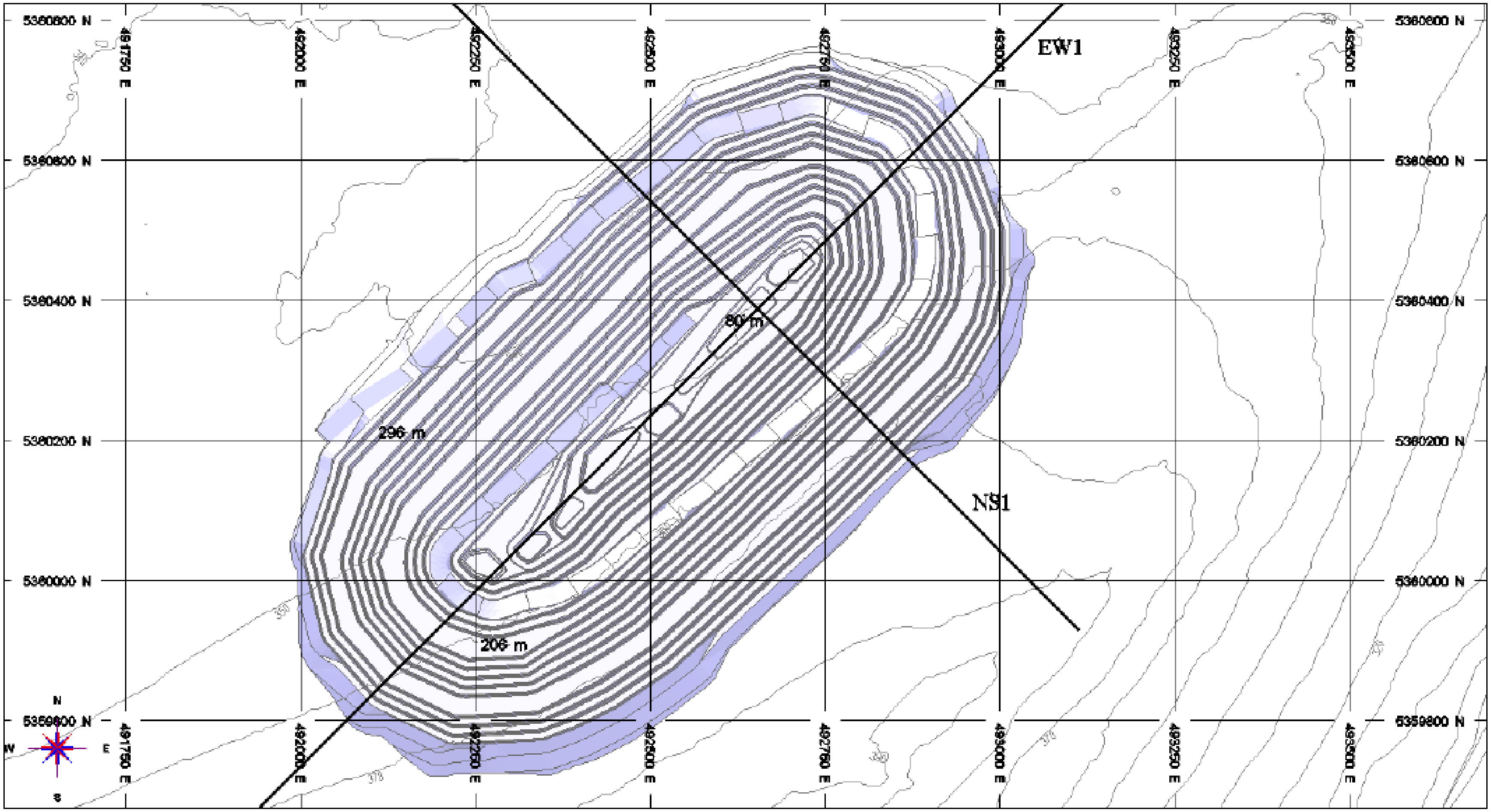
Source: Moose Mountain, 2020.

Figure 2-9 Marathon Phase 1 Pit, M611



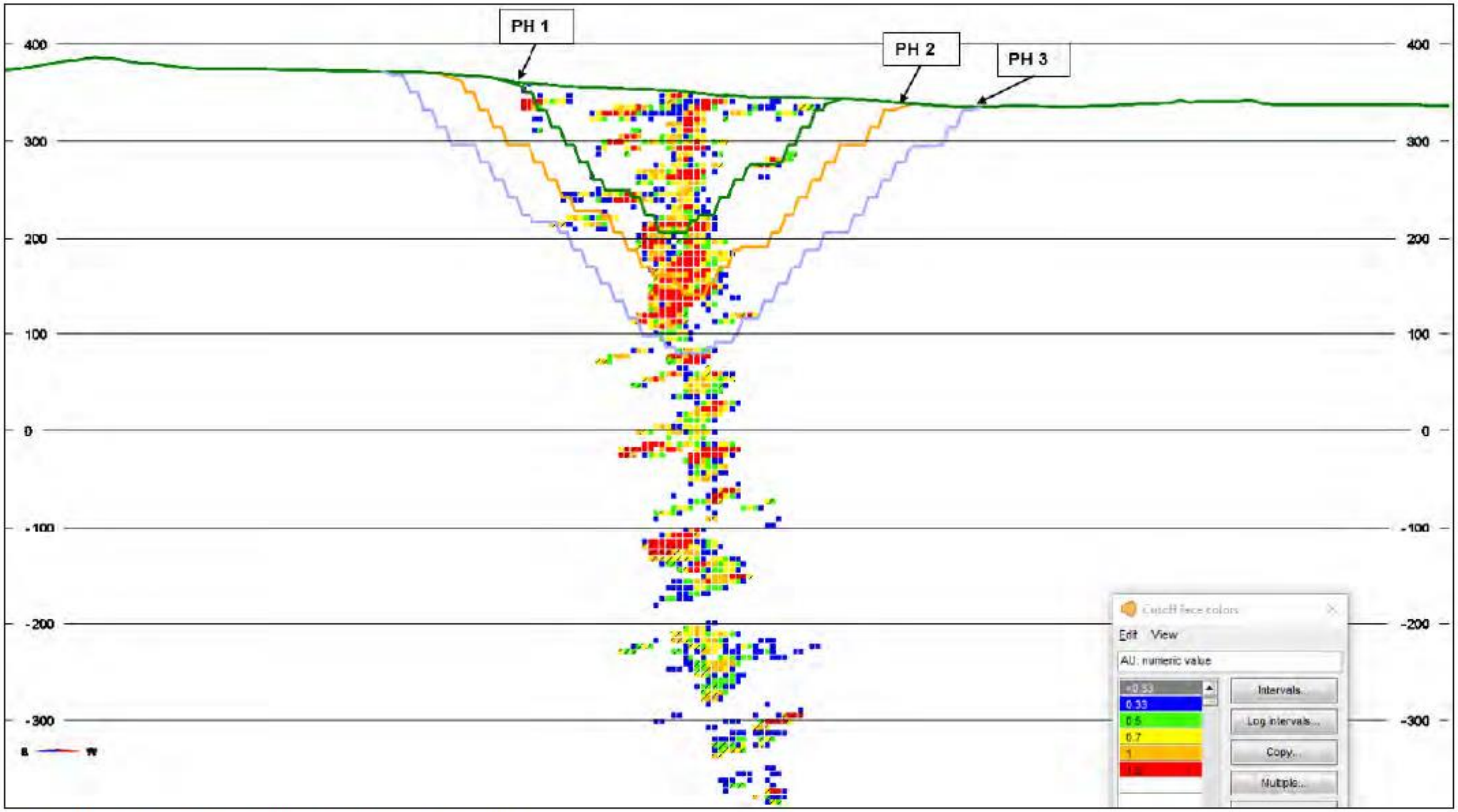
Source: Moose Mountain, 2020.

Figure 2-10 Marathon Phase 2 Pit, M612



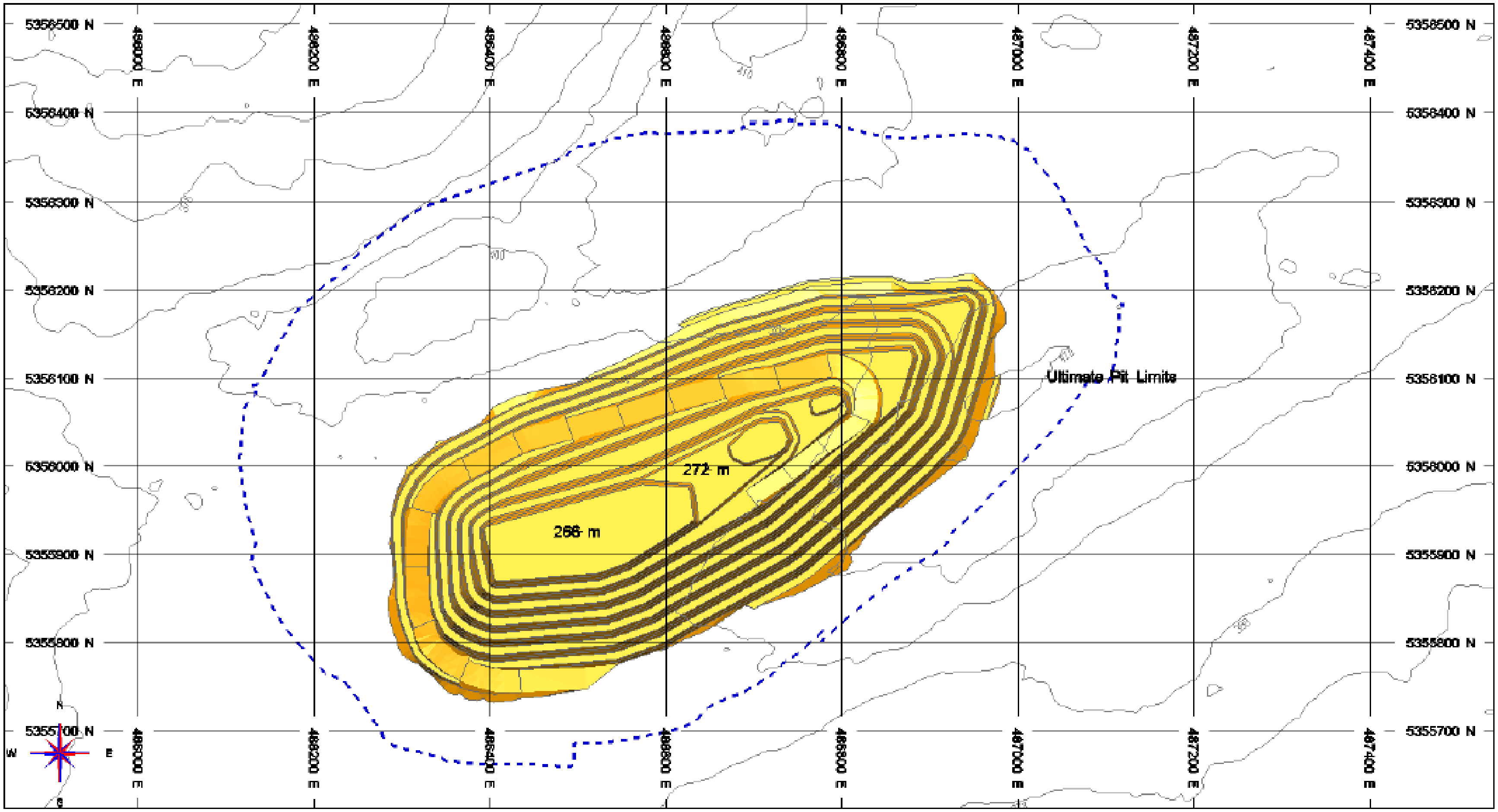
Source: Moose Mountain, 2020.

Figure 2-11 Marathon Phase 3 Pit, M613



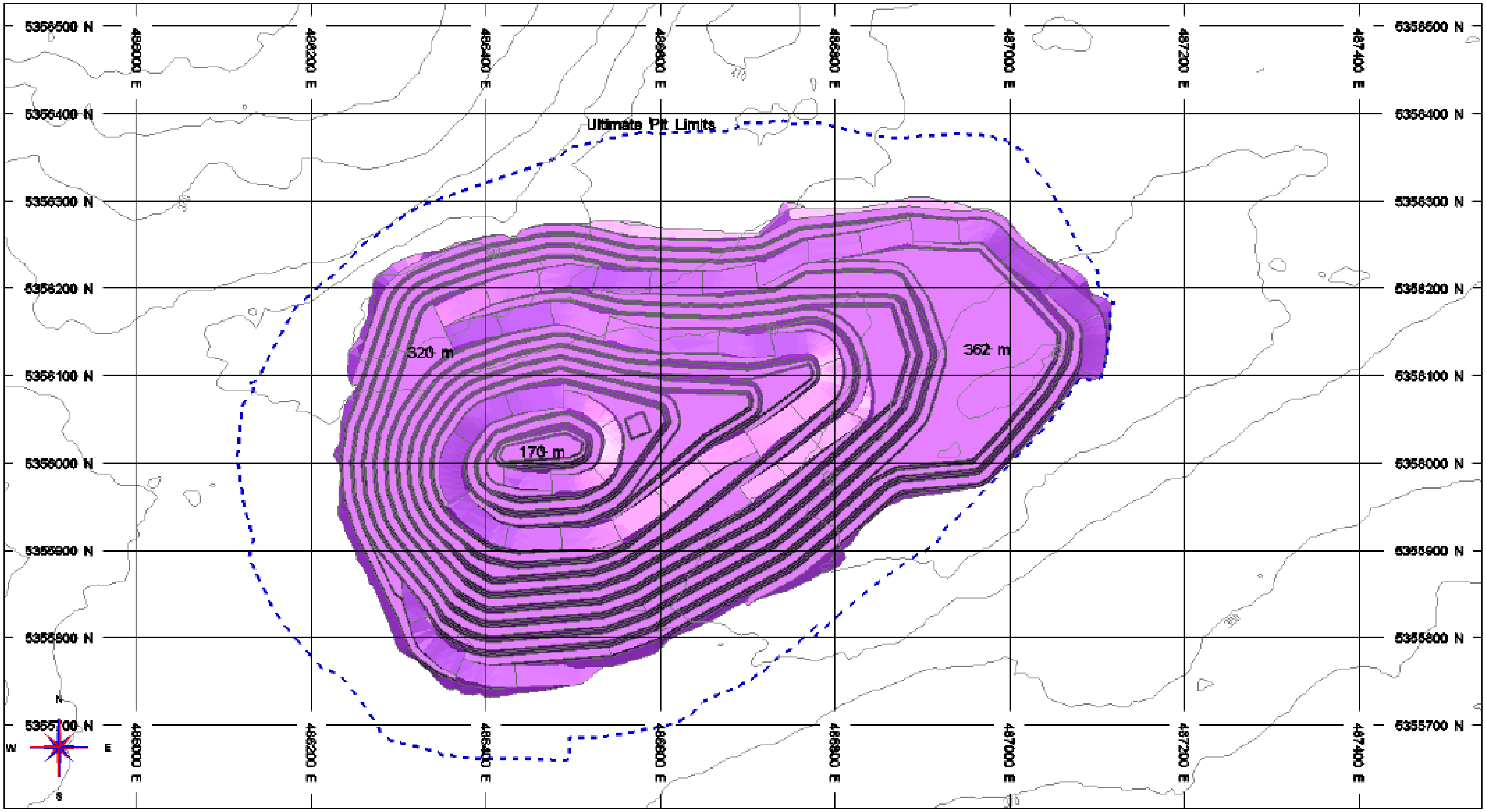
Source: Moose Mountain, 2020 (NS1 as shown in Figure 16-8).

Figure 2-12 Marathon Pit Designs, North-South Section



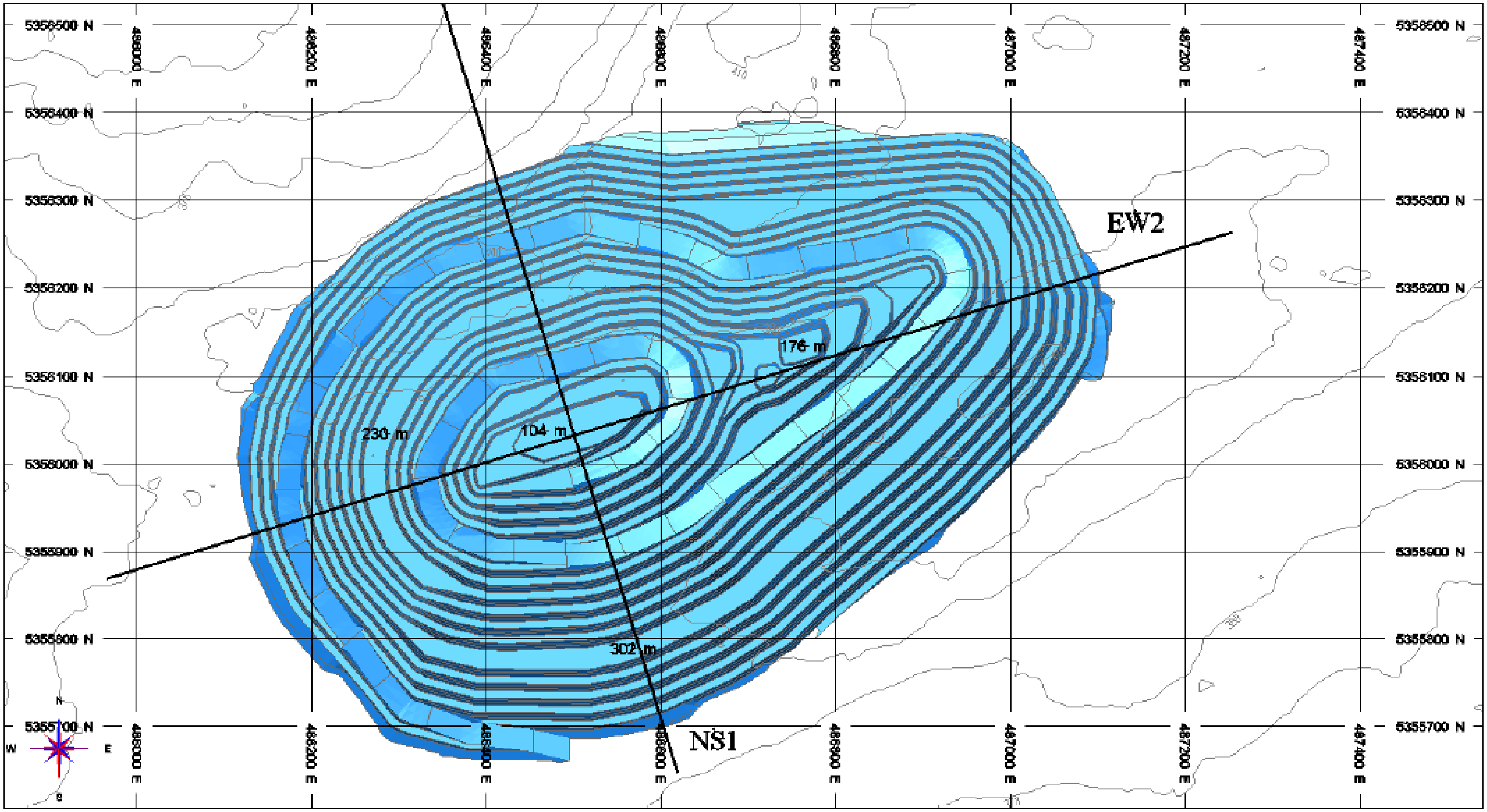
Source: Moose Mountain, 2020.

Figure 2-13 Leprechaun Phase 1 Pit, L621



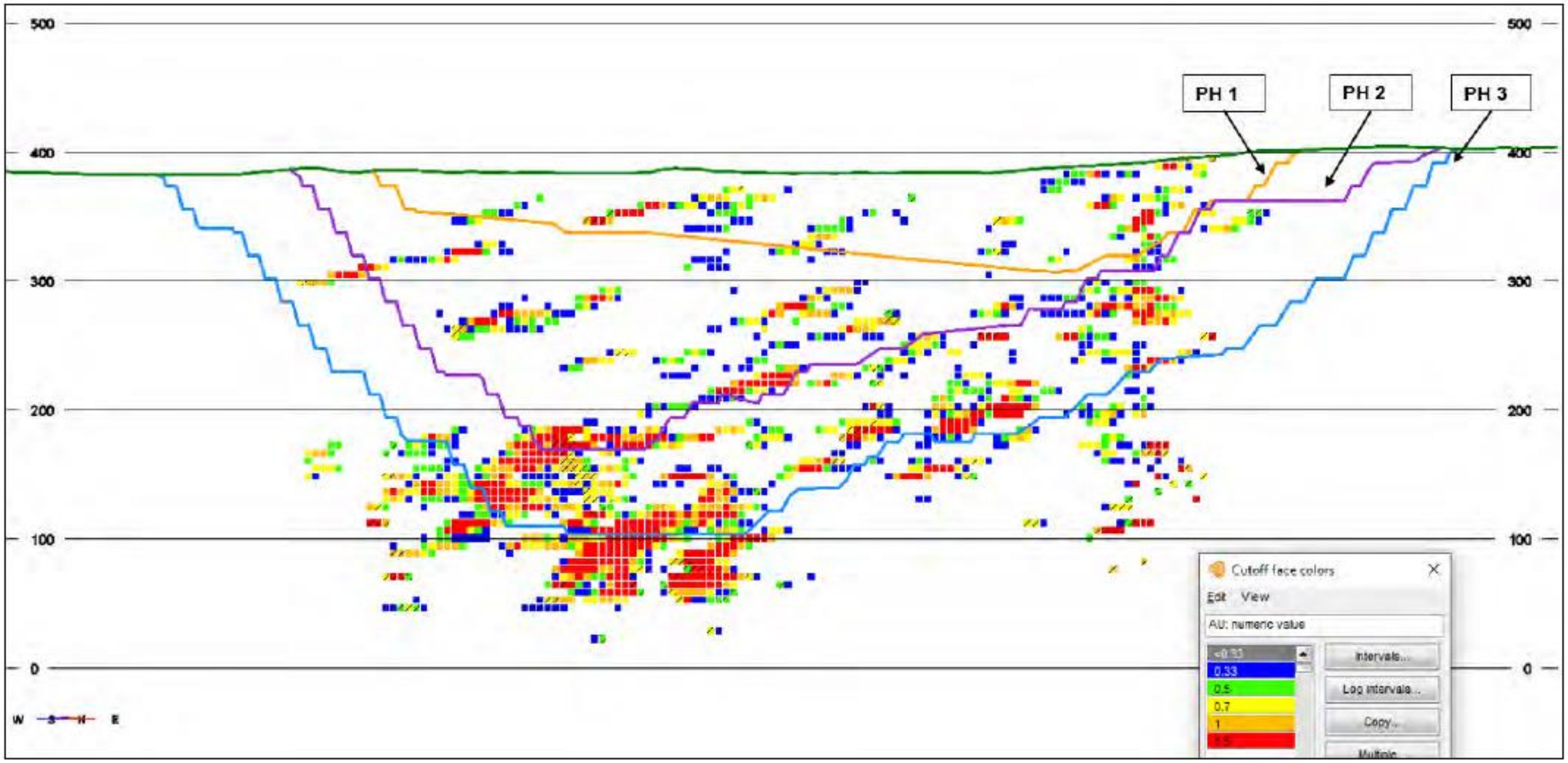
Source: Moose Mountain, 2020.

Figure 2-14 Leprechaun Phase 2 Pit, L622



Source: Moose Mountain, 2020.

Figure 2-15 Leprechaun Phase 3 Pit, L623



Source: Moose Mountain, 2020 (EW2 as shown in Figure 16-13).

Figure 2-16 Leprechaun Pit Designs, East-West Section

Standard surface mining techniques (drill, blast, load, haul) will be used to create an open pit within each of the two mining areas. Drilling will be conducted per optimized blast patterns with 6 m depths in ore, and 6 to 12 m depths in waste. Blasting activities will be carried out by a licensed blasting contractor. Haulage of ore and waste rock will be carried out by 91-tonne haul trucks.

Two-way haul roads of 25 m width are designed within the pit. Haul road grades are limited to a maximum of 10%. Pit access ramps are not designed for the last two benches of the pit bottom, on the assumption that the bottom ramp segment will be removed using some form of retreat mining. The bottom two ramped benches of the pit use one-way haul roads of 19 m width and 12% grade, since bench volumes and traffic flow are reduced.

Mine haul roads external to the open pits are designed to haul ore and waste materials from the open pits to the scheduled destinations. The mine haul roads are designed with the following key inputs:

- 30 m wide ex-pit haul roads that incorporate a dual-lane running width and berms on both edges of the haul road
- sized to handle 91-tonne payload rigid-frame haul trucks
- 8% maximum grade

2.3.2 Waste Rock Piles and Stockpiles

The Marathon pit and Leprechaun pit will each have an associated waste rock pile, topsoil and overburden stockpiles, and a low-grade ore (LGO) stockpile. One high-grade ore (HGO) stockpile, located between the two open pits, will be used to stockpile HGO from both Marathon pit and Leprechaun pit. Volumes and capacities of these piles are noted in Table 2.7.

Table 2.7 Volumes and Capacities of Waste Rock Piles and Stockpiles

Project Component	Volume (m^3)	Capacity (t)
Leprechaun Waste Rock Pile	68,100,000	138,300,000
Leprechaun LGO Stockpile	2,300,000	4,700,000
Leprechaun Overburden Pile 1	1,800,000	3,100,000
Leprechaun Overburden Pile 2	400,000	700,000
Leprechaun Topsoil Pile	100,000	200,000
Marathon Waste Rock Pile	71,500,000	145,200,000
Marathon LGO Stockpile	3,600,000	7,300,000
Marathon Overburden Pile	4,300,000	7,500,000
Marathon Topsoil Pile	150,000	300,000
HGO Stockpile	1,450,000	2,900,000

2.3.2.1 Waste Rock Piles

Waste rock piles are shown on Figure 2-3. The Leprechaun waste rock pile is located southeast of the Leprechaun pit. The Marathon waste rock pile is located northwest of the Marathon pit. As described in the alternatives analysis (Section 2.11), these locations were selected based on a number of factors including reducing potential effects to surface water resources, fish and fish habitat, and caribou migration; topography; sterilization of potentially economic ore; and distance from the pits to the waste rock piles. 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 piles will be constructed in single lifts with a 35° face angle and a 6.1 m safety bench using bottom up construction.

Based on acid rock drainage (ARD) testing to date, waste rock has a low percentage of PAG (Potentially Acid Generating) materials from the Marathon and Leprechaun pits, approximately 14% and less than 0.5%, respectively. Metal concentrations in leachates from humidity cells containing waste rock samples are two to three orders of magnitude below *Metal and Diamond Mining Effluent Regulations* (MDMER) discharge limits. Moderate leaching potential was conservatively determined for Al, P, Cu, Hg, Se, and Zn based on the exceedances of the respective long-term Canadian Water Quality Guidelines (CWQG) for protection of Freshwater Aquatic Life (FAL) in the leachates from waste rock. Further testing and modelling work are ongoing to confirm the initial 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 PAG materials from being used in construction.

2.3.2.2 Topsoil and Overburden Stockpiles

As the open pits are expanded during operation, topsoil and overburden materials will be excavated and require storage until future use for rehabilitation activities. The topsoil and overburden stockpiles are located adjacent to the each of the open pits as shown on Figures 2-5 and 2-6. The locations were selected based on options described in Section 2.11. These stockpiles have been designed to accommodate the entire volume of materials from the open pit areas, which is considered conservative as it is expected that some of the overburden materials will be used in site construction and early progressive rehabilitation.

Similarly, for general site construction and development where excess topsoil 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 or within the ‘future footprints’ of major mine components (pits, TMF, waste rock piles) where they can be reclaimed for progressive rehabilitation prior to the component being expanded.

Some topsoil and overburden materials will be excavated as major mine components (pits, TMF, waste rock piles) are expanded during operation and used directly for progressive rehabilitation activities (e.g., waste rock pile progressive rehabilitation). This will eliminate double handling of these materials and the need to stockpile them until they are required.

Marathon will develop a detailed material balance for all mined (pit) materials and materials to be excavated for general site development, incorporating strategic planning with respect to the handling, storage and re-use of waste materials for construction, progressive rehabilitation, or longer-term storage for final rehabilitation. This material balance will reduce the Project footprint and re-handling of materials, while increasing the progressive rehabilitation opportunities related to waste rock piles and other areas of the site.

Overburden stockpiles (glacial till and topsoil) will be developed using 3 (horizontal) to 1 (vertical) slope construction (3:1), with a 4 to 5 m horizontal berm at 5 m elevation increments. This geometry will reduce erosion and help to support temporary vegetation that will further reduce erosion and prevent dust generation from the stockpile.

Organics stockpiles are generally limited to approximately 4 to 5 m in total height with relatively flat side slopes – often 4 or 5 (horizontal) to 1 (vertical) (4:1 or 5:1), due to nature of these materials. Erosion and dust liftoff are not usually a substantial issue for organic stockpiles; however, it is likely these will be seeded where not reused for early progressive rehabilitation activities.

2.3.2.3 Ore Stockpiles

Ore not immediately destined for the process plant will be stockpiled for future processing, either for blending with higher grade ore or processing towards the end of the mine life. Each of the open pits will have an adjacent LGO stockpile, to be located to the northeast of the Leprechaun pit and to the south of the Marathon pit. The LGO stockpiles will be placed on prepared pads using 15 m lift heights with benches of 19 m, to form overall slope angles of 2.6 horizontal: 1 vertical. A 25 m wide haul road will be incorporated into each stockpile. The Marathon and Leprechaun LGO stockpiles, with their maximum potential volumes and heights, are shown on Figures 2-5 and 2-6.

Approximately one-half of the Marathon's LGO is conservatively classified as PAG. The minimum ARD onset time in PAG LGO is approximately six years, based on maximum laboratory leaching rates. There were no exceedances of MDMER limits observed in humidity cell leachates from LGO under neutral conditions. Based on kinetic testing, Al, P and Zn have moderate leaching potential. The Marathon LGO stockpile effluent has been segregated from other mine component flow streams in the overall mine design to facilitate collection and further ARD treatment, if required. About 10% of LGO from Leprechaun pit is estimated to be PAG. The LGO stockpile is not expected to generate ARD before all the LGO has been processed at the mill. Kinetic testing suggests moderate leaching potential for Al and P and no exceedances of MDMER limits.

An HGO stockpile will be located immediately to the north of the process plant. The HGO stockpile will be developed in the same method and dimensions as the LGO stockpiles, placed on a prepared pad using 15 m lift heights with benches of 19 m to form overall slope angles of 2.6 horizontal: 1 vertical. A haul road, 25 m in width, will be incorporated into the stockpile slope.

On average, the HGO stockpile will consist of approximately 30% of material originating from the Leprechaun pit and the remainder from the Marathon pit. Approximately 13% and 67% of ore samples from the Leprechaun and Marathon pits, respectively, are conservatively classified as PAG. No exceedances of MDMER were observed. Kinetic testing showed moderate Al leaching for both Leprechaun and Marathon ores. Drainage from the HGO stockpile flows to the TMF by gravity and potential acidity will be neutralized in the TMF pond or in the mill during the pH adjustment required as a part of the gold recovery by cyanide process.

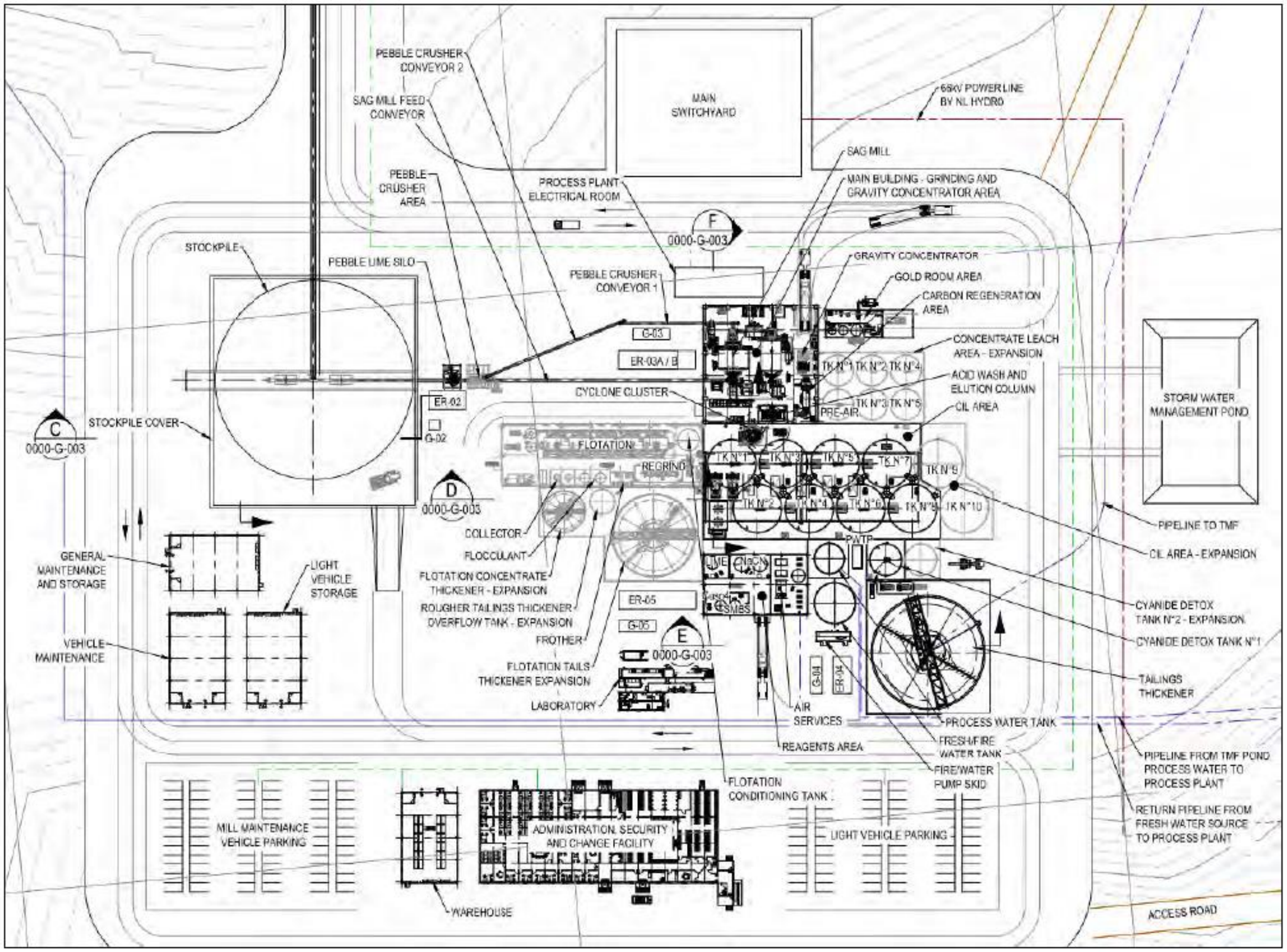
2.3.3 Process Plant Facilities

The process plant will be constructed in two phases. In the initial phase, the plant will be designed to treat 2.5 Mt/a of higher-grade ore using a simple, low-cost circuit appropriate to the tonnage and ore grades of the initial years. A key part of the initial operation is the use of a fine grind for the ore at 80% passing 75 µm. After approximately four years of operation at 2.5 Mt/a, the process plant will process lower-grade ore at a rate of 4 million tonnes per annum (Mt/a). The grinding circuit will not require significant expansion since the grind size for the ore will be relaxed to 80% passing 150 µm. To maintain a high recovery with the lower grade ore and at the higher tonnage, a flotation circuit is installed, and the flotation concentrate finely ground and intensively treated.

The process design, both initial and following the expansion in Year 4, is comprised of the following circuits:

- Primary crushing of ore
- 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 with a pebble crusher added for the expansion
- 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 gold room
- Trash screen and rougher flotation of gravity tailings (added in Year 4)
- Thickening of flotation concentrate and flotation tails prior to leaching (added in Year 4)
- Regrind mill for the flotation concentrate (added in Year 4)
- Gravity tailings CIL initially, then flotation concentrate CIL and flotation tails CIL (added in Year 4)
- 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 using Air/SO_2 process prior to release of tailings effluent to TMF
- A 3-dimensional visual rendering of the process plant facilities is provided as Figure 2-17. The overall process plant layout is shown in Figure 2-18; the process areas shaded in grey represent the equipment that is required for Phase 2, which will be constructed in parallel to the Phase 1 operation (during production Year 3). Figure 2-19 is an overall process flow diagram showing the equipment used in the two phases. Figure 2-20 is a section of the plant services area.

Figure 2-17 Process Plant Rendering



Source: Ausenco, 2020.

Figure 2-18 Overall Process Plant Layout

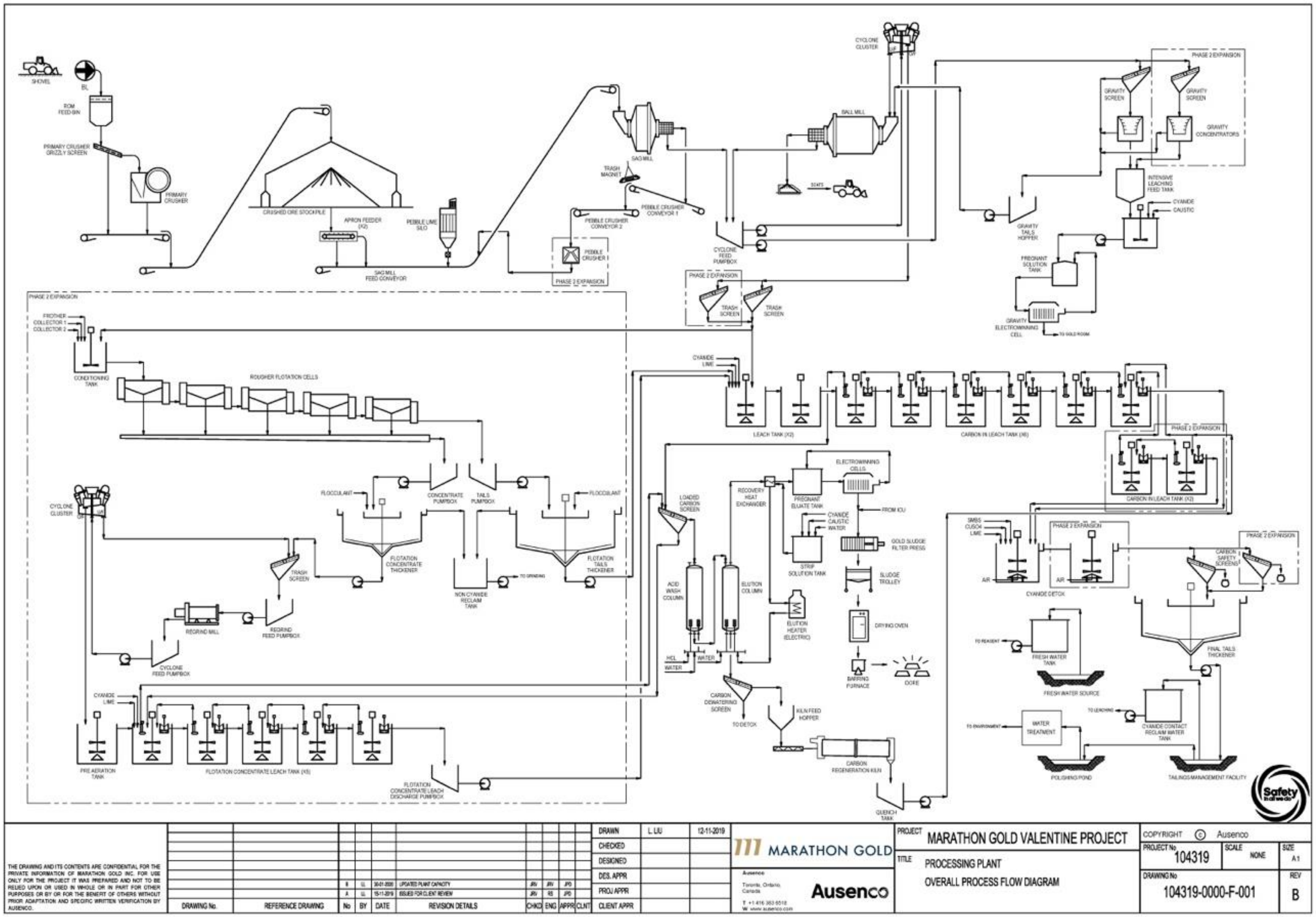


Figure 2-19 Overall Process Flow Diagram

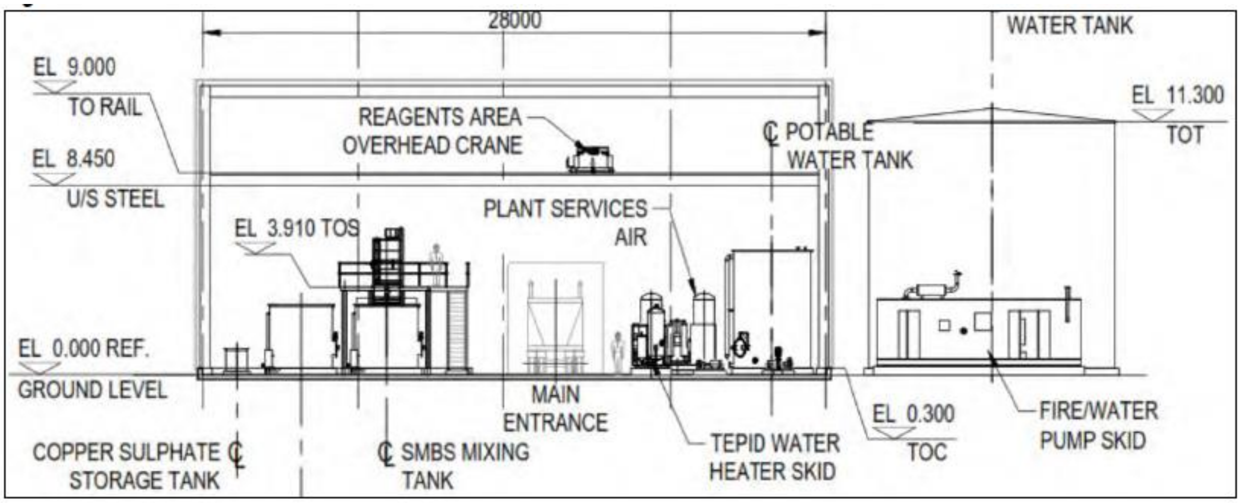


Figure 2-20 Plant Services Area Section

The key process design criteria for the mill are listed in Table 2.8.

Table 2.8 Key Milling Plant Process Design Criteria

Parameter	Units	Value
Plant Throughput (nominal)	tpd	6,800 expanding to 11,000
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	3.03
Silver Head Grade	g/t Au	Trace (negligible)
Crushing Plant Availability	%	75
Plant Availability	%	92
Bond Crusher Work Index (Design)	kWh/t	23
Bond Ball Mill Work Index (Design)	kWh/t	16
SMC Axb		30
Bond Abrasion Index (Ai)	g	0.57
Primary Crusher		C150 or Equivalent
Material Specific gravity	tonne/m^3	2.68
Angle of Repose	degrees	35
Moisture content	%	5.0
SAG Mill		7.92 m dia. x 5.49 m EGL
Ball Mill		Overflow type – 5.18 m dia. x 8.53 m EGL
Grind Size (P_{80})	µm	75 initially, 150 after expansion
Flotation concentrate mass pull	%	Zero initially, 5 after expansion
Concentrate regrind size (P_{80})	µm	15
Sodium Cyanide Addition	kgt ore	1.1 initial, 0.7 after expansion
Lime Addition (as CaO)	kgt ore	6.2 initial, 1.6 after expansion

Table 2.8 Key Milling Plant Process Design Criteria

Parameter	Units	Value
Frother	kgt ore	Zero initial, 0.04 after expansion
Promotor (Aero 208)	kgt ore	Zero initial, 0.02 after expansion
Potassium Amyl Xanthate (PAX)	kgt ore	Zero initial, 0.04 after expansion
Copper Sulphate	kgt ore	0.04 initial, 0.02 after expansion
SMBS	kgt ore	1.1 initial, 0.7 after expansion
Caustic	kgt ore	0.1 initial, 0.1 after expansion
Flocculant	kgt ore	0.04 initial, 0.02 after expansion
Flotation Conc. Pre-aeration & CIL Tanks	#	Zero initial, 1+5 after expansion
Gravity/Flotation Tails CIL pre-aeration & CIL Tanks	#	2+6 initial, 2+8 after expansion
Tonnes Carbon per Column	t	6
Number of Carbon Strip /Week	#	7.5 initial, 9 after expansion

2.3.3.1 Crusher and Mill Feed Stockpile

Figures 2-21 and 2-22 are renderings of the crushing area and the primary crushing and mill feed stockpile, and Figures 2-23 and 2-24 are sections of the crushing area and stockpile area, respectively. Material will be hauled from the mine and dumped on the ore stockpile 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 a rate of 381 t/h initially (609 t/h after expansion) 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 the crusher discharge conveyor by a loader. The crushed material is conveyed to a covered stockpile, which will provide approximately 12 hours of storage.

The mill feed stockpile will be equipped with apron feeders to regulate feed at 310 t/h initially (496 t/h after expansion) into the SAG mill.

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

- ROM hopper
- Apron feeder with Variable Speed Drive (VSD)
- Vibrating grizzly
- Fixed rock breaker
- Primary jaw crusher
- Mill feed apron feeder (VSD)
- Material handling equipment

Figure 2-21 Crushing Area (conveyors illustrated without planned enclosures)

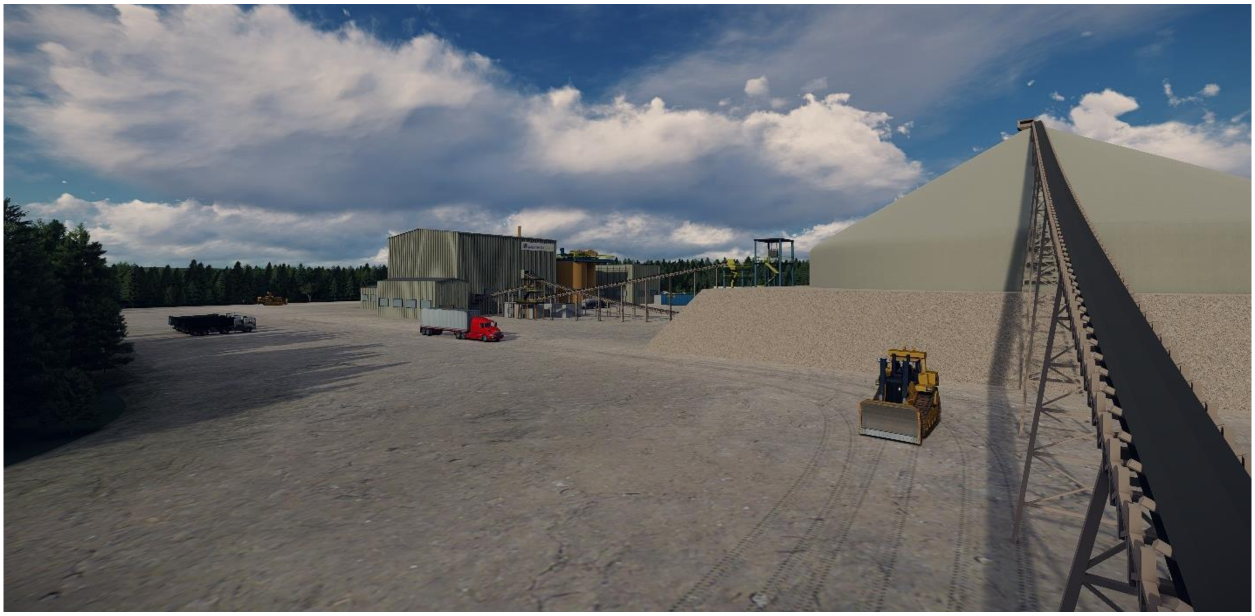


Figure 2-22 Primary Crushing and Mill Feed Stockpile (conveyors illustrated without planned enclosures)

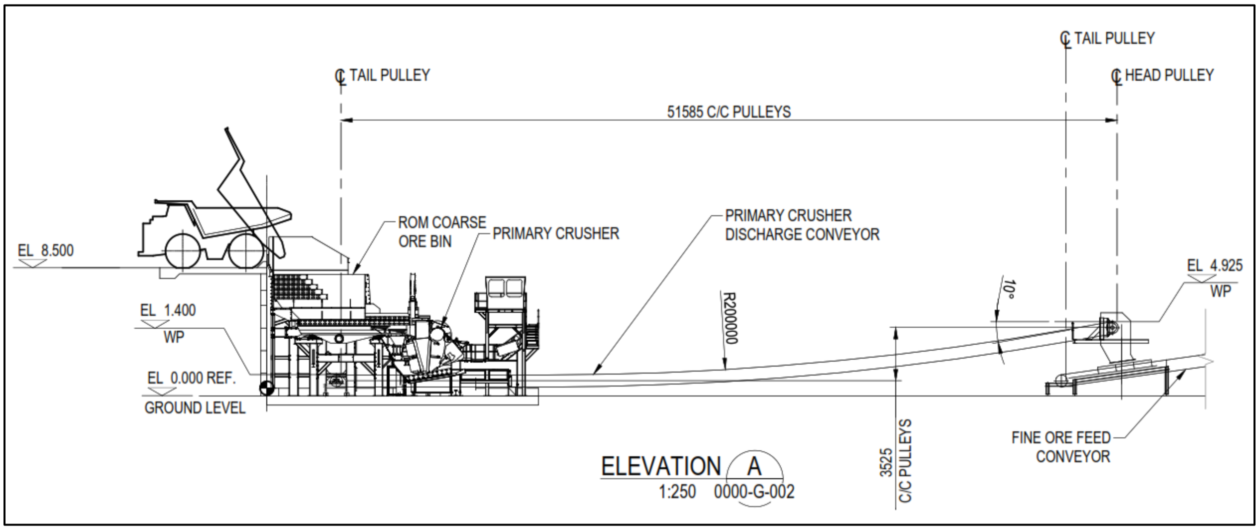


Figure 2-23 Crushing Area Section

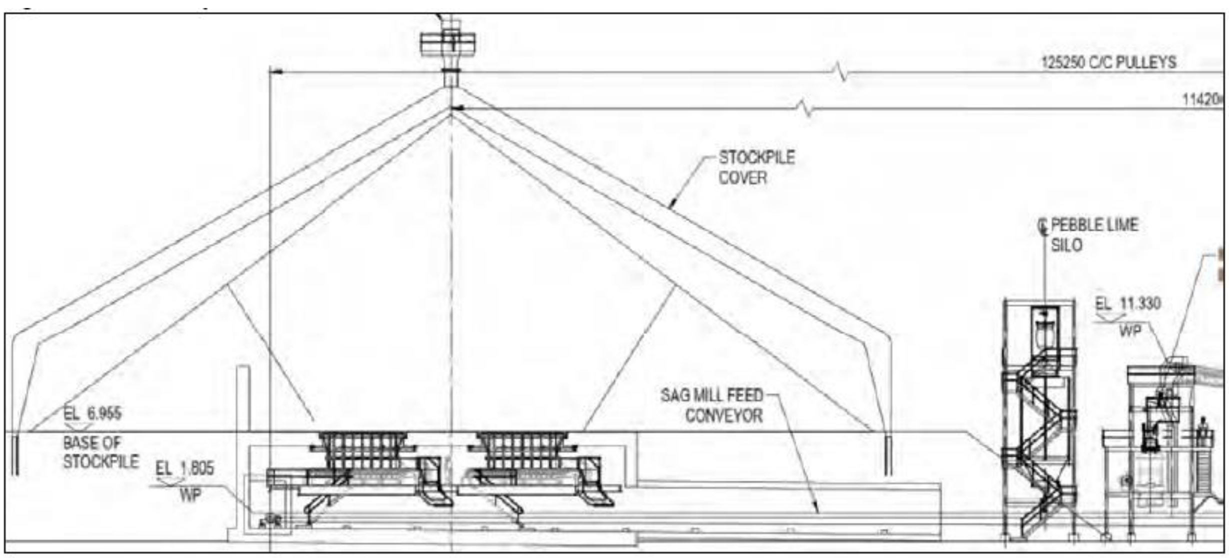


Figure 2-24 Stockpile Area Section

2.3.3.2 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 will discharge through a trommel screen where the pebbles will be removed 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 slurry 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 – 6,500 kW VSD
- Ball mill – 4,200 kW
- Cyclone feed pumpbox
- Classification cyclones
- Figures 2-25 and 2-26 are renderings of the grinding mill building and associated equipment, and Figure 2-27 provides a section of the grinding and tank area.

Figure 2-25 Internal View of the Grinding Mill Building (SAG/Ball Mills and Gravity Recovery Circuit)

Figure 2-26 External View of the Grinding Mill Building
(exterior cladding shown as transparent for illustrative purposes), adjacent to the Leaching Tanks, Reagents Preparation Building and Gold Room, with Stockpile in the distance

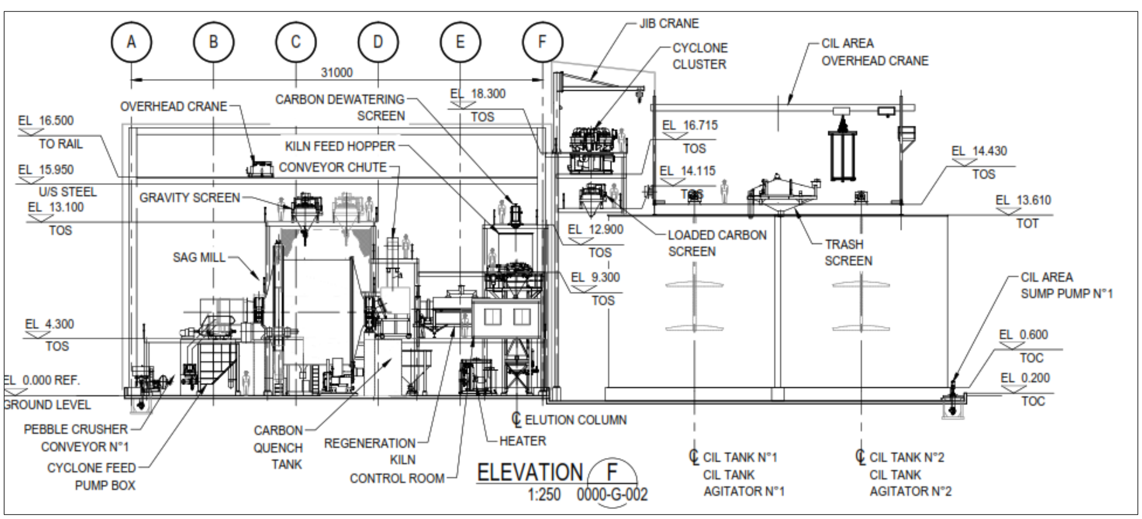


Figure 2-27 Grinding and Tank Area Section

2.3.3.3 Gravity Recovery Circuit

The initial gravity circuit comprises a single centrifugal concentrator complete with a feed scalping screen. A second parallel system is installed for the expanded tonnage. 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.

The gravity concentration circuit will recover about half the gold in the ore. 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

2.3.3.4 Intensive Cyanidation Reactor

Concentrate from the gravity concentrators will be sent to 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 mixed 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 hours, 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 gravity tails CIL circuit (initial phase) or the flotation concentrate regrind mill (after expansion).

The ICR pregnant leach solution will be pumped from the reaction vessel feed tank to the ICR pregnant solution tank, located near the gold room. ICR pregnant solution will be pumped to the gold room for gold recovery as gold sludge in a dedicated electrowinning cell. The sludge may 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
- ICR
- Reactor vessel feed tank heater
- Leach Aid screw feeder
- ICR pregnant solution tank
- ICR electrowinning cell

2.3.3.5 Direct Leach Circuit

Prior to the addition of the flotation circuit (Phase 2), the cyclone overflow is passed over a trash screen to remove oversize material then directly leached to extract the gold that was not recovered by the gravity recovery circuit. Leaching is done in a high-lime environment since the ore contains tellurides which respond well to such treatment. The Direct Leach circuit comprises two pre-leach tanks and six CIL tanks. The finely ground ore slurry flows by gravity through the circuit where the gold is leached using sodium cyanide under the influence of the high lime content of the slurry. Activated carbon is passed counter-currently through the CIL circuit to extract the gold from solution as it is dissolved. Carbon is retained in the CIL tanks by mechanically swept screens and periodically moved forward by pumps. The fully loaded carbon is forwarded to the carbon elution circuit.

The direct leach circuit includes the following equipment:

- Trash screen
- Direct leach pre-aeration tank
- Direct leach CIL tanks
- Loaded carbon screen
- Intermediate carbon screen

After installation of the flotation circuit, the Direct Leach circuit is used to treat flotation tailings and the tailings from the concentrate leach circuit. Two additional CIL tanks are added to accommodate the higher tonnage.

2.3.3.6 Flotation Circuit

The flotation circuit, illustrated in Figure 2-28, will be added to the processing facility in Year 4. Cyclone overflow will gravitate over the trash screen described earlier, supplemented by a second parallel 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 circuit will consist of five 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.

The flotation tails thickener underflow will report to the first pre-aeration tank of what was the Direct Leach circuit. 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 an ultra-fine grinding mill containing small ceramic beads as the grinding medium.

The flotation concentrate will amount to less than 5% of the mass of ore. Thus, the intensive grinding and leaching process applied to the concentrate to get high gold recovery are relatively minor on an ore tonnage basis.

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

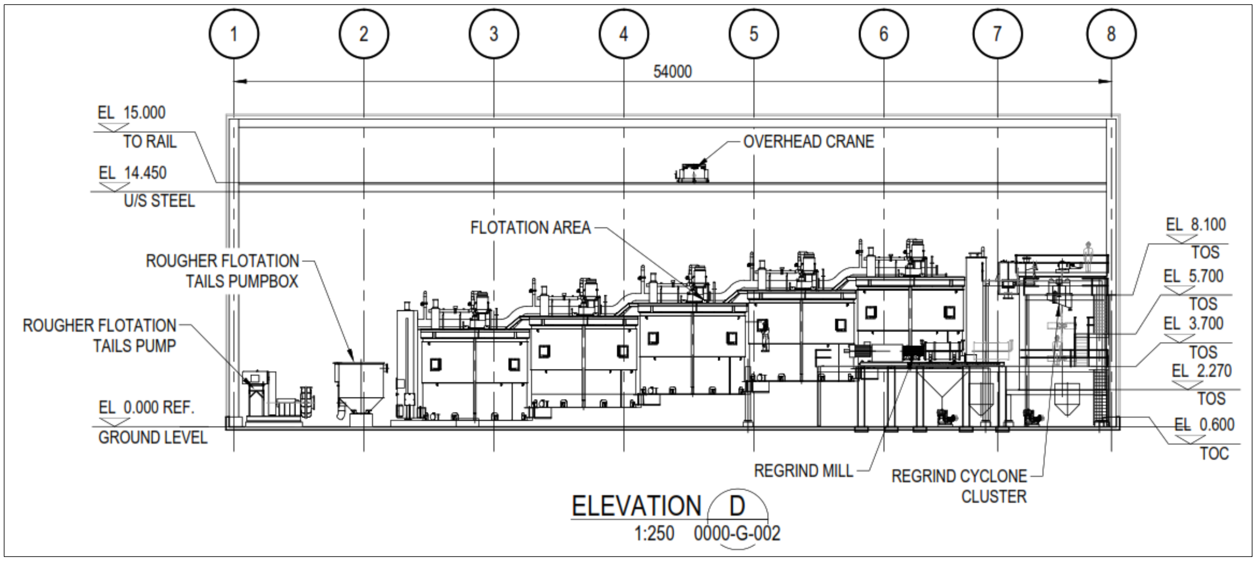


Figure 2-28 Flotation Area Section

2.3.3.7 Flotation Concentrate and Flotation Tailings Carbon in Leach Process

A leach train comprising a pre-aeration tank and five small CIL tanks will handle 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. Figure 2-29 is a section of the concentrate leach area.

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 CIL residence time of 48 h at 42% w/w density in the tanks. 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.

The Direct Leach tanks are used to leach the flotation tailings and the tailings from the flotation concentrate leach circuit. Thus, the reground flotation concentrate, which contains almost half the gold in the ore, is first pre-aerated, then subjected to 48 h of CIL under high cyanide concentrations, then joins the flotation tailings where it receives another 22 h of CIL treatment.

Fresh / regenerated carbon from the carbon regeneration circuit will be returned to the last tank of the combined CIL circuit, and will be advanced counter currently to the slurry flow by pumping slurry and carbon from one CIL tank to the 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 cyanide destruction tanks.

The flotation concentrate 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

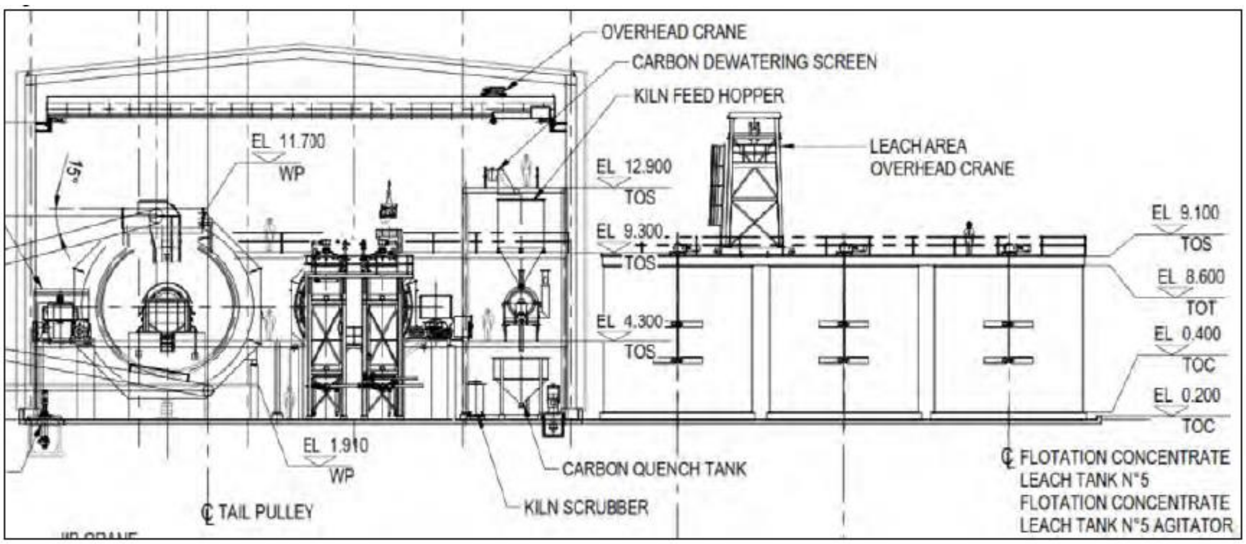


Figure 2-29 Concentrate Leach Area Section

2.3.3.8 Cyanide Destruction

Plant tailings from the CIL circuit are treated to give a weak acid dissociable cyanide (CN_{WAD}) concentration of <1 ppm, to comply with environmental requirements, prior to deposition in the TMF. The CIL tails at a design 40% solids will flow by gravity to a single cyanide reduction tank (increased to two after expansion). The tank will operate with a total residence time of at least 60 mins to reduce CN_{WAD} design levels from approximately 150 ppm design level to less than 1 ppm.

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

After cyanide reduction, the tailings are passed over a vibrating carbon safety screen to recover carbon that might have been spilled or leaked through worn screens. Screen underflow is pumped to the tailings thickener. Screen oversize (recovered carbon) will be collected in a fine carbon bin for potential return to the circuit. One screen is installed initially with a second installed after expansion.

Detoxified and thickened tailings will be pumped as a high-density slurry to the TMF for final deposition with decant water from the TMF reclaimed to the process plant for use as process water. Overflow from the TMF will be discharged to the water treatment plant, then to the polishing pond where it will be held for approximately 5 days prior to discharge into the environment.

The main equipment in this area includes:

- One agitated cyanide destruction tank (two after expansion)
- Air supply system
- Reagent supply systems
- Carbon safety screen (one initially, two after expansion)
- Tailings thickener

2.3.3.9 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.

Loaded carbon from the loaded carbon recovery screen will flow by gravity to the 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 – 6 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 – 6 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 6-t kiln feed hopper. A screw feeder will meter the carbon into the reactivation kiln, where it will be heated to 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.

As carbon is lost by attrition, new carbon is added to the circuit via the quench tank following the carbon reactivation screen. In this way, new carbon will be transferred via the carbon sizing screen into the circuit in the same way as reactivated carbon. Thus, carbon fines in new carbon will be removed along with degraded carbon particles.

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

Electrowinning and Gold Room

Gold will be recovered from the pregnant eluate geberated from the loaded carbon and from the ICR process by electrowinning and then smelted to produce doré bars.

The pregnant eluate is pumped through a single electrowinning cell equipped 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 processes will take place within a secure and supervised gold room equipped with access control, intruder detection and closed-circuit television equipment.

The electrowinning circuit and gold room includes the following key equipment:

- Electrowinning cells with rectifiers
- Sludge pressure filter
- Drying oven
- Flux mixer
- Induction smelting furnace with bullion molds and slag handling system
- Bullion vault and safe
- Tools and sampling systems
- Dust and fume collection system
- Gold room security system

Reagent Storage

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. Marathon anticipates that the specific reagent storage requirements with which it will comply will be specified in the Certificate of Approval anticipated to be issued under the NL *Environmental Protection Act.* 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 Safety Data Sheet (MSDS) stations will be located throughout the facilities. Sumps and sump pumps will be installed for spillage control.

2.3.4 Tailings Management

Tailings will be managed for the first nine (9) years of operation in the TMF, to be located as shown in Figure 2-3. After Year 9 of the operation phase, tailings will be pumped via pipeline to the exhausted Leprechaun open pit until the cessation of milling operation. Once tailings deposition is switched to the Leprechaun open pit, the TMF will be decommissioned and rehabilitated in accordance with the rehabilitation and closure activities described in Section 2.6 of this document.

2.3.4.1 Tailings Management Facility

Background

Golder Associates Ltd. (Golder) was engaged to complete a pre-feasibility level TMF design. The dam safety program established in NL requires that dams must be designed, operated and maintained to meet the requirements of the Canadian Dam Association (CDA) and Mining Association of Canada (MAC) guidelines, Global Industry Standards on Tailings Management (ICMM et al. 2020), as well as applicable provincial requirements. In accordance with the dam classification methodology presented in the CDA Dam Safety Guidelines, the proposed TMF dams have been provisionally classified as having a “very high” consequence of failure, based on the potential environmental impact and population at risk.

The design of the TMF was carried out to meet minimum allowable factors of safety under static and pseudo-static loading conditions recommended in the current CDA Dam Safety Guidelines. Seepage and stability analyses were carried out as part of the design. Based on the model results, the dams are expected to be stable under the assumed loading and expected foundation conditions. As part of its mandate, Golder first proceeded with a high-level options evaluation to select the best tailings deposition method and TMF site.

Options Evaluation

The options trade-off study considered operational, technical, environmental, social, and financial aspects, and, in particular, the following:

- reducing the impact on known areas of fish and fish habitat
- avoiding known caribou migration routes
- reducing potential adverse effects on the downstream receiving water course, including the Newfoundland Hydro dam at Victoria Lake Reservoir
- proximity to the process plant to reduce the overall processing footprint
- using thickened or filtered tailings to reduce the consequence of failure
- establishing an additional downstream area to install a treatment plant, polishing pond, and monitoring system

The preferred site was selected between the Marathon and Leprechaun pits, south of the thrust fault and to the east of the process plant. As described in the alternatives analysis (Section 2.11), siting the TMF in this location avoids the need to infill or dewater fish-bearing and/or navigable waterbodies, and eliminates potential interaction and risks associated with the Victoria Dam and Victoria Lake Reservoir. The preferred tailings deposition method is thickened tailings which, as described in the alternatives analysis Section 2.11, presents a number of advantages over conventional slurry. These include increasing water recycling at the mill prior to tailings discharge to the TMF, reducing tailings effluent, and reducing the risk of TMF failure and the potential area of inundation (in the unlikely event of a failure).

TMF Design

The TMF is designed to store the 30 Mt of tailings to be produced over the initial nine years of the mine life. The preliminary design has the TMF embankments being raised in five stages and will be constructed primarily from mine waste rock. Note that in constructing the TMF embankment, mine waste will not be placed in fish-bearing waters. A geomembrane liner will be incorporated into the upstream slope of the embankment to retain water within the impoundment.

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

- Reducing potential adverse effects to fish and fish habitat and risks to the surrounding environment and the Victoria Reservoir and Dam in the unlikely event of a dam failure
- Permanent, secure, and total confinement of tailings materials within the engineered TMF
- Control, collection, and removal of effluent from the tailings during operation for recycling as process water to the extent practicable
- The inclusion of monitoring features for the facility to demonstrate that facility performance goals are achieved, and design criteria and assumptions are met
- Staged development of the TMF over the life of the Project to defer capital cost and allow for efficient use of rock materials from open pit development as construction materials for the TMF

The TMF was designed based on the following criteria:

- Material specific gravity = 2.68
- Tailings particle size P_{80} = 75 µm, non-plastic (Years 1 and 2), P_{80} = 150 µm, non-plastic (Year 3 onwards)
- Tailings discharge solids content = 65% (by mass)
- Assumed void ratio of the deposited tailings = 0.9
- Calculated dry density of the deposited tailings = 1.41 t/m^3
- Calculated maximum volume of tailings for storage at the TMF = 24.8 Mm^3
- Assumed tailings beach slope = 3%
- Minimum stability factors of safety of 1.5 under static conditions where loss of containment is possible and 1.0 under seismic loading, in accordance with the CDA Dam Safety Guidelines
- A spillway designed to safely pass the inflow design flood (IDF), resulting from the probable maximum flood (PMF) event

Composite samples of tailings from both deposits are classified as non-PAG and are not expected to generate ARD. During operation, the water in the tailings impoundment and pore water in tailings may exceed the MDMER limits for CN(T), un-ionized NH3, and Cu generally sourced from process water. In addition, high leaching potential is also determined for total ammonia (NH3 + NH3), CNWAD (surrogate for CN free), F, Hg, P, and Fe based on exceedances (10x) of CWQG.

A conventional embankment construction concept is planned based on the mine plan and assessment of site topography, with embankments raised in a downstream direction. The TMF will be constructed in five stages over the mine life and is designed to be raised based on the storage requirements and operating criteria. Mine waste rock from the pit developments will be the primary embankment construction material. The upstream embankment will be lined with a geomembrane to reduce or avoid potential seepage and underlain by a geotextile, a fine filter layer and a coarse filter layer. The filter zones will be engineered from material sourced from waste rock piles.

A review of available surficial geology mapping for the Project Area indicates that the dominant subsurface material in the TMF footprint is glacial till occurring mainly as hummocky and blanket deposits with thicknesses up to 15 m or as thin discontinuous veneer (typically less than 1.5 m thick) overlying bedrock. The area of high ground along the crest of the ridge at the north limit of the TMF is characterised by bedrock outcrop either exposed above the till veneer or concealed by vegetation. Bogs are present in poorly drained areas. Finite sampling from borehole drilling suggests the till is primarily granular and non-cohesive in nature, comprising silt, sand, and gravel containing cobbles and boulders. It is a requirement that the TMF dams are founded on compact to dense native tills and/or bedrock with low permeability characteristics to limit seepage.

The accumulation of water in the TMF has been modelled for the mean and 25-year wet annual precipitation conditions. A water treatment plant and polishing pond will allow for the treatment and discharge of the excess water to Victoria Lake Reservoir. Treatment and discharge will occur for eight months a year during operation (avoiding winter months). The TMF has been sized to store the excess water during the non-discharge period.

Excess water produced by the TMF will be reclaimed to the process plant to offset process water demand and limit volumes of discharge from the tailings impoundment. TMF excess water that is not reused in ore processing will be treated via the water treatment plant and discharged to a polishing pond prior to discharge to the environment. Effluent discharged to the environment will be sampled and tested in accordance with the requirements of the MDMER and the NL *Environmental Control Water and Sewer Regulations* (2003) (the ECWS Regulations). Discharged effluent is required to meet the MDMER and ECWS Regulations criteria.

The polishing pond will be located downstream of the TMF, with a footprint area of approximately 4.1 hectares. The pond will be constructed as part of the initial TMF with an operational capacity of 44,000 m^3. The pond will be lined with a geomembrane, similar to the upstream slope of the TMF embankment. The pond is designed to provide sufficient residence time for the settlement of solids. A retention time of 5 days was assumed based on a nominal flow through rate of 115 to 280 cubic metres per hour (m^3/h), which is sufficient to treat runoff, precipitation, and process flows for up to a 25-year wet precipitation year. To promote settling, the pond is designed with a length-to-width ratio of 5:1. The design also allows for up to 0.5 m of solids accumulation and has a minimum freeboard of 2 m above the maximum operating level.

The dams required for the tailings impoundment will be designed, constructed, operated and closed in accordance with the CDA and MAC guidelines, Global Industry Standards on Tailings Management, as well as all applicable provincial requirements, including the dam inspection, maintenance and repair requirements of the NL *Water Resources Act*.

Dam Safety

As outlined in the CDA Dam Safety Guidelines, dam surveillance is a critical component of dam safety for all phases of the life of most dams (including the Victoria Dam). Dam surveillance will start with construction, utilizing a comprehensive construction monitoring plan, including inspections by the Engineer of Record. Once constructed, pre-operational inspections will be completed by Marathon, the Engineer of Record, and if feasible, the engineer who will conduct the annual inspections and Dam Safety Reviews.

Prior to operation, emergency preparedness and response plans (e.g., MDMER Emergency Response Plan for effluent and tailings release) and the TMF Operations, Maintenance and Surveillance (OMS) manual will be developed which will provide a comprehensive plan for operation, inspection, and emergency response using the best practices outlined by the CDA and MAC. From a dam safety perspective, the OMS manual will prescribe the type, frequency, and intensity of dam inspections to be completed, including daily observational inspections, weekly and monthly formal inspections completed by trained staff, and third party annual inspections and Dam Safety Reviews (for Project TMF dams, required every 5 years based on “very high” dam classification). As previously noted, the Project Rehabilitation and Closure Plan and Financial Assurance will contain provisions for post-closure monitoring and maintenance of Project dams for 100 years, in the event that Marathon defaults on the Project at any time.

Dam monitoring and surveillance instrumentation will provide a record of key TMF dam performance data, including TMF water levels and flows, internal dam and downstream groundwater levels, groundwater quality upstream (natural) and downstream of the TMF, and settlement or movement of the dam itself.

The detailed engineering design (for construction) will be submitted to the Water Resources Management Division, NLDECCM to obtain the necessary approvals (permits) for construction and operation of the TMF dams. Pre-operational plans (emergency response plans, OMS) will also be submitted to the appropriate regulators for review. The Project OMS will include a reporting plan and structure to provide dam safety information (inspection reports, monitoring data) to regulators and NL Hydro.

2.3.4.2 Tailings Disposal in Leprechaun Open Pit

The Leprechaun pit will be exhausted in Year 9 of operation, at which point the tailings produced in the mill will be piped to the open pit for disposal. Approximately 11 Mt of tailings are expected to be piped to the Leprechaun open pit during Years 9 through 12, which represents only 15% of the total volumetric capacity of the open pit below the approximately discharge crest elevation. Based on the hydrogeological assessment and modelling completed to date (see assessment in Chapter 6, Groundwater VC), the permeability of the open pit (wall and floor rock) is expected to be very low and therefore water quality associated with tailings/effluent is not expected to expected to have a significant impact on the surrounding groundwater resources. For in-pit tailings storage, this makes the requirement for a liner within the pit unlikely. In addition, contact water and surface water will be directed to the Leprechaun open pit at the same time as tailings deposition is occurring to help expedite the flooding of the pit for closure. This will act to further dilute any potential parameters of potential concern (POPCs) within the tailings effluent pumped to the pit.

Marathon is currently completing the next phase of hydrogeological drilling to support detailed engineering and this additional information will be used to complete a more detailed assessment of the Leprechaun open pit with respect to tailings disposal, which will be submitted to regulators for review during the permitting process.

2.3.5 Water Management Infrastructure

Water will be managed in accordance with the Water Management Plan (Appendix 2A). Key aspects of the Water Management Plan are summarized in Chapter 7, Section 7.4.1. Water management infrastructure for the Project is designed to reduce operational risks and environmental impacts, with the following objectives:

- Reduce water inventory through perimeter berms, separation of groundwater and surface water flows and promote overland flow of non-contact runoff
- Effectively control flooding and provide water management design that produces effluent achieving regulatory effluent criteria
- Reduce final points of discharge through grading of ditches and construction of diversion channels to combine spill points to collective effluent discharge points and or sedimentation ponds
- Maintain flow to fish-bearing streams and bogs by maintaining pre-development catchments
- Reduce water management costs during operation through gravity drainage, where feasible, thus reducing pump requirements

Design parameters included a 15 m setback from fish-bearing waterbodies, in line with the Newfoundland and Labrador Policy on Flood Plain Management (DOEC 2004); consideration of climate change-associated precipitation events and associated flow; and maintaining flow to fish-bearing waterbodies where feasible (draining mine site components to pre-development catchment areas, where practicable).

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

- Diversion of non-contact water where feasible – channels and berms will be constructed around the crest of the open pits or up-hill of waste disposal piles and other developed areas to divert natural precipitation and surface runoff away to natural water drainage areas and away from contact with mining operation, where feasible
- 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)
  - 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
  - Sedimentation ponds will be appropriately sized for retention and removal (by gravity) of suspended solids (sediment)
  - Discharge from these ponds will be compliant with the applicable regulatory requirements including the MDMER pursuant to the *Fisheries Act*
- Precipitation runoff from waste rock piles and other developed areas of the site will be collected via ditches and channels and directed to downstream sedimentation ponds similar to those to be constructed for management of water from the open pits
- Sedimentation ponds will be constructed in-ground, and/or using earthen berms and till, or synthetic liners, where required, for water retention
- Sedimentation ponds have been sited based on topography and geotechnical conditions. Where feasible, water collected in pit, or in the sedimentation ponds will be used for other purposes on site rather than discharged to the environment

2.3.5.1 Water Management Complexes

The mine site is broken up into three complexes, from north to south: the Marathon Complex, the Process Plant and TMF Complex, and the Leprechaun Complex. Water management in these complexes functions independently, with decentralized water treatment and management in each. Water management components consist of sedimentation ponds, berms, drainage ditches, and pumps to collect and contain surface water runoff from waste rock, low-grade stockpiles, overburden stockpiles, topsoil stockpiles, and pits. Water management components are identified on Figure 2-30 for the Marathon Complex and Figure 2-31 for the Leprechaun Complex. Further details are provided in the Water Management Plan (Appendix 2A). Note that Figure 2-31 shows the Leprechaun waste rock pile overprinting water management infrastructure. During summer 2020 field work, it was determined that the NL 1:50,000 mapping contains an error in relation to the extent of Stream VIC-15, which extends eastward approximately 200 m farther than mapped. The Leprechaun waste rock pile has been adjusted to avoid this fish habitat, however, the design of the water management infrastructure could not be updated in time for the EIS submission. The water management design will be updated as part of the Feasibility Study that is scheduled to be completed in early 2021.

Water management features were designed under a decentralized water treatment framework, operating under gravity drainage to reduce pumping needs; however, pumps will be required to dewater the Marathon and Leprechaun pits. A pit dewatering pond was designed at a low-lying location adjacent to each pit. Cuts and fills were optimized in design to reduce initial trucking costs and use local materials. Design measures to control erosion and prevent sedimentation into a fish-bearing watercourse or waterbody include ditch and berm lining for erosion protection and energy dissipation measures, such as sediment traps and energy dissipation pools.

The Marathon Complex consists of the Marathon pit, Marathon northwest waste rock pile, Marathon topsoil stockpile, Marathon overburden stockpile, and Marathon low-grade stockpile. The Leprechaun Complex consists of a waste rock pile, Leprechaun topsoil pile, Leprechaun overburden stockpiles, and sedimentation ponds. Pond discharges will be directed locally to unnamed tributary streams to Victoria

River (70%), and directly to Valentine Lake (30%) for Marathon. The ditches and ponds will discharge to tributaries of Valentine Lake Reservoir or Victoria River. Excess runoff from the TMF not reused in processing will be routed through a polishing pond and water treatment plant prior to discharge to Victoria Lake Reservoir.

Drainage from the Marathon Complex reporting to Valentine Lake ultimately discharges to the Victoria River, which flows north to Red Indian Lake and the Exploits River system. The Leprechaun Complex will discharge locally to unnamed tributary streams to Victoria Lake Reservoir, as well as directly to Victoria Lake Reservoir. Victoria Lake Reservoir was diverted during the Bay d'Espoir hydroelectric project to the east, and the lake now drains via the Victoria Canal, Granite Canal, and Meelpaeg Reservoir to the Bay d'Espoir generating facility on the south coast of the Island.

The Process Plant and TMF Complex consists of the TMF (tailings impoundment and polishing pond), water treatment plant, process plant, truck shop wash-ROM pad, and HGO stockpile, as shown above on Figure 2-3. The process plant and the TMF will operate as a circuit with tailings being deposited in the TMF as a thickened slurry (60-75%) and process water being reclaimed via a pump and pipeline from a point downstream of the polishing pond back to the process plant.

To reduce the amount of contact water to be managed at the process plant site, the associated stormwater design is aimed at intercepting and diverting non-contact water outside of the process plant area. The process plant site pad will be graded to allow surface runoff water to drain naturally to the internal network of collection ditches that are sized to handle peak flow resulting from a 1-in-25-year rainfall storm event. The collection ditches will convey the water to a sedimentation pond at 3,000 m^3 live capacity. The pond is sized based on a 1-in-50-year event of 107 mm of precipitation in 24 h, minimum pond depth for operational purposes, maximum pond depth based on maximum operating volume, maximum storage required in combination with a discharge pumping rate, and retention time to promote settling of solids. Water in the sedimentation pond will be pumped into the process water tank as make-up water and excess water will discharge through a final discharge point (FDP) and flow into Victoria Lake Reservoir.

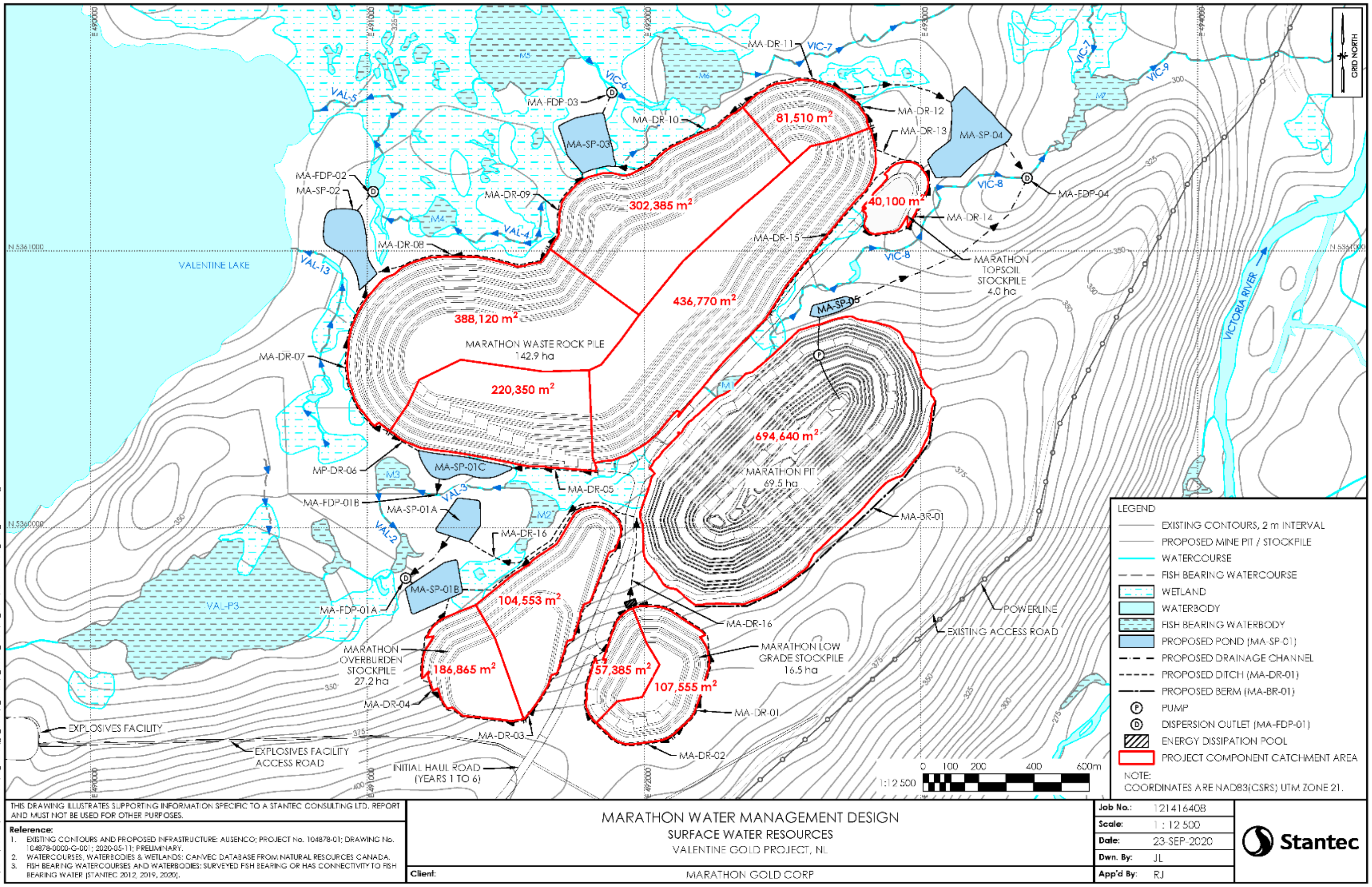


Figure 2-30 Marathon Water Management Design

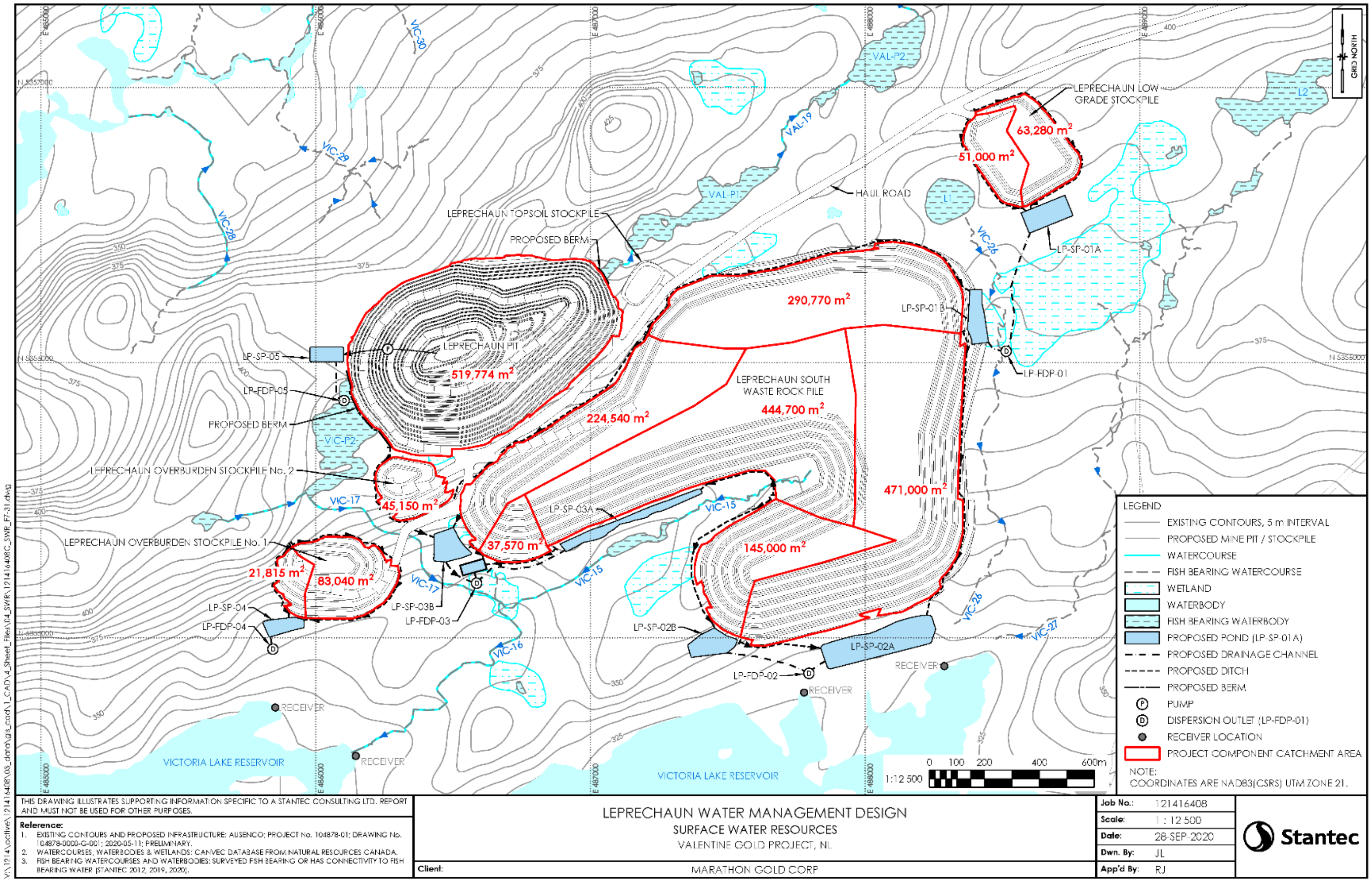


Figure 2-31 Leprechaun Water Management Design

2.3.5.2 Water Treatment Plant

A dedicated water (effluent) treatment plant is required for the Project to treat suspended solids, pH, and other water quality issues. The water treatment plant will receive discharge water from the TMF and use proven processes to treat the water to meet MDMER limits, with an estimated 5,333 operating hours per year (nominal treatment rate of 170 m^3/h and a peak flow rate of 255 m^3/h). The plant will operate for eight months of the year, from April to November. Following treatment, the water will be retained in the polishing pond for an estimated five days prior to being directed and discharged to Victoria Lake Reservoir.

2.3.5.3 Sedimentation Ponds

Ditches will be constructed along the perimeter of piles to convey the 1:100 AEP surface runoff and toe drainage to sedimentation ponds for water quality and quantity control. Ditch runs have been designed to convey flow through gravity to reduce operational costs of pumping. Ditch excavation materials will be sidecast and berms constructed of the sidecast glacial till material following a standard trapezoidal geometry to reduce construction costs.

Contact water treatment design focused on sedimentation, as this will reduce TSS concentrations and the particulate fraction of metals. Ponds are designed primarily to meet the minimum residence time required for sediment to settle 1 m reaching a trapping efficiency of 80%. Runoff from the water quality design storm event will be detained in the sedimentation pond for a minimum of 24 hours. A subsurface low-level outlet will also act as a hydrocarbon and Light Non-Aqueous Phase Liquids (LNAPL) containment feature as well as to reduce thermal discharge effects.

The sedimentation ponds are designed with multiple outlets to incorporate system flexibility to manage water under variable climatic conditions. Sedimentation ponds are sized to store runoff from the Project component areas for storm events up to 1:100 AEP with spring snowmelt and emergency spillways to accommodate the 1:200 AEP flow. The capacity of each sedimentation pond is designed such that any effluent is discharged gradually from the pond, to enhance baseflow augmentation to provide flood attenuation and reduce downstream scour and erosion.

Effluent is subject to MDMER and ECWS Regulations, with set maximum allowable limits for the discharge of specific deleterious substances (e.g., metals and TSS) and a daily flow volume monitoring requirement at each FDP. Where feasible, points of sedimentation pond effluent have been combined, to reduce the number of FDPs. The sedimentation ponds were designed such that the effluent will meet MDMER and ECWS Regulations limits prior to release to the receiving environment. Sedimentation pond berms were designed to be constructed lower than 2.5 m from the toe of the downstream slope to the dam crest and therefore do not trigger CDA safety guidelines.

2.3.5.4 Site Water Balance

A site-wide water balance was completed to estimate the quantity of mine site contact water expected to be managed during the operational phase of the Project to support the pre-feasibility study. Figure 2-32 and Figure 2-33 show the water balance gains and losses for each mine component identified in the three complexes, in cubic metres per hour, under normal climate conditions. Actual instantaneous flows will vary significantly by month and by varying annual climate conditions.

The water balance accounted for the precipitation and groundwater gains and evaporation, transpiration, and infiltration losses of each identified mine site component. The water balance represents the mine site components at full development during operation. Average precipitation at the mine site was represented by the climate normals precipitation (1981 to 2010) for the Environment and Climate Change Canada (ECCC) climate station Buchans (Station ID 8400698). A proportion of precipitation in the cold months of December through March was assumed to be stored as snow with melt occurring in the months of April through June. Groundwater and surface water inflows to the pits were based on a hydrogeological model developed by others (Terrane 2019) (Appendix 2C). Evaporation from ponds at the site was represented by the average evaporation rate (mm/month) reported at the Stephenville and Gander ECCC climate stations (Station IDs 8401700 and 8403800).

The percentage of precipitation that results in runoff was accounted for in the water balance model through a runoff coefficient. The runoff coefficient of the mine infrastructure components was 76%, assuming that piles are already wetted and water will not be lost due to saturation of the pile.

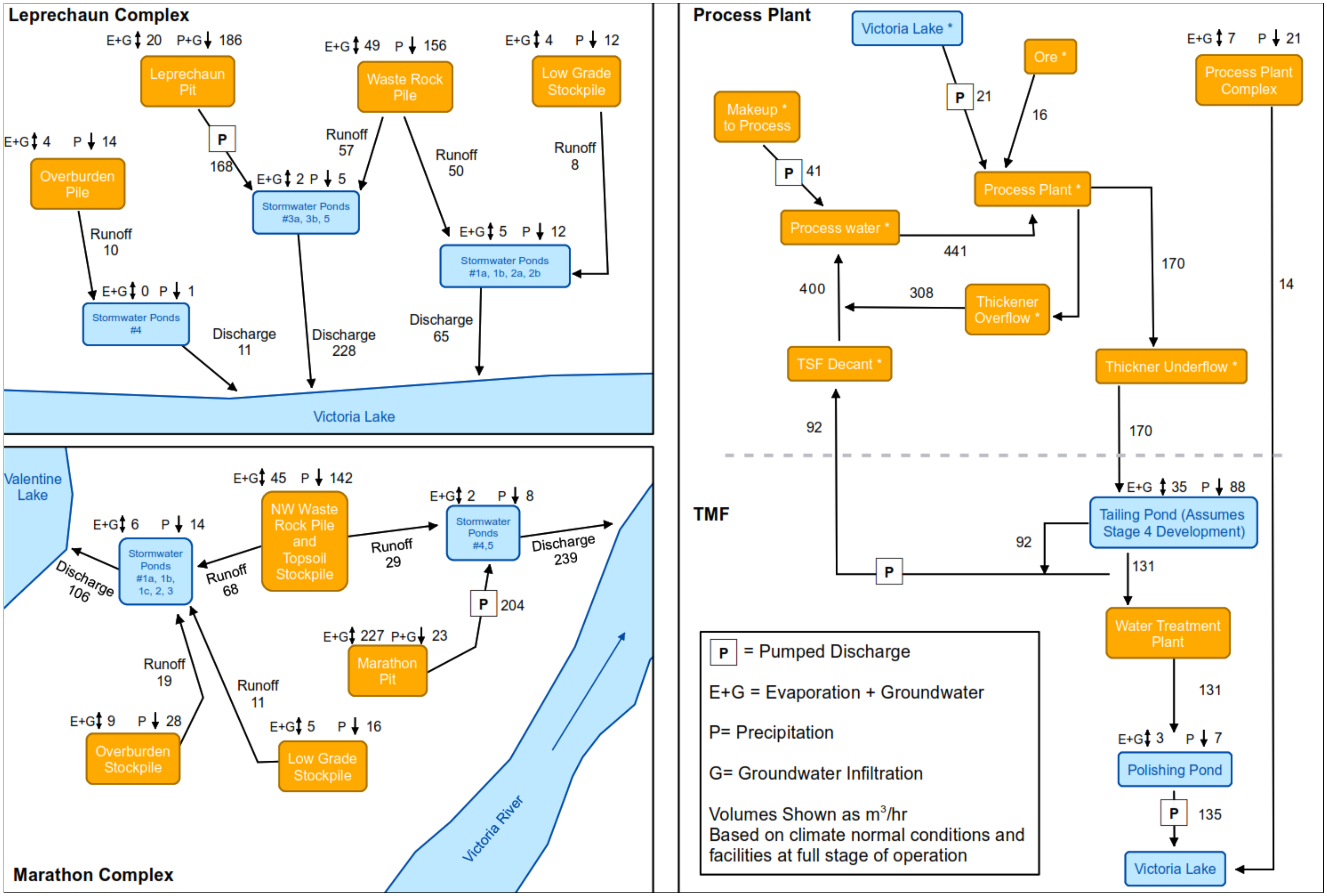


Figure 2-32 Site-wide Water Balance - Phase 1

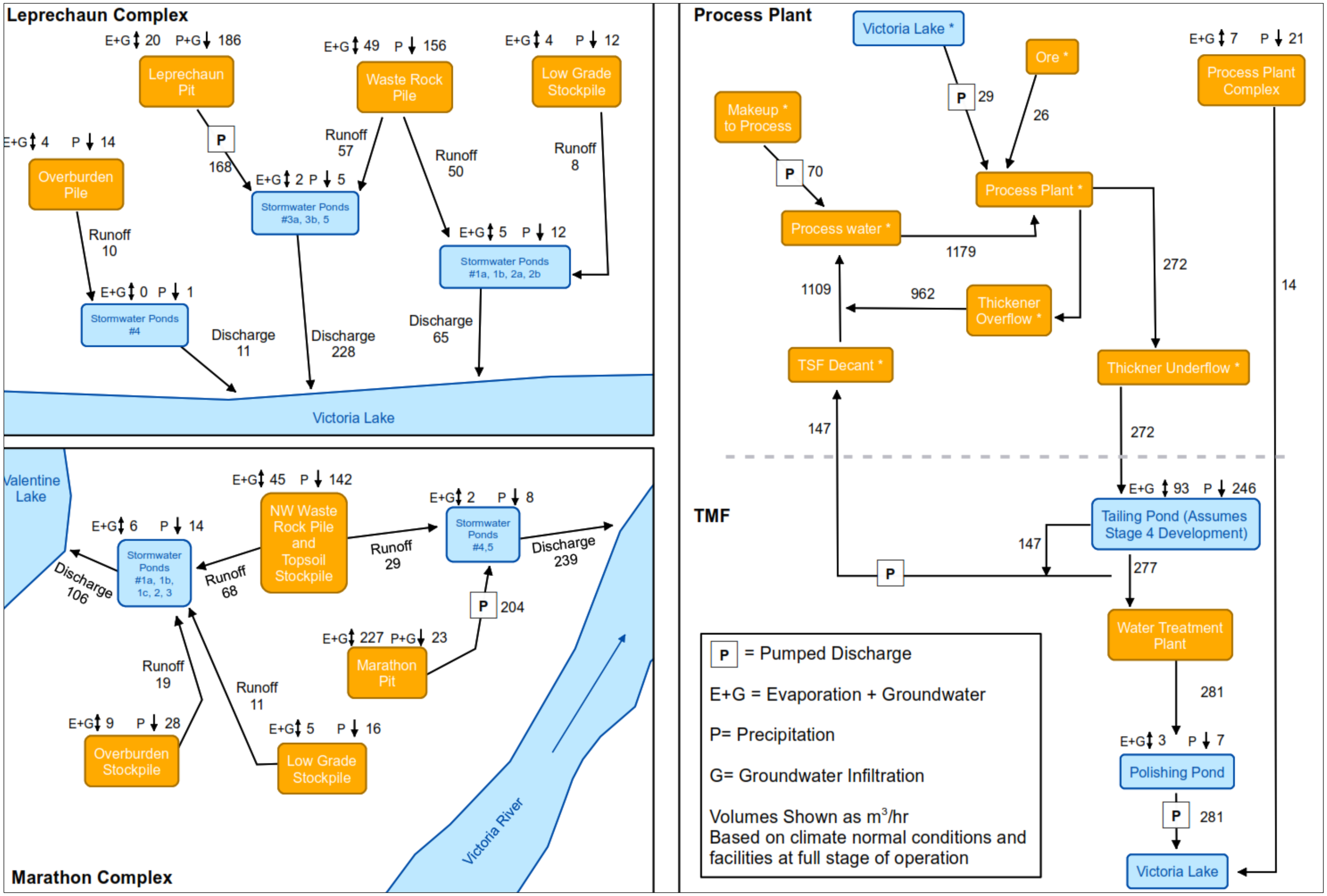


Figure 2-33 Site-wide Water Balance - Phase 2

2.3.6 Water Intake and Distribution

2.3.6.1 Raw Water Supply System

Raw water is anticipated to be obtained from Victoria Lake Reservoir. It will be pumped from the intake to the raw water tank and distributed to the process plant and the potable water treatment system. The bottom portion of the raw water tank (minimum reserve) will be dedicated for the fire suppression system. Raw water will primarily be used for purposes that require clean water with low dissolved solids, including:

- Fire water for use in the sprinkler and hydrant system
- Cooling water for mill motors and mill lubrication systems
- Gland water for pumps
- Reagent mixing
- 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

2.3.6.2 Fire Suppression and Water Supply System

All facilities will have a fire suppression system in accordance with the structure's function in accordance with the applicable codes and standards. Fire water will be piped from the raw water tank 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 handheld 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.

2.3.6.3 Potable Water Supply

The potable water treatment plant will be designed to meet the Guidelines for Canadian Drinking Water Quality and monitored in accordance with NL monitoring and reporting requirements. 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 TMF. 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.

2.3.6.4 Process Water Supply

Process water recycled from the flotation concentrate and tailings thickeners overflow and TMF decant water will meet the main process water requirements. A small amount of make-up water and elution water will be pumped from Victoria Lake Reservoir to the process plant, amounting to approximately 13% of process water (2.5 Mt/a scenario) and 8% of process water (4.0 Mt/a scenario).

2.3.6.5 Rehabilitation and Closure

Water will also be withdrawn for the purpose of expediting open pit filling times during closure. Natural surface water runoff and groundwater infiltration is proposed to be supplemented from Valentine Lake for the Marathon pit and from Victoria Lake Reservoir for Leprechaun pit.

2.3.7 Sanitary Effluent

Sewage system design, including capacity requirements, will be based on the Guidelines for the Design, Construction and Operation of Water and Sewerage Systems (Government of NL, 2005) on the basis of full accommodations camp capacity. 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). Sewage effluent will be treated and monitored in accordance with the NL ECWS Regulations prior to discharge to the environment. Sludge generated as a by-product of the treatment of sewage will be collected by a licensed contractor for offsite disposal.

2.3.8 Power Supply and Associated Infrastructure

Site power will be provided from a 66 kV high voltage (HV) line extending from the Star Lake area to the main substation at the mine site, constructed and connected by NL Hydro, and who will own and maintain the line. A peak demand of 22 megawatts (MW) is required for the mine operation: 18 MW are required for Phase 1, and an additional 4 MW will be required for the Phase 2 expansion.

It is anticipated that the HV line will follow the existing rights of way (gravel roads between the grid connection and the Project site), thereby eliminating the creation of a new corridor. Preliminary routing of the HV line is provided in Figure 2-35. Consultation with NL Hydro is ongoing, with the exact power line route, connection details, and power purchase agreement to be determined through further consultation.

A peak demand of 23 MW is required for the Project. The 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. Four standby diesel generators in weatherproof enclosures will be at site throughout the operation phase to supply critical process loads and life safety systems.

2.3.8.1 Electrical Distribution

The plant electrical system is based on 13.8 kilovolt (kV), 2,000 A, 60 hertz (Hz) distribution. The 66 kV feed provided by NL Hydro 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
- Flotation plant main substation
- Flotation plant feed preparation substation
- Flotation 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.

2.3.8.2 Electrical Buildings

Electrical buildings will be prefabricated ‘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.

2.3.8.3 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, cooling configuration and will have either on-line tap changer 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.

2.3.9 Other Plant Site Buildings

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

2.3.9.1 Administration and Change Facility

The administration office will be a 23 m (wide) x 64 m (long), single-storey building located south of the process plant. The building will include offices, meeting rooms, lunchroom, washrooms, men's and women's dry, lockers and showers. The buildings will be of prefabricated modular construction, placed on precast concrete block footings.

2.3.9.2 Warehouse

The warehouse will be located immediately west of the administration, security and change facility. The building will be of poured concrete foundation and steel-clad construction.

2.3.9.3 Laboratory

The laboratory will be located north of the warehouse, and will be an assortment of prefabricated, single-storey, modular buildings placed on precast concrete blocks, totalling 180 m^2 of area, and housing the equipment required for typical site assays. Ventilation equipment will be installed as required by regulation for the types of test work conducted.

2.3.9.4 Security Gate

The security gatehouse will have separate boom gates for vehicle access and personnel. Gate security personnel will have a security shack with an area where training can be performed for visitors and new employees.

2.3.9.5 Maintenance and Storage

A vehicle maintenance and storage area will be located at the southwest end of the process plant and will consist of areas for general maintenance and storage, light vehicle storage, and vehicle maintenance.

2.3.9.6 Mine Services

The mine services area will be located on a separate pad to the west of the process plant, with easy access to the haul road and ROM pad. A 3-dimensional visual rendering of the mine services area and ROM pad is provided as Figure 2-34. Service areas and buildings will include mine offices, a mine truck wash, a truck shop (maintenance), and a fuel station. The truck shop 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. Diesel fuel for heavy and light vehicle refueling will be stored at the mine services area, as described in Section 2.3.13.

Figure 2-34 Mine Services Area and ROM Pad

2.3.10 Roads

2.3.10.1 Access Road to Site

Access to the Project is via existing gravel public access roads from Millertown as shown in Figure 2-35. The initial 8 km part of this roadway leaving Millertown is a public roadway which is operated and maintained by the Province of NL. The roadway is otherwise primarily maintained (e.g., grading, snow clearing) by Marathon. The 76 km class D gravel road extending from the turnoff near the Millertown Dam to the mine site 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 small, existing borrow pits along the 80 km route, and possibly from site generated rock materials.

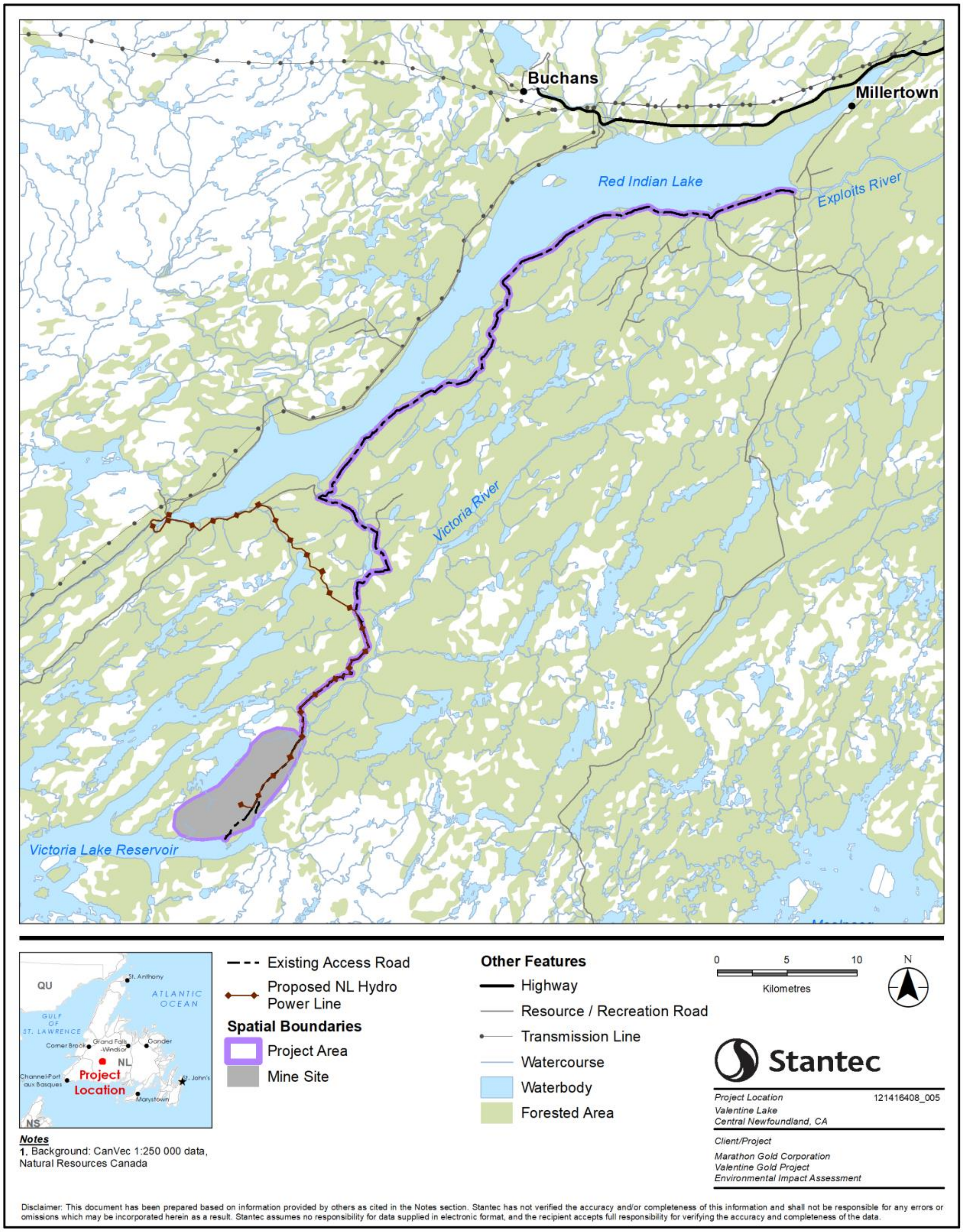


Figure 2-35   Routing of Access Road and Power Line

2.3.10.2 Plant Site Roads

Plant site roads will provide access to the administration area, process plant facilities, accommodations camp, 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 process plant area.

2.3.10.3 On Site Roads and Haulage Roads

Several onsite roads will be constructed to access infrastructure, such as the TMF and other site infrastructure. These site 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 designed to haulage road construction specifications to accommodate haul truck loads, meeting grades and passing (2-way traffic) requirements. The width and grades of these roads will vary accordingly and will typically be 30 m wide. Where practicable, haulage roads will be kept separate from other site access roads for safety reasons.

2.3.10.4 Stream Crossings

As Project planning and engineering proceed, existing infrastructure at stream crossings along the 76 km access road will be evaluated for possible upgrade or replacement. In addition to culvert upgrades or replacements (where required), eight existing steel bridges along the access road will be inspected to determine if upgrades or repairs are required. This work will be done in consultation with the NL Department of Fisheries, Forestry and Agriculture (NLDFFA), Forestry Division as the owner.

New stream crossings will also be needed on some site roads. New culverts will be sized appropriately and designed to maintain fish passage. Applicable regulatory approvals will be obtained prior to starting stream crossing upgrades or installations. Marathon will employ design and construction best practices and adhere to all conditions of approval.

The following information describes the types of new and existing stream crossings that may be used to upgrade, replace or install stream crossings, and includes photos of the stream crossing types.

Type 1: Bridge

A bridge consists of steel trusses with a concrete or steel girder superstructure, providing a large span over major streams or rivers. The superstructure rests on concrete or timber foundations placed on the two banks of the stream and may have intermediate mid-stream foundations. This crossing type does not change the natural stream bed substrate or flow velocity, nor does it change natural stream width.

Figure 2-36 Type 1 - Bridge

Type 2 – Arch Culvert

An arch culvert consists of single or multiple bottomless corrugated steel plate arches spanning a major creek or stream. The foundations of the arch rest on concrete strip footings placed on the two banks of the stream. This crossing generally does not change the natural stream bed substrate or flow velocity; however, riprap may be required on the stream bed to prevent erosion that may compromise the foundations, which does change the stream bed substrate and/or flow velocity. This crossing generally does not change natural stream width.

Figure 2-37 Type 2 - Arch Culvert

Type 3: Box Culvert

A box culvert consists of a single or multiple rectangular reinforced concrete box culverts resting on compacted engineered fill on the stream bed. The size and quantity of culverts is designed to accommodate the maximum flow of water. Aquatic connectivity (fish passage) during different seasons may be accommodated, however it is not specifically designed for. The stream bed at this crossing is changed to a concrete floor.

Type 3F: Box Culvert (Fish Passage)

With similar construction to Type 3 - Box Culvert, this version specifically accommodates aquatic connectivity (fish passage) during various flows and seasons.

Figure 2-38 Type 3 - Box Culvert

Type 4: Round Pipe Culvert

A round pipe culvert consists of a single or multiple round corrugated steel, reinforced plastic, or concrete pipes resting on engineered compacted bedding.

The size and quantity of culverts is designed to accommodate the maximum flow of water. Aquatic connectivity (fish passage) during different seasons may be accommodated, however is not specifically designed for. The stream bed at this crossing is changed to a concrete floor for concrete pipe culverts or to ribbed steel for corrugated steel / plastic pipe.

Type 4F: Round Pipe Culvert (Fish Passage)

With similar construction to Type 4 - Round Pipe Culvert, this version specifically accommodates aquatic connectivity (fish passage) during various flows and seasons.

Figure 2-39 Type 4 - Round Pipe Culvert

Existing conditions for fish and fish habitat have been evaluated at the existing and proposed stream crossings at site and along the access road identified on Figure 2-40. These stream crossing locations are shown at a finer scale in the series of figures provided in Appendix 2D.

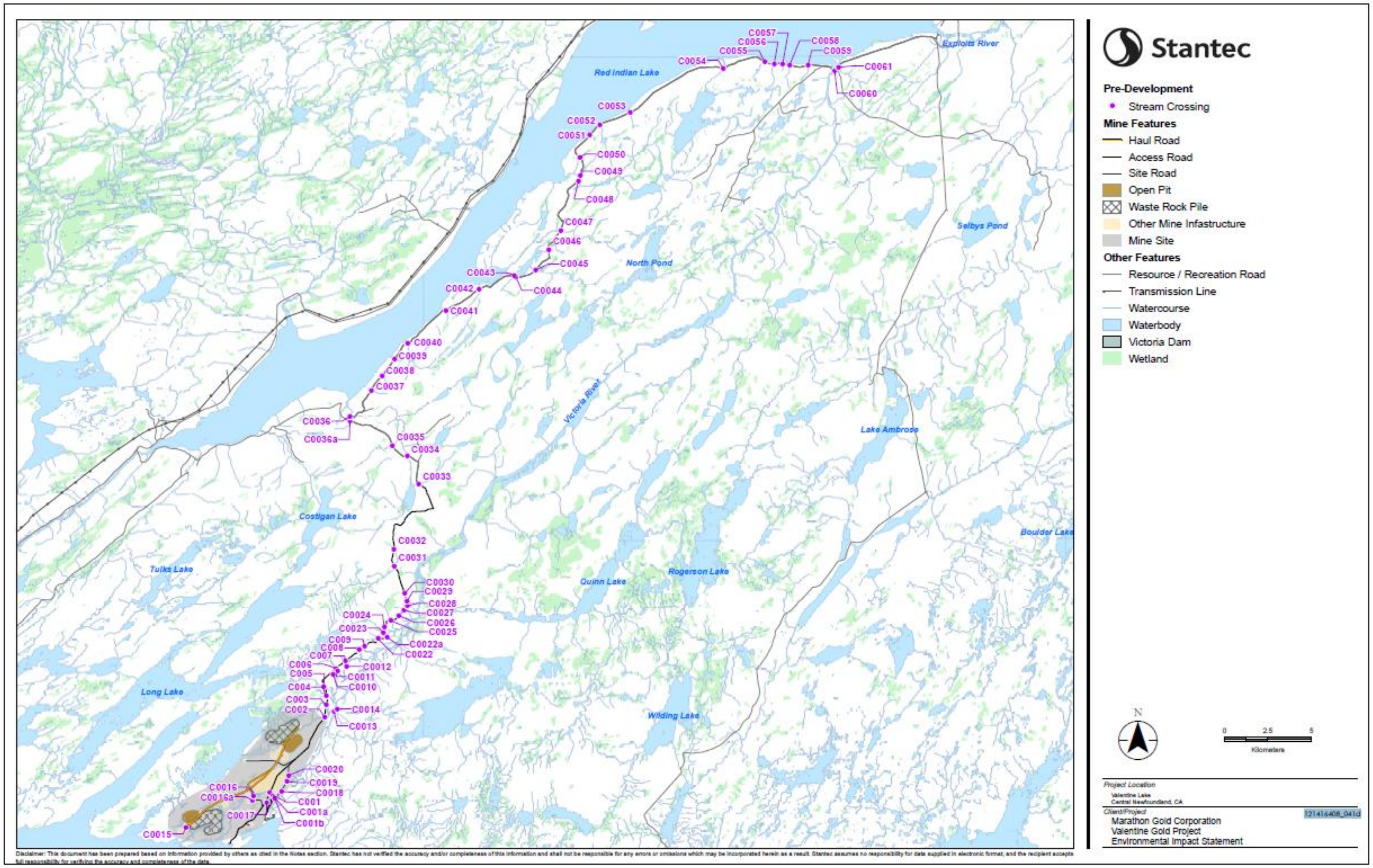


Figure 2-40 Stream Crossing Locations

2.3.11 Accommodations Camp

A permanent 300-person accommodations 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. It is expected that the existing exploration camp will be refurbished and used for the first six months of construction until the accommodations camp is operational, then maintained for overflow accommodations.

Accommodations will be provided in single-occupancy, 30- to 44-person dormitories. Rooms will be approximately 6.5 m^2 with a mix of ensuite or jack-and-jill style shared washrooms. Kitchen / dining, recreational and laundry facilities will be shared and linked to the dormitories through climate-controlled corridors.

The number of beds in camp takes into consideration all personnel, as there is the possibility of access restrictions due to weather conditions. Short-term workforce spikes associated with TMF construction are anticipated to align with the peak operation workforce.

2.3.12 Explosives Storage and Production

The explosives storage and production area, to be located to the northwest of the TMF, will consist of four main components: bulk ammonium nitrate storage, bulk emulsion storage, an emulsion production facility, and storage for explosive and blasting accessories (e.g., detonators, boosters, detonating cords). The planned facilities will enable storage of approximately 150 metric tonnes of ammonium nitrate (AN) prill (a one-week supply), and up to 30 tonnes of bulk emulsion. This location respects buffers mandated by Natural Resources Canada’s Explosives Regulatory Division (NRCAN), to people, roadways and infrastructure of the mine. The gated 150 m X 150 m explosive pad will have a buffer of 1.1 km to all other site facilities and operations.

Ammonium nitrate mixed with fuel oil (i.e., ANFO), which has no water resistance and is readily soluble, is not being considered for this Project; rather, the blasting will be conducted with an emulsion, which is a combination of liquefied ammonium nitrate in a fuel/wax matrix, providing the required water resistance. The emulsion will be manufactured on site; the AN will be delivered in a prill / flaked form (solid), shipped in 1,000 kg IBC bags packed in a shipping container. Fuel oil (likely diesel) is added in the manufacturing process as part of the emulsifier. As part of the emulsion manufacturing process, the ammonium nitrate prill is first transformed into a solution with steam and water, and then is combined with the fuel phase, which contains fuel oil and waxes.

It is anticipated that ammonium nitrate shipments will arrive by cargo ship to Corner Brook or another suitable port facility, where containers will be off-loaded and moved to a local storage facility. The containers will be transported overland to the mine site.

High explosives and detonators will be transported by the explosives’ supplier from their central storage facility to the mine explosives magazines by truck on an as need basis.

The oil phase component of the emulsion will be transported via highway tanker from its point of manufacture to the storage tank to be located at the on-site manufacturing facility.

The storage and production facilities are designed to meet all government regulations including required separation distances as regulated by the Explosives Regulatory Division of NRCAN. All explosives and accessories will be stored at the planned NRCAN approved magazine site and explosive storage facility.

2.3.13 Fuel Station

The fuel station will consist of a 30 m (long) x 20 m (wide) open-air, reinforced, concrete containment area located adjacent to the truck shop. The fuel station will service the on-site mine equipment and mobile fleet.

Diesel fuel will be stored on site near the ROM pad for heavy and light vehicles. Diesel fuel storage and supply will be provided by a fuel supplier and will include a total volume of 450 m^3 of fuel storage, offloading pumps, dispensing pumps, associated piping and electronic fuel control/tracking.

The fuel storage and handling facilities will be designed to and compliant with the *Storage and Handling of Gasoline and Associated Products Regulations, 2003* enacted under the NL *Environmental Protection Act*.

2.4 CONSTRUCTION ACTIVITIES

General construction activities for the Project include:

- Site Preparation: cutting and clearing of vegetation and removing organic materials and overburden on areas to be developed and developing construction stage water and erosion control (e.g., ditching, temporary / permanent sedimentation ponds) and access roads
- Earthworks: facilitating construction of infrastructure development areas by excavating, preparing excavation bases, placing structural fill, and grading; stripping and stockpiling organic and overburden materials from open pits; and use of open pit development rock for earthworks, such as structural fill and road gravels
- Infrastructure Construction: placing concrete foundations and constructing buildings and Project infrastructure
- Equipment Installation: installing major Project equipment and supporting infrastructure
- Utilities Installation: constructing and connecting power, water and fuel supply infrastructure
- TMF Construction: constructing the first phase of the TMF including the Phase 1 dam, water treatment plant, and polishing pond

Further details on specific construction and development activities are provided below. Construction activities will be conducted in accordance with a construction Environmental Protection Plan (EPP) under the Project Environmental Management System (EMS) (Section 2.7), and in respect of the conditions of EA release and all permits specific to construction activities. It is expected that construction activities will be governed also by the terms of a Certificate of Approval issued under the NL *Environmental Protection*

Act. Marathon will employ environmental monitors / technicians and environmental consulting firms and labs to monitor environmental conditions relative to the baseline studies conducted prior to construction.

2.4.1 Vegetation Removal

In preparation for earthworks, site development, and infrastructure construction, vegetation will be removed over development areas in accordance with cutting permits. Vegetation removal will be planned as per the regulations pertaining to bird breeding seasons and recommended buffers around wetlands and waterbodies, where feasible. Note that as per the current schedule, initial construction activities (including vegetation clearing) are scheduled for late 2021 and early 2022 and are therefore expected to be conducted outside of bird breeding seasons. However, where/if the schedule requires vegetation clearing during bird breeding season, experienced environmental monitors will conduct nest sweeps in accordance with the Avifauna Management Plan, inspecting areas to be cleared to avoid disturbing active nests.

2.4.2 Earthworks

The Project will require earthworks development throughout the Project Area to support infrastructure, such as roads, buildings, TMF dams and sedimentation ponds. Surface elevations vary across the site, as do soil conditions which range from boggy areas, thin to thick till layers, and bedrock outcrops.

Earthworks construction will include excavation of unsuitable materials (e.g., organic and/or loose soils), preparation of excavation bases, and placement of fill materials (e.g., rockfill, overburden (glacial till)) to develop the access and haul roads, building and stockpile pads, water management infrastructure, tank containment berms, and associated site infrastructure. A Rock and Soils Management Plan will be developed as part of construction planning to optimize earthworks across the site, minimizing excavation and re-handling, and maximizing the re-use of materials for earthworks construction.

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 millimetre (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. 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.

Organic and overburden soils excavated during earthworks construction will be stockpiled strategically around the site for future site rehabilitation as described in Section 2.6.

2.4.3 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. No local sources of fine aggregates (sand) have been identified and these materials may need to be imported to site. If required by the Project schedule, some pre-cast of larger building footings may be poured off-site and transported to the site.

2.4.4 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, including the *Storage and Handling of Gasoline and Associated Products Regulations, 2003* under the NL *Environmental Protection Act.*

2.4.5 Materials Shipping and Employee Transportation

Materials required for Project construction will be shipped to site by truck via the access road. Given the approximately two-hour travel time from Millertown to the site, there will be no daily commuting to the site. Employees will be transported from nearby communities by bus and stay in the on-site accommodations camp. During construction, an average of six vehicles per day on the access road is anticipated, with a peak of 18 vehicles per day on rotation change days.

Materials will be sourced locally where practicable. Some specialized equipment will need to be sourced from outside the province / country. For example, the haul truck fleet is not available locally and will arrive by boat at a Newfoundland port where it will be offloaded, loaded onto flatbed trucks and transported directly to site. Other supplies may arrive to the Island by ferry or cargo ship prior to being transported by truck to site.

2.4.6 Initial Open Pit Development

Prior to the plant start-up, organic and overburden soils will be excavated and stockpiled strategically for future site rehabilitation as described in Section 2.6, and mill feed will be mined and stockpiled, with waste rock used in the construction of the mill area and ROM and truck shop pads, as required. At the conclusion of the preproduction period, enough exposed mill feed material, as well as stockpiled material, will be available to commence and sustain processing operation. See Section 2.5.1 for the life-of-mine production schedule projecting total resource milled and waste mined and moved.

2.4.7 Tailings Management Facility

The TMF consists of the tailings impoundment and the polishing pond, which are described below. The TMF will store approximately 30 Mt of tailings to be processed over the initial nine years of the mine life. Tailings will subsequently be deposited in the mined-out Leprechaun Pit for the remaining mine life.

2.4.7.1 TMF Construction

The TMF embankment will be constructed in five stages by implementing downstream dam raise methods. Mine waste rock from the pit developments will be the primary embankment construction material and will use approximately 8,650,000 m^3 (18,300,000 t) of waste rock that would otherwise be stored in the waste rock piles. Note that in constructing the TMF embankment, mine waste will not be placed in fish-bearing waters. The upstream embankment will be lined with a geomembrane to reduce or avoid potential seepage, and underlain by a geotextile, a fine filter layer and a coarse filter layer. The filter zones will be processed material crushed from waste rock material. Excess water within the TMF will be controlled, collected and recycled to the process plant as practicable.

2.4.7.2 Polishing Pond Construction

The polishing pond, to be located downstream of the tailings impoundment, will have a footprint area of 4.1 ha. The pond will be constructed as part of the initial TMF with an operational capacity of 44,000 m^3. The pond will be lined with a geomembrane, similar to the upstream slope of the TMF embankment. The pond is designed to provide sufficient residence time for the settlement of solids. A retention time of five days was assumed, based on a nominal flow through rate of 115 cubic metres per hour (m^3/h) and a peak flow rate of 280 m^3/h, which is sufficient to treat runoff, precipitation, and process flows for up to a 25-year wet precipitation year. To promote settling, the pond is designed with a length-to-width ratio of 5:1. The design also allows for up to 0.5 m of solids accumulation and has a minimum freeboard of 2 m above the maximum operating level.

2.4.8 Power Distribution

Power for construction and the site offices will be provided from the 6.9 kV overhead line and a pad mount transformer. Initial power for construction will be provided by diesel generators.

Site power for operation will be provided from a HV line extending from the Star Lake area to the main substation at the mine site. The 66 kV HV line will be constructed and connected by NL Hydro, and it is anticipated that the line will follow the existing rights of way (gravel roads between the grid connection and the Project site). As described in Section 2.3.8, consultation with NL Hydro regarding power line routing is ongoing, with the exact power line route, connection details, and power purchase agreement to be determined through further consultation.

2.4.9 Construction Labour Requirements

Table 2.9 provides estimates of construction-related total direct employment (in FTEs), and the related National Occupation Classification (NOC) codes Canadian labour. A FTE of employment is typically equivalent to approximately 2,000 hours of work. Construction is estimated to require a peak labour force of approximately 625 full-time equivalents (FTEs) (an average of 320 FTEs).

Table 2.9 Construction-Related Estimate of Direct Employment (FTEs) by Four-Digit NOC Code

Category	NOC	Description	Construction (FTEs)	
			Pre-production	Phase 2 Expansion
Trades and Production Occupations	7521	Heavy equipment operators (except crane)	65	9
	7311	Construction millwrights and industrial mechanics (except textile)	55	8
	7511	Truck drivers	52	7
	7237	Welders and related machine operators	35	5
	9411	Machine operators, mineral and metal processing	31	4
	7312	Heavy-duty equipment mechanics	28	4
	7242	Industrial electricians	28	3
	9611	Labourers in mineral and metal processing	22	3
	8614	Mine labourers	19	3
	7452	Material handlers	18	2
	7371	Crane operators	14	2
	7611	Construction trades helpers and labourers	13	2
	7252	Steamfitters, pipefitters and sprinkler system installers	12	1
	9241	Power engineers and power systems operators	11	1
	7372	Drillers and blasters - Surface mining, quarrying and construction	7	1
	7612	Other trades helpers and labourers	4	1
	7271	Carpenters	2	1
	7251	Plumbers	1	-
Professional and Physical Science Occupations	2113	Geologists, geochemists and geophysicists	21	3
	2143	Mining engineers	14	2
	2121	Biologists and related scientists	2	1
	2131	Civil engineers	2	-
Human Resources and Financial Occupations	1111	Financial auditors and accountants	12	1
	0112	Human resources managers	5	1
	0111	Financial managers	5	1
	1121	Human resource professionals	2	-
	1112	Financial and investment analysts	2	-

Table 2.9 Construction-Related Estimate of Direct Employment (FTEs) by Four-Digit NOC Code

Category	NOC	Description	Construction (FTEs)	
			Pre-production	Phase 2 Expansion
Support Workers	1414	Secretaries (except legal and medical)	12	1
	2263	Inspectors in public and environmental health and occupational health and safety	12	1
	2261	Non-destructive testers and inspection technicians	7	1
	9415	Inspectors and testers, mineral and metal processing	5	1
	1523	Production clerks	5	1
	1525	Dispatchers and radio operators	4	1
	6322	Cooks	9	1
	1241	Administrative clerks	2	1
	2234	Construction estimators	1	-
	6541	Security guards and related security service occupations	-	-
	2262	Engineering inspectors and regulatory officers	1	-
Technical Occupations	2154	Land surveyors	9	1
	2171	Information systems analysts and consultants	4	1
	2243	Industrial instrument technicians and mechanics	7	1
	2232	Mechanical engineering technologists and technicians	7	1
	2212	Geological and mineral technologists and technicians	5	1
	2211	Chemical technologists and technicians	5	1
	2231	Civil engineering technologists and technicians	5	1
	2253	Drafting technologists and technicians	5	1
	2241	Electrical and electronics engineering technologists and technicians	5	1
	2255	Mapping and related technologists and technicians	4	1
	2254	Land survey technologists and technicians	4	1
	2233	Industrial engineering and manufacturing technologists and technicians	2	-
	2221	Biological technologists and technicians	5	1
Supervisors, Coordinators, and Foremen	0811	Primary production managers (except agriculture)	12	1
	8221	Supervisors, mining and quarrying	12	1
	9211	Supervisors, mineral and metal processing	5	1
	0211	Engineering managers	7	1
	0711	Construction managers	7	1
	7301	Contractors and supervisors, mechanic trades	5	1
	7203	Contractors and supervisors, pipefitting trades	5	1

Table 2.9 Construction-Related Estimate of Direct Employment (FTEs) by Four-Digit NOC Code

Category	NOC	Description	Construction (FTEs)	
			Pre-production	Phase 2 Expansion
Total			**660**	**93**

Notes:
- Not applicable
Source: Adopted from SC 2020; Mining Industry Human Resources Council 2015

2.5 OPERATION ACTIVITIES

It is anticipated that the Project will be operated and maintained pursuant to a number of key approvals. Principal among these will be a Certificate of Approval to operate the mine, mill and TMF (issued under the NL *Environmental Protection Act*), a mill licence issued under the NL *Mining Act*, and a development plan approved under the *Mining Act*.

The following summarizes key operation and maintenance activities for the Project:

- Open Pit Mining: blasting, loading and haulage of rock from the open pits using conventional mining equipment, in sizes and numbers optimized for the operation
- Utilization of Excavated Rock: rock excavated from the open pits that will not be processed for gold will be used as engineered backfill for post-construction site development (e.g., TMF dam raises), maintenance and progressive rehabilitation, or will be deposited in waste rock piles
- Ore Hauling: ore extracted from the open pits will be hauled to stockpiles and the processing area where it will be crushed and ground, then processed to extract the gold via gravity, leaching and flotation processes
- Tailings Management: process waste (tailings) will be pumped to an engineered TMF in Years 1 through 9, to the exhausted Leprechaun open pit thereafter. Tailings dam raises will be constructed during the operational phase of the Project to achieve the ultimate storage capacity requirement
- Contact Water and Effluent Management and Treatment: contact water and process effluent will be managed on site and treated to remove sediments and deleterious substances prior to discharge to the environment; where feasible, water will be diverted around site features, and site contact and process water will be reused on site where practicable – treatment of discharge from the tailings impoundment will be conducted via a water treatment plant and polishing pond prior to release to the environment
- Transportation, Storage and Use of Reagents, Hazardous Materials and Fuels: will be conducted in accordance with applicable regulations and guidelines

- New and Modern Technologies, Equipment and Industry Best Practices: current planning and design for the Project is based on ‘conventional’ and proven mining and milling techniques and processes; however, Marathon will incorporate and employ new and modern technologies and equipment and industry best practices where feasible to reduce adverse effects on the environment and, where available, will investigate and consider new and emerging technologies to further improve the ‘environmental footprint’ of the Project
- Update of Procedures and Plans: Marathon will update environmental procedures and plans (developed for construction) under the EMS to address potential environmental impacts associated with mine and mill operation and sustaining development activities (e.g., phased TMF construction) – there are numerous environmental plans and monitoring programs required under the Certificate of Approval and other permits that Marathon will incorporate into the EMS for the operation phase of the Project
- Infrastructure, equipment and facilities will be subject to regular inspection and maintenance throughout the life of the Project. Equipment and infrastructure will be inspected, maintained and tested in accordance with current and future standards and regulatory requirements. Marathon will maintain the access road that begins at Millertown, aside from the first 8 km which will be maintained by the Province of NL. Marathon will maintain all site roads, including activities such as culvert maintenance, pick up of refuse, grading and road repairs, snow removal and ice control, traffic sign installation and repairs, dust control, traffic signal maintenance, and vegetation control. Maintenance of site power lines (e.g., vegetation control), including regularly scheduled inspections, will be conducted to allow for safe and reliable operation.

2.5.1 Mining

2.5.1.1 Mining Sequence

The open pit operations are planned to run for ten years, including one year of pre-production. Following pit operations, stockpile re-handling operations will continue for a further three years. Life of mine activities are summarized in

Table 2.10 Annual Mine Activities

Year	Activity
Y-1	• Clearing and grubbing the Phase 1 and 2 Marathon pit and Phase 1 Leprechaun pit. • Clearing and grubbing of ex-pit haul road, ore stockpile and overburden stockpile footprints. • Removal and stockpiling of topsoil from pit areas. • Removal and stockpiling of overburden from the pit areas. • Haul road construction from the pits to the stockpiles, crusher and tailings dam. • Initial Grade Control delineation drilling to the 308 bench of the Marathon Phase 1 pit and the 350 bench of the Leprechaun Phase 1 pit. • Mining of the Marathon Phase 1 pit down to 338 bench. • Mining of the Leprechaun Phase 1 pit down to the 380 bench. • Delivery of construction rock to the facilities area, for use in the ROM, truck shop, mill and explosives storage pads. • Delivery of construction rockfill to Stage 1A of the tailings dam, remaining waste rock to waste rock piles. • Stockpiling HGO on the ROM Pad and HGO stockpile for use in mill commissioning.

Table 2.10 Annual Mine Activities

Year	Activity
Y1	• Clearing and grubbing of the waste rock pile footprints. • Clearing and grubbing Phase 2 Leprechaun pit. • Removal and stockpiling of topsoil from Leprechaun Phase 2 pit. • Marathon Phase 1 pit mined down to 290 bench, Phase 2 mined down to 344 bench. • Leprechaun Phase 1 pit mined down to 326 bench. • Re-handle of stockpiled HGO. • Delivery of construction rockfill to Stage 1B of the tailings dam, remaining waste rock to waste rock piles.
Y2	• Clearing and grubbing Phase 3 Marathon and Leprechaun pits. • Removal and stockpiling of topsoil from Phase 3 Marathon and Leprechaun pits. • Marathon Phase 1 pit mined down to the 236 bench, Phase 2 mined down to the 296 bench. • Leprechaun Phase 1 pit mined down to 272 bench, Phase 2 mined down to the 362 bench. • Re-handle of stockpiled HGO. • Delivery of construction rockfill to Stage 1B of the tailings dam, remaining waste rock to waste rock piles.
Y3	• Marathon Phase 1 pit mined down to the pit bottom on the 206 bench. • Leprechaun Phase 1 pit mined down to the pit bottom on the 266 bench. • Marathon Phase 2 pit mined down to the 242 bench, Phase 3 mined down to the 326 bench. • Leprechaun Phase 2 pit mined down to 308 bench, Phase 3 mined down to the 356 bench. • Re-handle of stockpiled HGO. • Delivery of construction rockfill to Stage 2 of the tailings dam, remaining waste rock to waste rock piles.
Y4	• Marathon Phase 2 pit mined down to the 194 bench, Phase 3 mined down to the 296 bench. • Leprechaun Phase 2 pit mined down to 254 bench, Phase 3 mined down to the 326 bench. • Re-handle of stockpiled HGO. • Delivery of construction rockfill to Stage 2 of the tailings dam, remaining waste rock to waste rock piles.
Y5	• Marathon Phase 2 pit mined down to the 146 bench, Phase 3 mined down to the 254 bench. • Leprechaun Phase 2 pit mined down to 206 bench, Phase 3 mined down to the 278 bench. • Re-handle of stockpiled HGO. • Delivery of construction rockfill to Stage 3 of the tailings dam, remaining waste rock to waste rock piles.
Y6	• Marathon Phase 2 pit mined down to the pit bottom on the 140 bench. • Leprechaun Phase 2 pit mined down to the pit bottom on the 170 bench. • Marathon Phase 3 mined down to the 206 bench. • Leprechaun Phase 3 mined down to the 224 bench. • Re-handle of remaining stockpiled HGO (stockpile depleted). • Re-handle of stockpiled LGO. • Delivery of construction rockfill to Stage 3 of the tailings dam, remaining waste rock to waste rock piles.
Y7 to Y9	• Marathon Phase 3 pit mined down to the pit bottom on the 80 bench. • Leprechaun Phase 3 pit mined down to the pit bottom on the 104 bench. • Re-handle of stockpiled LGO. • Delivery of construction rockfill to Stage 4 of the tailings dam, remaining waste rock to waste rock piles.
Y10 to Y12	• Re-handle of remaining stockpiled LGO (stockpiles depleted).

2.5.1.2 Open Pit Development

The economic pit limits for Marathon and Leprechaun deposits were determined using the Pseudoflow algorithm. As described in Section 2.3.1, the ultimate pit limits are split up into phases or pushbacks with each pit being split into three phases.

Pit designs are configured on 6 m bench heights, with 8.1 m wide berms placed every three benches, or triple benching. Bench face angles, and subsequent inter-ramp angles, are varied based on prescribed geotechnical zones. The pit slope criteria for each deposit is listed in the tables below.

Table 2.11 Marathon Bench Face and Inter-Ramp Pit Slope Inputs

Domain	Bench Face Angle (º)	Inter-Ramp Angle (º)
Overburden	18	18.0
Southwest	75	54.3
NW and SE	71	51.5

Table 2.12 Leprechaun Bench Face and Inter-Ramp Pit Slope Inputs

Domain	Bench Face Angle (º)	Inter-Ramp Angle (º)
Overburden	25	25.0
Southeast	65	47.4
NW and End Walls	75	54.3

In-pit haul roads and geotechnical berms (25 m wide) are added to the pit designs and flatten the inter-ramp slopes out to shallower overall slopes. Geotechnical berms are placed on 90 m vertical spacing at Marathon, and 126 m vertical spacing at Leprechaun, wherever in-pit ramps are not present. Haul road grades are limited to a maximum of 10%. Access ramps are not designed for the last two benches of the pit bottom, on the assumption that the bottom ramp segment will be removed using some form of retreat mining. The bottom two ramped benches of the pit use one-way haul roads of 19 m width and 12% grade since bench volumes and traffic flow are reduced.

2.5.1.3 Pit Dewatering

In-pit dewatering systems will be established for each pit, consisting of conventional dewatering equipment (pit bottom submersible pumps). Daily pit inflow rates have been estimated based on direct precipitation over the pit areas and groundwater inflow rates via host rock hydraulic conductivity (Terrane 2020). Current estimates of pit hydrogeology suggest inflow from direct precipitation and groundwater to average 5,454 m^3/day for Marathon and 4,568 m^3/day for Leprechaun. Pit water will be pumped to sedimentation ponds adjacent to the pits, where it will be managed as per the overall site water management plan.

2.5.1.4 Mine Production

A life-of-mine production schedule is presented in Table 2.13, 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. 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.

The open pit mine operation will operate 24-hours per day, seven days a week, on a 12-hour shift basis. Mining operations are based on 365 operating days per year, with an allowance of 10 days without mine production built into the mining schedule, to allow for adverse weather conditions and other potential interruptions.

Material and waste will be extracted on day and night 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 all other equipment), and a 90% utilization (for trucks and loaders) of available hours varied to reflect seasonal usage of equipment where appropriate.

A standard dayshift blasting crew will be required, while four rotating labour crews will be scheduled to operate production equipment.

Table 2.13 Life of Mine Production Schedule

	Year	Life of Mine	Y-1	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12
TOTAL Resource Milled	ktonnes	**41,049**	**-**	**1,875**	**2,500**	**2,500**	**3,250**	**4,000**	**4,000**	**4,000**	**4,000**	**4,000**	**4,000**	**4,000**	**2,923**
AU	g/t	1.41	-	3.03	2.61	1.83	1.81	1.42	1.25	1.62	1.76	1.40	0.51	0.51	0.51
Recovered Gold	koz.	1,750	-	173	197	136	178	172	151	195	213	169	61	61	44
Total Resource Mined from Pit	ktonnes	41,049	823	6,347	5,327	4,120	4,817	3,178	3,296	5,134	4,842	3,165	-	-	-
Mill Feed Stockpile Balance	ktonnes		406	1,887	2,577	2,177	1,527	152	-	-	-	-	-	-	-
AU	g/t		1.84	1.22	1.14	1.14	1.14	1.14	-	-	-	-	-	-	-
Low-Grade Stockpile Balance	ktonnes		417	3,407	5,544	7,564	9,781	10,334	9,782	10,916	11,758	10,923	6,923	2,923	-
AU	g/t		0.54	0.54	0.54	0.54	0.54	0.54	0.53	0.52	0.51	0.51	0.51	0.51	-
TOTAL Waste Mined	ktonnes	311,932	10,177	34,037	39,131	55,842	48,134	46,106	37,862	28,038	10,020	2,585	-	-	-
Strip Ratio (Waste/Resource Milled)		7.60	12.37	5.36	7.35	13.55	9.99	14.51	11.49	5.46	2.07	0.82	-	-	-
Total Material Mined	ktonnes	352,980	11,000	40,384	44,458	59,962	52,951	49,284	41,158	33,171	14,863	5,749	-	-	-
Cumulative Material Mined	ktonnes		11,000	51,384	95,842	155,804	208,755	258,039	299,197	332,369	347,231	352,980	352,980	352,980	352,980
Total Material Moved	ktonnes	368,879	11,000	40,699	44,508	60,362	53,601	50,659	42,508	33,171	14,863	6,584	4,000	4,000	2,923

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). Grade control drilling will be carried out with 144 mm (5.5") diesel hydraulic RC drills. Production drilling will be carried out with 165 mm (6.5") diesel hydraulic down-the-hole (DTH) drills.

Graders will be used to maintain the haul routes for the haul trucks and other equipment within the pits and on all routes to the various waste storage locations and the crusher. Trucks outfitted with a water tank and a gravel spreader are included for haul road maintenance. Track dozers (447 kW and 325 kW) are included to handle waste rock, till, and topsoil to the various waste storage locations. Front end wheel loaders (4.5 m^3 bucket) and hydraulic excavators (3.8 m^3 and 3.0 m^3 bucket) are included as pit support, loading tools for the articulated haulers and back-up loaders for the main fleet. Custom fuel/lube trucks are included for mobile fuel/lube support. Various small mobile equipment pieces are proposed to handle all other pit service and mobile equipment maintenance functions.

Pits will be dewatered with conventional dewatering equipment (pit bottom submersible pumps). Daily pit inflow rates have been estimated based on direct precipitation over the pit areas and groundwater inflow rates via host rock hydraulic conductivity. Pit water will be pumped to sedimentation ponds adjacent to the pits, where it will be managed as per the overall site water management plan (Appendix 2A).

Mine fleet maintenance activities will be performed in the maintenance facilities located near the plant site.

The required primary mining equipment is shown below in Table 2.14.

Table 2.14 Primary Mining Fleet Schedule

	Y-1	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11
Drilling												
Diesel DTH tracked drill 165 mm (6.5") holes	2	5	5	6	6	6	6	6	2	2	0	0
Diesel RC tracked drill 144 mm (5.5") holes	2	3	3	3	3	3	2	2	2	2	0	0
Loading												
Wheel loader 13.0 m^3 bucket	1	2	2	2	2	2	2	1	1	1	1	1
Hydraulic excavator 12.0 m^3 bucket	1	3	4	5	5	4	3	3	2	2	0	0
Hauling												
Rigid frame haul truck 91 t payload	5	18	23	32	32	32	32	32	17	8	3	3
Articulated haul truck 36 t payload	2	2	2	2	2	2	2	2	2	0	0	0

Drilling and Blasting

Drilling demands will be met with up to 11 production drills. Blasting will be limited to daytime hours. There will be an average of one blast per day, alternating pits, for approximately 350 total blasts per year. Average blast depths will be 8.5 m and 9.5 m for Marathon pit and Leprechaun pit, respectively.

An average blast will consume approximately 38 tonnes of explosives, for an annual average consumption of 13,150 tonnes. Explosive quantities are based on blastholes with a 152 mm diameter, 4 m collar (3 m for shorter holes), and depths (including subdrill) of 13 m for most holes, with some 6.9 m holes where required for tighter grade control. Bench heights will be 6 m.

Drill spacing is dependent on the assumed material properties and for design, 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 emulsion product with an average density of 1.1 kg/m^3 will be used, with an explosives load per hole of approximately 215 kg for 12 m holes and approximately 80 kg for 6 m holes. When combustion is complete, the bulk emulsion product does not leave a post-blast ammonium residue.

Bulk explosives, including the explosive storage facilities, explosives delivery and loading trucks, and loading and firing of the blasts will be managed by a licensed explosives' contractor.

Loading and Hauling

Reliable mining equipment commonly used in the construction and open pit mining industry and sized to meet the production requirements of the mining schedule have been selected for the loading and hauling fleet. Loading in ore zones will be completed with hydraulic excavators on 6 m benches, and in waste zones with hydraulic excavators and wheel loaders on 6 m or 12 m benches, depending on grade control requirements.

Hydraulic excavators (12.0 m^3 bucket, up to five units in the fleet) are proposed based on their ability to reduce losses and dilution for the ore control operations. Front end wheel loaders (13.0 m^3 bucket, up to two units in the fleet) are proposed based on their ability to load the haulers in three to four passes, and their ability to load the crusher when required. Rigid frame haulers (91 t payload, up to 32 units in the fleet) are proposed to be flexible enough to use on the smaller pit benches and in selective mining scenarios designed for this project, yet not too small that the fleet size is excessive. Two articulated haulers (36 t payload, up to two units in the fleet) are proposed to supplement the fleet and provide additional flexibility for construction of the pits, haul roads and tailings dam.

Table 2.15 Estimates the Truck Traffic on the Haul Road for the Peak Operation Year.

Route	# Cycles (per year)	Avg. One-Way Truck Count (per day)
High-Grade Storage to Crusher	4,711	25.82
Leprechaun Pit to Crusher	3,145	17.23
Leprechaun Pit to LLGSP	3,392	18.59
Leprechaun Pit to OVBSP	16,250	89.04
Leprechaun Pit to LWRSF	290,683	1592.78
Marathon Pit to Crusher	21,590	118.30
Marathon Pit to MLGSP	20,400	111.78
Marathon Pit to OVBSP	38,026	208.36
Marathon Pit to Tailings	27,680	151.67
Marathon Pit to MWRSF	290,789	1593.37

Support Equipment

An auxiliary fleet of dozers, graders, water trucks, and other support equipment will be required for mine operations, as outlined in Table 2.16, 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.

Table 2.16 Support Units

Unit	Function	Units
Motor grader (4.9 m blade)	Haul road maintenance	6
Water/gravel truck	Haul road maintenance	4
Track dozer (447 kW)	Dump maintenance	3
Track dozer (325 kW)	Pit support and construction	2
Wheel loader (4.5 m^3)	Pit support and construction	2
Hydraulic excavator (3.8 m^3)	Ore Cleaning, Prep for Ore Loading	2
Hydraulic excavator (3.0 m^3)	Pit Support, Ditching, Construction Activities	2
Fuel and Lube truck	Mobile fuel/lube service	3
Shuttle bus	Employee transportation	4
Pickup trucks (1/4 ton)	Staff transportation	10
Light plants (20 kW)	Pit lighting	8

Table 2.16 Support Units

Unit	Function	Units
Water pumps (150 m^3/h)	Pit sump dewatering	2
On-highway dump truck	Utility material movement	2
Flatbed Picker Truck	Material Transport, Pump Crew Support	2
Emergency response vehicle	First aid and mine rescue	1
Maintenance trucks	Mobile maintenance crew and tool transport	3
Mobile crane (36 t capacity)	Mobile maintenance material handling	1
Float trailer (55 t capacity)	Equipment transport	1
Forklift (3 t capacity)	Shop material and tire handling	1
Mobile steam cleaner	Mobile maintenance	1
Scissor Lift	Maintenance Support	1
Mobile Manlift	Mobile Maintenance Support	1

Open pit maintenance activities will include haul road maintenance and dust control, open pit dewatering, transporting operating supplies, relocating equipment, and snow removal.

2.5.2 Ore 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 that are well proven in the industry.

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 TMF.

The Project will be constructed in two distinct phases, as follows:

- Phase 1 (2.5 Mt/a) – gravity-leach
- Phase 2 (expansion to 4.0 Mt/a) – gravity-flotation-regrind-leach concentrate-leach tail

Phase 1 will consist of crushing, semi-autogenous and ball milling, gravity recovery, leaching-adsorption, carbon elution, and gold recovery. Leach-adsorption tails will be treated via cyanide destruction, thickened, and deposited in the TMF.

Phase 2 will consist of crushing, milling as before, with the addition of a pebble crusher, gravity recovery, flotation, flotation concentrate thickening, flotation concentrate regrind, flotation concentrate leaching-adsorption, flotation tails thickening, flotation tails leaching-adsorption, carbon elution, and gold recovery. Leach-adsorption tails will be treated via cyanide destruction, thickened, and deposited in the TMF.

Key process design criteria are listed below:

- Phase 1 nominal throughput of 6,850 tpd or 2.5 Mt/a
- Phase 2 nominal throughput of 10,960 tpd or 4.0 Mt/a
- crushing plant availability of 75%
- plant availability of 92% for grinding, gravity concentration, flotation, and leach plant and gold recovery operation

An overall process flow diagram showing the unit operations in the selected process flowsheet is presented in Figure 2-41.

The process plant general arrangement is presented in Figure 2-42. Descriptions of each component or circuit associated with the process plant circuit is provided in Section 2.3.3

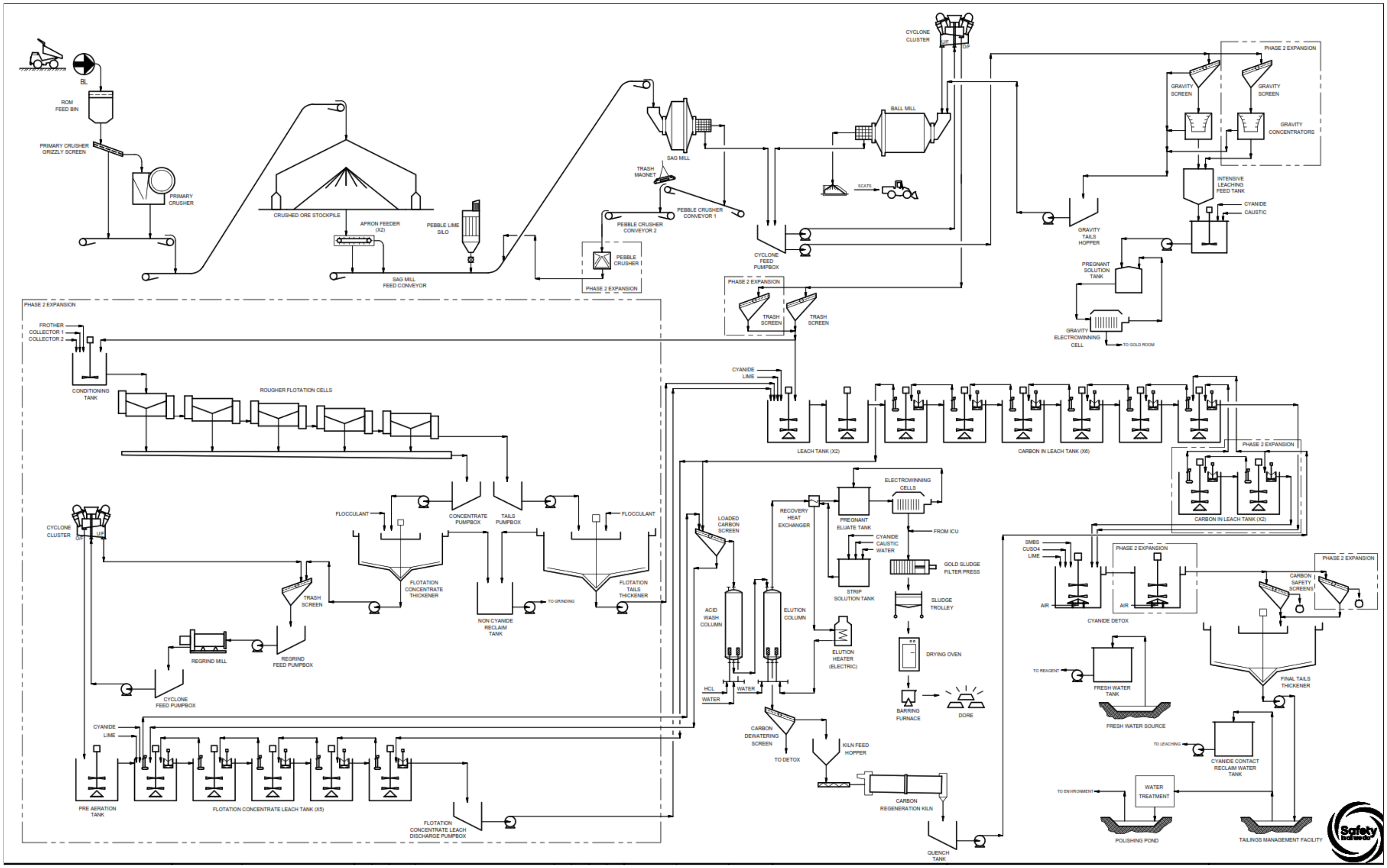


Figure 2-41 Overall Process Flow Diagram

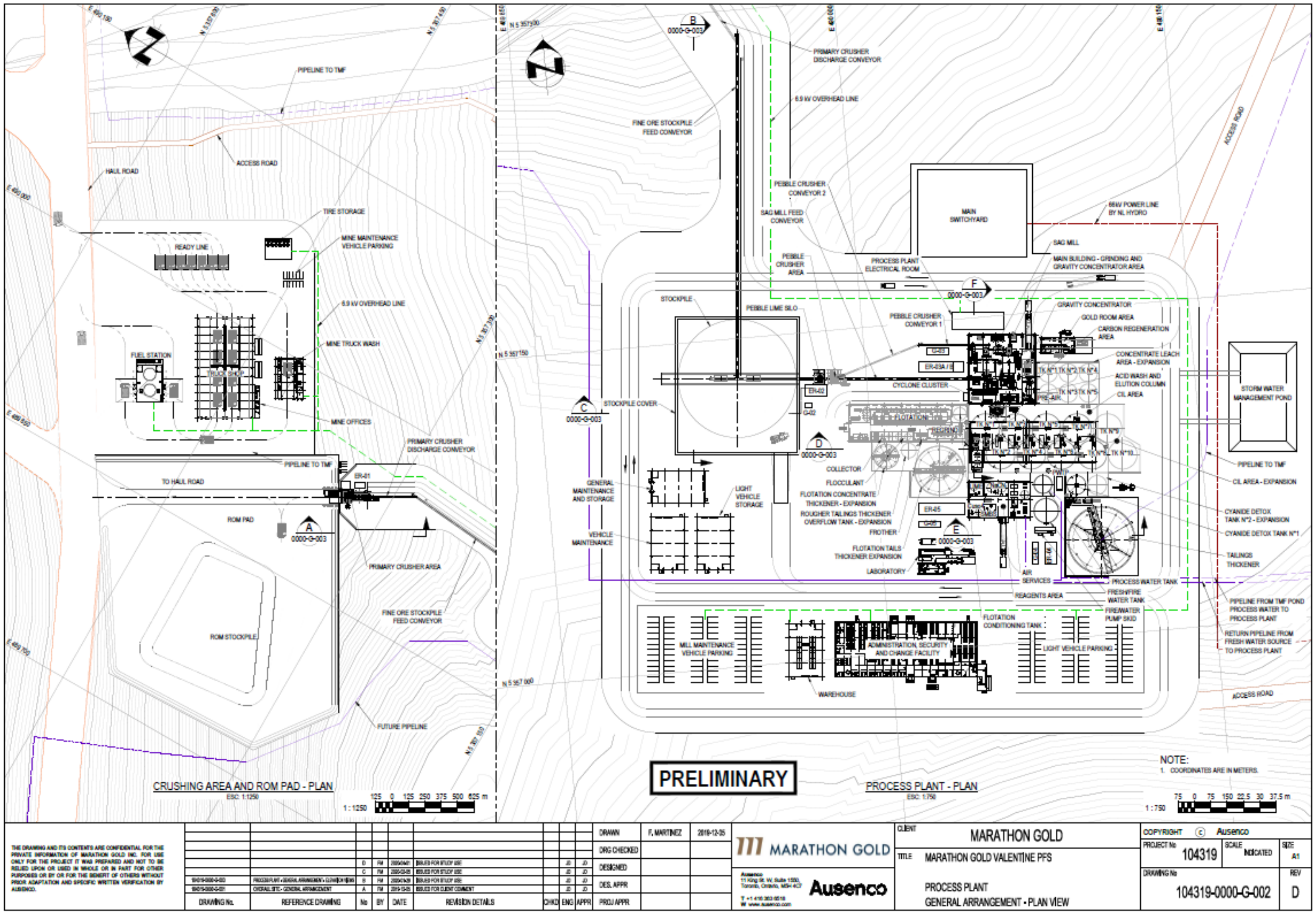


Figure 2-42 Process Plant – General Arrangement, Plan View

2.5.2.1 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 2.17. It is anticipated that the use, storage and handling of these materials will be regulated pursuant to the Certificate of Approval to be issued under the NL *Environmental Protection Act,* and in accordance with the requirements of the Environmental Emergency Regulations pursuant to the *Canadian Environmental Protection Act*, if it is determined that applicable substances are to be located at site in concentrations and quantities listed in Schedule 1 of the regulations.

Table 2.17 Reagent Systems Required During Project Operation

Reagents	Planned Use, Transport and Handling
Quicklime	There will be one lime silo system at the milling facility. Quicklime will be delivered to the 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 SAG mill feed conveyor in the milling facility. Quicklime will be distributed as solid form.
Sodium Cyanide (NaCN)	Sodium cyanide (dry) will be delivered as briquettes in 1 t bulk bags contained within secure plywood boxes and stored in a reagent shed. As required, boxes will be taken by forklift truck into the reagent mixing area, opened, and the bulk bag lifted out of the box using a lifting spreader attached to a hoist. The bag will then be lifted into a bag breaker on top of a cyanide mixing tank. The bag breaker is provided with a dust collector and fan to avoid escape of cyanide dust during bag breaking operations. Before the bag is broken open, sufficient water to give a 20% NaCN solution will be added to the cyanide mixing tank, the agitator started, and a small amount of sodium hydroxide solution added to ensure protective alkalinity and avoid generation of hydrogen cyanide gas. The cyanide bag is then broken open and the briquettes allowed to fall into the agitated tank. Once the cyanide is all dissolved, cyanide solution will be transferred to the cyanide storage tank using a pump. Pumps attached to the solution storage tank will deliver solution to the CIL circuits, intensive leach circuit and carbon elution circuit via closed circuit pipe systems within the mill. Automatic control valves will provide the required cyanide flowrates at a number of locations around the plant.
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.

Table 2.17 Reagent Systems Required During Project Operation

Reagents	Planned Use, Transport and Handling
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 several locations around the flotation circuit.
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 in 1 m^3 Intermediate Bulk Containers (IBC) containing 50% wt concentrate, 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 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.

Table 2.17 Reagent Systems Required During Project Operation

Reagents	Planned Use, Transport and Handling
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.
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.
Anti-scalant	Pebble lime is delivered by bulk tanker to a silo and reports to the SAG mill feed conveyor. Hydrated lime will be delivered in 1 m^3 bags (600-700 kg) and split by bag breaker into the mix tank where it will be distributed by ringmain to leaching and detoxification.
Gold Room 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.

2.5.3 TMF Operation

Slurry will be deposited into the tailings impoundment via spigots, primarily from the naturally high ground on the northwest side of the TMF and secondarily from the perimeter embankment. This will result in the tailings pond being located to the east side of the TMF, with a tailings beach forming that slopes (at 3 to 4%) from the deposition points along the high ground down to the perimeter embankment. This will optimize tailings storage capacity while reducing other risks, such as stability and seepage. The perimeter embankment will be raised in stages as previously described to provide the necessary storage during the first nine years of operation. Tailings will subsequently be deposited in the mined-out Leprechaun open pit from Year 10 onwards. The TMF will be monitored throughout the life of the facility to demonstrate performance goals are achieved and design criteria and assumptions are met.

The accumulation of water in the TMF has been modelled for the mean and 25-year wet annual precipitation conditions. The site has a positive water balance (i.e., rainfall exceeds evaporation). The TMF will receive rainwater and the process water discharged with the tailings slurry. Excess water from the open pit dewatering and runoff from waste rock stockpiles are managed separately and do not end up in the TMF. A water treatment plant and polishing pond allow for the treatment and discharge of the excess site water to Victoria Lake Reservoir. Treatment and discharge will occur for eight months a year. The TMF pond, with a maximum storage capacity of 1 Mm^3, has been sized to store the excess site water during the non-discharge period. Reclaim water will be pumped from a floating barge and pump in the TMF to the process plant.

The polishing pond is designed to provide sufficient residence time for the settlement of solids. A retention time of five days is assumed (based on a flow through rate of 115 to 280 m3/hr), which is sufficient to treat runoff, precipitation and process flows for up to a 25-year wet precipitation year. To promote settling, the pond is designed with a length to width ratio of 5:1. The design also allows for up to 0.5 m of solids accumulation and has a minimum freeboard of 2 m above the maximum operating level.

2.5.3.1 TMF Dam Raises

The TMF will be constructed in five stages over the mine life, with embankments raised in a downstream direction (see Figure 2-43), with raises based on storage requirements and operating criteria. The embankment design concept is shown in the typical cross-section in Figure 2-44.

The rockfill will be placed as part of the mining operation and for the intermediate stages a crest width of 20 m was selected to allow for mine vehicle and equipment access during construction. The embankment has a 3.5H:1V upstream slope and 2.0H:1V downstream slope. The flatter upstream slope allows for the placement of the coarse and fine filters, which will be processed material sourced from waste rock along with the installation of the geomembrane liner. The maximum final crest elevation of the TMF is 408.5 masl and the maximum embankment height is 49 m. An emergency discharge spillway and runout channel will be included for each embankment raise. Rip-rap lined seepage collection ditches along the toe of the embankment will direct surface runoff to a downstream settling pond.

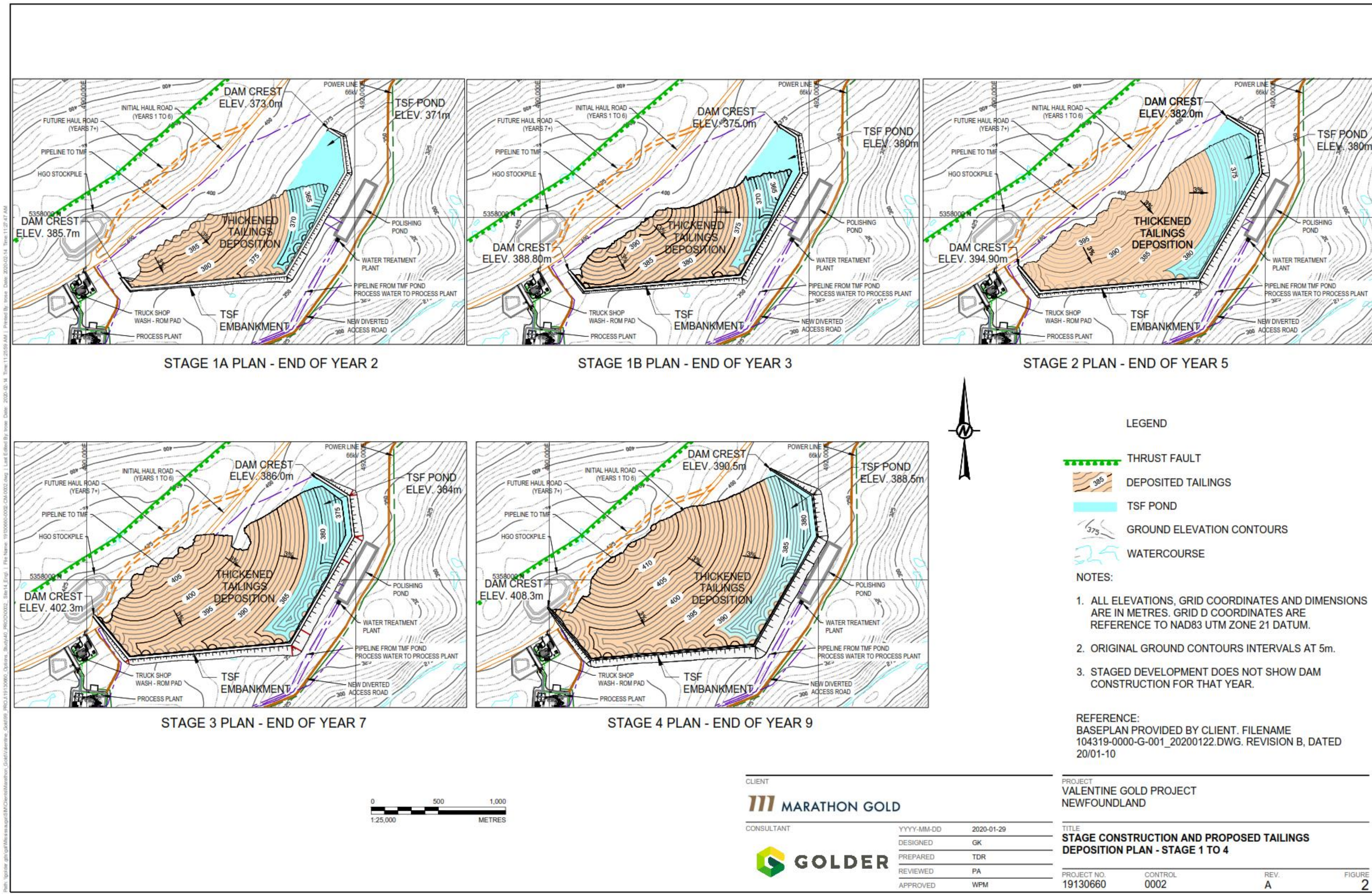


Figure 2-43 Tailings Storage Facility Staged Development

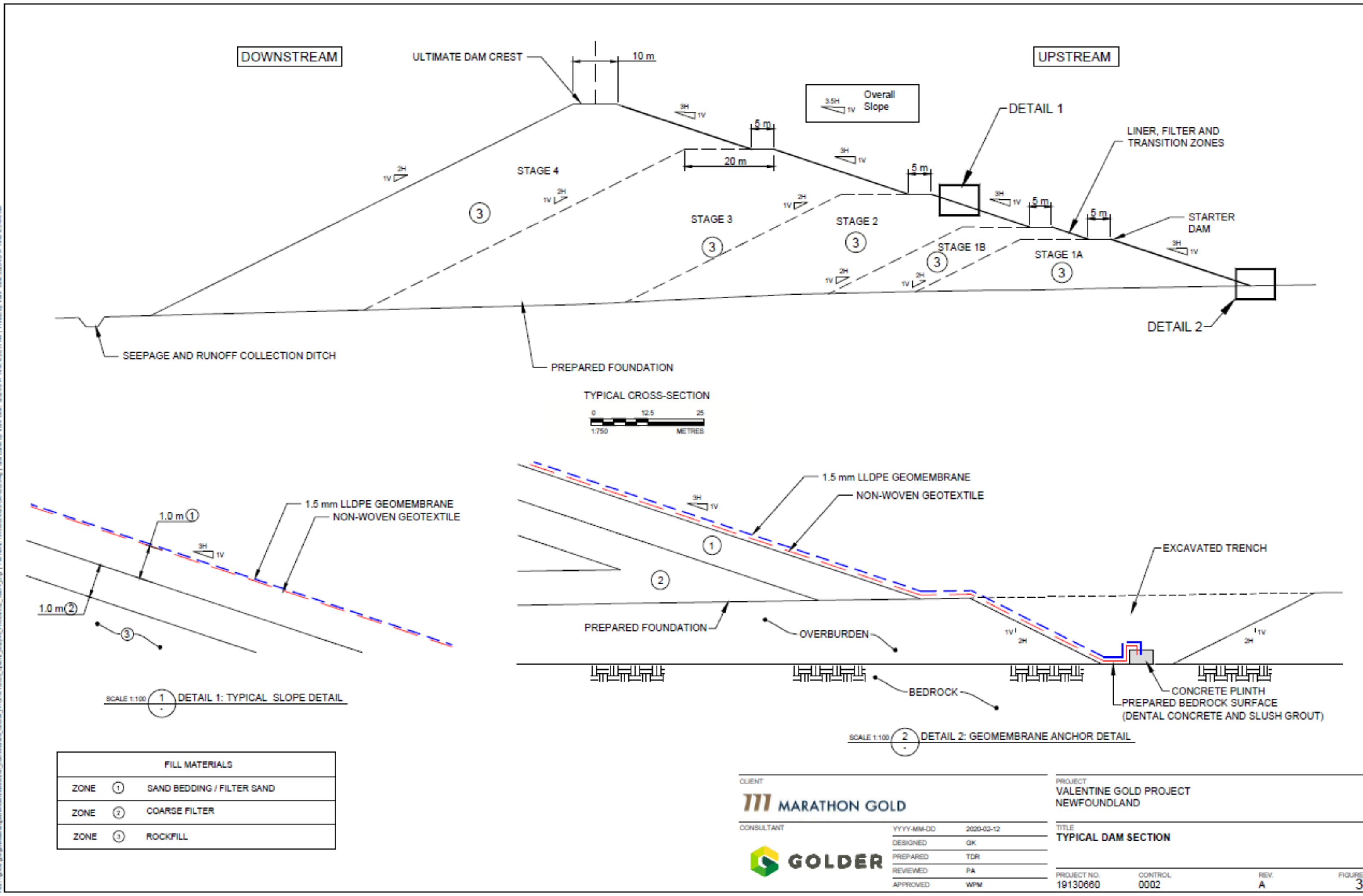


Figure 2-44 Tailings Dam – Typical Cross-Section

2.5.4 Haul Road Realignment

As the TMF is raised, the haul road to the process plant will require relocation. By the end of Year 5, 95% of HGO stockpile will be depleted (reclaimed to the mill). Construction of the haul road realignment will be in Year 5, and the realigned road will be used from Year 6 to the end of the mine life for hauling ore from the Marathon deposit area. Given the topography, the relocated haulage road will have a steeper grade and further travel distance, thus increase the fuel usage and air emissions (including GHGs) of the haul trucks. Delaying the relocation of the haulage road to Year 6 will reduce the overall fuel requirements and air emissions during the life of the mine.

2.5.5 Materials Shipping and Employee Transportation

Materials required for Project operation will be shipped to site via truck on the main access road, likely on a weekly basis. The volume of truck traffic during operation is anticipated to be much lower than during construction. During operation, an average of five vehicles per day is anticipated, with a peak of ten vehicles per day on rotation change day, with personnel transported by bus to / from nearby communities.

2.5.6 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.

2.5.7 Operational Labour Requirements

Table 2.18 provides estimates of total direct employment (in FTEs) to be generated during the operation phase of the Project, and the related NOC codes for Canadian labour. A FTE of employment is typically equivalent to approximately 2,000 hours of work. For this estimate, 2,000 hours was used to measure FTE-years of employment from capital expenditures and 2,190 hours per year for operation jobs. The latter is based on the planned work schedule of a 24-hour operation with two 12-hour shifts. Operation is estimated to require a peak workforce of approximately 480 FTEs (an average of 300 FTEs).

Table 2.18 Operation-Related Estimate of Direct Employment (FTEs) by Four-Digit NOC Code

Category	NOC	Description	Operation	
			Operation	Sustaining Capital Labour[2]
Trades and Production Occupations	7521	Heavy equipment operators (except crane)	1,354	23
	7311	Construction millwrights and industrial mechanics (except textile)	141	19
	7511	Truck drivers	166	18
	7237	Welders and related machine operators	84	12
	9411	Machine operators, mineral and metal processing	186	11
	7312	Heavy-duty equipment mechanics	187	11
	7242	Industrial electricians	62	9
	9611	Labourers in mineral and metal processing	110	7
	8614	Mine labourers	76	7
	7452	Material handlers	-	5
	7371	Crane operators	-	5
	7611	Construction trades helpers and labourers	36	5
	7252	Steamfitters, pipefitters and sprinkler system installers	-	4
	9241	Power engineers and power systems operators	-	4
	7372	Drillers and blasters - Surface mining, quarrying and construction	464	2
	7612	Other trades helpers and labourers	48	2
	7271	Carpenters	-	2
	7251	Plumbers	-	-
Professional and Physical Science Occupations	2113	Geologists, geochemists and geophysicists	55	7
	2143	Mining engineers	19	5
	2121	Biologists and related scientists	24	2
	2131	Civil engineers	12	-
Human Resources and Financial Occupations	1111	Financial auditors and accountants	-	4
	0112	Human resources managers	-	2
	0111	Financial managers	12	2
	1121	Human resource professionals	12	-
	1112	Financial and investment analysts	-	-

[2] Sustaining capital is the capital expenditures required to maintain, complete, or improve production assets, including the replacement of machinery, and phased construction of the TMF and process plant. Sustaining capital labour is the labour (workforce) required to support the execution of the work.

Table 2.18 Operation-Related Estimate of Direct Employment (FTEs) by Four-Digit NOC Code

Category	NOC	Description	Operation	
			Operation	Sustaining Capital Labour[2]
Support Workers	1414	Secretaries (except legal and medical)	-	4
	2263	Inspectors in public and environmental health and occupational health and safety	12	4
	2261	Non-destructive testers and inspection technicians	33	2
	9415	Inspectors and testers, mineral and metal processing	-	2
	1523	Production clerks	23	2
	1525	Dispatchers and radio operators	13	2
	6322	Cooks	-	4
	1241	Administrative clerks	9	2
	2234	Construction estimators	-	-
	6541	Security guards and related security service occupations	48	-
	2262	Engineering inspectors and regulatory officers	-	-
Technical Occupations	2154	Land surveyors	22	4
	2171	Information systems analysts and consultants	-	2
	2243	Industrial instrument technicians and mechanics	48	2
	2232	Mechanical engineering technologists and technicians	8	2
	2212	Geological and mineral technologists and technicians	96	2
	2211	Chemical technologists and technicians	-	2
	2231	Civil engineering technologists and technicians	-	2
	2253	Drafting technologists and technicians	-	2
	2241	Electrical and electronics engineering technologists and technicians	48	2
	2255	Mapping and related technologists and technicians	-	2
	2254	Land survey technologists and technicians	-	2
	2233	Industrial engineering and manufacturing technologists and technicians	12	-
	2221	Biological technologists and technicians	12	2

Table 2.18 Operation-Related Estimate of Direct Employment (FTEs) by Four-Digit NOC Code

Category	NOC	Description	Operation	
			Operation	Sustaining Capital Labour[2]
Supervisors, Coordinators, and Foremen	0811	Primary production managers (except agriculture)	59	4
	8221	Supervisors, mining and quarrying	69	4
	9211	Supervisors, mineral and metal processing	21	2
	0211	Engineering managers	21	2
	0711	Construction managers	-	2
	7301	Contractors and supervisors, mechanic trades	22	2
	7203	Contractors and supervisors, pipefitting trades	-	2
Total			**3,624**	**234**

Notes:
- Not applicable
Source: Adopted from SC 2020; Mining Industry Human Resources Council 2015

2.6 REHABILITATION AND CLOSURE ACTIVITIES

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 NL Department of Industry, Energy and Technology (DIET), NLDECCM, and NLDFFA-WD. 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 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 operation ceases, 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 NLDIET 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; however, the following sections outline the rehabilitation and closure philosophies and concepts 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 NLDIET upon release from the EA process.

In addition to compliance with the approved Rehabilitation and Closure Plan, Marathon will be required to register closure of the mine as an undertaking subject to assessment under the NL *Environmental Protection Act*. It is anticipated that such assessment will engage the closure requirements of the Rehabilitation and Closure Plan.

2.6.1 Approach to Rehabilitation and Closure

As the planning and design stages of the Project continue, consideration for the future closure issues and requirements will continue to be incorporated into Project design. 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 practicable, and protected for future use.
- Stabilization of disturbances will be completed to reduce erosion and promote natural revegetation.
- Natural revegetation will be encouraged throughout the Project Area
- Organic material, topsoil, and overburden will be removed from various development areas and stockpiled for progressive and final rehabilitation activities. Some overburden (suitable glacial till) may be used as a low-permeability fill material for dams, ditching, and as a base for stockpile pads to assist in drainage control. As the Project design process moves forward, the volume of soils required for all rehabilitation activities will be assessed, and a materials (rock and soils) balance and Soil and Rock Management Plan will be developed for the overall Project to ensure that sufficient soils are available for rehabilitation, while avoiding excavating and stockpiling soils in greater quantities than those required, thereby resulting in increased Project footprint and soils excavation, management and closure impacts.
- ARD/ML test results are presented in detail in Baseline Study Appendix 5. Overall, the soils and rock materials at the site have a low risk of being acid generating, with some ore materials having an increased risk and are currently classified as PAG. However, with appropriate mitigation (mixing and blending of PAG and non-PAG materials), none of the permanent site waste features (waste rock piles and TMF) are expected to generate acidic drainage. As such, the site design and development, as well as the plans for rehabilitation and closure, do not include measures to address ARD/ML issues. In the unlikely event that further testing determines that ARD/ML may present a risk post-closure, the Project design, as well as the rehabilitation and closure plans. will be adapted.

2.6.2 Progressive Rehabilitation

As the mine advances from development to operational stages and throughout the operational phase of the Project, opportunities for progressive rehabilitation are possible. Opportunities include, though are not limited to, the following:

- Demolishing and rehabilitation of construction or exploration related infrastructure (e.g., buildings, roads, and laydown areas)
- Grading and revegetating completed tailings areas, where practicable
- Stabilizing and temporarily seeding longer-term organics, topsoil and overburden stockpiles to reduce erosion
- Installing rock barricades and signage along the highwalls of the open pits
- Progressively rehabilitating waste rock piles as benches and/or sections are completed (ongoing over life of Project) – waste rock piles will be constructed from the ground up using slopes and benches of 10 m height; when a bench is finished in one area, the horizontal bench and downhill slope will be covered with overburden / organics (anticipated 0.3 m in total thickness) and revegetated
- Completing revegetation studies and trials
- Decommissioning and rehabilitating the TMF while Project operation continues, once tailings deposition moves from the TMF to the Leprechaun open pit in Year 9 of the operation phase (noting that decant water from the TMF will continue to be recycled for process water)
- Directing tailings and contact water to Leprechaun pit, and contact water to Marathon pit, as each of the pits is exhausted and while milling operation continues; based on the hydrogeological assessment (see Chapters 7 and 8), it has been determined that the pits could require up to 42 years to fully flood without supplementing inflow – water may also be pumped from Valentine Lake and Victoria Lake Reservoir to the Marathon and Leprechaun pits, respectively, to further reduce the time to flood the pits

2.6.3 Closure Rehabilitation

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

- Removing hazardous chemicals, reagents and similar materials for re-sale or disposal at an approved facility as per provincial and federal regulations
- Disconnecting, draining, cleaning, disassembling and, where feasible, selling equipment for re-use to a licensed scrap dealer; if this is not achievable, equipment will be removed from site for disposal
- Dismantling and removing site buildings and surface infrastructure for re-use, disposal or recycling at approved facilities
- Demolishing concrete foundations to a minimum of 0.3 m below the surface grade and covering areas with natural overburden materials to promote re-vegetation; demolished concrete will be used as fill material for re-grading or removed from site for disposal in an appropriate facility

- Removing and rehabilitating fuel and explosive storage and dispensing facilities; this will include Environmental Site Assessments, if required
- Breaching water management ponds will 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; these features will subsequently be graded and contoured to re-establish drainage patterns and revegetated as required
- Decommissioning any wells on site (including groundwater monitoring wells and potable drinking water wells), in compliance with the Guidelines for Sealing Groundwater Wells (Government of NL 1997)
- Re-establishing pre-mining site drainage patterns to the extent feasible
- Graded and/or scarifying disturbed areas, covering these with overburden and organic materials, where required, and seeding to promote natural re-vegetation

2.6.3.1 Open Pits

Upon closure, equipment and dewatering infrastructure will be removed, and the open pit(s) will be allowed to fill with surface water runoff, precipitation and groundwater seepage. Natural filling of the pits is forecast to require from 34 to 38 (Marathon pit) and 37 to 42 (Leprechaun pit) years without supplementing inflow. While the site is still in operation, and potentially for some time following operation and prior to final closure, excess site contact water will be directed to the open pits, as practicable, to accelerate filling. It is also proposed to pump water from Valentine Lake and Victoria Lake Reservoir to further expedite filling of the Marathon pit and Leprechaun pit, respectively, reducing the flooding times to within the closure and anticipated post-closure monitoring periods. Water would be withdrawn from Victoria Lake Reservoir (0.178 m^3/s) and Valentine Lake (0.145 m^3/s) over an eight-year period. Further details and assessment of potential effects of the proposed approach are provided in Chapter 7.

Once filled to the spill elevation, the water will be permitted to overflow the pit. A detailed assessment of the pit geometry and spill elevation in relation to the surrounding terrain will be required during operation to determine where the water will ultimately flow from the pit post-closure, and a channel may be required to reconnect this drainage to the natural, adjacent waterbodies. Monitoring of water quality within the open pit during filling will be completed to assess the potential discharge water quality and to determine if any water treatment could be required until water quality meets the appropriate criteria.

Rock or soil barricades and signage will be constructed along the crest of the open pit(s), as well as across any access roads or ramps, barricading access to the open pit(s). Warning signs will be erected at regular intervals along the berm, notifying the public of the open pit. Areas of sloped access, above and below the final high-water mark, will be constructed to permit ingress and egress for people or animals.

2.6.3.2 Waste Rock Piles

Two waste rock piles, one adjacent to each of the open pits, will be created throughout the operational life of the Project. These piles will be sloped and benched in accordance with the closure design as they are developed, creating overall safe slopes for final closure of three horizontal to one vertical (3H:1V), incorporating interim benching. The waste rock piles will also be progressively rehabilitated via placement of overburden / organic materials on benches and slopes and subsequent revegetation. At final closure, only the remaining areas of the waste rock piles that could not be progressively rehabilitated will require rehabilitation. The ditching and sedimentation ponds constructed to manage the runoff from these piles will be left in place until the runoff water quality is suitable for direct release, at which point the ditching and pond infrastructure will be removed and regraded to return drainage patterns to as close to natural as possible.

2.6.3.3 Tailings Management Facility

The tailings that are produced from the gold milling process will be deposited in the TMF for the first nine years of the Project operation phase using a thickened tailings process as described in Section 2.3.4. Once the Leprechaun open pit is exhausted in Year 9, the tailings will be pumped to and deposited in this open pit.

The TMF is being designed for closure in accordance with the guidance provided by the CDA, such that the geometry of the dams will not require modification during the mine closure phase to provide long term stability of the facility. When the tailings deposition is moved to the Leprechaun open pit in Year 9, the process of closure and rehabilitation of the TMF will commence. It is expected that the water treatment plant and polishing pond components of the TMF will operate for some time, and that water collecting within the TMF (drainage from the tailings, as well as precipitation) will continue to be pumped to the mill as reclaim water. Exposed tailings will be covered with overburden and revegetated, and as water quality and flows reach equilibrium within the facility, a larger, closure spillway will be constructed to lower the water level within the tailings impoundment. At this time, the water treatment plant and polishing pond will be removed and water flowing from the tailings impoundment will be channeled to release to the environment.

After closure, covered tailings beaches are not expected to produce acidic runoff and/or have high or moderate leaching except for P. The seepage from TMF is conservatively predicted to exceed MDMER limits for $CN_{(T)}$, un-ionized NH_3, and Cu in post-closure. Passive treatment systems for the seepage with consequent dilution by relatively clean TMF runoff is considered as a mitigation option.

As the Project progresses, Marathon will evaluate the tailings impoundment and consider options to further dewater the stored tailings working towards classifying the TMF as a landform (under the CDA closure guidelines) and therefore alleviating the requirements for maintaining and inspecting the dams post-closure. Conservatively, Marathon will work with NLDIET and NLDECCM, Water Resources Division, and use the guidance established by the CDA and MAC, and Global Industry Standards on Tailings Management, to establish a plan for long term inspection and maintenance of the dams.

The regulatory landscape regarding tailings management has been changing as a result of significant dam failures in recent years, and it is anticipated that regulation and guidance will continue to change with respect to tailings management, closure of tailings facilities, and needed alignment with climate change. Marathon is committed to working with provincial regulators, and following CDA guidelines so that the TMF is designed, constructed, operated, and ultimately rehabilitated, in a safe and responsible manner that will protect the environment in the long term.

2.6.4 Decommissioning, Rehabilitation and Closure Labour Requirements

Table 2.19 provides estimates of total direct employment (in FTEs) to be generated during the decommissioning, rehabilitation and closure phase of the Project, and the related NOC codes Canadian labour. A FTE of employment is typically equivalent to approximately 2,000 hours of work.

Table 2.19 Decommissioning, Rehabilitation and Closure -Related Estimate of Direct Employment (FTEs) by Four-Digit NOC Code

Category	NOC	Description	Decommissioning, Rehabilitation and Closure
Trades and Production Occupations	7521	Heavy equipment operators (except crane)	29
	7311	Construction millwrights and industrial mechanics (except textile)	25
	7511	Truck drivers	23
	7237	Welders and related machine operators	16
	9411	Machine operators, mineral and metal processing	14
	7312	Heavy-duty equipment mechanics	13
	7242	Industrial electricians	13
	9611	Labourers in mineral and metal processing	10
	8614	Mine labourers	8
	7452	Material handlers	8
	7371	Crane operators	6
	7611	Construction trades helpers and labourers	6
	7252	Steamfitters, pipefitters and sprinkler system installers	5
	9241	Power engineers and power systems operators	5
	7372	Drillers and blasters - Surface mining, quarrying and construction	3
	7612	Other trades helpers and labourers	2
	7271	Carpenters	1
	7251	Plumbers	1
Professional and Physical Science Occupations	2113	Geologists, geochemists and geophysicists	10
	2143	Mining engineers	6
	2121	Biologists and related scientists	1
	2131	Civil engineers	1
Human Resources and Financial Occupations	1111	Financial auditors and accountants	5
	0112	Human resources managers	2
	0111	Financial managers	2
	1121	Human resource professionals	1
	1112	Financial and investment analysts	1

Table 2.19 Decommissioning, Rehabilitation and Closure -Related Estimate of Direct Employment (FTEs) by Four-Digit NOC Code

Category	NOC	Description	Decommissioning, Rehabilitation and Closure
Support Workers	1414	Secretaries (except legal and medical)	5
	2263	Inspectors in public and environmental health and occupational health and safety	5
	2261	Non-destructive testers and inspection technicians	3
	9415	Inspectors and testers, mineral and metal processing	2
	1523	Production clerks	2
	1525	Dispatchers and radio operators	2
	6322	Cooks	4
	1241	Administrative clerks	1
	2234	Construction estimators	1
	6541	Security guards and related security service occupations	-
	2262	Engineering inspectors and regulatory officers	1
Technical Occupations	2154	Land surveyors	4
	2171	Information systems analysts and consultants	2
	2243	Industrial instrument technicians and mechanics	3
	2232	Mechanical engineering technologists and technicians	3
	2212	Geological and mineral technologists and technicians	2
	2211	Chemical technologists and technicians	2
	2231	Civil engineering technologists and technicians	2
	2253	Drafting technologists and technicians	2
	2241	Electrical and electronics engineering technologists and technicians	2
	2255	Mapping and related technologists and technicians	2
	2254	Land survey technologists and technicians	2
	2233	Industrial engineering and manufacturing technologists and technicians	1
	2221	Biological technologists and technicians	2

Table 2.19 Decommissioning, Rehabilitation and Closure -Related Estimate of Direct Employment (FTEs) by Four-Digit NOC Code

Category	NOC	Description	Decommissioning, Rehabilitation and Closure
Supervisors, Coordinators, and Foremen	0811	Primary production managers (except agriculture)	5
	8221	Supervisors, mining and quarrying	5
	9211	Supervisors, mineral and metal processing	2
	0211	Engineering managers	3
	0711	Construction managers	3
	7301	Contractors and supervisors, mechanic trades	2
	7203	Contractors and supervisors, pipefitting trades	2
Total			**295**

Notes:
- Not applicable
Totals may not align with those shown in Tables 15.13 and 15.17 due to rounding.
Source: Adopted from SC 2020; Mining Industry Human Resources Council 2015

2.6.5 Post-Closure and Long-Term Monitoring

The post-closure monitoring program will continue after final closure activities are completed for an estimated 6 to 10 years noting that final closure for some key components will be closed and rehabilitated prior to the end of the operation phase of the Project. The monitoring period could also be shortened based on the satisfaction of regulators that physical and chemical characteristics of the site are acceptable and stable. When the Project is deemed physically and chemically stable, it is currently anticipated that the site will be relinquished to the Crown, noting the requirements for relinquishment in 2035 may be different from current requirements.

The post-closure and long-term monitoring plans are yet to be developed. These programs will be developed based on the experience gained through monitoring plans during construction and operation and it is anticipated that the closure monitoring plans will mirror the operational monitoring program to provide continuity of data and a historical baseline. It is also anticipated that, as the post-closure monitoring program moves forward, the monitoring requirements will decrease until ultimately they will no longer be required.

2.7 ENVIRONMENTAL MANAGEMENT

Marathon is committed to designing, constructing, and operating the Project in a manner that reduces environmental effects to the extent practicable and in a manner that complies with required regulatory requirements. Marathon's environmental management tools, including an overarching EMS, which will include environmental management plans, mitigation measures, response plans, and follow-up and monitoring, will allow for the commitments made in this EIS and permitting conditions to be implemented, monitored and adapted as needed throughout the life of the Project.

The following sections outline how Marathon will implement, manage, and report on environmental protection measures, follow-up, and other monitoring programs, as well as regulatory requirements and other commitments identified in the EIS. Applicable conditions from various approvals and authorizations following the EA process will also be included in these plans to consolidate regulatory requirements and company commitments throughout the Project life cycle.

2.7.1 Marathon's Approach to Environmental Management

Marathon is committed to the sustainable and responsible development of the Project as reflected in its corporate values and *Environmental Policy*. Environmental management and protection are recognized as a corporate priority, which is critical to the successful construction, operation, and decommissioning, rehabilitation and closure of the Project.

Consistent with its internal policies and corporate values, Marathon will implement processes and procedures to identify, assess, and avoid or reduce environmental risks during all phases of the Project life cycle. These processes and procedures will be developed and maintained under Marathon's EMS, which will be developed in alignment with ISO 14001, comply with relevant legal requirements and be informed by industry best practices and standards, such as the Mining Association of Canada's Towards Sustainable Mining standards.

The EMS will be used by Marathon to manage environmental aspects of the Project throughout its life cycle in a manner that is fully integrated with other management considerations and which will apply across all corporate levels and functions. The EMS will be regularly reviewed and revised as necessary to provide continuous improvement in environmental performance.

The EMS is designed as a conceptual and systematic framework to manage environmental risks, based on principles of adaptive management and continuous improvement. As such, it will guide the development and implementation of Environmental Management Plans (EMPs) required to maintain environmental protection during all Project phases – construction, operation, and decommissioning, rehabilitation and closure. The EMS and associated EMPs will function as a set of standards to guide the environmentally and socially responsible development and operation of the Project through the definition and implementation of the following components:

- Defined objectives informed by Marathon's *Environment Policy*
- Defined roles, responsibilities and accountabilities
- Risk management processes
- Monitoring, auditing and reporting processes

Each component is summarized in the following sections.

2.7.1.1 Objectives

Marathon has developed an *Environmental Policy* (Appendix 1C), which is guided by a commitment to responsible and sustainable development. This commitment is at the core of the EMS and will be advanced by:

- Regular review and evaluation of the EMS and associated plans and processes to provide continuous improvement as measured by defined targets and objectives
- Development and implementation of management and monitoring plans to identify, assess and manage environmental effects upon both the biophysical and human environment
- Compliance with applicable legal and regulatory requirements and industry best practices
- Commitment to adaptive management and continuous improvement
- Ongoing communication with Indigenous groups, communities and stakeholders respecting our environmental performance

Objectives and targets for environmental performance will be established in the EMS, consistent with the overall strategic goals of the Project and the Environmental Policy. Objectives will be measurable (if quantifiable), monitored, communicated, and updated, as necessary.

2.7.1.2 Roles, Responsibilities and Accountabilities

The EMS will be integrated into Marathon's corporate structure and apply across the organization to promote compliance with the objectives of the EMS and provide transparency in environmental management and decision-making. Marathon will make resources available to carry out environmental management and to comply with regulatory compliance and best management practices. While it is anticipated that there will be further refinement and delineation of corporate roles and responsibilities as the Project progresses through to construction, based on current operations, the contemporary corporate organizational structure consists of the the Board of Directors, President & Chief Executive Officer (CEO), Senior Officers (Chief Financial Officer, Chief Operating Officer), Vice Presidents, Managers and other employees and consultants. Below the President and Chief Executive Officer level, Marathon currently divides its management team into the following areas: (i) Project Exploration, Engineering and Execution; (ii) Accounting and Finance; (iii) Environment, Government and Community Affairs; and (iv) Corporate Development and Investor Relations.

The Board of Directors and CEO are ultimately responsible for environmental management and will direct and approve the implementation of the EMS. Senior management will incorporate the environmental policy and objectives underlying the EMS into strategic planning, integrate EMS requirements into business processes, make necessary resources available and oversee the fulfillment of the terms and conditions of the EMS. The responsibilities and accountabilities of various roles under the EMS will be communicated throughout Marathon's organization and every reasonable effort will be made to carry out the EMS in conformity with standard practice and to comply with reporting obligations.

Effective discharge of roles and responsibilities under the EMS requires that relevant personnel have the necessary competence to perform activities related to the Project's environmental performance. Marathon will provide appropriate training and records of training will be maintained.

2.7.1.3 Risk Management Processes

The EMS will set out risk management processes to identify, assess and manage environmental risks. Risk management will focus on risk avoidance or mitigation through measures such as engineering controls, training requirements, operating standards, contingency planning, monitoring programs, compliance evaluation and audit and inspection requirements.

These measures will apply throughout the Project life cycle and will be subject to periodic reviews and evaluation to confirm their effectiveness in managing risk. Marathon will record risks in a risk register, which will be regularly updated and reviewed by the appropriate level of management. Similarly, procedures for the identification of compliance obligations related to environmental risks will be implemented and maintained as part of the EMS. A register of compliance obligations will be maintained and updated on a regular basis and Marathon will provide orientation training to communicate associated requirements to employees and contractors.

2.7.1.4 Monitoring, Evaluation and Reporting Processes

The status and effectiveness of EMS implementation will be monitored through regular reviews and reports to senior management, and the EMS will be revised as necessary to maintain compliance with environmental performance goals.

Evaluation of predicted effects will be conducted through environmental effects monitoring plans, which form a critical part of the EMS. Proposed follow-up and monitoring programs identified as part of this environmental assessment will be used to:

- Verify the accuracy of environmental predictions
- Measure compliance with applicable licences, permits and other approvals
- Confirm adherence to general and specific mitigation measures
- Assess the effectiveness of mitigation and management measures
- Identify Project effects requiring further mitigation

Individual follow-up and monitoring programs are further described in Chapters 5 to 19, as applicable, and summarized in Chapter 23.

2.7.2 Application of the Precautionary Principle

One of the purposes of EA is to demonstrate that a project has been designed and assessed with consideration of the precautionary principle. With respect to EA, the precautionary principle requires that if an undertaking has the potential to cause a threat of serious or irreversible damage to the environment, the proponent will take all reasonable environmental protection measures to protect the environment, even if full scientific knowledge is lacking.

The Federal EIS Guidelines (Appendix 1A) require the EIS to demonstrate that all aspects of the project have been examined and planned in a careful and precautionary manner to avoid significant adverse environmental effects. The Provincial EIS Guidelines (Appendix 1B) require Marathon to demonstrate that the Project has been examined and planned in a careful and precautionary manner to prevent or reduce adverse environmental effects, and that strategies to avoid adverse effects have been given priority. They also require alternative means of carrying out the Project to be considered in light of risk avoidance and adaptive management capacity. Contingency planning must address environmental effects from accidents and malfunctions, and follow-up and monitoring must be identified, particularly in areas where scientific uncertainty exists. Finally, public views on the above must be considered.

The EA for the Project has applied the precautionary principle in keeping with the guidance from federal and provincial regulators:

- As outlined in Section 2.1 and based on consultation with regulators, Indigenous groups, and stakeholders, the Project design has been updated to reduce the potential for environmental effects; for example, the heap leach pad has been removed, Project infrastructure locations have been shifted to reduce / avoid effects on fish habitat, and the overall Project footprint has been reduced by only including development of the Marathon and Leprechaun open pits
- Marathon will design, construct and operate the Project in keeping with regulatory requirements and proven mining standards and practices; Marathon has committed to mitigation measures (Section 2.7.4) which have proven effective in reducing environmental effects associated with construction and mining activities
- As provided in Section 2.11, Marathon has conducted a thorough assessment of alternatives means of carrying out the Project
- Marathon has been and will continue to work with local communities and Indigenous groups to enhance local benefits from the Project and address environmental concerns
- In assessing potential effects on the environment as a result of the Project, conservative assumptions and approaches have been taken, resulting in an overestimation of potential adverse effects; this is also the case for the assessment of accidental events and malfunctions, where worst-case scenarios have been assessed, even where these are considered unlikely to occur
- Marathon has proposed follow-up and monitoring as summarized in Chapter 23 to verify effects predictions, with a focus on those areas where scientific uncertainty exists; the details of these programs will be developed in consultation with regulators, local communities, Indigenous groups and stakeholders and as required through permitting conditions
- Marathon will continue to follow these principles and use the feedback received during the EA process to adapt aspects of the Project, where required, to further reduce potential environmental effects as project planning and engineering advance

2.7.2 Design Standards and Codes

Marathon will abide by the design standards and codes that are applicable to the design, construction, operation, and decommissioning of the Valentine Gold Project.

2.7.3 Environmental Management Plans

A series of EMPs will be developed under the overarching EMS and will encompass the environmental regulatory requirements and commitments made for the Project. This includes the formal conditions of the EA processes, as well as subsequent requirements of federal and provincial permitting processes required for the Project. They will also encompass commitments made in this EIS, which includes applicable compliance standards and/or industry best management practices.

Table 2.20 details the EMPs that have been identified to date through the EA process; this list is not considered exhaustive, as the need for additional management plans may be identified through the permitting process. In addition, as required by the Provincial EIS Guidelines (Appendix 1B), Table 2.21 provides an annotated table of contents for the EPP, which will be modified as needed for each phase of the Project.

Table 2.20 Environmental Management Plans

Management Plan	Comments
Environmental Protection Plan	This is a field-usable, living plan that will outline the environmental protection procedures to be incorporated into the various Project phases. An annotated Table of Contents is provided in Table 2.21. It will include an Air Quality Management Plan, Greenhouse Gas Management Plan, Erosion and Sedimentation Control Plan, Soils and Rock Management Plan, Avifauna Management Plan, Wildlife Management Plan and Traffic Management Plan. The EPP will be in place prior to initiating construction activities and will be adapted for the operation phase.
Chemical and Hazardous Materials Storage and Handling Plan	This plan will be developed to address the safe transportation, handling, and storage of chemicals and other hazardous materials that may be required throughout the life of the Project. The plan will incorporate appropriate provincial, federal, and international guidelines and requirements for all materials categorized (e.g., cyanide, propane, waste oil)
Waste Management Plan	This plan will address the handling, storage and disposal of both hazardous and non-hazardous wastes generated from the Project throughout all Project phases.
Contingency Plan	It is anticipated that Marathon's Certificate of Approval will require, and that Marathon will develop, a Contingency Plan directed towards the actions which will be taken in the event of a spill of a toxic or hazardous material. The Contingency Plan will include notification procedures, spill control and clean-up procedures, restoration and remediation of the spill site, and associated reporting. This plan will dovetail with other emergency responses plans required for the Project; see "Emergency Response and Spill Contingency Plans" below.
Explosives and Blasting Management Plan	This plan will be developed by Marathon and its selected, licenced blasting contractor(s) to provide direction for the safe storage, handling and use of explosives and explosive components at the Project site, to address the safety of the public and Project personnel, and protection of both the environment and Project components.
Fish Habitat Offset Plan	The Fish Habitat Offset Plan will address the direct and indirect effects on fish habitat, resulting in habitat alteration, disruption or destruction. It will take into account input from consultation and will be developed and implemented in consultation with DFO and in consideration of the "Policy for Applying Measures to Offset Adverse Effects on Fish and Fish Habitat Under the Fisheries Act" (DFO 2019).
Water Management Plan	The Water Management Plan (Appendix 2A) provides details on the key site-specific mitigation measures to reduce the potential for Project effects on surface water quantity and quality. The Water Management Plan provides detail on runoff and seepage collection strategies and systems (e.g., sedimentation ponds, berms, drainage ditches, pumps) to collect and contain surface water runoff and groundwater discharge from major Project components (open pit, waste rock piles, TMF, ore stockpile and overburden stockpiles, process plant) during climate normal and extreme weather conditions.

Table 2.20 Environmental Management Plans

Management Plan	Comments
Gender Equity and Diversity Plan	A Gender Equity and Diversity Plan will be implemented that meets the approval of the Minister of Natural Resources and Minister Responsible for the Status of Women.
Benefits Agreement	A Benefits Agreement will be implemented that meets the approval of the Minister of Natural Resources and Minister Responsible for the Status of Women.
Community Cooperation Agreements	Marathon will negotiate these agreements with the six communities in proximity to the Project Area, to enhance local benefits. Community engagement will include regular updates on planned and ongoing Project activities, the timely dissemination of environmental, employment, contracting and procurement information, and sponsorship of community programs, activities and initiatives, consistent with Marathon's corporate sponsorship policy and values.
Soil and Rock Management Plan	This plan will include a mass balance estimate and plan for all rock and soil materials that will be excavated and handled over the life of mine. The purpose of the plan is to reduce double handling and stockpiling of materials, make available sufficient overburden and organic materials for progressive and closure rehabilitation, address any issues associated with potential acid generation and metal leaching, and complete soil and rock materials handling in an efficient and cost effective manner.
TMF Operations, Maintenance and Surveillance Manual	This manual is required under the CDA Guidelines for the TMF and will dictate the frequency of dam inspections and dam safety reviews that are required to be completed to aid in preventing failures.
Public (Stakeholder) Safety Plan	In the event of a failure, CDA requires a Public (Stakeholder) Safety Plan be developed which will identify the notifications procedures, warnings and alarms to be implemented.
Effluent Monitoring Plan	Under MDMER, there are extensive testing obligations during all Project phases to ensure compliance with limits for deleterious substances and other regulated effluent characteristics. This includes equipment testing, 'effluent characterization', 'acute lethality' on fish and *daphnia magna* samples, and tailored biological monitoring studies, as well as regular monitoring of volume, pH, temperature, levels of various metals and other compounds, and 'water quality'. MDMER also allows for reduced frequency of certain tests with consistent compliant testing, which Marathon aims to achieve and maintain.
Tailings / Effluent Release Emergency Response Plan	Under MDMER, there is a requirement for a tailings / effluent emergency response plan that uses a risk-based approach to address the personnel and equipment, as well as procedures required to react to an unplanned release of tailings and/or effluent.
Emergency Response and Spill Contingency Plans	The required plans will be developed to manage, mitigate and remediate adverse effects resulting from accidental events or malfunctions. Many of these plans are required under various provincial and federal regulations and conditions of regulatory approvals and, in some cases, there is crossover with health and safety plans. As the Project develops, these plans will be structured under the EMS and amalgamated as needed to provide for clear direction to personnel in the event of an accident or malfunction.

Table 2.20 Environmental Management Plans

Management Plan	Comments
Follow-up and Monitoring Plan(s)	This plan(s) will be composed of environmental effects and compliance monitoring required in relation to the environmental effects assessed in this EIS and permitting requirements (e.g., environmental sampling and monitoring plan [air and water], real time water quality monitoring agreement). It/they will address requirements for monitoring of wastes, effluents and emissions and effects on the biophysical and socio-economic environments. The plan(s) will include schedules, methods and reporting requirements and will be developed in consultation with regulators, Indigenous groups and stakeholders.
Rehabilitation and Closure Plan	This plan will be developed in consultation with NLDIET and NLDECCM upon release from the EA process. Section 2.6 outlines the rehabilitation and closure philosophies and concepts that will be used in the development of the Project's Rehabilitation and Closure Plan.

Table 2.21 Annotated Table of Contents for the Environmental Protection Plan

Section	Description
Introduction	Introduces the EPP and Marathon's environmental policy, provides a brief description of the Project's location and Project activities and components, as well as outlines the purpose and organization of the EPP, roles and responsibilities, and orientation and training requirements.
Purpose and Scope	Outlines the purpose and objectives of the EPP, describing how it will be used by staff and why it is required (e.g., to reduce potential adverse environmental effects and provide direction in the case of an accidental event).
Organization	Provides an annotated list of the sections of the EPP, summarizing the organization of the document.
Marathon Environmental Policy	Describes Marathon's commitment to environmental protection and community engagement.
Roles and Responsibilities	Lists roles and responsibilities of Marathon and its management team, on-site environmental personnel, Marathon staff, contractors, subcontractors, and other site personnel.
Environmental Orientation and Training	Describes the proper environmental orientation and ongoing awareness training requirements for Marathon staff, contractors, subcontractors, and other site personnel.
Project Description Overview	Provides an overview of the Project activities and components.
Regulatory Requirements and Commitments	Lists the approvals, authorizations and permits that may be required, provides an overview of environmental compliance monitoring, rehabilitation of work sites, and reporting and communication procedures.

Table 2.21 Annotated Table of Contents for the Environmental Protection Plan

Section	Description
Environmental Compliance Monitoring	Describes site inspections and compliance monitoring requirements, as well as requirements specified in the applicable contracts and other relevant permits, authorizations and approvals: 1. Outlines the responsible personnel and appropriate timing of site inspections and provides an overview of the types of details recorded during site inspections. 2. Outlines the responsible personnel for compliance monitoring and the types of Project activities that may be monitored to comply with applicable regulatory requirements and proper implementation of environmental protection procedures
Reporting and Communication	Describes internal and external communication procedures for addressing environmental concerns, issues and/or incidents.
Internal Communications	Lists the personnel responsible for communicating Marathon policies, procedures, legal and other requirements to staff and contractors to address environmental concerns, issues and/or incidents that arise during Project activities and describes sign-off procedures and requirements.
External Communications	Lists the personnel responsible for communicating environmental concerns, issues and/or incidents that arise during Project activities and the relevant regulatory agencies to report to, such as NLDECCM, NLDFFA and the Provincial Archaeology Office. Details of monthly reporting is also provided and contacts of agencies to report to for specific incidents.
Environmental Protection Measures	Potential environmental concerns and the environmental protection procedures implemented during Project activities will be described in detail for the applicable Project phase. Adherence to these procedures will be required of Marathon staff as well as contractors and sub-contractors. At a minimum, environmental protection procedures for the following Project activities / environmental concerns will be outlined: 1. Site Clearing and Site Preparation 2. Erosion and Sediment Control 3. Soil Management 4. Watercourse Crossings and Works In or Near Fish Habitat 5. Blasting 6. Air Emissions (Including Dust Control) 7. Use of Vehicles, Equipment and Roads, including Road Maintenance 8. Lighting 9. Noise Control 10. Site Water Management 11. Tailings Management 12. Ore Processing 13. Materials Handling and Waste Management (including Storage, Handling and Transfer of Petroleum Products And Other Hazardous Materials; Non-Hazardous Waste Management and Recycling; Hazardous Waste Disposal and Sewage Disposal) 14. Vegetation / Wildlife / Avifauna Management 15. Employment and Expenditures 16. Site Facilities and Services 17. Engagement with Stakeholders, Indigenous Groups and the Public 18. Progressive Rehabilitation 19. Rehabilitation and Closure 20. Specific mitigation measures to be applied to these activities are outlined in Section 2.7.4 of the EIS. Additional measures may be identified through the permitting process.

Table 2.21 Annotated Table of Contents for the Environmental Protection Plan

Section	Description
Contingency Plans	Outlines contingency plans for fuel and hazardous material spills, wildlife encounters, failure of erosion and sediment control measures, forest fires, extreme weather, and discovery of historic resources. Stand-alone emergency response plans will also be developed.
Environmental Protection Plan Control Revisions	Outlines the process for revising the EPP.
Contact List	Contains a list of key contacts relevant to the EPP.
References	Contains a list of references cited in the EPP, and other relevant sources of additional information

2.7.4 Mitigation Measures

Table 2.22 provides a listing of the mitigation measures to be applied by Marathon throughout the construction, operation and decommissioning, rehabilitation and closure phases of the Project. It is not intended to be an exhaustive list and will be updated to reflect permit requirements and conditions of ES release, as applicable. Throughout the EIS, the measures applicable to each VC have also been highlighted in their respective VC chapters. STANTEC TO PROVIDE

Table 2.22 Summary of Mitigation Measures

Category	Mitigation	C	O	D	EIS Section Reference
Site Clearing, Site Preparation and Erosion and Sediment Control	• Project footprint and disturbed areas will be limited to the extent practicable.	✓	-	-	• Section 6.4 • Section 7.4 • Section 8.4 • Section 9.4 • Section 10.4 • Section 11.4 • Section 12.4 • Section 16.4 • Section 17.4
	• The boundaries of areas to be cleared will be well marked prior to the start of clearing activities.	✓	-	-	• Section 9.4
	• Sensitive areas (e.g., wetlands, hibernacula, mineral licks, roosts, caribou migration corridors) will be identified prior to construction and appropriate buffers will be flagged and maintained around these areas, where feasible.	✓	-	-	• Section 9.4 • Section 10.4 • Section 12.4
	• Existing riparian vegetation will be maintained to the extent practicable.	✓	-	-	• Section 9.4 • Section 10.4 • Section 12.4
	• Vegetation will be maintained around high activity areas to the extent practicable, to act as a buffer to reduce sensory (light and noise) disturbance.	✓	-	-	• Section 9.4 • Section 11.4 • Section 12.4

Table 2.22 Summary of Mitigation Measures

Category	Mitigation	C	O	D	EIS Section Reference
	• Clearing for road construction will be limited to the width required for road embankment, drainage requirements, and safe line of sight requirements. Trees will be cut close to ground level, and only large tree stumps will be removed, where practicable. Low ground shrubs will be left in place for soil stability and erosion protection purposes.	✓	-	-	• Section 9.4
	• Vegetation will be removed from development areas in accordance with cutting permits.	✓	-	-	• Section 9.4
	• Standard construction practices will be used, such as erosion and sediment control measures, placement and stabilization of excavated material, and seepage cutoff collars (pipes and culverts).	✓	-	-	• Section 8.4 • Section 9.4
	• Construction areas will be routinely monitored to identify areas of potential erosion and to apply appropriate mitigation. Progressive erosion and sediment control measures will be implemented, as required.	✓	-	-	• Section 7.4 • Section 8.4 • Section 9.4
	• Where crossing of wetlands beyond the area to be cleared is unavoidable, protective layers such as matting or biodegradable geotextile and clay ramps or other approved materials will be used between wetland root / seed bed and construction equipment if ground conditions are encountered that create potential for rutting, admixing or compaction.	✓	-	-	• Section 9.4
	• To reduce the risk of introducing or spreading exotic and/or invasive vascular plant species, equipment will arrive at the Project site clean and free of soil and vegetative debris. Equipment will be inspected by Marathon personnel or designate and, if deemed to be in appropriate condition, will be approved for use. Equipment that does not arrive at the Project site in appropriate condition will not be allowed on the construction footprint until it has been cleaned, re-inspected and deemed suitable for use.	✓	-	-	• Section 9.4
	• Quarried, crushed material will be used for road building in and near wetlands, to reduce the risk of introducing or spreading exotic and/or invasive vascular plant species.	✓	-	-	• Section 9.4
	• Where waste rock will be used for site earthworks and grading during construction and operational development, necessary test work will be conducted to avoid potentially acid generating materials from being used in construction.	✓	-	-	• Section 8.4
	• Merchantable timber will be salvaged and used, or it will be made available to local communities for fuelwood.	✓	-	-	• Section 9.4 • Section 16.4
	• Construction materials (soils and rock) will not be sourced from locations known to contain invasive plant species.	✓	-	-	• Section 9.4

Table 2.22 Summary of Mitigation Measures

Category	Mitigation	C	O	D	EIS Section Reference
	• Environmental personnel responsible for site monitoring during construction will receive training to recognize species of conservation concern (SOCC) that may be present in Project Area.	✓	-	-	• Section 9.4 • Section 10.4 • Section 12.4
	• Known occurrences of plant SOCC will be avoided. If avoidance of plant SOCC is not possible, seed collection or transplant of the plant will be considered in consultation with the applicable regulators.	✓	-	-	• Section 9.4
	• Grading will be directed away from wetlands, where possible, and will be reduced within wetland boundaries unless required for site specific purposes.	✓	-	-	• Section 9.4
	• Ground level cutting / mowing / mulching of wetland vegetation will be conducted instead of grubbing, where practicable.	✓	-	-	• Section 9.4
	• Slope stability will be considered with respect to the development of Project infrastructure, and if required a slope stability assessment will be conducted for areas where risks may exist. Where possible, construction in areas with potentially unstable terrain will be avoided. Where avoidance is not possible, best management practices will be implemented which may include: – Reduction of slope gradient with grading or terracing – Slope stabilization methods: retaining wall, drainage management, etc. – Geotextiles, wire mesh, shotcrete to manage erosion and rockfall potential – Revegetating soil slopes as soon as possible	✓	-	-	• Section 9.4
	• Cross drainage will be maintained to allow water to move freely from one side of the road to the other in areas of permanent or temporary access roads.	✓	✓	-	• Section 8.4 • Section 9.4
	• Signage will be installed around the mine site to alert the public and land users of the presence of the Project and its facilities.	✓	✓	✓	• Section 16.4 • Section 17.4
	• Movement of equipment / vehicles will be restricted to defined work areas and roads, and specified corridors between work areas.	✓	✓	✓	• Section 8.4 • Section 9.4
	• Native seed mix (free of non-native, invasive, and weed species) and native species (where available) will be used as erosion control on exposed soils and overburden stockpiles and during site rehabilitation.	✓	✓	✓	• Section 9.4
	• The requirement for broad-spraying of herbicide is not anticipated; spot-spraying may be required on occasion. If broad-spraying of herbicides is required, it will not be conducted within 30 m of plant SOCC, wetlands or waterbodies.	✓	✓	-	• Section 9.4

Table 2.22 Summary of Mitigation Measures

Category	Mitigation	C	O	D	EIS Section Reference
Soil Management	• During excavation, organic and mineral topsoil will be separated from cleared trees and brush and stored for future use during rehabilitation.	✓	-	-	• Section 9.4
	• Care will be taken to reduce topsoil and subsoil mixing during excavation.	✓	-	-	• Section 9.4
	• Soil salvage will occur during appropriate weather conditions (avoiding high winds and dry conditions) as practicable. Appropriate machinery will be used for salvage to avoid compaction.	✓	-	-	• Section 9.4
	• Organic and mineral topsoil will be stored and kept separate from subsoil or rock material used for construction.	✓	✓	-	• Section 9.4
	• Soil stockpiles will be easily accessible, on well-drained ground, and away from bodies of water (minimum of 30 metres) and standing timber. A working space of at least 5 metres will be maintained around soil stockpiles.	✓	✓	-	• Section 8.4 • Section 9.4
	• Topsoil and organics will be stored in stable piles to decrease compaction effects.	✓	✓	-	• Section 9.4
	• Soil stockpiles will be constructed and maintained in lifts to achieve flatter slopes and permit terracing to reduce erosion and maintain moisture within the topsoil.	✓	✓	-	• Section 9.4
	• Longer term stockpiles will be seeded to reduce erosion due to wind and precipitation.	✓	✓	-	• Section 9.4
	• Marathon will develop and implement a soil management plan as part of the Environmental Protection Plan, which will outline management practices for handling of overburden / soils and associated stockpiles. Soil management will also be conducted in accordance with the Rehabilitation and Closure Plan.	✓	✓	✓	• Section 9.4
	• Sediment control fences will be installed in areas where topsoil is exposed to erosion and siltation, such as slopes and embankments and approaches to stream crossings or waterbodies. Sediment control fences will be inspected and maintained over the course of the construction phase until the disturbed area has stabilized and natural revegetation has occurred. Non-biodegradable materials used for Sediment control fences will be removed following revegetation.	✓	✓	✓	• Section 6.4 • Section 8.4 • Section 9.4
Works In or Near Fish Habitat	• In-water work will be planned to respect DFO timing windows to protect fish in Newfoundland and Labrador.	✓	-	-	• Section 8.4
	• Siting of Project infrastructure will be designed to avoid fish habitat to the extent practicable. Where Harmful Alteration, Disruption or Destruction (HADD) of fish habitat cannot be avoided, the habitat will be offset, as required by the *Fisheries Act*, through the development and implementation of a Fish Habitat Offsetting Plan.	✓	-	-	• Section 8.4

Table 2.22 Summary of Mitigation Measures

Category	Mitigation	C	O	D	EIS Section Reference
	• Waste material (i.e., organic waste material, waste rock or construction debris) material will be stabilized or contained.	✓	✓	✓	• Section 8.4
	• Weather advisories will be followed, and work will be scheduled to avoid high precipitation and runoff events or periods, which could increase potential for erosion/sedimentation.	✓	-	✓	• Section 8.4
	• The duration of instream works will be minimized. In-water worksites will be isolated from flowing water (i.e., by using a cofferdam) to contain or reduce suspended sediment where possible. Clean, low permeability material and rockfill will be used to construct cofferdams. When possible, machinery will be operated above the high-water mark or inside of isolated areas.	✓	-	-	• Section 8.4
	• Minimum flows will be maintained in watercourses where practicable. Where HADD of fish habitat cannot be avoided, habitat alternation, disruption or destruction will be offset. New culverts will be sized appropriately and designed to be passable to fish to maintain fish passage as described in Chapter 2.	✓	-	-	• Section 8.4
	• Use of explosives in or near water will be avoided, however, if required, will follow DFO blasting guidelines.	✓	-	-	• Section 8.4
	• Best efforts will be made by a qualified environmental professional to relocate fish from areas of in-water works or areas of water drawdown to an appropriate location in the same watershed.	✓	-	-	• Section 8.4
	• Fish screens and/or other barriers will be installed and maintained to prevent fish from entering water withdrawal intakes.	✓	✓	✓	• Section 8.4
Blasting	• The explosives storage and production facilities will meet government regulations including required separation distances as regulated by the Explosives Regulatory Division of Natural Resources Canada (NRCAN). All explosives and accessories will be stored at the planned NRCAN approved magazine site and explosive storage facility.	✓	✓	-	• Section 21
	• Best practices from Blaster's Handbook (ISEE 2016) and Environmental Code of Practice for Metal Mines (ECCC 2009) will be followed to reduce and monitor noise emissions during blasting.	✓	✓	-	• Section 5.4
	• An Explosives and Blasting Management Plan will be developed by Marathon and its selected, licenced blasting contractor(s) to provide direction for the safe storage, handling and use of explosives and explosive components at the Project site, to address the safety of the public and Project personnel, and protection of both the environment, Project components and the Victoria Dam. The Explosives and Blasting Management Plan will include requirements for Blast Design vibration limits and seismic monitoring for blasting activities.	✓	✓	-	• Section 19.4 • Section 20

Table 2.22 Summary of Mitigation Measures

Category	Mitigation	C	O	D	EIS Section Reference
	• Blasting activities will be included under a contract service agreement with the explosives supplier and who will have a valid blasters certificate issued by the NL Department of Environment, Climate Change and Municipalities (NLDECCM).	✓	✓	-	• Section 19.4
	• Blasting activities will be limited to only those areas required to achieve foundation grades for site development or open pit pioneering.	✓	-	-	• Section 19.4
	• Blasting for site development will be done by a certified blasting contractor who will develop a conservative Blast Design for engineering review and approval prior to carrying out the work. The Blast Design will be required to meet strict seismic (vibrational) limits at appropriate distances from any existing structures (Victoria Dam), developing infrastructure, and fish habitat.	✓	✓	-	• Section 19.4
	• Engagement with NL Hydro regarding blasting requirements, timing, vibration thresholds and monitoring	✓	✓	-	• Section 19.4
Air Emissions	• An Air Quality Management Plan will be developed and implemented as part of the EPP. The Plan will specify the mitigation measures for the management and reduction of air emissions during Project construction and operation.	✓	✓	✓	• Section 5.4 • Section 8.4 • Section 9.4 • Section 10.4
	• During dry periods, water will be applied to the access road, site roads and haul roads as needed to mitigate dust emissions. The application of water will be limited to non-freezing temperatures to avoid icing that can present a safety hazard. Watering is most effective immediately after application, and repeated watering several times a day might be required, depending on surface and meteorological conditions. Water used for dust suppression will be sourced from site contact water, not natural waterbodies.	✓	✓	✓	• Section 5.4
	• The application of dust suppressants other than water to roads as an alternative option to watering will be considered in consultation with NLDECCM. Dust suppression would be applied on an as-needed basis during high wind conditions or if measured ambient particulate matter (PM) concentrations are in exceedance of the Newfoundland and Labrador Ambient Air Quality Standards, and if an increase of watering is determined ineffective or unfeasible at the time. The chosen dust suppressant will be approved by the NLDECCM prior to application. These suppressants, if required, will be applied, as per the manufacturer's recommendations.	✓	✓	✓	• Section 5.4
	• Ambient air quality and noise monitoring programs will be implemented throughout the life of the Project, as required and in accordance with Project permitting and conditions of approval.	✓	✓	✓	• Section 5.4

Table 2.22 Summary of Mitigation Measures

Category	Mitigation	C	O	D	EIS Section Reference
	• When loading stockpiles, drop heights will be reduced to be as close to the pile as possible.	✓	✓	-	• Section 5.4
	• Surfaces of topsoil and overburden stockpiles will be stabilized during extended periods between usage by means of vegetating or covering the exposed surfaces.	✓	✓	-	• Section 5.4 • Section 9.4
	• Conveyors will be covered to reduce fugitive dust emissions.	-	✓	-	• Section 5.4
	• Select exhaust sources will be equipped with emission control technologies to reduce contaminant emissions. Exhaust controls are listed as follows: – Lime silo: baghouse – Sodium cyanide mix tank: dust collector – Copper sulphate storage tank: dust collector – Sodium metabisulphate mix tank: dust collector – PAX storage tank: baghouse – Lime mix/storage: baghouse – Elution electrowinning: mist eliminator – ICU Electrowinning: mist eliminator – Barring furnace: baghouse – Carbon regeneration kiln: scrubber	-	✓	-	• Section 5.4
	• A Greenhouse Gas Management Plan will be created to manage Project GHG emissions, and outline and track the effectiveness of mitigation measures, including follow-up and monitoring activities. Additional details are provided in Chapter 5.	✓	✓	✓	• Section 5.4
Vehicles / Equipment / Roads	• Engines and exhaust systems of construction and mining equipment will be subject to a comprehensive equipment preventative maintenance program to maintain fuel efficiency and performance. To reduce emissions, equipment and vehicle idling times, and cold starts will be reduced to the extent possible. Marathon will develop an idling policy to this effect	✓	✓	✓	• Section 5.4
	• Vehicles and heavy equipment will be maintained in good working order and will be equipped with appropriate mufflers to reduce noise.	✓	✓	✓	• Section 5.4 • Section 10.4 • Section 11.4 • Section 12.4
	• Haul roads and infrastructure will be designed to reduce transportation and haul distances where possible.	✓	✓	-	• Section 5.4
	• Haul roads, site roads and the access road will be maintained in good condition. This will include periodically regrading and ditching to improve water flow, reduce erosion, and to manage vegetation growth.	✓	✓	✓	• Section 7.4 • Section 8.4 • Section 9.4
	• Vehicles will use existing roads / trails while operating at the mine site. All-terrain vehicles used by Marathon personnel will also be restricted to existing roads, trails and corridors to the extent possible.	✓	✓	✓	• Section 9.4 • Section 10.4 • Section 11.4

Table 2.22 Summary of Mitigation Measures

Category	Mitigation	C	O	D	EIS Section Reference
	• Project vehicles will be required to comply with posted speed limits on the access road, site roads and haul roads to limit fugitive dust from vehicle travel on unpaved roads. Speed limits will be set in accordance with provincial regulations and industry standards (e.g., for haul roads). Additional speed restrictions will be implemented during caribou migration periods.	✓	✓	✓	• Section 5.4 • Section 10.4 • Section 11.4 • Section 12.4
	• Caribou crossing on roads / features will be facilitated where they occur (e.g., crossing point across ditch) within the caribou migration corridor. The access road, site roads and haul roads will be designed for provision of low areas in the plowed snowbanks, where practicable, to facilitate wildlife movements: – Breaks in snowbanks will be created at approximately 200 m intervals, to the extent practicable, to provide wildlife crossing opportunities – Snow berms will typically be less than 1 m tall to facilitate caribou crossing – Where feasible, breaks in snowbanks will be aligned on opposing sides and with existing wildlife trails, where they occur, to facilitate caribou crossing	✓	✓	✓	• Section 11.4 • Section 12.4
	• Project-related air traffic (helicopter, airplane) will maintain a minimum ferrying altitude of 500 m to the extent feasible.	✓	✓	✓	• Section 11.4 • Section 12.4
	• Marathon will develop and implement a Traffic Management Plan to manage transportation of workers and materials to site, product leaving site, the number of vehicles accessing the site, and to reduce traffic delays.	✓	✓	✓	• Section 10.4 • Section 11.4 • Section 13.4
	• Marathon will implement traffic control measures to restrict public access to the mine site, which may include gating approaches, placing large boulders and/or gated fencing.	✓	✓	✓	• Section 10.4 • Section 11.4 • Section 12.4 • Section 16.4 • Section 17.4
	• Project vehicles will be driven by trained and competent drivers who will use approved routes.	✓	✓	✓	• Section 21.5.6
	• Driving safety will be a part of the employee orientation program.	✓	✓	✓	• Section 21.5.6
	• Highway laws will be obeyed, including seasonal weight restrictions, speed limits, traffic signage and requirements for permit for oversized loads.	✓	✓	✓	• Section 21.5.6
	• Project vehicles will be manually inspected on a regular schedule to confirm serviceability	✓	✓	✓	• Section 21.5.6

Table 2.22 Summary of Mitigation Measures

Category	Mitigation	C	O	D	EIS Section Reference
Light Emissions	• Project lighting will be limited to that which is necessary for safe and efficient Project activities. Lighting design guidelines will be followed, such as the Commission Internationale de L'Éclairage, International Dark Sky Association, Illuminating Engineering Society, and the lighting requirements for workspaces, as applicable.	✓	✓	✓	• Section 5.4 • Section 10.4 • Section 11.4 • Section 12.4
	• Lighting will be located so that the lights are not directed toward oncoming traffic on nearby roads on or off site because of the objectionable nuisance and safety hazard this may present.	✓	✓	✓	• Section 5.4
	• Lights will be designed to avoid excessive use of mobile flood lighting units and will be turned off when they are not required.	✓	✓	✓	• Section 5.4
	• Mobile and permanent lighting will be located such that unavoidable light spill off the working area is not directed toward receptors outside of the Project Area, to the extent practicable.	✓	✓	✓	• Section 5.4 • Section 10.4 • Section 11.4 • Section 12.4
	• Full cut-off luminaires will be used wherever practicable to reduce glare, light trespass and sky glow from Project lighting.	✓	✓	✓	• Section 5.4
Noise Emissions	• Project facilities and infrastructure will be designed to limit noise emissions.	-	✓	-	• Section 5.4 • Section 10.4 • Section 11.4 • Section 12.4
	• Where practicable in accessible areas (e.g., along cleared rights-of-ways), trees and other vegetation will be left in place or encouraged to grow to obstruct the view of Project facilities, reducing the change in viewshed and muffling nuisance noise.	✓	✓	-	• Section 5.4 • Section 12.4 • Section 16.4
Site Water Management	• Marathon will implement a Water Management Plan (Appendix 2A) for the site which will incorporate standard management practices, including drainage control, excavation and open pit dewatering which collectively comprise the water management infrastructure currently designed as part of the Project scope. The Water Management Plan provides detail on runoff and seepage collection strategies and systems (e.g., local seepage collection ponds, berms, drainage ditches, pumps) to collect and contain surface water runoff and groundwater discharge from major Project components (open pit, waste rock piles, TMF, ore stockpile and overburden storage areas, process plant) during climate normal and extreme weather conditions.	✓	✓	✓	• Section 6.4 • Section 8.4 • Section 9.4

Table 2.22 Summary of Mitigation Measures

Category	Mitigation	C	O	D	EIS Section Reference
	• Progressive water management will be implemented over the life of the mine. This includes construction of water management infrastructure as an area is developed and decommissioning / rehabilitation of water management infrastructure as an area is decommissioned.	✓	✓	✓	• Section 7.4 • Section 8.4
	• Existing drainage patterns will be maintained to the extent feasible with the use of culverts and bridges.	✓	✓	-	• Section 7.4 • Section 8.4 • Section 9.4
	• Existing culverts along the site access road will be maintained or upgraded as necessary. This will include placement of culverts of the same size or larger, at the same inlet and outlet elevations, and in a manner to not cause flooding or ice jams.	✓	-	-	• Section 7.4
	• Project water storage features (i.e., sedimentation ponds) will be used to attenuate peak discharges to the environment.	✓	✓	✓	• Section 7.4 • Section 8.4
	• Standard construction methods, such as seepage cutoff collars, will be used where trenches extend below the water table to mitigate preferential flow paths.	✓	-	-	• Section 6.4
	• Water management ditches will be designed to allow wildlife crossing opportunities, aligned with wildlife trails where practicable.	✓	✓	✓	• Section 11.4 • Section 12.4
	• Precipitation runoff from waste rock piles and other developed areas of the site will be collected via ditches and channels and directed to downstream sedimentation ponds.	✓	✓	-	• Section 8.4
	• Site ditching will be designed to reduce erosion and sedimentation through use of rock check dams, silt fences, plunge pools, and grading as appropriate.	✓	✓	✓	• Section 8.4 • Section 9.4
	• Snow will be cleared from ditches prior to the spring thaw, as practicable, to maintain the designed capacity of ditches and ability to convey surface runoff.	✓	✓	-	• Section 8.4
	• Culverts will be inspected periodically to remove accumulated material and debris upstream and downstream of the culverts.	✓	✓	✓	• Section 7.4 • Section 8.4 • Section 9.4
	• Perimeter grading and access roads will be used to divert runoff away from the open pit and reduce the amount of dewatering required.	✓	✓	-	• Section 7.4
	• Contact water collection ditches will be installed around the overburden stockpiles, ore stockpiles and waste rock piles to collect toe seepage. Contact water collection ditches will be designed to convey the 1:100-year storm event, and with positive gradients to limit standing water and maintain positive flow.	✓	✓	✓	• Section 6.4 • Section 7.4 • Section 8.4
	• Where possible, contact water will be recycled for use on-site (e.g., dust suppression).	✓	✓	✓	• Section 7.4

Table 2.22 Summary of Mitigation Measures

Category	Mitigation	C	O	D	EIS Section Reference
	• Non-contact water will be diverted away from developed areas, where possible. Channels and berms will be constructed around the crest of the open pits or uphill of waste rock piles and other developed areas to divert natural precipitation and surface runoff away from contact with mining operations, where practicable.	✓	✓	✓	• Section 7.4 • Section 8.4
	• Water withdrawals from Victoria Lake Reservoir and Valentine Lake, for the purposes of expediting the filling of the open pits, will be done in accordance with a pumping operations plan. This plan will be developed to reduce effects on the lakes.	-	-	✓	• Section 7.4
	• Runoff and groundwater seepage will be collected from the open pits, with water pumped to sedimentation ponds before being discharged to each pits' pre-development watershed area.	-	✓	-	• Section 7.4 • Section 8.4
	• Pond inlet and outlet structures will be configured to reduce inlet velocity and scour, and to meet sedimentation requirements. Pond outlets will be designed with subsurface inlets to mitigate against chemical stratification in ponds, thermal heating of discharge and ice blockage of outlets.	✓	✓	✓	• Section 7.4 • Section 8.4
	• Contact water sedimentation ponds will be designed to provide onsite storage of local runoff with the size and residence times designed to provide sediment removal to meet the *Metal and Diamond Mining Effluent Regulation* (MDMER) effluent total suspended solids criterion of 15 mg/L (monthly mean concentration limit), with removal of particles down to 5 micron (μ) in size for up to the 1:10 Annual Exceedance Probability (AEP) flows.	✓	✓	✓	• Section 7.4 • Section 8.4
	• Sedimentation ponds will be designed to contain (without discharge) runoff resulting from storm events up to the 1:100 year AEP with spring snowmelt event, including emergency spillways and maintaining minimum freeboard of 0.5 m. The emergency spillways will accommodate flows up to the 1:200 AEP flow.	✓	✓	✓	• Section 7.4 • Section 8.4
	• Sedimentation ponds will be designed with active water storage that considers ice thickness during winter. Under an extreme storm event, only the stormwater in excess of the available storage at that time will be discharged to the environment via the emergency spillway to protect the collection ponds.	✓	✓	✓	• Section 7.4 • Section 8.4
	• Effluent will be treated prior to discharge to the receiving water environment, as required, to meet regulatory effluent criteria as well as criteria developed through the receiving water Assimilative Capacity Assessment (Appendix 7C).	✓	✓	✓	• Section 7.4 • Section 8.4
	• Effluent discharge rates will be maintained to below the highest rate used in the Assimilative Capacity Assessment (Appendix 7C).	✓	✓	✓	• Section 7.4 • Section 8.4

Table 2.22 Summary of Mitigation Measures

Category	Mitigation	C	O	D	EIS Section Reference
	• The potable water treatment plant will be designed to meet the Guidelines for Canadian Drinking Water Quality and monitored in accordance with NL monitoring and reporting requirements.	✓	✓	-	•
	• A maintenance schedule will be developed and implemented to provide for regular maintenance and inspection of site water management infrastructure, including culverts.	✓	✓	✓	• Section 9.4
	• Groundwater quality and quantity will be monitored and adaptively managed, if required, using a network of groundwater monitoring wells to document Project effects on groundwater flow and quality. Monitoring locations will be maintained until the water levels and water quality have stabilized post-closure.	✓	✓	✓	• Section 6.4
Tailings Management	• The dams required for the tailings impoundment will be designed, constructed, operated and closed in accordance with the Canadian Dam Association (CDA), Global Industry Standards on Tailings Management, and Mining Association of Canada (MAC) guidelines, as well as applicable provincial requirements	✓	✓	✓	• Section 8.4
	• As required by the CDA, an Operations, Maintenance and Surveillance manual will be developed for the TMF which will dictate the frequency of dam inspections and dam safety reviews.	✓	✓	✓	• Section 21.5.1
	• As required by the CDA, a Public (Stakeholder) Safety Plan will be developed, which will identify the notifications procedures, warnings and alarms to be implemented in the event of a failure.	✓	✓	✓	• Section 21.5.1
	• The TMF dam will be designed to maintain water storage to contain the Environmental Design Flood, a 100-year return hydrologic event (24-hour storm or freshet event (75 mm)) with no discharge through the spillway (Golder 2020).	-	✓	✓	• Section 7.4
	• To address extreme weather events, an emergency spillway will be maintained to safely pass the Inflow Design Flood while maintaining minimum freeboards requirements to protect the structural integrity of the dam. The Inflow Design Flood is generated by the theoretical maximum precipitation that could fall in the area.	-	✓	✓	• Section 7.4 • Section 21.5.1
	• The TMF closure spillway will be upgraded to meet closure requirements developed during detailed design.	-	-	✓	• Section 7.4
	• The TMF will be designed and managed to reduce the area of exposed dry surfaces, where possible, to reduce the potential for windblown dust emissions.	-	✓	-	• Section 5.4

Table 2.22 Summary of Mitigation Measures

Category	Mitigation	C	O	D	EIS Section Reference
	• Vegetation will be cleared within the TMF tailings containment zone prior to filling/flooding to reduce potential generation of methyl mercury (MeHg) water quality concerns.	✓	✓	✓	• Section 7.4 • Section 8.4
	• Shallow groundwater seepage from the TMF will be intercepted by seepage collection ditches and pumped back to the TMF via sump pumps.	✓	✓	✓	• Section 6.4 • Section 7.4 • Section 8.4
	• Contact and process water from the TMF will be recycled for ore processing to the extent possible.	-	✓	-	• Section 7.4
	• The tailings deposition strategy to deposit thickened tailings as beaches will reduce porewater lock-up in comparison to sub-aqueous deposition and will reduce the quantity of porewater seepage in closure.	-	✓	✓	• Section 7.4
	• Cyanide detoxification within the mill using the sulphur dioxide / air oxidation process will result in the degradation of cyanide and precipitation of metals prior to discharge to the TMF.	-	✓	-	• Section 6.4 • Section 8.4 • Section 10.4 • Section 11.4 • Section 12.4
	• A water treatment plant will receive discharge water from the tailings pond and use proven processes to treat the water to meet MDMER limits prior to discharge to the polishing pond and subsequent discharge to the environment.	-	✓	-	• Section 7.4 • Section 8.4
	• A polishing pond will receive discharge from the water treatment plant to further advance the treatment of water prior to discharge to the environment.	-	✓	✓	• Section 7.4
	• The TMF will be monitored throughout the life of the facility to demonstrate performance goals are achieved and design criteria and assumptions are met.	✓	✓	✓	• Section 21.5.1
	• Reclaim water will be taken from the TMF during Years 10 to 12 and will subsequently be pumped to Leprechaun pit as part of the tailings slurry for deposition. Using reclaim water from the TMF in the process plant will reduce the amount of freshwater needed to be taken from Victoria Lake Reservoir.	-	✓	-	• Section 7.4
	• As required by MDMER, a tailings / effluent emergency response plan will be developed, which will outline how a failure or malfunction of the TMF resulting in a release of tailings or tailings effluent will be managed.	-	✓	-	• Section 8.4
Materials Handling and Waste Management	• A Project-specific Waste Management Plan will be developed to address the collection, storage and transportation of hazardous and non-hazardous wastes generated from the Project. The Waste Management Plan will set out procedures for reducing Project-related waste and limiting demands on the regional landfill.	✓	✓	✓	• Section 12.4

Table 2.22 Summary of Mitigation Measures

Category	Mitigation	C	O	D	EIS Section Reference
	• Waste will be transported from site to be recycled, reused or disposed of in licensed/approved facilities. Non-reusable and non-recyclable wastes will be sent to the provincial waste management facility in Norris Arm, and reuse/recycling materials will be sent to the nearest management facility for each material type.	✓	✓	✓	• Section 9.4 • Section 13.4
	• Through proper handling and storage of industrial materials and debris, the mine site will be maintained in a manner that reduces the risk that caribou and other wildlife will encounter potential hazards.	✓	✓	✓	• Section 11.4
	• Sewage effluent will be treated and monitored in accordance with the NL *Environmental Control Water and Sewage Regulations* prior to discharge to the environment. Sludge generated as a by-product of the treatment of sewage will be disposed off-site by a licensed contractor.	✓	✓	-	• Section 7.4 • Section 8.4
	• Temporary use of existing sanitary sewage system at the exploration camp will be supplemented with mobile sanitary sewage storage facilities until the mine site system is operational.	✓	-	-	• Section 7.4 • Section 8.4
	• Reagents will be stored and handled within containment areas designed to hold 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 avoid mixing of incompatible reagents. Storage tanks will be equipped with level indicators, instrumentation, and alarms to prevent spills.	-	✓	-	• Section 8.4 • Section 21.5.3
	• Sumps and sump pumps will be installed in reagent storage areas for spillage control.	-	✓	-	• Section 21.5.3
	• Appropriate ventilation, fire and safety protection, eyewash stations, and Safety Data Sheet stations will be located throughout storage facilities for reagents.	-	✓	-	• Section 14.4 • Section 21.5.3
	• Fuel will be obtained from a licensed contractor who will be required to comply with federal and provincial regulations including federal *Sulphur in Diesel Fuel Regulations*, and provincial *Storage and Handling of Gasoline and Associated Products Regulations.*	✓	✓	✓	• Section 5.4 • Section 8.4 • Section 21.5.3
	• Fuel and hazardous materials storage on site will be a minimum of 200 m from a salmon river or tributary and 100 m from other waterbodies.	✓	✓	✓	• Section 8.4 • Section 21.5.3
	• Disposal and handling of waste oils, fuels and hazardous waste will be as recommended by the suppliers and/or manufacturers in compliance with federal, provincial and municipal regulations.	✓	✓	✓	• Section 8.4
	• Transportation of hazardous materials will be conducted in compliance with the federal *Transportation of Dangerous Goods Act* and the provincial *Dangerous Goods Transportation Act*	✓	✓	✓	• Section 21.5.3

Table 2.22 Summary of Mitigation Measures

Category	Mitigation	C	O	D	EIS Section Reference
	• Fuels and lubricants will be stored according to regulated containment methods in designated areas. Refueling, servicing, and equipment and waste storage will not take place within 30 m of watercourses to reduce the likelihood that deleterious substances will enter watercourses. Spill kits will be maintained at locations on-site during all Project phases.	✓	✓	✓	• Section 8.4 • Section 9.4
Wildlife / Avifauna Management	• The potential for on-site activity to be limited / restricted during caribou migration to reduce sensory disturbance will be reviewed with regulators.	✓	✓	✓	• Section 11.4
	• Activities in the Marathon pit area that may result in sensory disturbance to migrating caribou (e.g., blasting, loading, hauling) will be reduced or ceased while caribou are migrating through the corridor and within a set distance from the site (e.g., 10 km north or south). The extent of the activity reduction, and the conditions regarding caribou migration proximity will be determined in consultation with NLFFA-Wildlife Division and potentially developed under an adaptive management approach as described in Section 11.9.	✓	✓	✓	• Section 11.4
	• Wildlife-vehicle collisions, near misses or observations of wildlife (caribou, moose) road mortality on site roads and/or involving Project vehicles on the access road will be reported to the on-site environmental team and the NLDFFA - Wildlife Division. Adaptive management measures will be implemented should locations of high frequency wildlife-vehicle interactions be identified.	✓	✓	✓	• Section 11.4 • Section 12.4
	• The on-site environment team will be notified if caribou are observed within 500 m of Project activities such as vegetation clearing, construction, heavy equipment use, and the environmental manager will determine if the activity will be reduced or delayed (in consultation with NLDFFA-Wildlife Division, as applicable).	✓	✓	✓	• Section 11.4
	• The TMF will be monitored daily during caribou migration for hazards to caribou and caribou activity. Observations or signs of caribou within 500 m of the TMF will be reported to the on-site environmental manager. If observed repeatedly, Marathon will employ mitigation measures, such as fencing at the TMF, to discourage caribou from accessing the area.	✓	✓	-	• Section 11.4

Table 2.22 Summary of Mitigation Measures

Category	Mitigation	C	O	D	EIS Section Reference
	• If caribou are observed near the open pits during migratory periods, fencing may be installed as needed around the crest of the pits to reduce the risk of caribou becoming entrapped or injured. Note that a barrier (usually large rock) is required to be installed adjacent to the pit crest for closure and is usually completed as part of progressive rehabilitation activities – this barrier could be erected to achieve both purposes. Marathon will consult with NLDFFA-Wildlife Division on this issue.	✓	✓	✓	• Section 11.4
	• Caribou activities during the migratory periods will be monitored in the vicinity of the Project through visual observation, aerial surveys, and/or telemetry data from GPS (global positioning system) collars.	✓	✓	✓	• Section 11.4
	• To reduce the risk of caribou-vehicle collisions, caribou will have right-of-way except where deemed unsafe to site personnel. If wildlife is on a road, speed will be reduced and vehicle stopped if necessary, to allow wildlife to leave road.	✓	✓	✓	• Section 11.4
	• If a caribou mortality is observed or discovered on site or are reported by Project personnel, Marathon will report this event to NLDFFA-Wildlife Division as soon as possible.	✓	✓	✓	• Section 11.4
	• To reduce sensory disturbance, a visual survey for caribou will be conducted prior to blasting. If caribou are observed within a 500 m blasting radius buffer activity will be delayed until animals have left the buffer.	✓	✓	-	• Section 11.4
	• Observations of bat colonies, potential hibernacula sites, sick or dead bats will be reported to the provincial Wildlife Division at 709-637-2025. Bat sightings can also be reported to the toll-free bat hotline: 1-833-434-2287 (BATS).	✓	✓	✓	• Section 12.4
	• During the construction of buildings or other structures, bats will be discouraged from establishing roost sites by sealing openings of 15 mm in diameter or larger. Chutes and ducts will be sealed at the outside / top, so as to prevent entry by bats. Structures will be assessed to identify potential entry points before they become a problem.	✓	-	-	• Section 12.4
	• If a bat colony is found to exist within a Project structure, bats can remain there when it is safe for people and where there is no chance of contact with people. If it is not safe for bats to remain, Wildlife Division will be contacted to develop an approved removal plan.	✓	✓	✓	• Section 12.4

Table 2.22 Summary of Mitigation Measures

Category	Mitigation	C	O	D	EIS Section Reference
	• Open buckets, garbage bins, tubs or containers will be kept covered where practicable. Bats may fly into these open containers and may be attracted to standing water within them. Bats cannot climb slippery surfaces and are unable to fly straight up into the air, so can easily become trapped in such containers.	✓	✓	✓	• Section 12.4
	• Use of sticky traps for problem rodents will be avoided, as bats are often attracted to these.	✓	✓	✓	• Section 12.4
	• Large-diameter trees will be maintained to the extent possible; especially those that are old, dead or dying. These types of trees typically have the peeling bark, crevices and cavities that provide important natural roosting habitats for bats.	✓	-	-	• Section 12.4
	• Vegetation clearing will be avoided during the bird breeding season, if feasible, which will also protect other breeding wildlife species, by preventing the destruction of small mammal nests and bat maternity roosts. If avoidance is not practicable, pre-clearing surveys will be conducted for bat maternity roosts. Buffers / set back distances will be established if maternity roosts are identified.	✓	-	-	• Section 12.4
	• Pets will be prohibited on site.	✓	✓	✓	• Section 11.4
	• An Avifauna Management Plan will be developed and implemented for the Project and will include such measures as conducting pre-clearing surveys for active migratory bird nests during the breeding bird season and buffer / set-back distances from active nests. Where practicable, clearing and grubbing during the breeding season will be avoided.	✓	✓	✓	• Section 10.4
	• Trees that provide actual or potential habitat will be retained where safe to do so and technically feasible. Removal activities, where required, will be scheduled to the extent practicable, outside the migratory bird breeding season. If tree clearing is required during the migratory bird breeding season, experienced environmental monitors will inspect the trees to assess occupancy before tree removal.	✓	-	-	• Section 10.4
	• The discovery of nests by staff will be reported to the Marathon environmental manager at site and appropriate action or follow-up will be guided by the Avifauna Management Plan.	✓	✓	✓	• Section 10.4
	• As waterfowl species are particularly sensitive to disturbance during critical breeding and brood-raising periods (from May to mid-July), personnel will be made aware of the importance of the surrounding wetlands to waterfowl and efforts will be made to reduce impacts on them during Project activities.	✓	✓	✓	• Section 10.4 • Section 16.4

Table 2.22 Summary of Mitigation Measures

Category	Mitigation	C	O	D	EIS Section Reference
	• Embankments of the TMF and of sedimentation ponds will be maintained free of vegetation. This will also limit the attraction of waterfowl and/or wildlife to these ponds for foraging or breeding.	✓	✓	-	• Section 10.4
	• Avifauna use of the TMF ponds, open aquatic areas and other key Project locations will be monitored (primarily targeting waterfowl but also other wildlife species). If problematic avifauna use occurs, adaptive management measures (e.g., deterrents and/or exclusionary measures) will be implemented.	✓	✓	-	• Section 10.4
Employment and Expenditures	• Hunting / fishing / harvesting of wildlife will be strictly prohibited on the mine site. Workers will not be permitted to hunt / fish / harvest while staying at the accommodations camp and will not be permitted to bring firearms or angling gear to site.	✓	✓	✓	• Section 8.4 • Section 11.4 • Section 12.4 • Section 16.4 • Section 17.4
	• Marathon will work to develop cooperative protocols with responsible agencies to address access of Project personnel to emergency and other medical services, including employee medicals and check-ups.	✓	✓	✓	• Section 13.4 • Section 14.4
	• Workforce education will be provided to address topics such as: – healthy lifestyle choices – anti-harassment training – cultural awareness training – Marathon's health and safety policies	✓	✓	✓	• Section 13.4 • Section 14.4 • Section 17.4
	• Marathon will provide an Employee Assistance Program to Project personnel.	✓	✓	✓	• Section 13.4 • Section 14.4
	• Work schedules / rotations for Project workers, and the requirement to stay at the mine site accommodations camp during their rotation will deter workers from spending time in local communities and accessing community recreation services and facilities outside of working hours.	✓	✓	✓	• Section 13.4 • Section 14.4
	• Rotation changes will be scheduled so that all workers do not arrive in and leave the site at the same time, limiting Project-related demands on both road and air services and infrastructure.	✓	✓	✓	• Section 13.4
	• Workers will be bussed from nearby designated communities to the mine site for rotations to reduce effects of traffic on roads in the communities and the access road.	✓	✓	✓	• Section 11.4 • Section 16.4 • Section 17.4
	• Arrivals / departures of employee traffic will be scheduled to occur earlier than the existing observed morning peak hour for local traffic and later than the existing observed afternoon peak hour, if needed.	✓	✓	✓	• Section 13.4

Table 2.22 Summary of Mitigation Measures

Category	Mitigation	C	O	D	EIS Section Reference
	• A Gender Equity and Diversity Plan will be implemented that meets the approval of the Minister of Industry, Energy and Technology and Minister Responsible for the Status of Women and Marathon will engage with both Indigenous groups during the development of the Plan. A business access strategy for members of underrepresented populations will be included in the plan.	✓	✓	✓	• Section 14.4 • Section 15.4 • Section 17.4
	• A Benefits Agreement will be implemented that meets the approval of the Minister of Industry, Energy and Technology and Minister Responsible for the Status of Women.	✓	✓	✓	• Section 14.4 • Section 15.4
	• Marathon will communicate employment information to local communities and Indigenous groups in a timely manner so that local and Indigenous residents have an opportunity to acquire the necessary skills to qualify for potential Project-related employment.	✓	✓	✓	• Section 14.4 • Section 15.4 • Section 17.4
	• Marathon will work with the Province, educational and training institutions, Indigenous groups and stakeholders to identify skilled trade shortages relative to the Project and to identify training needs and opportunities to contribute to a sustainable Project workforce.	✓	✓	✓	• Section 15.4
	• On-the-job training programs and apprenticeship opportunities will be made available.	✓	✓	✓	• Section 15.4
	• Summary reports will be provided to the provincial regulator that include information on the number of persons employed by 4-digit National Occupational Classification (NOC), the number of full- and part-time employed, the number of apprentices (by level) and journey persons for each applicable 4-digit NOC code, gender and source of the workforce.	✓	✓	✓	• Section 15.4
	• Procurement packages will be developed with consideration for capacity and capabilities of local and regional Indigenous and non-Indigenous businesses.	✓	✓	✓	• Section 14.4 • Section 15.4 • Section 17.4
	• Project purchasing requirements will be posted in a timely manner so that local and regional businesses can position themselves to compete to supply goods and services needed for Project construction and operation.	✓	✓	✓	• Section 15.4
Site Facilities and Services	• An accommodations camp will accommodate construction, operation and closure workers.	✓	✓	✓	• Section 13.4
	• Power, water and wastewater treatment at the Project site and accommodations camp will be provided by Marathon and will not rely on resources within the Local Assessment Area communities.	✓	✓	✓	• Section 13.4

Table 2.22 Summary of Mitigation Measures

Category	Mitigation	C	O	D	EIS Section Reference
	• Project-specific environmental management plans and monitoring programs will be developed, including a Waste Management Plan that sets out procedures for reducing Project-related waste and limiting demands on the regional landfill.	✓	✓	✓	• Section 12.4 • Section 13.4
	• Security services will be established on-site.	✓	✓	✓	• Section 13.4
	• An on-site first aid facility will be provided with paramedic / nurse / ambulatory technician and an ambulance, as required. Designated, trained personnel will provide transport to the nearest hospital when required. During Project construction and operation, first aid stations and equipment will be distributed through the site, as appropriate.	✓	✓	✓	• Section 13.4 • Section 14.4
	• Marathon will implement COVID-19 protocols as necessary.	✓			• Section 14.4
	• Catering and recreation opportunities will be provided at the accommodations camp, including fitness equipment. The design of facilities will also consider culturally appropriate spaces.	✓	✓	✓	• Section 13.4
	• The worker accommodations will be designed with sufficient ventilation systems to reduce the need to open the windows. This can also be supported through closed-window policies with requirements highlighted during mandatory site orientations for employees, contractors and visitors.	✓	✓	✓	• Section 5.4
Engagement with Stakeholders, Indigenous Groups and the Public	• Marathon will continue to engage with cabin owners within the Project Area to discuss their occupancy, potential future use of these cabins, and potential applicable mitigation measures.	✓	✓	-	• Section 16.4
	• Marathon will consult with NLDFFA in advance of construction to incorporate the harvesting of forestry resources in the Project Area as part of site preparation.	✓	-	-	• Section 16.4
	• Marathon will continue to engage with local resource users (hunters, outfitters, trappers, anglers) regarding the overlap of the Project with hunting, trapping, and fishing areas in the Project Area. This will include the communication of Project information, updates on ongoing and planned activities, and a discussion of issues and concerns and a potential means of addressing them.	✓	✓	✓	• Section 16.4

Table 2.22 Summary of Mitigation Measures

Category	Mitigation	C	O	D	EIS Section Reference
	• Project activities, locations, and timing will continue to be communicated to Indigenous groups, affected land and resource users, environmental non-government organizations, the provincial government, and local authorities throughout the life of the Project. In particular, Marathon will communicate in advance with respect to Project activities that may limit/affect use of the access road (i.e., upgrading activities or transport of large loads or equipment). This information will be communicated through local town councils, local radio stations and social media.	✓	✓	✓	• Section 16.4 • Section 17.4
	• Marathon will continue to engage with Indigenous groups, including Indigenous resource users, throughout the life of the Project. This will include the communication of Project information, updates on ongoing and planned activities, and a discussion of issues and concerns and a potential means of addressing them. This will also include a discussion of the development and implementation of Project-specific environmental management and monitoring plans.	✓	✓	✓	• Section 17.4
	• Marathon will continue to engage with Indigenous groups for the identification, review, and analysis of existing and available information on Indigenous land and resource use activities, to consider this early and throughout Project planning, design and implementation.	✓	-	-	• Section 17.4
	• Marathon will continue to engage with local communities, including through the negotiation of Community Cooperation Agreements with the six communities in proximity to the Project Area. Community engagement will include regular updates on planned and ongoing Project activities, the timely dissemination of environmental, employment, contracting, and procurement information, and sponsorship of community programs, activities and initiatives, consistent with Marathon's corporate sponsorship policy and values.	✓	✓	✓	• Section 13.4
Rehabilitation and Closure	• Marathon will develop a Rehabilitation and Closure Plan that meets the requirements of the Department of Industry, Energy and Technology, NLDECCM, and NLDFFA-Wildlife Division. The plan will be reviewed and updated regularly until implemented.	✓	✓	✓	• Section 8.4 • Section 9.4 • Section 10.4 • Section 11.4
	• The volume of soils required for rehabilitation activities will be assessed, and a materials (soils) balance will be developed for the overall Project to ensure that sufficient soils are available for rehabilitation.	✓	✓	✓	• Section 9.4

Table 2.22 Summary of Mitigation Measures

Category	Mitigation	C	O	D	EIS Section Reference
	• Native seed mix (free of non-native, invasive, and weed species) and native species (where available) will be used as erosion control on exposed soils and overburden stockpiles and during site rehabilitation.	✓	✓	✓	• Section 9.4
	• Progressive rehabilitation (e.g., placement of soil cover and vegetation over waste rock piles, erosion stabilization and temporary vegetation of completed organics, topsoil, and overburden stockpiles) will be implemented.	-	✓	✓	• Section 6.4 • Section 7.4 • Section 9.4
	• Measures will be taken to address public health and safety requirements throughout rehabilitation and closure.	✓	✓	✓	• Section 15.4 • Section 16.4
	• Desired land and resource end-uses will be considered in the preparation of the Rehabilitation and Closure Plan.	-	-	✓	• Section 16.4 • Section 17.4
	• Prior to demolishing existing building and infrastructure, surveys for breeding birds and for bats will be conducted as per the Avifauna Management Plan. Where practicable, existing buildings and infrastructure will be demolished outside of the migratory breeding bird season.	-	-	✓	• Section 10.4
	• Linear features on the mine site (i.e., roads and power line corridors) not required for long-term monitoring will be decommissioned and rehabilitated to limit future hunting pressures on wildlife and restore habitat to pre-mine conditions where possible.	-	-	✓	• Section 11.4 • Section 12.4
	• At closure, following water quality testing, sedimentation ponds will be breached to allow drainage to the surrounding areas. These features will then be graded, contoured to re-establish drainage patterns and revegetated as required.	-	-	✓	• Section 8.4
	• Wells on site will be decommissioned in compliance with the Guidelines for Sealing Groundwater Wells (Government of NL 1997).	-	-	✓	•
	• Pre-mining site drainage patterns will be re-established to the extent practicable.	-	-	✓	• Section 8.4 • Section 9.4
	• Disturbed areas will be graded and/or scarified, covered with overburden and organic materials, where required, and seeded with native seed mix to promote natural plant colonization and succession.	-	-	✓	• Section 9.4
	• Passive water quality treatment technologies will be employed, where and if required, for closure / post-closure including engineered wetlands to treat site seepage and runoff, as practicable.	-	-	✓	• Section 7.4 • Section 8.4
	• Open pit filling will be accelerated at closure, which will return groundwater levels to baseline conditions in a shorter timeframe.	-	-	✓	• Section 6.4

Table 2.22 Summary of Mitigation Measures

Category	Mitigation	C	O	D	EIS Section Reference
Accidental Event Prevention and Response	• Marathon will liaise with local emergency providers so that roles and responsibilities are understood, and that the necessary resources required to respond are in place.	✓	✓	✓	• Section 13.4
	• Mandatory safety orientations will be provided for employees.	✓	✓	✓	• Section 14.5
	• Emergency response plans will be developed, including spill prevention and response, emergency response measures, training, responsibilities, clean-up equipment and materials, and contact and reporting procedures.	✓	✓	✓	• Section 13.4
	• Appropriate project personnel will be trained in fuel handling, equipment maintenance and fire prevention and response measures.	✓	✓	✓	• Section 13.4
	• Fire prevention and suppression systems will be maintained on site, including fire response vehicles and associated equipment, fire water distribution, sprinklers, fire extinguishers and other firefighting equipment.	✓	✓	✓	• Section 13.4
	• Facilities will have a fire suppression system in accordance with the structure's function and in accordance with regulatory requirements, including NL *Occupational Health and Safety Act* and *Occupational Health and Safety Regulations*. For the most part, fire water will be distributed via an underground ring main network around the facilities, which will be supplied from the bottom section (a reserve) of the raw water tank. All buildings will have hose cabinets and handheld fire extinguishers. Electrical and control rooms will be equipped with dry-type fire extinguishers. Automatic sprinkler systems will be installed in ancillary buildings. Appropriate fire suppression systems will be provided for reagents according to their SDS. Additionally, all mine water trucks will be fitted with fire-fighting equipment and foam injection tanks.	✓	✓	✓	• Section 21.5.5
Discovery and Protection of Heritage Resources	Mitigation measures to be applied with approval and appropriate permits issued by the Provincial Archaeology Office: • Field assessment surveys will be undertaken prior to construction wherever the Project Area has potential to interact with identified areas of high potential for archaeological resources. • Ground-truthing of the three identified Victoria River sites will be undertaken in the event that the Project Area expands to interact with their hypothesized locations. .	✓	-	-	Section 18.4

Table 2.22 Summary of Mitigation Measures

Category	Mitigation	C	O	D	EIS Section Reference
	• Review of historical fieldnotes pertaining to the Victoria River sites that are presently housed in the Provincial Archives will be undertaken in association with further field assessment. • Archaeological field assessment and testing of road routes and other required infrastructure (new and upgraded) at selected river crossings and lakeshores will be undertaken prior to construction once development plans are finalized.				
	Measures to be included in the Heritage and Cultural Resources Protection Plan to mitigate the potential of adverse effects on historic resources resulting from an accidental discovery: • Prior to construction, personnel will be made aware of potential historic resources in the area and understand their responsibility should they identify potential historic resources. • Personnel will be advised to report unusual findings to the Site Supervisor and not to touch such findings. • Work will be suspended in the immediate area should a potential resource be identified. • If features are found using heavy equipment, the equipment will not be moved so that historical information and evidence is left intact and not further disturbed. • The area of findings will be flagged to protect it from looting and further disturbance. • A qualified archaeologist or historic resources professional will be contacted by the Site Supervisor to conduct an assessment of the site.	✓	-	-	• Section 17.4
Effects of the Environment on the Project – Weather and Climate Change	• The Project will be designed and constructed to meet applicable engineering codes, standards and best management practices, such as the *National Building Code of Canada* (NBCC), *the National Fire Code of Canada,* and *the Canadian Dam Association Guidelines*. The codes and standards account for weather variables, including extreme conditions, that could affect the structural integrity of buildings and infrastructure. Designs will also consider projected climate change over the life of the Project.	✓	✓	✓	• Section 22.3.1
	• The potential effects of extreme weather including storms, precipitation, flooding/ice jams, and drought will be considered in Project planning, design and operation and maintenance strategies, including the selection of materials and equipment, and design of components, such as water management infrastructure and the TMF. These designs will consider projected climate change conditions over the life of the Project.	✓	✓	✓	• Section 22.3.1

Table 2.22 Summary of Mitigation Measures

Category	Mitigation	C	O	D	EIS Section Reference
	• Marathon will regularly inspect and monitor Project infrastructure and equipment that may be impacted by the environment (in addition to its normal function) and take required action to maintain, repair and upgrade infrastructure / equipment as needed.	✓	✓	✓	• Section 22.3.1
	• Work activities will include allowance / procedures for delays due to poor weather.	✓	✓	✓	• Section 22.3.1
	• Contingency plans, including emergency back-up power for necessary operations, will be in place to manage delays, such as temporary power outages.	✓	✓	✓	• Section 22.3.1
	• Weather forecasts will be considered when planning construction and operation activities that may be affected by adverse conditions, such as TMF embankment raises, receipt of materials and supplies, and product deliveries, particularly deliveries of chemicals, reagents and diesel fuel. Where required, these activities will be scheduled for periods of favourable weather conditions.	✓	✓	✓	• Section 22.3.1
	• Weather forecasts will be regularly monitored and prior to extreme weather events, appropriate preventative measures will be taken to reduce the risk of damage to the Project. This will include site inspection by staff to secure loose items and identify other risks (for wind events), and inspection / maintenance of sediment and erosion control measures prior to and following precipitation events.	✓	✓	✓	• Section 22.3.1
Effects of the Environment on the Project – Geological Hazards	• The Project will be designed and constructed to meet applicable engineering codes, standards, and BMPs, including the NBCC and CANFEM, which provide standards of safety to account for geological hazards, including seismic activity.	✓	✓	✓	• Section 22.3.2
	• Water retaining structures, including dams for the TMF, will be designed, constructed, operated and closed in accordance with the recommendations provided by CDA; these guidelines also outline the minimum design criterion to account for geological hazards.	✓	✓	✓	• Section 22.3.2
	• Implementation of site-specific erosion and sedimentation control plans that will be developed during detailed design phase of the Project.	✓	✓	✓	• Section 22.3.2
	• Geotechnical investigations for all site infrastructure, open pits, and waste and ore piles will be completed prior to construction to further assess the site-specific conditions and associated risk of geological hazards; information obtained from these site-specific investigations will be used to complete the designs and meet the requirements as presented in NBCC, CANFEM and CDA.	✓	-	-	• Section 22.3.2

Table 2.22 Summary of Mitigation Measures

Category	Mitigation	C	O	D	EIS Section Reference
Effects of the Environment on the Project – Forest Fires	• Marathon's environmental management system will describe emergency response measures, training requirements, roles and responsibilities, and contact and reporting procedures in the event of a fire at or near the mine site or along the access road.	✓	✓	✓	• Section 22.3.3
	• Marathon will actively monitor wildfires that could affect the mine site and/or access road and coordinate with provincial authorities with respect to response, including the need for potential shutdown and evacuation of employees.	✓	✓	✓	• Section 22.3.3
	• On-site fire prevention and response equipment will be provided and maintained, and Marathon will have employees / teams that will be trained in safe fire response. While the purpose of this response training and equipment is to respond to fire scenarios on the mine site, NLDFFA would be responsible for response to a forest fire in the area not related to the Project.	✓	✓	✓	• Section 22.3.3
	• Project-related activities will be adjusted in case of a severe fire and as needed to protect the health and safety of employees.	✓	✓	✓	• Section 22.3.3

Notes:
C – Construction Activities
O – Operation Activities
D – Decommissioning, Rehabilitation and Closure Activities

2.7.5 Emissions, Discharges and Wastes

Emissions, discharges and wastes will result from Project activities during all Project phases. During initial design, Marathon has employed design principles and plans for best available control technologies, as applicable, to manage and mitigate emissions, effluents and discharges. During Project execution, Marathon will adhere to mitigation measures based on industry standard best practices to reduce emissions, discharges and wastes, as described in the applicable EIS VC sections and summarized in Section 2.7.4 Marathon is also developing a comprehensive EMS comprised of component plans as described in Section 2.7.3. Emissions, discharges and wastes from accidental events are addressed in Chapter 21.

2.7.5.1 Effluent Management and Treatment

The assessment of Project-related effects on surface water, including details on sources of effluent, proposed mitigation measures and residual effects is provided in Chapter 7. Sources of effluent include the TMF/polishing pond, surface runoff (i.e., contact water), and grey water and sanitary sewage. Once operational, water coming into contact with Project components will be collected and treated to meet discharge requirements prior to release to the environment, as described in Section 2.3.5 and in the Water Management Plan (Appendix 2A). Details of the associated infrastructure (e.g., water treatment plant), processes and requirements are provided in Sections 2.3.5 to 2.3.7. Sources of sanitary sewage and grey water include the process plant / mine services area (Sections 2.3.7) and the accommodations camp (Section 2.3.11). Effluent from these sources will be treated as described in Section 2.3.7. During the construction phase, a contractor will handle sewage waste for offsite disposal until the sewage treatment plant is constructed.

2.7.5.2 Air Emissions

Air emissions associated with the Project include airborne particulate matter (dust) and greenhouse gases (i.e., carbon dioxide, methane and nitrous oxide) from the combustion of diesel and gasoline. Air quality modelling was completed for the operation phase and is provided in Appendix 5B. The assessment of Project-related effects on the atmospheric environment, including details on sources of air emissions, estimates of emission quantities, and proposed mitigation measures and residual effects, is provided in Chapter 5.

Emissions during site preparation activities and the construction of Project infrastructure include combustion gases from vehicles, heavy-machinery and temporary diesel generators, and dust from sources such as the operation of heavy earth-moving equipment and wind erosion. Emissions are expected to occur intermittently during the construction phase. Water collected from a sediment pond or the polishing pond (once constructed) will be the primary dust suppressant used during construction. Other dust suppressants may be considered (in consultation with NLDECCM) where high traffic construction (i.e., temporary) roads are developed, and permanent site/haul roads are established during construction. A comprehensive maintenance program for vehicles, equipment and roads will be implemented.

In addition to those during construction, potential sources of emissions during Project operation will include dust generated from blasting, mining and the TMF; stockpiling, handling and transporting ore, waste rock and overburden; and milling. The potential for fugitive dust emissions at the processing area will be limited, as milling and processing will occur in enclosed buildings, and the conveyors and stockpile will be covered. Scrubbers, baghouses, water misting will be used as applicable to reduce fugitive dusts and other atmospheric emissions. Additional mitigation measures include limiting vehicle speeds; connecting to the electrical grid to reduce the need for diesel generators; and managing the TMF to reduce the area of exposed dry surfaces, where feasible.

Emissions during active closure are expected to be less than during the operation phase (as no ore extraction or tailings deposition will be occurring), and the post-closure phase is expected to generate negligible air emissions.

An estimated 10 million litres of diesel could be consumed during the construction phase, and 30 million litres annually during operation and maintenance. Based on the anticipated amount of fuel to be consumed, it is estimated that an average of 630.42 kt CO_2e could be emitted throughout the life of the Project (construction and operation). Select exhaust sources will be equipped with emission control technologies to reduce emissions of contaminants.

Marathon is developing several plans associated with air emissions, including an Environmental Effects Monitoring Program, Environmental Protection Plan (including an Air Quality Management Plan, Greenhouse Gas Management Plan, Erosion and Sediment Control Plan, and Soil and Rock Management Plan), Explosives and Blasting Management Plan, and Rehabilitation and Closure Plan. Marathon will manage, monitor and report annual air emissions and GHGs, and develop strategies to reduce emissions.

2.7.5.3 Acoustic Emissions

Acoustic emissions associated with the Project include noise from operation of machinery and equipment during all Project phases, and from blasting during the operation phase. Noise modelling was completed and is provided in Appendix 5H. The assessment of Project-related effects on the atmospheric environment (Chapter 5) includes consideration of potential effects of acoustic emissions on receptors.

Generally, sources of noise during construction will include trucks and trailers, portable air compressors and welders, bulldozers, front-end loaders, excavators, graders, gravel and rock trucks, scrapers, compactors, mobile cranes, concrete pumps and temporary diesel generators.

The main noise-generating sources associated with operation include blasting in the open pits, process plant equipment such as rock breakers, feeders and conveyors, and moving sources such as trucks, excavators and dozers. Noise generated during active closure is predicted to be similar to or less than construction.

Proposed mitigation includes ensuring that construction and other mobile equipment is equipped with appropriate muffler systems and selecting equipment and/or designing enclosures to limit overall noise emissions during operation. In addition to noise mitigation measures, Marathon is developing several plans associated with acoustic emissions, including an Environmental Protection Plan (including a Traffic Management Plan), Environmental Effects Monitoring Program, and Explosives and Blasting Management Plan. Marathon will implement a complaint response procedure to address noise complaints should they arise.

2.7.5.4 Solid and Hazardous Waste Management

Solid waste management during all Project phases will align and conform with NL's provincial waste management strategy. There will be no on-site disposal of solid or hazardous waste. Waste management will include the following components:

- Receptacles placed at various locations around the mine site for the regular collection and segregation of waste and domestic recyclable materials (e.g., cans, paper).
- On-site waste sorting / storage areas for temporary storage of non-recyclable, non-hazardous domestic and putrescible waste, and of recyclable/reusable materials.
- Transportation of non-reusable and non-recyclable wastes to the provincial waste management facility in Norris Arm, and of reuse/recyclables to the nearest management facility per material type.
- Secure hazardous waste storage area for segregation and temporary storage of waste dangerous goods and hazardous wastes (e.g., waste oils, spent fuels, chemicals) prior to packaging and

shipment by licensed contractors to certified waste management facilities, in accordance with federal and provincial regulations.

- A Waste Management Plan, including the following strategies:
  - Consideration of truck traffic to/from site such that waste is removed via otherwise empty trucks heading off-site (which will also result in reduced emissions)
  - Integrating waste management into procurement contracts such that, where practicable, suppliers will be contractually obligated to remove recyclable and reusable materials related to their products and services (e.g., cable reels, liquid and storage containers)
  - Inclusion of waste management principles and practices in mandatory employee and contractor site orientations
  - Ongoing contracts with certified waste contractors such that waste materials are removed on a regular basis (i.e., varying with the type / quantity of waste generated) and waste materials do not accumulate at site

Anticipated waste types to be generated per Project phase and planned methods for disposal are provided in Table 2.23.

Table 2.23 Waste Types and Disposal Methods

Waste Type	Disposal Method
CONSTRUCTION	
Inert construction waste and recyclables (e.g., film plastics, containers/boxes, pallets/wood, cable reels)	Recycling/reuse or offsite landfill
Domestic waste	Offsite landfill
Used oil, oil filters, air filters, etc.	Hazardous materials recycling / disposal facility
OPERATION AND MAINTENANCE	
Inert waste and recyclables (e.g., film plastics, corrugated boxboard, pallets/wood, cable reels, liquid drums/international bulk containers)	Recycling/reuse or offsite landfill
Metal	Recycling
Batteries	Hazardous waste facility
Electrical wiring	Recycling
Used oil, oil filters, air filters, glycol, etc.	Hazardous materials recycling / disposal facility
Electronic waste (‘e-waste’)	Recycling / reuse or offsite disposal
Domestic waste	Offsite landfill
CLOSURE AND REHABILITATION	
Inert waste	Recycling / reuse or offsite landfill
Metal	Recycling
Domestic waste	Offsite landfill

2.8 APPROACH TO ADDRESSING PROJECT REFINEMENTS POST-EIS/EA

While there are no foreseeable substantive modifications to the Project at this time, the Project design is likely to be refined as planning and engineering design progress, and as a result of ongoing stakeholder, Indigenous and regulatory engagement. Additional refinements may be made during construction, and as production is optimized during the operation phase. Adaptive management (i.e., learning from monitoring and adjusting mitigation and monitoring accordingly) and post-EA consultation and engagement may also result in refinements during the life of the Project.

Marathon has taken a conservative approach to Project activities and components in the EIS/EA; therefore, potential changes to the Project are not anticipated to alter the overall conclusions of the EIS/EA with respect to the significance of effects. Refinements related to Project production, and capacity or design adjustments to account for those production changes, are expected to be relatively minor adjustments. Based on ongoing Project planning and engineering design, other Project design optimizations (within the Project Area) may occur as detailed design proceeds. These refinements are not expected to substantively affect the overall Project design or layout, nor to result in environmental effects that exceed the conservative predictions described in this EIS/EA, the conclusions related to mitigation measures, or the determination of residual effects.

Marathon will implement contingency measures and adaptive management throughout all Project phases, as applicable. As further Project planning and engineering design work are undertaken, refinements to the Project will be discussed as applicable with the NLDECCM, the Impact Assessment Agency of Canada (IAAC) and other applicable regulatory agencies.

2.9 PURPOSE OF AND NEED FOR THE PROJECT

The following section outlines the purpose of, and need for the Project, both in terms of its underlying rationale and objectives, as well as the anticipated socio-economic benefits.

The purpose of the Project is to mine and process the discovered gold resources at the Project site to provide an economic return for the company's investors, which they can then redeploy thus creating new, future opportunities. The Project will also benefit the local communities, central region of the province, the province of NL, Canada as a whole, as well as current and future Project personnel. The Project will bring much needed employment to the region, increase business activity in the region and in the province, and provide revenue to the province and Canada.

Gold is a valuable resource not only in the context of jewelry and investments, but also due to its reliability, performance and versatility, making it indispensable in engineering and electronics. Some of the unique properties of gold include:

- Conducts electricity
- Resistant to corrosion
- Malleable and ductile
- Catalytic properties
- Biocompatible

- Nanogold

Electronics and Technology

The most important industrial use of gold is in the manufacture of electronics. It is a soft, pliable material, which can be easily drawn out into narrow wires or plated into thin coatings. These physical properties make gold the ideal material for a wide range of electronic applications. Almost every modern electronic device uses a small amount of gold.

The automotive sector is another source of demand. The industry is shifting rapidly towards electrification and autonomous driving and gold remains the preferred metal for wire bonding, as vehicle electronics have tight safety and reliability requirements, which tend to outweigh material cost considerations. Gold demand is driven primarily by the increasing number of electronic control systems required to meet safety regulations, energy efficiency, emissions control, driving information, and driver assistance.

Medical and Dentistry

Gold is used in dentistry because it is chemically inert, nonallergenic, and easy for the dentist to work with. Gold alloys are used for fillings, crowns, bridges, and orthodontic appliances.

Gold is also helping to bring the fields of advanced electronics and medicine closer together. Today, healthcare providers are using gold for diagnostic procedures and medical treatments. Gold has been increasingly used to treat several types of cancer, most remarkably through chemotherapy of tumours. This largely reflects recent developments which have allowed scientists to synthesize gold nanoparticles of various shapes and sizes. These nanoparticles are stable, easily functionalized and, critically, biocompatible, meaning they can potentially be used in the body as therapeutic agents. Realizing the healthcare potential of gold nanoparticles in combination, these properties mean that gold nanoparticle-based technologies have enormous potential in the healthcare sector. There are a wide range of possible applications in diagnostic testing, medical treatments, and procedures, such as drug delivery, gene therapy, tumour detection and radiotherapy dose enhancement. Many surgical instruments, electronic equipment, and life-support devices are made using small amounts of gold. Gold is nonreactive in the instruments and is highly reliable in the electronic equipment and life-support devices.

Environment

Gold nanoparticles are being used to improve the efficiency of solar cells, and gold-based materials are being used in the search for new, more effective fuel cell catalysts.

Industrialized areas have a problem with groundwater contamination and gold is being used to help break down contaminants into their counterparts.

Most of the ways that gold is used today have been developed only during the last two or three decades, and this trend is expected to continue. As our society requires more sophisticated and reliable materials, the uses for gold will increase. The combination of growing demand, few substitutes, and limited supply is likely to cause the value and importance of gold to continue to increase steadily over time.

2.9.1 Gold Price Outlook

In addition to the utility provided by gold as summarized above, gold has long been considered its own financial asset class (or currency). Gold tends to perform particularly well during times of macroeconomic uncertainty. Year-to-date, the gold price has risen from US$1,525 per ounce to approximately US$2,000 per ounce, or 31%. Some of the factors contributing to this increase include:

1. Global debt-to-GDP reached 331% in Q1/20 ($258 trillion), up from 320% in Q4/19, 230% in Q1/19 & 217% five years ago
2. The Balance Sheets of the G3 Central Banks combined expanded by over $5 trillion since March 2020 to over $20 trillion
3. There is a very high inverse correlation between the gold price and the real yield on the 5-year inflation-linked US government bonds (TIPS); since the beginning of 2019, TIPS have been on a downward path, with the real yield falling to below -1.0% from ~ +1.0% in early 2019 (see graph below)
4. Global liquidity (total international foreign exchange reserves + US monetary base) increased by $3.0 trillion since early March 2020 to over $19 trillion
5. The Total Public Debt of the U.S. increased by over $3 trillion since March to over $26 trillion

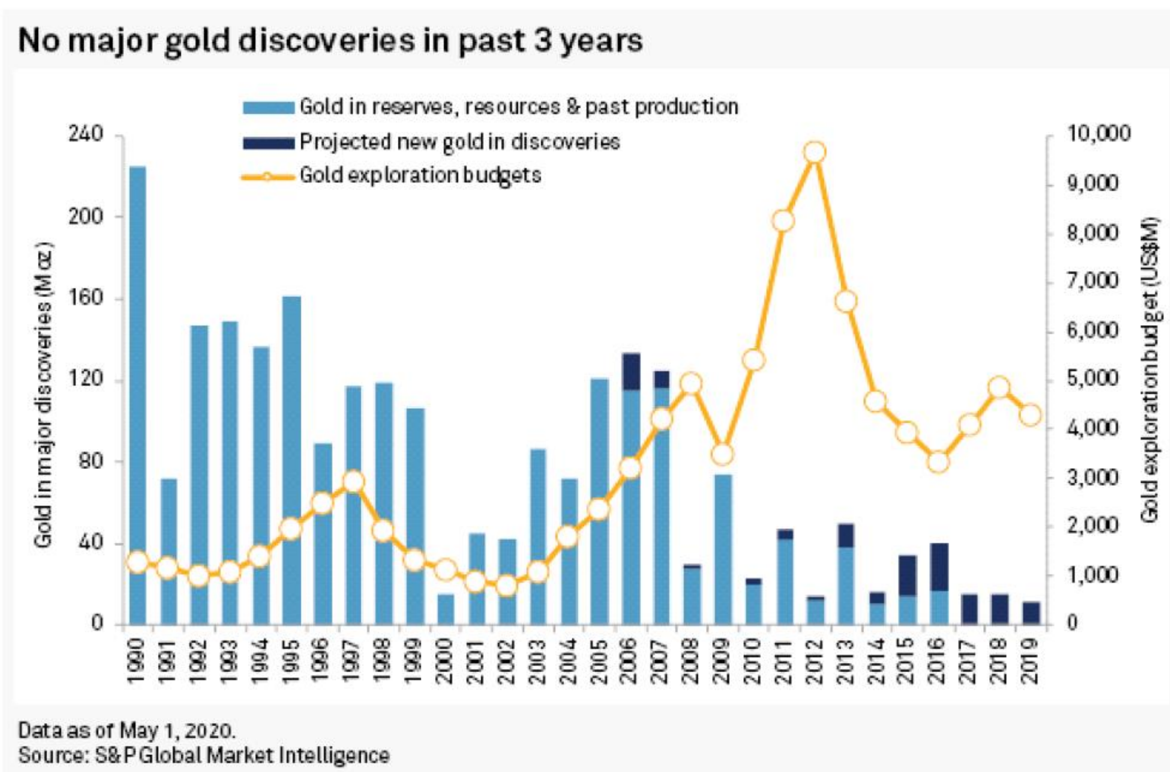
Gold themes: Real rate expectations have declined over the long-term across all maturities

Real rates expectations have declined over the long-term across all available maturities and are now firmly negative across the curve out to 2050. These declines have supported higher gold prices.

The current forecast for gold prices based on the average of the estimates of 20 global financial institutions are as follows:

- 2021 – US$1,830 per ounce
- 2022 – US$1,741 per ounce
- 2023 – US$1,685 per ounce
- Long-term – US$1,485 per ounce

Based on the results of the company's Pre-Feasibility Study (PFS) (Ausenco 2020) completed in April 2020, the Project generates an after-tax rate of return of 15% down to US$1,075 per ounce gold. Taking into account the current gold price and those forecasted for the coming years (noted above), the Project has a low risk of not being economically viable. Further, with an estimated development capital requirement of C$272 million (based on the PFS), Marathon should be well positioned to obtain financing for the Project given current market conditions. There is a scarcity of high-quality gold development projects, particularly projects located in good jurisdictions, which should also help attract capital to the Project (see graph below).



2.9.2 Importance of the Mining Industry

2.9.2.1 Canada

Canada ranks in the top five producing countries for 13 major minerals and metals, and mining is a major generator of wealth and employment for Canadians. As detailed in the March 2019 Canadian Minerals and Metals Plan (CMMP):

> *"Canada's people and natural advantages translate into benefits for Canadians. In 2017, mineral production totaled approximately $44 billion. Canada produces some 60 minerals and metals at 200 active mines and 7,000 pits and quarries. The minerals sector (which includes exploration, mining and related support activities, primary processing, and downstream product manufacturing) accounts for 19% of Canada's total domestic exports, and accounts for 5% of nominal Gross Domestic Product (GDP). The minerals sector is a major employer, delivering 634,000 direct and indirect jobs throughout the country in rural, urban and remote regions. This includes 16,500 jobs for Indigenous Peoples. Some 7,600 of these jobs are in the upstream mining industry sub-sector, making this the second highest proportional employer of Indigenous Peoples among private sector employers in Canada."*

The Government of Canada is taking steps to solidify its status as a global mining leader, and to ensure the industry continues to contribute to prosperity for Canadians. Federal, provincial and territorial jurisdictions have collaborated on the development of the CMMP, which focuses on unlocking Canada's resource potential. The CMMP focuses on six strategic directions, and the actions needed to support each strategy, including:

- Economic Development and Competitiveness
- Advancing the participation of Indigenous Peoples
- The environment
- Science, technology and innovation
- Communities
- Global leadership

In general, the CMMP has been developed to advance Canada's minerals and mining industry, increasing the socio-economic benefits, while protecting the environment.

2.9.2.2 Newfoundland and Labrador

Newfoundland and Labrador currently ranks fifth in Canada for value of mineral production and contributes 46% of iron ore and 26% of nickel nationally. The mining industry in NL also boasts the following (directly from NLDIET):

- 13 producing mines
- Seven metal and nine non-metal commodities produced
- 6,486 estimated number of person years of employment for 2020 (including mining project construction)

- $4.4B projected gross value of mineral shipments for 2020
- $235M in mining taxes in 2018/19
- 6.3% estimated percentage contributed to GDP by mining in 2017
- $65.0M estimated exploration expenditures in 2020 (this is expected to be adjusted down significantly based on COVID-19 impact)

In the 2019 Annual Survey conducted by the Fraser Institute, NL ranked as one of the top 10 jurisdictions globally on the Policy Perception Index. Policy factors examined include uncertainty concerning the administration of current regulations, environmental regulations, regulatory duplication, the legal system and taxation regime, uncertainty concerning protected areas and disputed land claims, infrastructure, socio-economic and community development conditions, trade barriers, political stability, labor regulations, quality of the geological database, security, and labor and skills availability.

In late 2018, the Government of NL unveiled their Mining the Future 2030 strategy, a plan to grow the minerals and metals industry in the province. The vision statement for the strategy highlights the potential for the industry "*Newfoundland and Labrador is a globally competitive, top tier jurisdiction for mineral exploration and development – one that is safe, environmentally responsible, maximizes benefits and opportunities, and competitively produces quality products for global markets*." The strategy sets aggressive, measurable goals to be accomplished by 2030 including five new mines, sustainable, direct employment of more than 6,200 in mine operation, annual expenditures of $100 million or 5% of the Canadian total, $4 billion in annual mineral shipments, and a diverse work force that includes a minimum of 50% women.

Development of significant, sustainable projects like Marathon's proposed Valentine Gold Project are critical to the success of the CMMP and NL's Mining the Future 2030 plan. Marathon is committed to the principles outlined in both documents and will work with the provincial and federal governments to reduce environment effects, enhance benefits, and create a diverse and inclusive workforce.

2.9.3 Project and Timeline Risks

A favourable gold market, an existing lull in major project development in NL and Canada, and even the employment and economic downturn created by COVID-19, are creating an opportunity for Marathon to develop the Project, which if realized will create substantial employment and economic benefits for the central region of NL, the province of NL and Canada. Instrumental to the success of the Project is the schedule to production. Many projects have failed to be developed due to schedule delays and/or capital cost overruns resulting in loss of confidence from existing and potential investors and missed market opportunities (downturn in commodity prices, e.g., Alderon Iron Ore). From a Project execution perspective, maintaining the schedule is critical to success. Key factors in schedule adherence include the project developer ensuring that the financial resources are in place to execute on the development plans, and receiving regulatory approvals to conduct permitted works on a timely basis and in line with expectations. Subject to a successful and timely EA process and taking into consideration the current gold market dynamics, Marathon is well positioned to address these critical success factors and deliver a successful Project.

2.9.4 Benefits of the Project

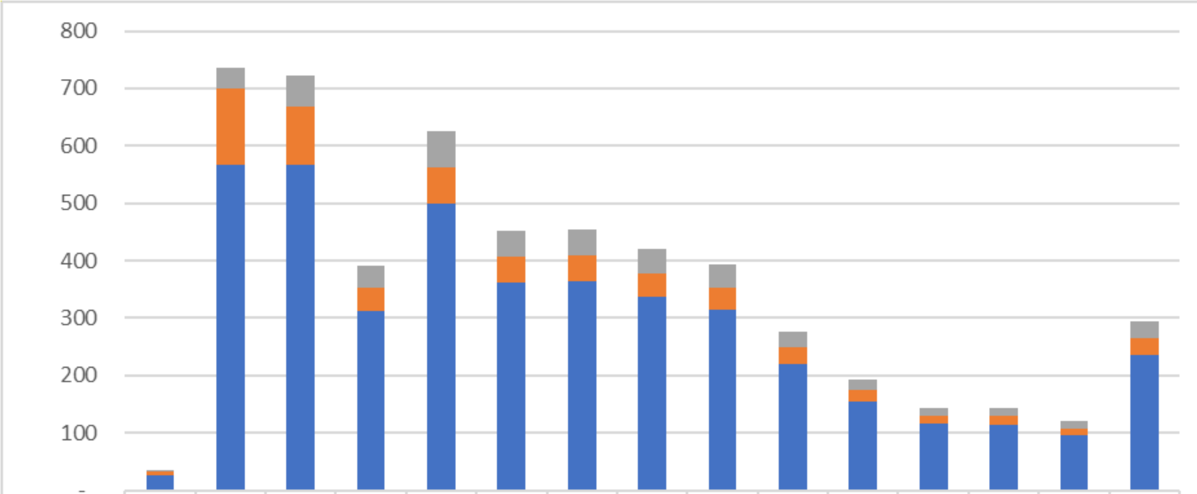
Based on an independent economic assessment completed by Strategic Concepts Inc. (Strategic Concepts 2020; BSA.9, Attachment 9-A), the Project is expected to yield substantial economic impacts for both NL and Canada. The mine will generate significant impacts on both the federal and provincial treasuries. The Project will expend approximately $2.0 billion Canadian dollars (CAD) to develop and operate the gold mine over its planned 15-year life (two years of construction, twelve years of operation, and one year of decommissioning, rehabilitation and closure). This expenditure is comprised of $272 million in pre-production capital expenditures, $288 million in post-production capital expenditures and $1.4 billion in operating expenditures. The key economic impacts on the economy and the treasury are(1):

- Creation of over 19,000 person-years (FTEs) of total employment (direct, indirect and induced) in Canada, including approximately 11,000 FTEs in NL
- Average annual employment of nearly 1,300 FTEs of employment annually in Canada, including an average of 725 FTEs annually within NL
- Generation of approximately $1.3 billion in income to workers and business within Canada, including $750 million to workers and businesses located within NL
- Contribution of $3.6 billion to Canada's GDP, which includes $2.9 billion to NL's GDP
- Generation of $292 million in federal government revenues
- Contribution of almost $400 million ($27 million on an average annual basis) in incremental revenues to the treasury of NL[3]

The Project has a particularly meaningful impact from an employment perspective in NL.

[3] Note:

1. Treasury impacts based on US$1,350 per ounce of gold and an exchange rate of $0.75 US/CAD.
2. A full-time equivalent of employment is typically equivalent to approximately 2,000 hours of work. For this model, 2,000 hours was used to measure full-time equivalent-years of employment from capital expenditures and 2,190 hours per year for operation jobs. The latter is based on the planned work schedule of a 24-hour operation with two 12-hour shifts.



	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
NC	2	37	54	39	62	45	45	42	39	28	19	14	14	12	30
ROC	6	133	101	39	62	45	45	42	39	28	19	14	14	12	30
NL	26	567	566	313	500	361	364	336	314	221	155	115	115	96	236

Note: NC – Non-Canadian; ROC – Rest of Canada; NL – Newfoundland and Labrador

Figure 2-45 Direct Employment by Residency (person-years) (Strategic Concepts 2020)

2.10 ALTERNATIVES TO THE PROJECT

The purpose of the proposed Valentine Gold Project is to exploit the discovered gold resources at the Project site to the benefit of the province of NL, the central region of the province and local communities, the future employees of the operation, and the investors in the Project. The Project is needed to provide employment to the region, increase business activity in the region and in the province, and provide revenue to the province.

There is no alternative to mining the gold resource located at the Project site that would achieve the purpose and need for the Project. There are alternatives to the methods employed to mine the resource that are described in the following sections.

2.11 ALTERNATIVE MEANS OF CARRYING OUT THE PROJECT

This section identifies and describes alternative means of carrying out the Project, and components of the Project. As required under Section 19(1)(g) of CEAA 2012, Section 2.2 of the Federal EIS Guidelines (Appendix 1A) and Section 4.1.4.2 of the Provincial EIS Guidelines (Appendix 1B), the EIS must consider alternative means of carrying out the project that are considered technically and economically feasible and include the environmental effects of such alternative means. The approach to the alternative means assessment is consistent with the Agency's (CEA Agency 2015) Operational Policy Statement for Addressing "Purpose of" and "Alternative Means".

An analysis of alternative means was considered for the following Project activities / components:

- Mining methods
- Pit dewatering
- Waste rock storage and management
- Overburden material storage and management
- Ore processing
- Tailing management and tailings disposal
- Water supply and wastewater
- Transportation
- Power supply and transmission
- Life of mine
- Labour supply
- Working conditions
- Rehabilitation methods

A consideration of regulatory acceptability, technical feasibility and economic feasibility, as well as the environmental and socio-economic effects (where applicable) of each alternative means is described for each option (Table 2.24).

Table 2.24 Alternative Means Assessment Descriptors

Descriptor	Definition
Technically Feasible (including regulatory factors)	• Feasible considering criteria which could influence safe, reliable, and efficient operations • Technology must be available and proven for use by a similar activity, and cannot compromise personnel and process safety for it to be considered • Acceptable considering applicable regulatory guidelines and frameworks
Economically Feasibility (including market factors)	• Feasible considering capital and operational project expenditure, and opportunity cost • Project expenditure can be impacted directly (e.g., equipment and personnel requirements) and indirectly (e.g., schedule delays)
Environmental and Socio-economic Considerations	• Consideration of potential environmental and socio-economic effects on VCs • Considers applicable regulatory guidelines and frameworks for reducing environmental and socio-economic effects and applicable mitigation measures
Implications of Failure / Malfunctions of Option	• Consideration of the implications of the option regarding the potential for failure or malfunction, including resulting potential environmental and socio-economic effects
Preferred / Selected Option	• The preferred alternative means in consideration of legal acceptability, technical feasibility, economic feasibility, and potential environmental considerations • The preferred alternative means forms the basis for the Project to be assessed

The following sections provide a comparative analysis of technical and economic feasibility and the environmental and socio-economic effects of the alternatives that led to the selection of the preferred option. Each option for the alternative means is summarized in a tabular format. The preferred alternative means form the basis for the Project to be assessed (i.e., assumed to be the base case that is assessed for environmental effects in Chapters 5 to 19 of this EIS).

2.11.1 Mining Methods

Primary mining methods include placer, in-situ, open pit, and underground. Each of these methods is described further below.

2.11.1.1 Placer Mining

Placer mining is a method of extracting a mineral from alluvial or placer (sand and gravel) deposits that are typically found along river and stream beds. The gold at the Project is hosted in hard rock, beneath the ground surface, and therefore placer mining is not a technically feasible method.

2.11.1.2 In-Situ Mining

In-situ mining uses a solution pumped into the ground that dissolves the mineral from within the rock; the solution is pumped back out of the ground and the dissolved mineral is extracted from the solution. In-situ mining has been used at a commercial scale to mine copper, uranium, and potash / salts; however, it has not been used to mine gold at scale. Technically speaking, solution or in-situ mining requires a host rock that is porous and fractured, and as such the host rock for this Project is not suitable for this mining method. Environmentally, the primary concern in solution mining is potential contamination of surface and groundwater resources. From a market and regulatory perspective, as in-situ mining for gold has not been proven successful at a commercial scale, there would be considerable risk in developing a project using this method.

2.11.1.3 Open Pit

Open pit mining is a common mining technique and is the preferred method where sufficient mineral resource is available relatively close to the ground surface (usually within 250 to 350 m of the ground surface or less). Economically, this mining method is less costly than underground mining, which is considered the leading alternative to open pit for most mineral deposits. Open pit mining generally creates a larger environmental footprint due to the pit itself and the associated waste rock pile. As open pit mining operation is typically less expensive to operate and less risky in terms of grade recovery and operating feasibility, market factors, including the ability to raise capital to develop a project, tend to favour open pit projects. Failures in open pits generally occur where poor rock conditions lead to slope failures, lead to unsafe working conditions, or the inability to mine sections of the pit effectively.

2.11.1.4 Underground

Underground mining methods are usually employed where the mineral resource occurs at considerable depth below the ground surface and/or is a mineral deposit that does not lend itself to open pit mining (e.g., narrow-vein mineral deposits). Underground mining requires higher ore grades than open pit mines, as the costs of underground development work (e.g., access ramps, shafts) to access the ore are high, and mine production rates are usually lower. Environmentally, underground mining generally requires less environmental footprint as the surface access points are relatively small and there is usually less waste rock generated in underground mining as waste rock can be placed in mined out stopes. Failures in underground mining methods may come via the selection of the underground mining method (e.g., block caving, room and pillar) ultimately not being efficient for ore production, or poor rock conditions that affect the stability of the underground workings, creating safety issues and increasing mining costs. As underground mining is inherently more expensive than open pit, market conditions such as commodity prices may have a larger impact on the viability and success of a project. Underground mining is not technically feasible for extracting the near surface gold resources that have been defined for the Leprechaun and Marathon Deposits.

2.11.1.5 Summary

Table 2.25 summarizes the assessment of alternatives related to mining methods. Based on the proximity of the gold resources to the ground surface, and the relatively low average grade relative to underground mine method requirements, open pit mining is the feasible method for the Project.

Table 2.25 Summary of Project Alternatives Analysis – Mining Methods

Determining Factors	Options Considered			
	Placer	In-Situ	Open Pit	Underground
Technically Feasible (including regulatory factors)	No	No	Yes	No
Economically Feasible (including market factors)	-	-	Yes	No
Environmental Considerations	-	-	Larger footprint than other options; however, it is the only technically and economically feasible option	-
Socio-economic Considerations	-	-	-	-
Implications of Failure / Malfunctions of Option	-	-	-	-
Preferred Option – carried forward in the assessment	✗	✗	✓	✗

2.11.2 Pit Dewatering

Open pit dewatering techniques can be divided into two main groups (which may be used in combination). The first group is pumping methods, where water is pumped from arrays of wells or sumps and piped away for disposal. Pumping methods include in-pit pumping, and ex-pit pumping (i.e., pumping from wells; sub-horizontal wells and drains; wellpoints and ejector wells; and drainage adits and tunnels). The second group of techniques are exclusion methods, where low permeability walls or barriers are used to reduce groundwater inflows into the pit. Exclusion methods include bentonite slurry walls; grout curtains; and artificial ground freezing (Preene 2015).

There are two water sources that accumulate within an open pit that need to be addressed, groundwater from the soil and rock forming the exterior shell (or walls) of the pit, and direct precipitation (snow or rain) entering the pit, assuming surface flows are diverted away from the pit. In temperate regions where substantial precipitation falls, some form of in-pit dewatering is generally required to capture and remove the precipitation component. The method of groundwater control within the pits generally depends on the potential rate of flow of groundwater into the pit, and the potential for groundwater flow or pressure to impact the stability of the pit slopes (walls). Where low to moderate groundwater flow is expected, in-pit pumping is generally considered the most efficient solution. Where moderate to high groundwater flow or pressure is expected, ex-pit pumping infrastructure or exclusion methods are employed. The options noted are technically feasible with the exception of ground freezing (based on climate); however, for the Project, the groundwater inflows and pressures associated with pit slope stability are sufficiently low that in-pit dewatering is suitable.

Economically, the costs of each solution rise with complexity, and if more than one method is needed. For pumping methods, the costs are typically lower for in-pit dewatering methods, increasing as the technical requirements move to pumping wells, sub-horizontal drainage, wellpoint systems, and drainage adits and tunnels. Exclusion methods are typically high in cost, unless only a portion of the pit perimeter (pit shell area) is required to be treated.

The primary environmental considerations are the quantity and quality of water that must be managed, as in most cases, the water is pumped to a surface waterbody. The quantity of water depends on the groundwater conditions at the Project site. The quality of water depends in part on the natural groundwater quality in the area, and also impacts from the mining process, including but not limited to fines (solids) or blast residue chemistry (e.g., ammonia, nitrates). For in-pit dewatering methods, sumps (in-pit settling ponds) are often used to allow some attenuation prior to pumping, which helps settle suspended solids and naturally degrade ammonia. For ex-pit wells, the water quality may not be affected as much by the in-pit solids or chemistry; however, if the wells required are as deep or deeper than the pit, the in-pit drainage may be pulled into the wells via migration through the pit walls.

Failure of pit dewatering system generally results in excess water accumulating in the pit and affecting mining operations. In cases where groundwater pressure impacts slope stability, failure of the system for a period of time may reduce the slope stability and in the worst-case, result in a pit slope failure.

2.11.2.1 Summary

Based on the open pit engineering and groundwater assessment work completed to date, Marathon's preferred option is to use a combination of solutions for the required pit dewatering requirements. Surface water that could drain into the open pits will be diverted. As the groundwater flows into the open pits are considered low, and do not substantially impact pit slope stability, in-pit pumping is considered the most efficient method of pit dewatering. Marathon will employ in-pit sumps to collect and manage water prior to pumping it from the pit, and an ex-pit sedimentation pond will be constructed to manage water quality prior to release to the environment. Note that Marathon is also planning to use explosives that substantially reduce residual chemistry post-blast, as described in Section 2.3.12. Table 2.26 summarizes the assessment of alternatives related to pit dewatering.

Table 2.26 Summary of Project Alternatives Analysis – Pit Dewatering

Determining Factors	Options Considered		
	In-Pit Pumping	**Ex-Pit Pumping**	**Exclusion Methods**
Technically Feasible (including regulatory factors)	Yes	Yes, however this is not required	Yes, however this is not required
Economically Feasible (including market factors)	Yes	Yes, however this is less feasible than in-pit pumping	Yes, however this is less feasible than pumping
Environmental Considerations	-	-	-
Socio-economic Considerations	-	-	-
Implications of Failure / Malfunctions of Option	-	-	-
Preferred Option – carried forward in the assessment	✓	✗	✗

2.11.3 Waste Rock Storage and Management

2.11.3.1 Waste Rock Management

Options for waste rock management for an open pit Project of this nature include:

- Disposal in a natural waterbody
- Creation of an on-land waste rock pile(s)
- Disposal in-pit during operation or at the end of the mine life
- Use as construction aggregate for the development of the Project
- Use / sale as construction aggregate for other developments or markets

Disposal in a natural waterbody is a technically feasible approach and may be economically feasible if a suitable waterbody exists close to the open pit. From a regulatory perspective, it is not usually considered favourable relative to on-land piles, and in-water disposal in fish habitat requires additional environmental approvals, including listing on Schedule 2 of MDMER. Environmentally, there are a number of potentially important considerations, including degradation of water quality and potential downstream impacts and destruction of fish habitat. However, there are some positives such as elimination of dust generation and improvement of general aesthetics. In the case of potentially acid-generating waste rock, submergence in a waterbody would be a permanent mitigation, assuming the waste rock could be stored a minimum of several metres below the water surface.

Waste rock is most often stored in surface piles nearby the open pit. Technical considerations for this alternative include general geometry, slope stability, the acid-generating potential of the rock, and contact water management. Economically, this alternative is often preferred unless the rock is potentially acid-generating and must be covered at closure and/or water runoff treated indefinitely, or if the suitable /

acceptable location is a great distance from the open pit. Environmental considerations such as dust generation, aesthetics, contact water management, and footprint (e.g., disruption or destruction of vegetation, waterbodies) can be managed with proper design, planning for closure, and progressive rehabilitation over the operational phase of the Project. Potential failure would be in the form slope failure that could result in disruption of additional footprint, degradation of water or a waterbody, and loss of revegetated (rehabilitated) surface area.

Placement of waste rock in an open pit is technically feasible if an exhausted open pit, or an exhausted area of an open pit, is available; however, in most cases, these opportunities do not exist. Theoretically, the waste rock generated over the life of the Project could be re-excavated and returned to the open pit from where it came at the end of the mine life; however, there are a number of important considerations for this alternative:

- In NL, it is required to make efforts to progressively rehabilitate the exposed waste rock pile. These efforts would be sacrificed and the area beneath the pile would need to be rehabilitated once the life of Project is complete
- A nearly equal number of years of equipment operation (fuel consumption, vehicle emissions, dust, and employment) to return the waste rock to the same open pit
- Approximately 70 to 80% of the waste rock material would fill the pit due to bulking; therefore, 20 to 30% of the waste rock would remain within the waste rock pile location and would need to be covered with overburden and revegetated
- Once the pit was filled, it would reduce the risk of slope failures on highwalls, as they would be better supported by the weight of the waste rock material
- Backfill of 300 m vertical depth of the open pit will be slow; however, ‘creep’ settlement of the waste rock backfill in the pit will continue for some time after it is originally filled and will require long term maintenance to ‘top up’ the fill in the pit as it will also likely settle unevenly. This will also prevent the placement of a soil cover and subsequent revegetation of the pit area for some time.
- In general terms, the cost associated with the activities outlined above would make the mining Project uneconomical

In Marathon’s case, due to reasons of Project scale and economy as outlined in Section 2.5, both pits are mined simultaneously and are exhausted at approximately the same time, leaving little or no opportunity to place waste rock from one pit into the other. In addition, the additional haulage distance of 4 to 5 km would negatively impact the Project economics and environmentally would substantially increase fuel consumption, vehicle emissions, and dust generation.

It is usually advantageous to use waste rock generated from the open pit to produce aggregates (rockfill, gravel, even sand) for the construction of the mine infrastructure, provided the waste rock is suitable from an engineering perspective and is not acid-generating or metal-leaching. The general effect of using waste rock for aggregates required for Project development includes a reduction in the volume of waste rock that must be otherwise disposed of, and a reduction in the requirement to quarry aggregates from an otherwise natural area that would not be impacted by the Project development. Economically, use of waste rock for aggregate is preferred as the material has already been stripped, drilled, blasted, and excavated; comprises a good portion of the cost of aggregate production. There is no specific failure mechanism for this alternative unless the material were to be acid-generating or unsuitable from an engineering perspective, both of which are mitigated through proper testing programs.

Generation of aggregates for uses outside the Project can be considered where the rock is chemically stable and has desired engineering properties for other uses. There are many considerations that may affect the feasibility of this option, including the distance to market (transportation costs versus sale price of product), transportation emissions, end-use specifications (cost of crushing and screening), and others. The environmental implications for a mining project include a potential reduction in waste rock management costs (creation and management of piles, water management, rehabilitation), reduced footprint, reduced emissions (dust), and improved aesthetics. From a socio-economic perspective, this alternative is likely to create additional jobs; however, would also lead to a substantial increase in traffic on the local roads and highways, depending on the transportation route to market.

Summary

Table 2.27 summarizes the assessment of alternatives related to waste rock management. Marathon's selected options include on-land waste piles and use of waste rock for aggregate for site development. Most of Marathon's waste rock is expected to not be acid-generating and therefore, does not require special management like submergence in a waterbody, and the minor amounts of potentially acid generating waste rock will be managed within the pile so that no ARD/ML issues develop. In-lake disposal is not considered by Marathon primarily based on stakeholder engagement and regulatory considerations. In-pit disposal is not considered feasible based on the need to mine both pits simultaneously, and the distance between the two pits, and the negative environmental and economic issues outlined above with respect to backfilling at the end of the mine life. Use of waste rock as aggregates for other projects will be considered and has even been discussed in preliminary terms with NL Hydro (Nalcor) for use in maintenance or upgrades to their nearby hydro assets. However, no current opportunities have been established for this alternative.

Table 2.27 Summary of Project Alternatives Analysis – Waste Rock Management

Determining Factors	Options Considered				
	In-Lake Disposal	**On-Land Piles**	**In-Pit**	**Aggregate for Project**	**Aggregate for Other**
Technically Feasible (including regulatory factors)	Yes	Yes	No	Yes	Yes
Economically Feasible (including market factors)	Yes		-	Yes	Yes
Environmental Considerations	Changes to fish habitat require *Fisheries Act* approvals	Contact water management is required; however, rock Is mostly not PAG	-	-	Additional traffic, fuel combustion, and dust due to transportation
Socio-economic Considerations	Stakeholders do not support	-	-	-	Additional job creation

Table 2.27 Summary of Project Alternatives Analysis – Waste Rock Management

Determining Factors	Options Considered				
	In-Lake Disposal	On-Land Piles	In-Pit	Aggregate for Project	Aggregate for Other
Implications of Failure / Malfunctions of Option	-	-	-	-	-
Preferred Option – carried forward in the assessment	✗	✓	✗	✓	✗, though could be pursued in the future if feasible

2.11.3.2 Waste Rock Storage Locations

Marathon has carefully considered the location and related factors to the design for the two waste rock piles to be developed for the proposed Project. The key factors considered are summarized as follows:

- Sterilization of potentially economic ore – Marathon has completed condemnation drilling at the waste rock pile locations to determine if the development of the pile could sterilize potentially economic mineralization. Condemnation of any major site component area is a requirement of NLDIET during the post-EA permitting process, however it is best practice to complete the work early in the design and EA to ensure that major site components do not need to be moved later in these processes. The condemnation drilling indicates no significant mineralization within the footprint of the waste rock piles. Further geological interpretation will be conducted to confirm these initial results and a report will be completed for submission to NLDIET.
- The distance from the pit to the waste rock pile is important to reduce haul truck travel distances. This is not only an economic consideration (operating costs), it is also a major factor in the overall footprint of the Project, fuel consumption and emissions from the haul trucks, and air quality (dust generation from truck travel and noise).
- Reducing impacts to surface water resources and balance, as well as fish and fish habitat. These factors have been considered in selecting the location of the waste rock piles and have also contributed to the selected the Project layout / footprint.
- Topography is an important contributor to the footprint / layout, slope stability, storage capacity, and aesthetics components of the waste rock pile design. Topography also influences the design of runoff effluent management.
- General environmental factors have been considered, and an important environmental factor for the proposed Project is the caribou migration in the area of the Marathon pit. Marathon considered the location and layout of the Marathon waste rock pile with respect to the north-south movement of migrating caribou to reduce the potential impact as an individual Project component, and in combination with other Project features.

Summary

For the Leprechaun waste rock pile, potential locations and configurations were considered in general proximity to the Leprechaun open pit. The open pit sits on a quasi-peninsula of high ground (a linear ridge running southwest-northeast), which is bounded by Victoria Lake Reservoir to the south, southwest and west, and Valentine Lake to the north. Locations considered to the southwest and northeast of the pit were eliminated due to ore sterilization potential along this geological orientation. The partial waste pile location, previously shown in the EA Project Description / Registration north of the open pit, was determined to be potentially unsuitable due to possible mineralization, and a series of fish-bearing brooks along the northwest boundary of the area. However, consideration of a smaller area northwest of the pit could be feasible if condemnation drilling (yet to be completed) shows that resources will not be sterilized. An area further north of the pit was considered; however, a number of challenges impact this area, including flatter topography, water resources and fish habitat, potential mineralization, and increased distance and elevation difference between the pit and the waste rock pile. The area to the south of the open pit is a side hill that has shown not to hold economical mineralization potential. While a number of small streams exist in this area, a waste rock pile footprint and design were workable to reduce impacts to water resources and fish habitat. Table 2.28 summarizes the assessment of alternatives related to waste rock pile locations for the Leprechaun pit.

For the Marathon waste rock pile, potential locations to the southwest and northeast were eliminated for the same reasons noted for Leprechaun. The potential location to the southeast presents a number of factors that eliminate this option. The slope towards the Victoria River is relatively steep and would require a substantially larger footprint and/or pile height to achieve the required storage capacity. In combination with the TMF, this would act to create a relatively continuous southwest-northeast-orientated barrier to caribou migration. It would also affect fish habitat along the length of the ridge / slope. For these reasons, the location to the southeast was eliminated. The area to the northwest of the pit was investigated from a potential resource perspective (condemnation drilling), and the preliminary results indicate there is no economical resource in this location. The waste rock pile location and design are in line with the open pit and related features to reduce the southwest-northeast dimension of the site components in relation to the caribou migration path. The location and footprint of the pile also avoid most water resources and do not impact fish habitat. Table 2.29 summarizes the assessment of alternatives related to waste rock pile locations for the Marathon pit.

Table 2.28 Summary of Project Alternatives Analysis – Waste Rock Pile Locations for Leprechaun Pit

Determining Factors	Options Considered			
	Area South of the Pit	Area Northwest of the Pit	Areas to the Southwest and Northeast of the Pit	Areas at Greater Distance in Any Direction
Technically Feasible (including regulatory factors)	Yes	Yes	Yes	Yes
Economically Feasible (including market factors)	Yes	Yes	Yes	No
Environmental Considerations	-	-	-	-
Socio-economic Considerations	Does not to hold economical mineralization potential	Potentially feasible if additional drilling shows no potential sterilization of additional mineral resources	Potential sterilization of additional mineral resources	-
Implications of Failure / Malfunctions of Option	-	-	-	-
Preferred Option – carried forward in the assessment	✓	✗	✗	✗

Table 2.29 Summary of Project Alternatives Analysis – Waste Rock Pile Locations for Marathon Pit

Determining Factors	Options Considered			
	Area Southeast of the Pit	Area Northwest of the Pit	Areas to the Southwest and Northeast of the Pit	Areas at Greater Distance in Any Direction
Technically Feasible (including regulatory factors)	Yes	Yes	Yes	Yes
Economically Feasible (including market factors)	Yes	Yes	Yes	No
Environmental Considerations	Larger footprint, would create a larger obstacle to caribou migration, adverse effects to fish habitat	Avoids most water resources and avoids fish habitat	-	-
Socio-economic Considerations	-	No known economical mineral resources	Potential sterilization of additional mineral resources	-
Implications of Failure / Malfunctions of Option	-	-	-	-
Preferred Option – carried forward in the assessment	✗	✓	✗	✗

2.11.4 Overburden Materials Storage and Management

Overburden, which will include glacial till, topsoil, and organic materials (peat), will be excavated during development of the various mine features. In the open pit areas, overburden materials must be removed in the pit area to access the bedrock (ore and waste) beneath; however, in other areas of infrastructure development (e.g., roads, buildings, dams) only the surficial topsoils and organic materials may need to be removed. The current estimates of overburden materials to be excavated and stockpiled are based on the PFS, and as further engineering investigation and design work is completed, Marathon will develop an accurate inventory of the overburden materials that are expected to be excavated and stockpiled at the site. Marathon will also develop a soils balance for the site, which will address the amount of overburden materials to be excavated, and the amount of overburden materials that will be required to complete rehabilitation of the site, through both progressive and closure rehabilitation activities. For a project of this size, it is expected that stockpiled overburden materials will be used in rehabilitation activities, and it is often required to excavate materials that are not required to be moved for engineering and site development purposes, in order to have sufficient overburden materials for rehabilitation.

There are no true alternatives to stockpiling overburden materials when regulations and best practices are considered unless there is sufficient overburden materials beyond what is required for both progressive and closure rehabilitation. This is only likely to be in the case of non-organic overburden materials like glacial till. In NL, the requirement to salvage overburden materials is dictated in the rehabilitation and closure guidelines to the NL *Mining Act*. In consideration of these requirements and incorporating best management practices, overburden materials storage and management generally results in the following:

- Development of a soils mass balance (part of an overarching Soil and Rock Management Plan), which will identify how much and when overburden materials will be produced during development of the site components, and how much and when material will be required for rehabilitation, which will in turn determine stockpile volume requirements during the life of mine.
- The locations for stockpiling overburden are generally based on the volumes to be stored and attempting to keep the stockpiles as close to the areas where these materials will be required for rehabilitation in the future. Keeping the stockpiles in proximity to their final use location reduces environmental impacts due to equipment usage for loading, hauling, and placement for rehabilitation. The stockpile location selection also considers ‘standard’ environmental issues such as avoiding fish and fish habitat, reducing footprint, contact water management.
- The soils mass balance / management plan will also consider stockpiling overburden materials within the future footprint of a mine component that will expand with time (secondary locations). For example, open pits, waste rock piles, and the TMF start small, leaving substantial footprint area for temporary storage of overburden materials that will be used in progressive rehabilitation, and that will be moved prior to expansion of the mine component into that footprint. This reduces the overall footprint of the Project, while also reducing environmental effects.
- Regulatory guidelines and best practices require that water contacting the overburden materials stockpiles be captured and managed prior to release. It is also necessary to provide cover to the surface of the stockpile to reduce soil loss and dust generation. Temporary cover may include seeding or artificial covers, which also aid in maintaining water quality by reducing erosion.

- With proper planning, it is possible to avoid double handling (excavation, stockpiling, re-excavation) for some rehabilitation activities by taking overburden materials from the expansion of a mine component (e.g., a raise of the tailings dam) and placing them directly on an area being progressively rehabilitated (e.g., an early bench on a waste rock pile).
- Some overburden materials may be used in construction if suitable, and this should also be considered in the soil management plan. For example, glacial till material may be incorporated into the tailings dam design and may be used in the development of building and equipment pads.

Marathon has planned for conservatively sized overburden stockpiles adjacent to each open pit and waste rock pile. Both open pits will generate surplus overburden materials that will require longer term storage, and these materials are expected to be re-used for later progressive and final rehabilitation of the waste rock piles. To be conservative, the overburden stockpiles are sized to contain the overburden produced from each open pit, over the full life of the pit, without reductions for use in progressive rehabilitation activities, temporary stockpiles in future development footprint, or use in construction. Other overburden materials excavated for site development are expected to be stockpiled in future development footprint areas, windrowed adjacent to the infrastructure (e.g., site roads) or re-used in progressive rehabilitation.

2.11.4.1 Summary

Developing stockpiles for overburden materials, including glacial till, topsoil and organic materials are not considered an optional component of the Project. There are a number of options with respect to how these materials are stockpiled around the site, and Marathon will employ the available options to reduce the overall Project footprint and re-handling of these overburden materials, to generally reduce environmental effects, and to enhance the re-use of overburden materials in site rehabilitation. The locations of the primary stockpiles have been selected to be close to the location of excavation (the pits) and to where these materials will be primarily used for rehabilitation (the waste rock piles), as well as avoiding waterbodies, fish and fish habitat, and wetlands. Environmentally, alternate locations may increase haulage distance (costs, fuel consumption, and emissions) and could impact other environmental features such as wetlands and fish habitat. It is noted again that the size (footprint) and location of the primary and secondary storage areas will continue to be evaluated and optimized through the planning and engineering stages, and as part of the Rehabilitation and Closure Plan development. Table 2.30 summarizes the assessment of alternatives related to overburden stockpile management.

Table 2.30 Summary of Project Alternatives Analysis – Overburden Stockpile Management

Determining Factors	Options Considered			
	Primary Stockpiles	Secondary Storage (windrows, future Project footprint areas)	Primary Stockpiles Located Adjacent to Pits / Waste Rock Piles	Primary Stockpiles Located Elsewhere
Technically Feasible (including regulatory factors)	Yes	Yes	Yes	Yes
Economically Feasible (including market factors)	Yes	Yes	Yes	May not be depending on location
Environmental Considerations	-	-	-	-
Socio-economic Considerations	-	-	-	-
Implications of Failure / Malfunctions of Option	-	-	-	-
Preferred Option – carried forward in the assessment	✓	✓	✓	✗

2.11.5 Ore Processing

The mineral deposits of the Project contain elemental gold and gold compounds, such as tellurides, in quartz-tourmaline-pyrite (QTP) veins that occur within trondhjemite and quartz-eye porphyry. The average gold content of the rock, as it would be mined, is approximately 2 g/t. To obtain gold in a form that can be marketed, the as-mined ore must be processed by physical and chemical means to form a gold bullion bar (doré) containing substantially pure gold.

Except for gold recovered from placer deposits, or as a by-product of base metal processing, essentially gold is recovered by mining ore, breakage or comminution of the as-mined rock, physical recovery of gold particles by gravity separation (in many cases), cyanide leaching of the gold, and its subsequent recovery from solution.

2.11.5.1 General Process Alternatives

The ore processing route proposed for the Project follows the same general route used by other non-placer, non-base metal gold recovery operations in the world. There are variations on the general process that have been considered by Marathon, and compared to the proposed process route, including heap leach, milling, or a combination of both, as described below.

Heap Leach Only

Gold heap leaching consists of mining the ore, piling it in heaps, and then passing a cyanide leach solution through the ore to dissolve the gold. Some mines have practiced heap leaching on run-of-mine (ROM) ore without crushing; however, most heap leach operations crush the ore.

Marathon has tested the heap leaching of low-grade (approximately 0.5 g/t) and higher-grade (approximately 3 g/t) ore from the Marathon and Leprechaun deposits. The tests on LGO examined the effect of crush size and leach time and showed that on ore crushed to -6 mm, gold extraction of 73% was obtained after 160 days of leaching. The higher-grade Leprechaun ore yielded 80% gold extraction after 160 days of leaching. The Marathon leach test on higher-grade ore was terminated after 94 days when extraction was approximately 66%, indicating that Marathon would have given approximately 70% extraction after 160 days. The test data indicate that further extraction with longer times would be minimal. It should be noted that practical extraction values would be slightly lower than values obtained in a laboratory setting.

Tests of a crushing-grinding-gravity concentration-leach processes, with and without the flotation step, gave recoveries from the similar Marathon ore greater than 90%. The much lower recoveries indicated for recovering gold by heap leaching are a major disadvantage of the heap leach process if applied to the ore.

In addition to lower gold recovery, heap leaching poses several technical and environmental considerations for an operation located in central NL. These are as follows:

- If the produced ore (approximately 41 Mt) were to be processed by heap leach, the pile and hence the containment pad would be approximately 100 ha or 1 km^2, and would be difficult and costly to build given the terrain at the site.
- Although modern heap leach pad technology and design includes extensive leak prevention and detection systems, such a large leach pad would pose some risk of leakage.
- In additional to the heap pad itself, heap leach systems require solution ponds for process solutions and for control of site drainage and storm water and to handle solution in emergency events (precipitation). These requirements increase the overall footprint and environmental risks (leaks, releases) associated with this process method.
- Heap leaching works best in a temperate climate with modest rainfall. Freezing conditions make operation of a heap leach difficult given the risks and production disruptions that would result from frozen pipes carrying leach solution to and from the heap. There is also the risk of forming impermeable ice lenses in the heap, which can reduce ore-solution contact and reduce recovery.
- High rainfall, similar to that in central NL, leads to dilution of the leach solution and substantial amounts of excess water requiring treatment and discharge.

From an economic perspective, the revenue from the heap leach is delayed during start-up in that it will take several months of mining and heap leach operations before the gold recovery rate reaches an equilibrium level. This is because the time taken to reach ultimate recovery is at least six months. During this initial period of limited revenue, the full operating costs will be incurred, leading to a negative cash flow during the crucial first several quarters of operation. The technical and environmental considerations outlined above can be partially addressed via increased capital and operating investments; however, some challenges will remain.

Heap Leach and Milling

In this option, lower grade material, less than 1 g/t gold, would be heap leached and higher-grade material would be processed by grinding-gravity concentration-flotation (optionally) and cyanide leaching. This option was included in the Preliminary Economic Assessment (PEA) for the Project (Marathon 2018).

This option results in higher overall gold recovery in comparison with the all-heap leach option as the milling of higher-grade ore will deliver gold recoveries greater than 90%. However, the gold recovery from the heap leached ore would remain low or even lower than the levels discussed above. The recoveries determined in the PEA from the heap leach for material with an average grade of 0.48 g/t was estimated to be 54% and from milled ore with an average grade of 2.2 g/t was estimated to be 91%.

The combined heap-mill option offers better gold recovery and therefore better revenues; however, the capital and operating cost intensity is considerably higher due to the need for a mill and TMF, though the cost for the heap leach facilities would be lower than the heap leach only option. Environmentally, the heap leach pad would be smaller and thereby reduce some of the risks of leakage or releases. However, the footprint required for the mill and TMF will increase the overall environmental impact. Development and operation of the mill and TMF will also increase environmental effects, including water use and effluent discharge, air emissions (dust, process stack emissions), light, and noise. From a socio-economic perspective, there is a substantial increase in employment during construction and operation of the mill. The development, operation, and closure of both a TMF and heap leach process increases the risk and potential outcomes of failure of these facilities.

Milling Only

A third option for the recovery of gold from the deposits is one in which mined ore-grade material is processed in a mill that incorporates grinding, gravity recovery and leaching systems. This option eliminates the heap leach pad and its associated storage ponds, solution / water handling ponds and the associated environmental and technical issues.

Such an operation has the added advantage of removing the complexity of integrating and operating two different recovery systems on the same site. The all-milling option simplifies the waste storage requirements of the site in that the heap leach residue is eliminated.

In a refinement of this general approach, higher-grade ore (>0.5 g/t) could be sent directly to the mill with lower grade material (i.e., 0.33 to 0.5 g/t) stockpiled and processed after higher grade material has been exhausted. This strategy would maximize the cash flow during the critical earlier years of the Project. The proposed development strategy offers more robust economics and eliminates certain environmental concerns.

This option, in which the ore is milled, has been selected by Marathon as the preferred method of developing the deposits.

Summary

Table 2.30 summarizes the assessment of alternatives related to general process alternatives.

Table 2.31 Summary of Project Alternatives Analysis – General Process Alternatives

Determining Factors	Options Considered		
	Heap Leach Only	**Heap Leach and Mill**	**Mill Only**
Technically Feasible (including regulatory factors)	Yes, however lower gold recovery and unfavourable precipitation issues	Yes	Yes
Economically Feasible (including market factors)	Yes, though no revenue for several months after start-up and lower revenue due to lower recovery	Yes, however this has substantially higher capital costs for both processes	Yes
Environmental Considerations	Large footprint for pad, process, management ponds	Smaller heap leach Footprint, however, additional footprint for mill and tailings	Lowest footprint overall, larger tailings footprint
Socio-economic Considerations	Many stakeholders have concerns with heap leach	Many stakeholders have concerns with Heap Leach	Stakeholder concerns with TMF, however more accepted generally-
Implications of Failure / Malfunctions of Option	Some risk of leakage from containment given the pad size	-	-
Preferred Option – carried forward in the assessment	✗	✗	✓

2.11.5.2 Mill Process Options

There are several alternatives for recovering gold within the general concept of milling the ore. These alternatives are described as follows:

- Flowsheet Option A. Grind-gravity recovery. Extensive test work has shown that approximately 50% of the gold in the Valentine Gold deposits can be recovered by gravity concentration processes alone. The gravity concentrate, amounting to less than 1 kg/t of ore processed, could be processed by pyrometallurgical smelting or by intensive cyanide leaching - either on-site or at a remote place. A gravity recovery only option could be considered. However, recovery of just 50% of the gold would not be economical and would represent an irresponsible waste of resources. This option is not desirable and has not been considered.

- Flowsheet Option B. Grind-cyanide leach. Direct cyanide leach tests on ore from Marathon and Leprechaun deposits will give high extractions (>90%) if the ore is finely ground prior to leaching. However, it has been found in most gold milling operations around the world that if a high gold recovery can be obtained by gravity concentration, it is better to apply gravity recovery first, then cyanide leach. This strategy increases overall gold recovery and reduces the size, complexity, and capital and operating costs of the cyanide leach and gold recovery circuits.
- Flowsheet Option C. Grind-gravity recovery-cyanide leach gravity tailings. Test work has shown that gravity concentration would recover approximately 50% of the gold and that the 50% in the gravity circuit tailings could be cyanide processed, leading to an overall gold recovery of at least 90%. This option gives higher recoveries if the ore is ground finer. This option, fine grind-gravity-cyanidation, is an acceptable option in that it is simple to build and operate and offers low capital costs.
- Flowsheet Option D. Coarse grind-gravity recovery-flotation-cyanide leach of flotation concentrate and tailings. Test work on Marathon ore has shown that high recovery of gold can be obtained by froth flotation of the gravity concentration tailings. The mass of flotation concentrate is low, at approximately 3% of the mass of ore. This small mass of material can be finely ground and intensively leached to give very high recovery. If the flotation tailings are also leached, this will give a higher recovery than Option C and lower energy demand than the fine primary grind of Option C. Because of complexity and capital cost considerations, this option becomes particularly attractive as a low cost means of expanding capacity. The coarser required grind means that a higher throughput can be obtained from the Option C grinding circuit without substantial expansion. Therefore, expansion primarily requires addition of a flotation plant and suitable concentrate handling equipment.

Summary

An option with a simple fine-grind, gravity recovery, cyanide leach option is preferred as a low capital cost, high recovery initial flowsheet that is readily and economically expanded by the addition of a flotation circuit and concentrate processing facilities.

Table 2.32 summarizes the assessment of alternatives related to mill process options.

Table 2.32 Summary of Project Alternatives Analysis – Mill Process Options

Determining Factors	Flowsheet Options Considered			
	A	B	C	D
Technically Feasible (including regulatory factors)	Yes	Yes, however proven to be more effective if gravity recovery first	Yes	Yes
Economically Feasible (including market factors)	No	Yes, however it is better economically to complete gravity first	Yes	Yes
Environmental Considerations	-	-	-	-
Socio-economic Considerations	-	-	-	-
Implications of Failure / Malfunctions of Option	-		-	-
Preferred Option – carried forward in the assessment	✗	✗	✓	✓

2.11.5.3 Leaching Reagents

Where gold leaching is included in the options mentioned above, cyanide leaching has been discussed. Several alternative reagents for gold leaching have been investigated by researchers and there is a wealth of literature on the subject. Some of the more widely studied and reported leach alternatives are briefly discussed below:

- Cyanide. Cyanide has been used by almost every gold recovery mill in the world since 1887. There are well established rules, procedures, and equipment for the safe handling of cyanide. Well-proven processes are available to render waste cyanide-bearing solutions safe for discharge. Environmental regulations and assessment procedures are clear. Cyanide is widely available from several vendors and economical in use. Cyanide gives high gold extractions from properly prepared feed material.
- Thiosulphate. Calcium thiosulphate was used at small-scale silver operation in Mexico for many years. A calcium thiosulphate gold leach system has been operated at Barrick's Goldstrike mine on an unusual material stream that cannot be effectively leached with cyanide. Special gold recovery procedures are needed, including the use of resin-in-pulp instead of the more common carbon-in-pulp. The indications are that gold recovery in this circuit has been less than expected.
- Thiourea. Thiourea is able to dissolve gold. It was used commercially at a small antimony-gold operation in Australia, where it was more effective than cyanide because the feed material was very high in stibnite – an antimony mineral. There are no known other mine-related applications of this reagent.
- Halides. Chlorine, bromine, and iodine, their salts and oxygen-containing compounds have (e.g., chlorate) were used for gold recovery before the development of cyanide leaching. More recently, several halide-based or hypohalide (generally chloride) gold leach systems have been proposed and tested, including the Platsol, Intec, Dundee, Neomet, and Outotec processes. None of these processes has advanced to a large-scale gold recovery operation.

Of the gold leach reagents, only cyanide has been used on a commercial scale. Alternatives have only been used where the feed material could not be economically treated for gold recovery by cyanide. The properties of cyanide are well established, and its safe handling and the treatment of effluent streams have been demonstrated at hundreds of commercial plants.

Summary

Cyanide has been safely and economically used by most gold producers. There are alternatives to the use of cyanide for gold leaching; however, none has been shown, through large-scale industrial application, to be as cost effective and well controlled as cyanide.

Table 2.33 summarizes the assessment of leaching reagent alternatives.

Table 2.33 Summary of Project Alternatives Analysis – Leaching Reagent Options

Determining Factors	Options Considered			
	Cyanide	Thiosulphate	Thiourea	Halides
Technically Feasible (including regulatory factors)	Yes	Yes	Potentially, although unproven commercially	Potentially, although unproven commercially
Economically Feasible (including market factors)	Yes	No – recoveries less than required	-	-
Environmental Considerations	-	-	-	-
Socio-economic Considerations	-	-	-	-
Implications of Failure / Malfunctions of Option	-	-	-	-
Preferred Option – carried forward in the assessment	✓	✗	✗	✗

2.11.5.4 Mill Location

The location of the mill is an important aspect in the development of the overall site plan; however, the location can be somewhat more flexible than other key mine components. Key considerations in the location selection for the mill for the Project include:

- Health and safety requirements impact the location as safety zones are set around the open pits for blasting safety, around the explosives storage, and downstream of dams.
- The distance and topography between the open pits and the mill area (assumes the primary crusher is kept close to the mill) impacts the ore haulage requirements, which has both environmental and economic implications. The haulage requirements impact the number of trucks, fuel consumption, and therefore air emissions.
- The distance from the mill to the TMF impacts the pumping distance and effort to send tailings to the impoundment, as well as to recycle water back to the mill process.
- Air, noise, and light emissions from the mill may impact the location selection if there are sensitive receptors on the site.
- Geotechnical conditions may impact the location selection as there are substantial static and dynamic loads associated with some foundations within the mill complex (the grinding mill, tanks, thickener).

Since the EA Project Description / Registration was submitted in April 2019, Marathon completed a full review of site infrastructure considering the most recent environmental information available, including information from regulatory and stakeholder consultation. Once the TMF location was determined, the following considerations resulted in the location selection as currently shown:

- The blast safety zones around the open pits, and the issue of potential sterilization of ore (not permitted as per the NL *Mining Act*), required that the mill be located to the south of the geological fault zone, or south of the northeast / southwest trending topographical ridge.

- Ideally, the mill would be located immediately between the two open pits, biased to the Marathon pit as it holds approximately two-thirds of the resource. However, due to the location of the TMF and the restriction noted above, the mill would need to be located much closer to the Marathon pit, or to the southwest of the TMF.
- Based on environmental receptors, specifically the caribou's migration path, and economical factors, the area southwest of the TMF was selected.
- Further refinement of the location has been conducted based on the local topography and terrain, as well as the proximity to the western-most dams for the TMF.

Summary

The location as currently shown on the site plan is the selected location given considerations and constraints related to technical, economic, regulatory, environmental, and failure criteria. In terms of "alternate" locations, theoretically other locations on the site could be considered as an alternate location; these also have some shortcoming relative to the selected location. Table 2.33 summarizes the potential mill location options.

Table 2.34 Summary of Project Alternatives Analysis – Mill Location Options

Determining Factors	Options Considered		
	Central Site Area	Eastern Site Area	Western Site Area
Technically Feasible (including regulatory factors)	Yes	Yes	Yes
Economically Feasible (including market factors)	Yes	Yes, however it would be a longer haulage from Leprechaun – increased operating costs	Yes, however it would be a longer haulage from Marathon – increased operating costs
Environmental Considerations	Best option in terms of haulage (air emissions), west of primary caribou migration path	Within, or closer to, caribou migration path, increased air emissions due to haulage	Further from caribou migration path, however substantially increased air emissions due to haulage
Socio-economic Considerations	-	-	-
Implications of Failure / Malfunctions of Option	-	-	-
Preferred Option – carried forward in the assessment	✓	✗	✗

2.11.6 Tailing Management and Tailings Disposal

2.11.6.1 Alternate Locations

The TMF location and design presented in the Project PEA and subsequently presented in the EA Project Description / Registration (Marathon 2019) considered general environmental and design factors such as terrain, identified fish habitat (at the time of the study), and location relative to other Project features, however, it did not fully address other key factors. First, the potential impact on NL Hydro's Victoria Lake Reservoir and Victoria Dam, and second, it was determined subsequent to siting the TMF that the small pond central to that location contained fish. While these issues could potentially be addressed without moving the TMF, Marathon opted to complete a full-scale, formal siting study for the TMF as part of the PFS study in late 2019 and early 2020 (Marathon 2020). The purpose of this study was to consider feasible locations given the updated environmental information and latest Project planning and designs. Golder Associates Limited was hired to complete the TMF siting study (Appendix 2B) and PFS design in cooperation with Marathon's lead PFS consultant, Ausenco (Ausenco 2020).

The siting study was conducted as follows:

- Golder was provided with the latest environmental, Project planning, LiDARr, and other pertinent data to develop a list of potential TMF locations. The results of this component of the study are shown on Figure 2-46. Note that the site layout shown on Figure 2-46 reflects the initial mine layout, which has since been revised as outlined in Section 2.1.
- Golder initially identified a total of 12 potential TMF locations. Marathon, Golder, and Ausenco reviewed the full list to determine the best candidates on which to complete a more detailed trade-off study. This exercise was completed by considering each option independently and evaluating the options based on key technical, environmental, and economic criteria.
- From the initial review, two options were considered suitable for further study. It was also determined that some alterations to these options could further improve their suitability, and two new options were identified as a result, as further discussed below.

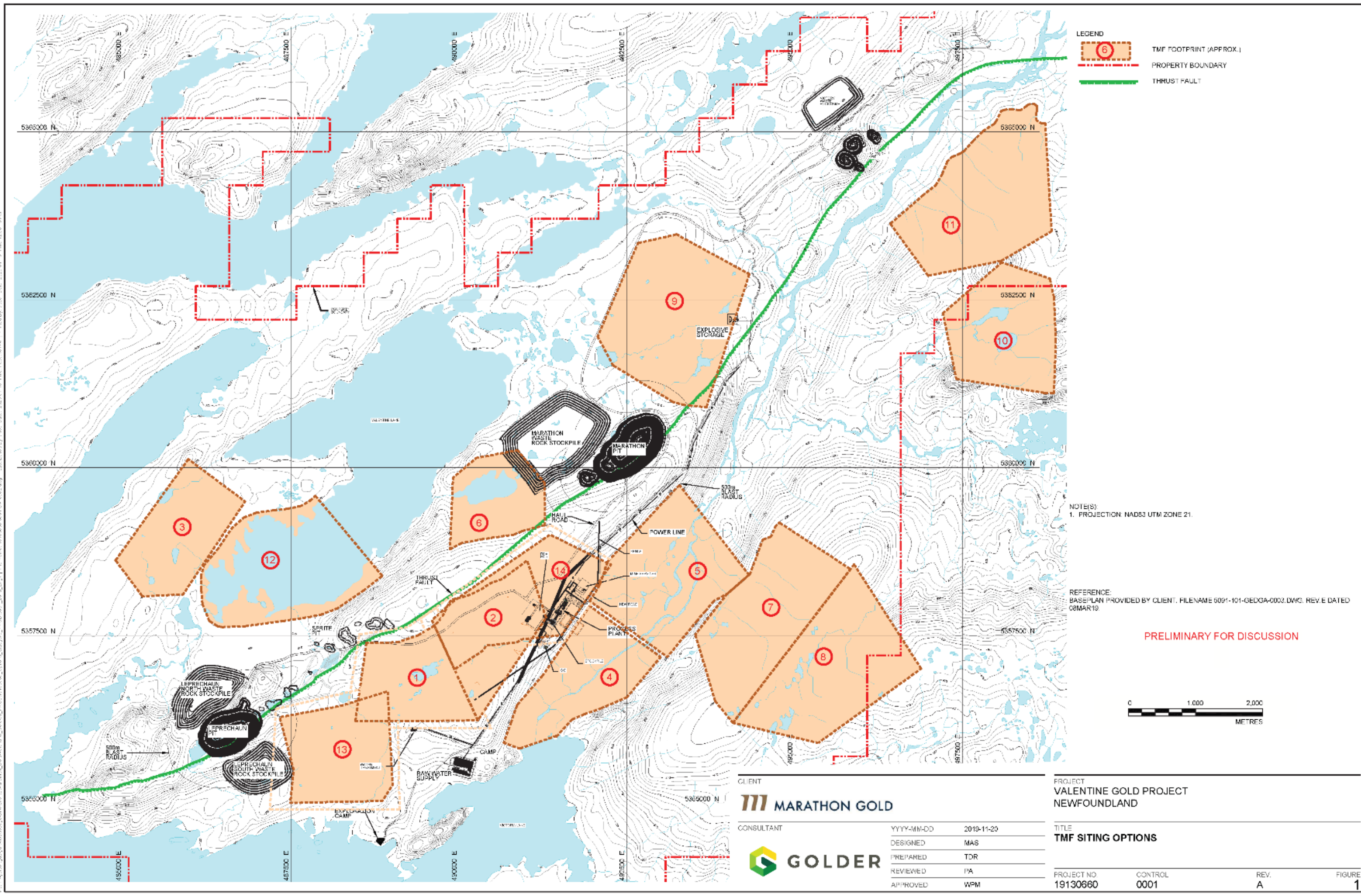


Figure 2-46 TMF Siting Options

2.11.6.2 Initial Siting Review

As noted, the initial siting review completed by Golder resulted in 12 potential TMF locations. The details of this review are provided in the design report (Golder 2020a) located in Appendix 2B, the results of which are summarized below.

The review of the 12 initial options determined that only two were considered suitable for further review, Options 1 and 2. The primary reason for selecting these options were:

- Environmental: While impacts to fish and fish habitat remain for these selections, they were not in the primary caribou migration path, and did not require long pumping / pipeline distances and emergency discharge provisions for power / mechanical failures.
- Economics: shorter pumping / pipeline distances meant lower costs; however, still unknown costs related to Victoria Dam, though Option 2 was located in an area that would impact primarily downstream of Victoria Dam.
- Schedule: As fish and fish habitat were still impacted by both options, schedule remained a consideration. It was anticipated that these TMF locations could be built in phases to potentially avoid fish habitat for a number of years, potentially mitigating related schedule delays.
- Third-party infrastructure: Option 1 is the same location presented in the PEA and EA Project Description / Registration and carried the same level of potential impact and risk associated with the Victoria Lake Reservoir. Option 2 was located further east and most of the footprint was downstream of potentially impacting the Victoria Reservoir and Dam.

2.11.6.3 Secondary Review

The results of the initial review were used as the basis for a more detailed assessment of the remaining options. Options 1 and 2 from the initial review were further assessed in terms of the configuration, possible phasing of construction, aspects of the terrain and environment specific to these locations, and the implications of different tailings management and depositional methods for the location selection. The result of this assessment is summarized below.

Option 1

The size and orientation of this location option was optimized in the PEA and based on the tailings storage efficiency and topography of the area, it was not considered to be suitable for phasing to avoid fish habitat for a portion of the operational life of the facility. This location and general layout was assessed per the PEA design.

Based on a general review of the surrounding terrain and environment, an alternative to Option 1 was developed that was sufficiently different to consider it as a separate option, which was subsequently assessed as Option 13.

(Option 13)

As noted, Option 13 was an alternative developed based on a review of the area around Option 1. The area to the south of Option 1 presents a slightly steeper, side-hill area, which indicated potential for better storage efficiency while avoiding some of the fish habitat impacted by Option 1.

Option 2

The change in this location option was considered sufficient to assign a separate option identification number to avoid potential confusion, and the modified Option 2 was subsequently assessed as Option 14.

(Option 14)

The size and orientation of this location option was further assessed and it was determined that the tailings volume and footprint could be shifted a little further east to address the issues associated with potential impacts to the Victoria Lake Reservoir and Dam, as well as avoid fish habitat, while also keeping west of the primary caribou migration path. This would require moving the mill from the location presented in the PEA; however, this trade-off was considered beneficial from a number of environmental perspectives related to the TMF and the mill.

The detailed review of the three options being consider, Options 1, 13, and 14, resulted in the following determinations:

- Option 1: Despite having the best storage efficiency of the three options, and being the lowest cost overall, this option was not considered suitable based on the impacts to fish habitat, and the potential for a dam failure to cause a cascade failure of the Victoria Dam.
- Option 13: This option had the second-best storage efficiency and cost profile; however, the same issues related to Victoria Lake Reservoir and Dam exist. In terms of fish habitat, the known fish habitat areas could be avoided by altering the footprint; however, several smaller waterbodies within the footprint had not been investigated.
- Option 14: Relative to Options 1 and 13, this location resulted in the lowest overall storage efficiency and the highest costs overall. However, the TMF footprint for this location could be configured to avoid fish habitat, and the impact of a potential dam failure would occur downstream of the Victoria Dam. Overall, this was considered the best alternative to carry forward into the PFS design. Note that from a socio-economic perspective, some stakeholders will consider this an undesirable location in the event of a tailings dam failure being at the headwaters of one of the highest profile Atlantic salmon rivers in the province; however, the inundation study completed for this Project (Golder 2020b; BSA.1, Attachment 1A) indicates that a TMF failure should not have an impact on these resources. This is discussed further in Chapter 21.

As noted above, alternatives for tailings deposition and management were considered for each option during this assessment; however, it was determined that this did not impact the final location selection. The deciding factors in this selection are summarized in Table 2.35.

Marathon has also completed condemnation drilling at the selected TMF location to determine if the development of the pile could sterilize potentially economic mineralization. Condemnation of any major site component area is a requirement of NLDIET during the post-EA permitting process, however it is best practice to complete the work early in the design and EA processes to ensure that major site components do not need to be moved later in these processes. The condemnation drilling indicates no significant mineralization within the footprint of the TMF. Further geological interpretation will be conducted to confirm these initial results and a report will be completed for submission to NLDIET.

Table 2.35 Summary of Project Alternatives Analysis – Final Assessment of TMF Location Options

Determining Factors	Options Considered		
	Option 1	Option 13	Option 14
Technically Feasible (including regulatory factors)	Yes	Yes	Yes
Economically Feasible (including market factors)	Yes	Yes	Yes, though higher costs than Options 1 and 13
Environmental Considerations	Does not avoid fish habitat	Interacts with fish habitat, though less than Option 1	Avoids fish habitat
Socio-economic Considerations	-	-	Avoids interactions with Victoria Lake Reservoir and Dam
Implications of Failure / Malfunctions of Option	Potential for a dam failure to cause a cascade failure of the Victoria Dam	Potential for a dam failure to cause a cascade failure of the Victoria Dam	Effects of a potential dam failure would occur downstream of the Victoria Dam
Preferred Option – carried forward in the assessment	✗	✗	✓

2.11.6.4 Tailings Disposal Alternatives

Tailings disposal alternatives were considered prior to selecting a location and design, as outlined below.

Offshore Disposal

Offshore (ocean) disposal is not considered feasible and was not seriously considered as an alternative for the Project. Notably the closest site would be approximately 90 km direct line distance.

Disposal in a Waterbody

Disposal in a waterbody can be a preferred method technically and economically, especially for the permanent storage of PAG tailings where a long-term water cover is required for mitigation purposes. Best management practices for disposal of non-acid-generating tailings is to avoid fish and fish habitat to the extent feasible, and notably, the larger waterbodies in the vicinity of the Project are headwater lakes on two watersheds containing valued fish habitat and fisheries downstream, with the Victoria Lake Reservoir being the headwater of the Bay d'Espoir hydroelectric system.

From a regulatory perspective, in-water disposal is feasible; however, from a stakeholder and public perspective, it is expected that there would be strong opposition to this disposal alternative.

In-Pit Disposal

Depositing tailings in an exhausted open pit is a safe and stable method of tailings disposal, particularly if tailings are PAG. Technical considerations include the need to have an exhausted pit available for disposal, potential contamination of groundwater resources surrounding the pit, the potential need for a permanent water cover over the tailings (e.g., in the event the tailings are acid-generating), and designing for rehabilitation (exposed high-walls, ingress / egress requirements, barricades and signage, and slope stability). From an economics, regulatory, and environmental perspective, this alternative is generally preferred over other options. Failure or malfunctions in terms of the storage / containment of tailings are limited.

Co-Disposal with Waste Rock

Tailings can be co-disposed with waste rock via three mechanisms:

- Co-mingling – tailings and waste rock material are mixed together mechanically and deposited in a waste pile.
- Co-placed – tailings and waste rock are placed in a waste storage facility independently. Examples include end dumping waste rock into a tailings impoundment, or using waste rock to create internal berms within the tailings impoundment.
- Co-deposited – waste rock and tailings are layered within the waste facility.

Technically, the considerations for co-disposal include climate, as freezing of tailings in co-disposal strategies can create important issues, the water content of the tailings slurry, the chemical stability (ARD / ML potential) of both materials, and the haulage / transportation / pumping distances that must be achieved to combine the materials. Another substantial consideration is areal space for waste disposal. For example, if waste rock is added to a tailings impoundment, considerably more space is required, even if the combined material properties are improved.

Economically, co-disposal can be a favourable disposal option if the technical considerations can be addressed. Environmentally, the primary issue can be footprint, and therefore avoiding fish habitat and other sensitive environmental features. From a failures and malfunctions perspective, while placement of waste rock in a tailings impoundment can improve the stability of the tailings, layering of tailings within a waste rock pile can act to reduce slope stability and therefore can substantially increase the footprint for the combined waste pile(s). It also considerably slows the rate at which waste rock can be placed, slowing mine production and/or increasing equipment requirements.

Tailings Impoundment

Deposition of tailings within an engineered impoundment is the most common disposal method. Technical considerations include storage efficiency (tailings storage capacity relative to dam height and length), available materials to construct the dam, dam foundation conditions, and requirements for water cover and storm water management. The economic feasibility is largely based on the design solution that addresses the technical considerations listed above. From a regulatory perspective, tailings impoundments have been the subject of increased scrutiny over the past five or six years due to several substantial dam failures around the world. Tailings design requirements and options, as well as instrumentation, monitoring, and maintenance requirements, have been improved and the current regulations and guidance within the industry consider these recent and significant failures.

Environmentally, management of water within the tailings impoundment (effluent and stormwater), and treatment and discharge of effluent to the environment, are generally the key aspects. Reducing dust generation from exposed tailings is also important.

Failure of an engineered tailings impoundment is most often related to a dam failure and these events, as noted above, can be substantial from an environmental and socio-economic perspective, in some cases resulting in deaths. Malfunctions generally relate to effluent management and can include the release of effluent that does not meet regulatory criteria, causing poor water quality downstream.

Dry Stack

Dry stack is both a disposal method and a deposition method. Dry stacking tailings involves dewatering tailings (via filter and vacuum presses) to the extent that the material can be ‘stacked’ or placed in a waste facility without the need for containment dams. The ‘dry’ material is conveyed or trucked to the disposal area, placed and compacted, and the exterior of the pile is typically sloped and covered with rock shell. Water management infrastructure is required to collect and treat the runoff from the pile, similar to the infrastructure placed around waste rock piles and other Project features for water management

Where conditions allow, dry stacking is generally considered the best available technology in terms of tailings management and allowing improved water conservation, and because the storage efficiency (smaller footprint) is often better compared with engineered tailings impoundments. Despite these advantages, there are numerous disadvantages to this disposal / deposition method:

- The dewatering equipment and infrastructure are costly to build and operate (power intensive).
- The energy required to load, haul, place, and compact the large quantity of tailings to the dry stack is considerably larger and produces more air emissions than for other tailings technologies.
- Precipitation and freezing conditions can create substantial stability issues with the tailings pile. Snow and ice lenses can form within the pile during freeze / thaw cycles and winter months, which can melt, rapidly causing slope failures. Major precipitation events can erode unprotected tailings and inhibit proper compaction of the placed tailings. Saturation of the pile can cause liquefaction and subsequent slope failure.
- This method does not provide for isolation of potentially acid-generating tailings.

- As the tailings materials are dry when placed, cold temperatures, and the need to clear snow during winter months, can lead to increased dust generation.
- The physical characteristics of the tailings strongly impact the potential to dewater the tailings solids to the extent required. The presence of fines can make it impractical to achieve a properly dewatered tailings suitable for dry-stacking.

Environmentally, the key issues include reduction in risk associated with impounding tailings and effluent within an engineered facility and, if proper dewatering and compaction can be achieved, a similar risk reduction is achieved with respect to the long term stability of the waste facility.

Summary

Marathon's selected option for tailings disposal is to use an engineered tailings impoundment for the first nine years of operation, switching to in-pit disposal for the remaining three years of operation. The deciding factors in this selection are described below and summarized in Table 2.36.

Based on the current mine plan, Leprechaun pit will be exhausted in Year 9 of operation and based on the advantages associated with in-pit disposal, a new tailings pipeline will be constructed to the pit for tailings delivery, which will also aid in filling the open pit for closure.

An engineered tailings impoundment has been selected, and this selection was made in conjunction with the TMF site location options, and the selection of the depositional method. The depositional method selected is thickened tailings.

Co-disposal has been considered, however, is not the preferred option based on the following issues:

- As there is limited space for the development of a tailings impoundment as determined in the location study based on environmental constraints, co-placement is not considered a technically viable option.
- Co-mingling is not considered technically feasible due to the distance from the mill to the waste rock pile (for in-pipe mixing) and climate conditions (winter freezing) will create issues with mechanical mixing at the waste rock pile.
- Co-deposition is considered the most technically feasible co-disposal option; however, due to snow and freezing conditions over six months annually, this option is only considered feasible for a portion of the year. As the set-up required to pump tailings is capital and operating cost intensive and would not eliminate the need for an alternative means of tailings disposal for the first nine years of operation, this option is not considered feasible.

Dry stacking has been considered for tailings disposal for the Project and early test work indicates that the filtering of the tailings may be theoretically feasible. However, with freezing conditions and snowfall for more than 6 months of the year, the potential snow and ice build up within the stack coupled with sloping terrain across the site, increases the risk of slope failures within the dry stack pile. The spring and fall periods at the Project Area are also quite wet (precipitation) leading to increased potential for slope stability issues. Further, based on Marathon's senior management's direct experience with the failure of filter systems for tailings due to the physical characteristics of tailings material despite positive pre-operational testing, dry stack tailings systems carry inherent risks associated with the successful dewatering to achieve the necessary moisture content of the tailings for proper placement and compaction. Based on these technical risks, dry stacking is not considered technically feasible for this Project and therefore a tailings impoundment has been selected for tailings management for the first 9 years of operation.

Table 2.36 Summary of Project Alternatives Analysis – Tailings Disposal Options

Determining Factors	Options Considered			
	Dry Stacking	**Engineered Tailings Impoundment**	**Co-Disposal with Waste Rock**	**In-pit Disposal**
Technically Feasible (including regulatory factors)	No, because of climate conditions and dewatering success risks	Yes	No, because of climate conditions	Yes, once pit is exhausted
Economically Feasible (including market factors)	-	Yes	-	Yes
Environmental Considerations	-	Requirement for treatment of effluent	-	-
Socio-economic Considerations	-	-	-	-
Implications of Failure / Malfunctions of Option	-	Dam failure can lead to substantial adverse effects, however current regulations and guidance will be followed to mitigate this potential	-	Potential for groundwater contamination outside of pit
Preferred Option – carried forward in the assessment	✗	✓	✗	✓

2.11.6.5 Tailings Deposition

The three primary modes of tailings deposition within a TMF include conventional slurry, thickened tailings, and dry stack. Dry stack tailing methodology is described in the previous section, and as noted, this was not considered feasible and therefore is not considered further.

Slurry Tailings Deposition

Conventional tailings slurry is the most common depositional method in mining. Tailings materials are pumped from the mill to the tailings management area in slurry form with water at approximately 40 to 45% tailings solids by weight. This method requires less pumping effort to move the tailings to the impoundment; however, it requires substantially more water management within the tailings management area. Slurry deposition of tailings results in a low tailings beach angle (typically approximately 1%), higher void ratio, and saturation of the deposited tailings. In addition, the low beach (or stacking) angle requires that containment dams be the full height of the tailings deposit. The low beach angle also leads to sorting of the coarse and fine tailings particles, leaving coarse particles concentrated along spigot points and fine particles at the toe of the beach, often coincidental to the tailings pond and dam(s).

From an environmental perspective, considerable water management and recycling is required for this methodology, and the low beach angle generally provides less available area for progressive rehabilitation. The saturation of the tailings may reduce potential dust liftoff of the active tailings deposition area; however, entrainment of snow and ice within the tailings in more common.

Economically, conventional slurried tailings is typically the lowest cost option for tailings deposition, depending on the storage efficiency of the tailings impoundment. Failure / malfunction considerations relate to the operational life of mine, and often in perpetuity where engineered dams are required to contain the tailings. The high water content, tailings sorting due to deposition, and entrapment of snow and ice lenses (that may not thaw seasonally), result in a tailing deposit that is susceptible to liquefaction during a seismic event or dam failure and may result in a significant tailings release should a failure occur.

Thickened Tailings Deposition

Thickened tailings deposition requires thickening, or water reduction, prior to deposition. This typically occurs at the mill and requires tailings thickening infrastructure and equipment to be installed to remove water and increase the solids content of the tailings to be delivered to the management area to approximately 60 to 70% by weight. Thickened tailings deposition within a tailings management area results in a steeper beach angle, typically approximately 3 to 4%, lower void ratio, and less saturation within the deposited tailings. This results in an overall improvement in tailings density (more stable), less sorting (more homogeneous deposit), and less water within the tailing impoundment, as the dewatering equipment removes additional water at the mill for recycling / recirculation within the mill. This also results in less dam building requirements.

From an environmental perspective, water management requirements are reduced, and due to the improved stability of the tailings, there are usually more opportunities for progressive rehabilitation, and closure rehabilitation can usually proceed quickly and without improvements to the tailings surface over most of the tailings area. While the density and storage efficiency of thickened tailings is improved over conventional slurry deposition, improvements in environmental footprint are not substantive, and downstream water treatment requirements are still required (water treatment, polishing pond), although usually to a lesser extent.

From a failure perspective, the thickened tailings deposition reduced the risk of a tailings failure, as the potential for liquefaction is considerably reduced and the amount of water impounded is substantially less. Less water with the tailings also reduces the requirements for the storage and management of major precipitation events in accordance with the CDA guidelines. The lowered water content, steeper tailings beach, and decreased pond requirements allow a greater opportunity for the density of the tailings deposit to be designated as a landform, in accordance with CDA guidelines, once tailings deposition is complete. This would also eliminate the need for long-term maintenance and inspection of the dams in perpetuity.

Summary

Marathon's selected option for tailings deposition is thickened tailings. As noted above, this was not a completely independent alternatives assessment, as the TMF location, as well as the disposal method, are inter-related to the selection of the deposition method. The primary basis for the decision is the improved water management and the reduced risk associated with dam failures over the life of mine and post-closure. In addition, use of thickened tailings systems will suit both the impoundment deposition as well as deposition in the open pit. The deciding factors in this selection are summarized in Table 2.37.

Table 2.37 Summary of Project Alternatives Analysis – Tailings Deposition Options

Determining Factors	Options Considered	
	Thickened Tailings	Slurry
Technically Feasible (including regulatory factors)	Yes	Yes
Economically Feasible (including market factors)	Yes	Yes
Environmental Considerations	Reduces requirements for water management	Additional effluent treatment and discharge
Socio-economic Considerations	-	-
Implications of Failure / Malfunctions of Option	Reduced risk of tailings failure	Increased risk of TMF failures
Preferred Option – carried forward in the assessment	✓	✗

2.11.6.6 Tailings Impoundment Design

Based on the selection of thickened tailings deposition within an engineered impoundment, the tailings management strategy considered the design of the impoundment. Within the design, alternatives exist with respect to the type of dam construction, dam raises, construction materials, and physical attributes of the dam itself. Note that the design alternatives do not generally have high-level considerations like socio-economic, market, and Project-scale economics. In addition, most design considerations are technically feasible and have similar failure or malfunction implications. Most design alternatives are guided by regulatory requirements (such as factors of safety per the CDA) and industry-based design requirements. Therefore, the selected design alternatives are described in terms of technical criteria specific to that alternative below.

Dam Design Alternatives

Earthen embankment design options were considered for the tailings impoundment design, including zoned dam construction, lined homogenous rockfill, and homogeneous fill alternatives.

Zoned dam construction involves the use of a combination of fill materials to create a relatively impermeable dam with a core (typically clay or till), shell (rockfill and/or rip rap), and drainage layers (sands and gravels). There are many configurations within this design alternative that can suit a variety of purposes and conditions: centred or inclined cores; internal (lateral and/or vertical) and external drainage;

and keyed foundations (cut-off walls). Traditionally, these types of dams were more common; however, with the development of robust synthetic liner systems, these dam design options are used less frequently. The primary challenges with a zoned earth dam are the need for materials with specific engineering characteristics and require careful construction practices so that materials are properly placed and compacted. Materials may need to be quarried, crushed, screened, and even mixed to produce the engineering properties required for this type of construction. Dry and non-freezing conditions are required for this type of construction. Technical challenges include potential for freeze / thaw impacts to the impermeable core materials, piping within the core material, blockage of the filter and drainage materials due to fines migration, and slope stability sensitivity to drainage within the dam.

Lined, homogeneous rockfill dams are gaining popularity due to continuing improvements in synthetic liner materials and installation, the general ease of construction, and addition of dam raises, even in less than ideal weather conditions, and the use of waste rock from the open pit for mass fill and crushed filter materials required reduces the waste rock that will otherwise end up in the piles elsewhere at the mine site. Technical challenges to the success of a lined rockfill dam include the need for an underlying, relatively impermeable "floor" material (e.g., glacial till) to tie the liner beneath the dam to retain water upstream, otherwise the entire impoundment may need to be lined. Rockfill must be chemically and physically stable; if waste rock is potentially acid-generating or is not physically suitable, another rock source may be required, increasing the Project footprint and the costs to supply the materials (pioneering, blasting, increased haulage).

Homogeneous fill dams are usually constructed using a relatively impermeable material such as glacial till, which is covered with a rockfill or rip rap shell to protect against weathering processes and wave action from the tailings pond. Homogeneous fill dams can have similar technical advantages to lined, homogeneous rockfilll dams in that their construction and the addition of subsequent dam raises are generally simplified. However, the availability of considerable sources of a relatively impermeable material like glacial till, and the need to keep that material relatively dry during the excavation, handling, and placement, can create substantial challenges as the fines content of the material is generally high. Materials with higher fines content cannot usually be used as fill in dams if it is excavated below the water table or becomes wet during excavation, transportation, stockpiling, placement, or compaction. Materials with higher fines content is also more susceptible to freezing, and cannot be properly placed in freezing conditions.

Based on the availability of good quality (chemical stability and physical characteristics) rockfill from the waste rock that will be excavated from the Marathon open pit, the dam raise strategy (described further below), and the climate conditions at the site in terms of rainfall and freezing conditions, Marathon has selected the lined, homogeneous rockfill dam alternative. In addition, based on the geotechnical work completed to date, the TMF is underlain by a continuous glacial till layer, which will serve as the impermeable floor of the impoundment once the dam liner is keyed into this material.

Summary

The deciding factors in this selection are summarized in Table 2.38.

Table 2.38 Summary of Project Alternatives Analysis – Dam Design Alternatives

Determining Factors	Options Considered		
	Zoned Dams	**Lined, Homogeneous Rockfill Dams**	**Homogeneous Dams**
Technically Feasible (including regulatory factors)	Yes, however unnecessarily complicated and difficult construction in wet/freezing climates	Yes	No, climate conditions affecting construction and dam materials
Economically Feasible (including market factors)	Yes	Yes	-
Environmental Considerations	-	Uses waste rock, lessening waste rock pile volumes	-
Socio-economic Considerations	-	-	-
Implications of Failure / Malfunctions of Option	More susceptible to weathering from climate conditions, piping failures, and filter blockages	-	-
Preferred Option – carried forward in the assessment	✗	✓	✗

Dam Raises

To construct the required dams for the proposed design, it is preferable to construct the dam in phases by completing dam raises as required over the life of mine to create the necessary storage space. Incorporating dam raises into the design allows construction to take place during suitable climate conditions, defers construction costs for dam heights that are not required for many years, allows internal settlement of the rockfill (referred to as creep) to occur, operating experience will help to confirm the ultimate containment volume required and therefore the ultimate height of the dams, and can avoid the need to excavate additional waste rock prior to commencement of mining / milling for the purpose of full dam construction.

Tailings dams may be raised using three methods: upstream, centerline, or downstream raises. The alternatives analysis completed by Marathon for this design component was based entirely on the risks related to the long-term slope stability and potential risk of failure for each dam raise alternative.

Upstream dam raises include the construction of containment dams upstream of the initial dam construction, with the dam raise being constructed directly on impounded tailings material. In some cases, the dam construction material is coarse tailings generated from milling. This dam raise method has been linked to several major dam failures that have occurred worldwide in recent years. This method is often the least costly dam raise option, especially where the raises are constructed using coarse tailings.

Centerline raises occur directly above the initial dam construction; however, the upstream portion of the dam foundation is constructed on deposited tailings. While this is an improvement to the risks associated with full upstream raises, the construction of even part of the dam foundation on tailings increases the risks associated with stability of the dam.

Summary

The deciding factors in this selection are summarized in Table 2.39. Marathon has selected the downstream dam raise method as it is the safest method of dam raises and allows for easy tie-in of the upstream liner system to the raised dam, with a minor horizontal bench incorporated into each raise.

Table 2.39 Summary of Project Alternatives Analysis – Dam Raise Options

Determining Factors	Options Considered		
	Upstream	Downstream	Centerline
Technically Feasible (including regulatory factors)	Yes, although unfavourable to regulators	Yes	Yes
Economically Feasible (including market factors)	Yes (lowest cost option)	Yes (highest cost option)	Yes
Environmental Considerations	-	-	-
Socio-economic Considerations	-	-	-
Implications of Failure / Malfunctions of Option	Considered to have the highest failure risk of the options	Considered to have the lowest failure risk of the options	-
Preferred Option – carried forward in the assessment	✗	✓	✗

2.11.7 Water Supply and Wastewater

2.11.7.1 Water Supply

Water management is critical to the operation of the mine, and to reducing the potential environmental impact of the operation on the environment. Best management practices will be employed commencing during construction, where water requirements for constructions activities (e.g., water for dust suppression, concrete batching) will be sourced from temporary water management features employed for construction (e.g., temporary ditching and sedimentation ponds constructed in development areas).

For the operation phase, substantially more water is required for numerous operational components of the mine and, as is the case for most mine operations, multiple water sources are planned to be used. The potential water sources available for use for the Project are described below.

Surface Water, Valentine Lake and Victoria Lake Reservoir

These large lakes are capable of supplying water for components of the Project. Economically, these options are preferable as larger pumps and pipelines can supply water to Project components efficiently; however, the distance and elevation between the lakes and Project infrastructure require large pumps and longer pipelines (capital costs) and increase power usage (operating costs). Freshwater use for mining projects is subject to a provincial water use fee. As the lakes are large, lake levels and outflows are not expected to be impacted and therefore socio-economic impacts are not expected. Use of appropriately designed intakes (i.e., fish screens) and discharging primary effluent back to the same waterbody will reduce potential environmental impacts. The impact of a failure or malfunction of using these larger lakes for water supply is the stoppage of milling or other activities; however, pump and pipeline spares are maintained to reduce operational interruptions. In the event of a pipeline failure, there is potential for impacts (erosion) at the failure location; however, real-time operational controls will shut down the intake system quickly in response to insufficient water at the mill, thereby limiting impacts.

Surface Water, On-site Ponds and Streams

On-site ponds and streams are relatively small due to the Project's location near the height of land between two major watersheds. These options are not considered feasible for the following reasons:

- Combined there is not expected to be sufficient volume / flow to supply the Project requirements.
- Water depths are insufficient to allow for pump intake construction below the estimated winter ice thickness, and ice formation will serve to further limit flow / supply of water during winter months.
- The use of these waterbodies would likely impact fish habitat downstream due to reduced flows or no-flow periods.

Surface Water, Off-Site Waterbodies

Use of off-site waterbodies would have similar advantages and disadvantages to using on-site waterbodies, whether larger lakes or smaller ponds and streams. However, adding distance to the water supply adds to the Project footprint, as well as additional capital and operating costs to the Project. It also adds additional environmental risk associated with pipeline failures.

Groundwater

Groundwater is shallow across the mine site and is estimated to be low to moderate in terms of yield potential. As the Project features are located at the height of land between two major watersheds, there is limited upstream recharge potential and therefore, groundwater resources are considered to be insufficient for the overall water supply requirements for the Project.

Off-site groundwater sources in the general area of the Project have not been investigated; however, these sources are expected to be similar to those found on site. The same additional issues as noted in the potential use of off-site surface water apply to the use of off-site groundwater sources.

Re-Use and Recycling of Project Contact Water

Re-used and recycled water is considered a "source" in terms of water supply and can substantially off-set the freshwater supply required for a mining project. Water re-use and recycling opportunities considered for the Project are summarized as follows:

- Water recycling within the mill is the single most substantial off-set to the requirements for freshwater. Water recycling within a mill process can run as high as 95% and Marathon will optimize this aspect as the mill process design is refined. Mill water requirements beyond the water recycled within the mill will be sourced from reclaim from the TMF.
- Mill commissioning and restarts are the largest consumer of water on a short-term basis and therefore set the peak water demand for the Project. Marathon plans to construct the initial stage of the TMF in 2022, prior to commissioning in early to mid-2023. This will permit accumulation of water (precipitation) in the TMF prior to commissioning, allowing for this water to be used during mill commissioning, thereby substantially offsetting or eliminating the need for freshwater during that period. For mill restarts during operation, water will be recycled from the TMF to the extent feasible.
- Site contact water will be used as a source for water used in dust suppression efforts.

Summary

Water supply for the Project water requirements will be drawn from multiple sources to reduce impacts to water resources. The primary water source will be re-use and recycling of site contact water, with the primary freshwater source from the Victoria Lake Reservoir. Fresh water will be withdrawn via an intake at Victoria Lake Reservoir to supply clean water for mill make-up water (as required), mixing water for certain milling solutions, pump gland seal water, fire water systems, and potable water. Table 2.40 summarizes the assessment of alternatives related to water supply.

Table 2.40 Summary of Project Alternatives Analysis – Water Supply

Determining Factors	Options Considered				
	Re-used / Recycled Water Sources	**Victoria Lake Reservoir**	**On Site Ponds and Streams**	**Off-Site Ponds and Streams**	**Groundwater**
Technically Feasible (including regulatory factors)	Yes	Yes	No – insufficient volume	No – insufficient volume and long distances for pumping	No – insufficient volume
Economically Feasible (including market factors)	Yes	Yes	-	-	-
Environmental Considerations	Offsets requirements for freshwater supply	-	-	-	-

Table 2.40 Summary of Project Alternatives Analysis – Water Supply

Determining Factors	Options Considered				
	Re-used / Recycled Water Sources	**Victoria Lake Reservoir**	**On Site Ponds and Streams**	**Off-Site Ponds and Streams**	**Groundwater**
Socio-economic Considerations	-	-	-	-	-
Implications of Failure / Malfunctions of Option	-	-	-	-	-
Preferred Option – carried forward in the assessment	✓	✓	✗	✗	✗

2.11.7.2 Wastewater Management

Wastewater produced from the operation of the Project includes process / tailings effluent and sanitary effluent. Wastewater management alternatives are guided by the regulatory requirements for each wastewater type, as further detailed below.

Process / Tailings Effluent Treatment

Wastewater (effluent) created from the milling process must be treated prior to release to the environment and there are a number of aspects to consider in managing this wastewater stream.

The initial alternative for treatment of process effluent is management of cyanide. As cyanide limits are set at the point of discharge under the MDMER (provincial requirements defer to MDMER), cyanide may be managed anywhere within the process effluent management system up to the point of discharge. For Marathon's Project, this would include at the mill, in the tailings impoundment, water treatment plant, or polishing pond. Ultimately, the alternative is to actively treat cyanide at the mill or in the water treatment plant via a cyanide destruct system, and/or allow natural attenuation (sunlight destroys cyanide naturally) and dilution within the tailings impoundment and polishing pond, and likely mechanical / chemical treatment downstream of the tailings impoundment.

Marathon has elected to reduce cyanide beyond the mill by employing a cyanide destruct unit at the mill, prior to pumping of effluent to the tailings impoundment. This is a common effluent management practice in gold mines and helps to eliminate residual cyanide in the downstream effluent management components. It also allows the downstream effluent management components to act as secondary and tertiary containment in the event of a malfunction of the cyanide destruct unit.

Summary

Table 2.41 summarizes the assessment of alternatives related to process effluent treatment. In-mill cyanide destruction is the preferred option and reduces the environmental risks associated with effluent containing higher levels of cyanide entering the TMF, and the stakeholder concerns associated with the same.

Table 2.41 Summary of Project Alternatives Analysis – Process / Tailings Effluent Treatment Options

Determining Factors	Options Considered		
	In-Mill Cyanide Destruction	**Downstream Natural Plus Treatment**	**Downstream Natural Only**
Technically Feasible (including regulatory factors)	Yes	Yes	No
Economically Feasible (including market factors)	Yes	Yes	-
Environmental Considerations	Cyanide mostly removed at mill (to < 1 ppm)	Not preferred as increases the risks associated with TMF seepage, leaks or failures with higher levels of CN	-
Socio-economic Considerations	-	-	-
Implications of Failure / Malfunctions of Option	Lower risk / consequences if failure or malfunction occurs	Higher risk / consequences if failure or malfunction of TMF occurs	-
Preferred Option – carried forward in the assessment	✓	✗	✗

Process Effluent Management

Recycling of wastewater is a key consideration within the process effluent system, as it reduces the amount of process effluent released to the environment and reduces the amount of raw water required to be drawn from the environment. The first alternative considered with respect to process effluent recycling was the depositional method for the tailings. Marathon has selected thickened tailings deposition, as described in Section 2.11.6 above, which involves the installation of dewatering infrastructure and equipment at the mill to remove water from the tailings streams prior to pumping of the tailings to the tailings impoundment. The water removed at the mill to thicken the tailings is then recycled back to the mill.

The second alternative is to recycle water from the downstream process effluent management system. In keeping with best practices, Marathon will recycle water from the tailings pond to be reused in the mill via a barge-mounted pump system. This will further reduce the volume of water that will leave the tailings pond to be treated in the water treatment plant, then pass through the polishing pond prior to discharge to the environment (Victoria Lake Reservoir).

Summary

Table 2.42 summarizes the assessment of alternatives related to process effluent management.

Table 2.42 Summary of Project Alternatives Analysis – Process Effluent Management Options

Determining Factors	Options Considered	
	Recycling	None
Technically Feasible (including regulatory factors)	Yes	Yes
Economically Feasible (including market factors)	Yes	Yes, although usually higher operating costs
Environmental Considerations	Reduces freshwater supply requirement, reduces effluent treatment and discharge volumes	Substantially increased freshwater supply requirement and resulting effluent treatment and discharge volumes
Socio-economic Considerations	-	-
Implications of Failure / Malfunctions of Option	-	Substantially larger effluent treatment capacity required, higher chance of larger spill if a failure or malfunction occur
Preferred Option – carried forward in the assessment	✓	✗

Additional Process Effluent Management Options

Process effluent treatment outside of the mill can take a number of forms. The primary options for treatment include:

- Tailings pond management – the tailings impoundment is designed to include a pond area that collects process effluent and precipitation runoff. When properly sized and operated, this pond allows settlement of suspending solids, natural attenuation, and dilution, which can help address residual cyanide and ammonia, and will allow for the management of design precipitation and runoff events.
- Polishing pond – a polishing pond is often included in the TMF design as a secondary pond to allow further attenuation, settlement of solids, and water management prior to release to the environment either in batch or continuous release.
- Water treatment plant – a water treatment plant, which may include mechanical and/or chemical processes, may be needed for environmental discharge water quality to be compliant with regulatory requirements. Water treatment plants can be incorporated into the system design before or after the polishing pond, or in some cases can replace a polishing pond entirely. Treatment plants can also work to substantially reduce the size of the tailings pond and/or polishing pond that would otherwise be required without the treatment plant.

Based on the assessment of process water quality within the TMF, and the operational plan to hold process water in the TMF during the winter, requiring higher discharge volumes in the spring, Marathon has elected to use the three methods of treatment for process effluent listed above. The tailings pond will be sized and operated to optimize effluent quality leaving the pond (recycled to the mill or discharged for release to the environment). Water discharged from the tailings impoundment will be set to a water treatment plant to treat suspended solids, pH, and other water quality issues. The water treatment plant will receive discharge water directly from the TMF and use proven processes to treat the water to meet MDMER limits, with an estimated nominal flow rate of 170 m^3/h and a peak flow rate of 255 m^3/h. Following treatment, the water will be retained in the polishing pond for an estimated five days prior to being discharged to Victoria Lake Reservoir.

Summary

The deciding factors in this selection are summarized in Table 2.43 summarizes the assessment of alternatives related to additional process effluent management.

Table 2.43 Summary of Project Alternatives Analysis – Additional Process Effluent Management Options

Determining Factors	Options Considered		
	Tailings Pond	**Polishing Pond**	**Water Treatment Plant**
Technically Feasible (including regulatory factors)	Yes	Yes	Yes
Economically Feasible (including market factors)	Yes	Yes	Yes
Environmental Considerations	-	-	-
Socio-economic Considerations	-	-	-
Implications of Failure / Malfunctions of Option	-	Provides extra retention to provide extra capacity and reduce the risk of water outside of regulatory thresholds	Incorporated monitoring equipment help to manage flow / discharge and can measure key parameters of concern at release from the plant.
Preferred Option – carried forward in the assessment	✓	✓	✓

Septic Effluent

Septic effluent generated from the Project will require treatment prior to release to the environment. Options for septic effluent treatment are extensive and may include biological treatment (activated sludge, rotating biological reactors, and sequencing batch reactors), wastewater treatment pond (lagoons), engineered wetlands, and other proprietary treatment systems. Marathon has not fully evaluated septic effluent treatment alternatives for the Project. 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). Sewage effluent will be treated and monitored in accordance with the NL *Environmental Control Water and Sewage Regulations* prior to discharge to the environment. Sludge generated as a by-product of the treatment of sewage will be disposed off-site by a licensed contractor.

Locations of Effluent Discharge Points

Numerous factors are considered in the selection and establishment of final effluent discharge points, including the size of the site, number and spacing of mine site components, downstream impacts (water flow and fish habitat), topography, predicted water chemistry, and other site features. For the proposed Project, the local topography and height of land between two watersheds that divides the site, as well as the smaller sub-watersheds spread across the site from southwest to northeast, result in the selection of numerous final effluent discharge points for this Project as described in Chapter 7 (Surface Water Resources VC).

The alternatives to the selection of numerous FDPs would be to use pumps and pipelines to consolidate effluent discharge points into less points, or ultimately to a single effluent discharge point. The alternative of reducing the number of effluent discharge points is assessed as follows:

- It is considered technically feasible using pumps and pipelines to move effluent across the distance and elevations required to consolidate at one or several points for final discharge. It will likely result in a relatively small increase in site footprint to accommodate pipeline routes and associated service roads (where other roads cannot be followed).
- Economically it will be considerably more expensive to purchase, install, maintain, and operate the network of pumps and pipes required to reduce the number of final effluent discharge points, and the less points, the more expensive. Further, no active water treatment of effluent discharges is currently anticipated except for the effluent at the TMF; however, if FDPs are combined (i.e., with tailings effluent), the water treatment plant capacity would need to be increased.
- From a regulatory perspective there would be a reduction in water sampling and testing requirements, which in turn would result in a modest cost reduction (collection, testing, and reporting costs).
- The most important environmental consideration is expected to be the disruption caused to the water balance of the sub-watersheds and the removal of drainage (flow) to downstream fish habitat. Alternatives include pumping water upstream from Valentine Lake or Victoria Lake Reservoir, or using groundwater wells (pumped) to replace the water (effluent) diverted from these sub-watersheds and associated waterbodies. Another potential environmental consideration is the concentrated release of effluent from a small number, or single point of discharge which would result in less natural dilution of constituents that may be present even if within regulatory limits.
- Failure or malfunction considerations include an increased number of pumps and pipelines, resulting in an increased risk of malfunction or failure, which in turn may result in erosion due to overland water flow and uncontrolled release of effluent that may exceed suspended solids criteria.

Summary

Table 2.44 summarizes the assessment of alternatives related to effluent discharge points.

Table 2.44 Summary of Project Alternatives Analysis – Effluent Discharge Points

Determining Factors	Options Considered	
	Multiple Discharge Points	**Reduced Number Or Single Discharge Point**
Technically Feasible (including regulatory factors)	Yes	Yes
Economically Feasible (including market factors)	Yes, increased capital costs for multiple ditching and management ponds plus increased sampling requirements	Yes, typically lower capital costs, however higher operating costs for pumping to centralize treatment and discharge
Environmental Considerations	Better to maintain small watershed balances and areas of fish habitat	Requires more assimilative capacity at discharge, disrupts small watershed balances
Socio-economic Considerations	-	-
Implications of Failure / Malfunctions of Option	-	Increased number of pumps and pipeline increase potential for mechanical / pipeline malfunction or failure
Preferred Option – carried forward in the assessment	✓	✗

2.11.8 Transportation

2.11.8.1 Alternate Routing of Access Road

There are four site access road options to reach the mine site that have been considered:

1. The gravel road route used by Marathon to access the site since 2010, which leaves the south end of Millertown, follows the southeast shoreline of Red Indian Lake, then heads south and west to Victoria Lake Reservoir. This road was established and maintained for forestry access and access to the Victoria Dam; however, it is also used by cabin owners, outfitters, and other recreational users. The road has been graded and maintained primarily by Marathon for the past six years; bridges and culverts along the route are primarily owned and maintained by the province.
2. A route that partially exists to the east of Marathon's current site access road that connects Millertown to the Granite Lake Canal, which is also used for forestry operations, and a portion of which is used to access the now closed Duck Pond Mine. From this main gravel road, connection could be made by using a smaller secondary gravel road currently used to access cabins on Quinn Lake. A bridge would be required at Quinn Lake or the downstream river, then use historical and now overgrown roads that provide a couple of route options, and options to cross the Victoria River to gain access to the site.
3. A third route connects the Burgeo Highway to a section of gravel road extending northeast along the Lloyd's River, crosses the river at the southwest end of Red Indian Lake, and joins into Marathon's existing site access route near the southwest end of Red Indian Lake at an intersection known locally as Roebucks.

4. A fourth route to access the site connects from the Buchans Highway near Buchans, where a gravel road traverses the north side of Red Indian Lake connecting to the third option described above at the Lloyd's River Bridge and joins into Marathon's existing site access route near the southwest end of Red Indian Lake at an intersection known locally as Roebucks.

Each of the four options is technically feasible, requiring varying degrees of improvements (e.g., widening, bridge upgrades, signage). From an existing conditions perspective, the access road currently used by Marathon (Option 1) is in the best condition overall and requires the least amount of technical upgrades / improvements. In addition, Option 1 and 2 would be similar in length of road; Options 3 and 4 are substantially longer.

Each of four options are considered economically feasible. Option 2 requires more substantial upgrades to the secondary component of the road (from the main road to the Quinn Lake cabin area) and essentially new road construction from Quinn Lake to the Project site, including two new substantially sized bridges. Operating costs for Option 2 are also expected to be substantially higher due to sections that traverse high, open ground that are difficult to clear of snow due to drifting. Options 3 and 4 have not been evaluated in detail in terms of initial (capital costs); however, initial improvements are expected to be higher due to the additional length of road. Operating costs will also be higher due to the increased travel distances for Project traffic.

Environmentally, the shortest route (Option 1) will result in the least environmental impact, as it carries the least amount of improvements (footprint) and the shortest travel distance, resulting in less fuel consumption and emissions over the life of the Project. Socio-economic considerations are similar for each option; however, Option 3 would link the Project to the Stephenville / Port au Port area, whereas the other three options connect to the larger Central Region.

There are no substantive differences in these options in terms of a failure or malfunction (e.g., a bridge failure or road washout). The advantage to having three current options is that other routes are available if a failure or malfunction occurs.

Summary

Table 2.45 summarizes the assessment of alternatives related to access road routing. Marathon has selected Route 1, the existing route via Millertown as the preferred access road alternative for the reasons described above and summarized below.

Table 2.45 Summary of Project Alternatives Analysis – Access Road Routing

Determining Factors	Options Considered			
	Route Option 1 (Existing)	**Route Option 2 (Granite Canal Rd)**	**Route Option 3 (Burgeo Highway)**	**Route Option 4 (Buchans)**
Technically Feasible (including regulatory factors)	Yes	Yes	Yes	Yes
Economically Feasible (including market factors)	Yes	Yes	Yes	Yes
Environmental Considerations	Shortest overall (lowest transport emissions), and fewest improvements required	-	-	-
Socio-economic Considerations	Links the Project to the Central Region	Links the Project to the Central Region	Links the Project to the Stephenville / Port au Port area	Links the Project to the Central Region
Implications of Failure / Malfunctions of Option	-	Snow drifting is known to be an issue and could cut off site access	-	-
Preferred Option – carried forward in the assessment	✓	✗	✗	✗

2.11.8.2 Alternate Means of Transporting Gold Concentrate

The proposed Project will see gold ore from the open pits transported directly to the process plant, where the ore will be crushed, milled and processed. Gold will be separated from the ore, with the waste going to tailings and the gold removed from solution via an electrowinning process. The gold is then smelted on site to produce gold doré bars. The gold bars will then be shipped via armoured truck to central Canada for sale. The route to ship the bars to central Canada is via the Trans-Canada Highway, and other routes would be secondary highways and not considered viable options.

2.11.9 Power Supply & Transmission

2.11.9.1 Power Supply

The Project's grinding mill and processing facility require a substantial amount of power (23 MW) to process the gold ore to produce gold doré bars. Marathon has consulted with NL's power authority, Nalcor, who have indicated that power for the Project can be provided via a direct connection to the existing power grid at a location near the Star Lake hydro generating station. Power in this area of the province is generated from a number of hydroelectric facilities owned and operated by NL Hydro and is considered one of the cleaner (environmentally friendly) forms of power generation available. Alternatives to this power supply would require Marathon to generate its own electrical power at site. These alternatives could include diesel generators, solar power, or wind power.

Diesel generators are commonly used for power supply where grid electricity is not readily available, such as remote communities or industrial sites. Diesel generators of the size and capacity required to supply the power required for the Project may be technically feasible; however, would require considerable initial investment, substantial operating and maintenance costs (fuel), and create substantial emissions over the life of the Project.

Solar power supply for the Project is not considered technically feasible due to climate conditions (sunlight exposure or solar irradiance), and will have greater environmental impact due to the substantial footprint of the solar farm installation and the fact that solar power has a higher life cycle emission intensity than hydroelectric and wind power generation (https://en.wikipedia.org/wiki/Solar_power).

Wind power has greater potential for success for a project in this region relative to solar power; however, wind power is considered an ‘intermittent’ power supply source due to variable wind conditions over short periods of time (days / weeks). As a result, wind power requires a back-up or secondary power supply to provide the consistent supply of power required. For this Project, wind power could be used to augment a connection to the power grid (hydroelectric power) or on-site diesel generators. As the life cycle emission intensity is similar to hydroelectric power generation, and there would be substantial environmental impacts to the construction and operation of a wind farm (likely a minimum of 10 to 12 large turbines) including increased footprint, noise, hazard to birds, and viewscape, it is not considered a suitable alternative.

Summary

Table 2.46 summarizes the assessment of alternatives related to power supply. Marathon has selected electrical power supplied by NL Hydro as the preferred alternative based on the negative implications of using alternate power sources as indicated above and below. The failure or malfunction considerations are similar for each of the each of the power grid connection, solar or wind power in that failure within the system will mean a loss of production for the Project and could impact workers on site in terms of the use of accommodations. Back-up generators are typically employed at mine sites to keep critical process equipment operating (e.g., to avoid frozen pipes) and to power areas of the mine including the accommodations complex for the health and safety of workers. On-site generated power would require more than one generator in parallel, so it is unlikely that the generators will fail at one time; however, it could result in similar issues depending on how many generators, and the capacity of each generator employed. Diesel generations also require significant volumes of fuel to run, and therefore carry an inherent increase in the risk of failures or malfunctions due to the transportation, storage, and handling of fuel.

Table 2.46 Summary of Project Alternatives Analysis – Power Supply

Determining Factors	Options Considered			
	Diesel Generators	**Power Grid Connection (Hydroelectric)**	**Solar**	**Wind**
Technically Feasible (including regulatory factors)	Yes	Yes	No	Yes
Economically Feasible (including market factors)	Yes, however, substantial capital and operating costs	Yes	-	Yes
Environmental Considerations	Substantial air emissions	-	-	Large footprint and ecological interactions
Socio-economic Considerations	-	-	-	-
Implications of Failure / Malfunctions of Option	-	-	-	-
Preferred Option – carried forward in the assessment	✗	✓	✗	✗

2.11.9.2 Power Transmission

Based on Marathon's consultation with NL Hydro, power will be supplied from the power grid via a connection adjacent to the Star Lake Hydroelectric station. NL Hydro will own the power line, and is ultimately responsible for the permitting, construction, operation and maintenance, and decommissioning of the line. Marathon continues to consult with NL Hydro and has requested NL Hydro review options to route the power line along existing gravel roads in the area to reduce the environmental effects and reduce maintenance costs, even if the capital cost increases. More specifically, based on consultation with NLFFA Wildlife Division, Marathon has requested that the power line follow the site access road within the caribou migration corridor to reduce potential effects on migrating caribou. The current, preferred route by both Marathon and NL Hydro is included on Figure 2-35.

2.11.10 Life of Mine

The PFS contemplates a 12-year mine life. This is based on the quantity of mineral resources and mineral reserves currently delineated, an assessment of the optimum mining rate based on pit access and ore body geometries (technical feasibility), and the optimum processing rate based on capital expenditures and rate of return (economic feasibility). The identification of additional mineral resources and mineral reserves through exploration that are technical and economically exploitable would be expected to lengthen the mine life past the initial 12 years.

Marathon has considered alternate mining plans with larger or smaller pits yielding larger or smaller mineral reserves and consequently longer or shorter mine lives. Marathon has also considered processing plans that involve an expansion of mill capacity from 2.5 Mtpa to 4 Mtpa in Year 4 (the Base Case in the PFS), or starting with the higher 4 Mtpa capacity from Year 1, or remaining at 2.5 Mtpa for the life of mine without an expansion. In each case, the mining and processing plan chosen, as represented by the PFS, is considered to be optimum in terms of technical feasibility, economic feasibility, and overall operating risk.

Market and regulatory factors, environmental and socio-economic considerations that may impact the chosen mine plan may be: a) a sustained higher gold price environment (an estimate of US$1350/oz was used in the PFS) that might merit developing larger open pits for the recovery of more mineral reserves, yielding a longer mine life; b) changes to the regulatory environment around tailings management or water quality (for example) that may impede the development of future mineral reserves, restricting mine life; or c) changes to the capital market environment that may inhibit the company's ability to finance its capital expenditure requirements. Marathon has considered each of these scenarios, among others, in its assessment of the optimum mining and development plan for the Project and the Corporation.

Since mining is inherently an industry focused on the reduction of risk, be it risk of harm to individual persons, risk of harm to the environment, or risk of technical failure leading to capital losses, a fully developed mining plan takes full consideration of the "Implications of Failure / Malfunctions". For that reason, the current mine plan as developed in the PFS contemplates open-pit mining only at this time, and contemplates conventional milling and processing, using established techniques and equipment.

2.11.10.1 Summary

Table 2.47 summarizes the assessment of alternatives related to life of mine.

Table 2.47 Summary of Project Alternatives Analysis – Life of Mine

Determining Factors	Options Considered		
	Contracted Life of Mine	**Current Life of Mine**	**Lengthened Life of Mine**
Technically Feasible (including regulatory factors)	Yes, although regulatory changes in the future may restrict	Yes	Yes
Economically Feasible (including market factors)	No, based on processing requirement	Yes	May be feasible with sustained high gold prices
Environmental Considerations	-	-	-
Socio-economic Considerations	-	-	-
Implications of Failure / Malfunctions of Option	-	-	-
Preferred Option – carried forward in the assessment	✗	✓	✗

2.11.11 Labour Supply

The PFS contemplates labour sourced primarily from NL, specifically the central region. Marathon considers the potential availability of labour with pre-existing experience in heavy equipment operation, environmental monitoring, mineral processing, equipment maintenance, geology and engineering, administration, and logistics to be a specific commercial advantage for the Project. This is based on Marathon's surveys of regional contractor capacities, and the quality and quantity of resumes from prospective employees within the region already received. Alternate strategies that contemplated sourcing a workforce outside of the province or regional would have a negative impact on the Project economically and in terms of its social acceptability.

It is possible that certain specialized roles, in particular within geology or mining engineering, or mineral processing, will be sourced from outside the province based on the availability of suitable candidates within NL with those specific skillsets. However, hiring priority will be given to residents of NL and, specifically, residents in the closest communities. Marathon will establish human resources practices aimed at the recruitment and retention of a skilled workforce for the duration of the Project.

Human resources risk is major concern of the Canadian mining industry. The inability to attract and retain skilled employees in often remote mining locations leads to operational inefficiencies, environmental, health and safety risk, production shortfalls, and cost escalation. These are amongst the risk factors that Marathon may also experience should it not be able to source a workforce with the adequate skills and experience from the region. Again, Marathon considers the potential availability of this workforce in central NL to be a specific commercial strength and is not contemplating an alternate workforce strategy.

2.11.11.1 Summary

Table 2.48 summarizes the assessment of alternatives related to labour supply.

Table 2.48 Summary of Project Alternatives Analysis – Labour Supply

Determining Factors	Options Considered	
	Local, Regional, Provincial Hiring Preferences	No Hiring Preferences
Technically Feasible (including regulatory factors)	Yes	Yes
Economically Feasible (including market factors)	Yes	Yes
Environmental Considerations	-	-
Socio-economic Considerations	Preference for local hiring	-
Implications of Failure / Malfunctions of Option	-	-
Preferred Option – carried forward in the assessment	✓	✗

2.11.12 Working Conditions

2.11.12.1 Site Accommodations

During construction, it is expected that a wide range of working arrangements will be used as the site is developed over a 16 to 20 month period. Initially, early works like tree clearing and access road improvement and development may be supported through existing on-site accommodations, temporary accommodations (trailers) used by contractors, outfitting camps, or accommodations in local communities. Early in the construction phase, development of the accommodations camp will begin and once operational, construction workers are anticipated to use the camp for the remainder of the construction phase. As construction work will be completed by contractors who will have a variety of approaches to completing each component of the Project, it is not possible for Marathon to understand or fully assess potential alternatives for this phase.

Marathon has assessed various alternatives with respect to working arrangement during the operational phase of the Project. A governing factor in determining working arrangements is accommodations. For the Project, the Project site is approximately 1.5 hours from the nearest community (Millertown) and is approximately 2.25 hours from Grand Falls-Windsor. Based on the driving distance, it is considered unsafe to have workers commuting daily, and therefore group transportation to and from the site, on-site accommodations, and appropriate shifts and rotations are required. This approach will increase health and safety of workers with respect to travel and working hours, and will reduce environmental impacts (vehicle emissions, dust, vehicle trips on local roads).

Summary

Table 2.49 summarizes the assessment of alternatives related to site accommodations. Marathon's preferred alternative is to develop and maintain accommodations on site for workers during operation. The selection is based on lowered environmental impacts (travel), reduced negative socio-economic impacts due to workers and their families moving into the nearest communities, and substantially reduced health and safety issues associated with travel to and from the site.

Table 2.49 Summary of Project Alternatives Analysis – Site Accommodations

Determining Factors	Options Considered	
	No Accommodations On Site	**Accommodations On Site**
Technically Feasible (including regulatory factors)	Yes	Yes
Economically Feasible (including market factors)	Yes	Yes
Environmental Considerations	-	Less commuting therefore less emissions, sensory disturbance from vehicles
Socio-economic Considerations	-	Enhanced safety for workers given long driving times to nearest communities
Implications of Failure / Malfunctions of Option	-	-
Preferred Option – carried forward in the assessment	✗	✓

2.11.12.2 Shift and Rotation Length

Two 12-hour shifts will be operated to enhance mine production. Rotations will be based on the nature of the work being conducted and may vary from two-week rotations for heavy equipment operators to 4 weeks on and 3 weeks off type rotations for more technical staff. The production and operating cost schedule contemplates certain workforce rotations and availabilities based on comparable mining projects elsewhere in Canada.

Marathon will establish the optimum rotational schedules within the Project's Feasibility Study in the context of its operational readiness planning. Economic consideration that will impact this planning will be direct cost and production efficiency. Socio-economic and regulatory considerations that will impact this planning will be employment standards, workforce location and availability, and labour market competition.

Failures or malfunctions that would impact Marathon's work shift and rotation planning may be a failure of the access road or bridges on the access road that impede vehicle access for personnel and supplies, incidents at the accommodations camp or with local power supply that affect's Marathon's ability to provide a safe and secure living and working environment, and capacity issues at the accommodations camp. Contingency planning around alternate vehicle access routes (via Buchans and Star Lake Generating Station for example), back-up generators, on-site supply storage (e.g., fuel), and temporary overflow accommodation capacity would be contained within the operational readiness planning process, and each would likely have an impact on workforce shift lengths and rotations.

Ultimately, there are no specific alternatives to shift and rotation length; rather, these working conditions factors are considered in terms of a range of variables in combination with the use of on-site accommodations, and may vary substantially in terms of employee roles. Marathon has assumed two 12-hour shifts and variable rotation lengths in Project planning to date, and variations to these assumptions will continue to be considered as Project planning advances.

2.11.13 Rehabilitation Methods

Rehabilitation and closure of a mining operation is required under the NL *Mining Act*, and the requirements for rehabilitation of a mining project are administered by the NLDIET's Mineral Development Division. Rehabilitation and closure are also subject to regulatory review by potentially interested provincial and federal departments. Prior to commencement of construction, Marathon will be required to prepare a detailed Rehabilitation and Closure Plan for approval, and once approved, the rehabilitation and closure cost as estimated in the approved plan must be posted by Marathon as Financial Assurance. This Financial Assurance, which is expected to be in the range of $45M to $50M, is insurance held by the provincial government for the purpose of rehabilitating the site in the event that Marathon defaults on the Project (e.g., declares bankruptcy).

The following sections present rehabilitation alternatives considered for the different Project components. Rehabilitation techniques have evolved considerably over the past decade and will continue to evolve over the life of the Project. Therefore, the techniques and alternatives considered and presented here may change with time. This is addressed in the guidance provided by NLDIET, Mineral Development Division in that a Rehabilitation and Closure Plan is not considered "final" until approximately 6 to 12 months prior to cessation of mining. This allows the final project rehabilitation requirements to be fully understood, and that the latest rehabilitation techniques can be considered for the Project.

It is also important to note that there is no "alternative" to completing progressive rehabilitation. The NL *Mining Act* and associated guidelines outline the requirement to plan for and complete progressive rehabilitation of mining projects, to the extent feasible.

2.11.13.1 Open Pit Rehabilitation

Open pit excavations can be rehabilitated using several techniques, summarized as follows:

- Allowing the pit to flood with water
- Backfill the pit using waste rock excavated from the pit, or from another open pit
- Use the pit for tailings storage

These alternatives have been considered for the Project, and the following describes the considerations in selecting the preferred option. Note that a factor in the decision or regulatory approval to backfill an open pit is the potential for exploitable resource beneath the open pit. NLDIET considers mineral resources, even if not economical at a given point in time, to be of potential value as technologies and markets change with time. A 'permanent' form of pit rehabilitation such as backfilling with waste rock may not be preferred if there is future potential for expansion of the open pit, or underground mining from within the pit.

Flooding

Allowing the open pit to flood (fill) with water is the most common method of rehabilitation for larger open pits. Technical considerations may include the length of time it may take to fill the open pit naturally via groundwater, surface water, and precipitation inflows, the presence of highwalls (exposed slopes remaining above the flooded water level), and ingress / egress requirements for animals or people that may enter the flooded pit.

Economic considerations include the cost associated with creating the ingress / egress area(s), barriers and signage addressing the approach to highwall areas from above the pit crest, and the costs of pumping water to flood the pit if the natural inflow sources will take considerable time to flood the pit volume.

The treatment of highwalls (stability), barriers and signage, as well as ingress / egress requirements are addressed in the NL *Mining Act* guidelines. Environmental considerations are generally specific to the site and open pit being considered. As the open pit wall rock is not currently expected to generate ARD / ML drainage from water accumulating in the pit, discharge location, and downstream connection are expected to be the primary environmental considerations. Steep slopes and waterbodies of this size and depth are common in the general area of the Project and therefore animals (such as caribou or moose) are expected to move around these features.

The most important failure or malfunction may be a pit slope failure above the flooded level of the pit, which would reduce the slope angle; however, it would likely remove the barricade and signage from this area and may create a different type of physical hazard.

Backfilling with Waste Rock

Backfilling of large open pits is not a common rehabilitation method. Generally, waste rock is piled nearby the pit and in NL it is required to make efforts to progressively rehabilitate the exposed waste rock pile. If at the end of the life of the pit the waste rock material was re-excavated to fill the exhausted open pit it would result in the following:

- A nearly equal number of years of equipment operations (fuel consumption, vehicle emissions, dust, and employment) to return the waste rock to the same open pit.
- Approximately 70 to 80% of the waste rock material would fill the pit due to bulking; therefore, 20 to 30% of the waste rock would remain within the waste rock pile location and would need to covered with overburden and revegetated.
- Once the pit was filled, it would reduce the risk of slope failures on highwalls as they would be better supported by the weight of the waste rock material.
- Backfill of 300 m vertical depth of the open pit will be slow; however, 'creep' settlement of the waste rock backfill in the pit will continue for some time after it is originally filled and will require long-term maintenance to 'top up' the fill in the pit as it will also likely settle unevenly. This will also prevent the placement of a soil cover and subsequent revegetation of the pit area for some time.
- In general terms, the cost associated with the activities outlined above would make the Project uneconomical. The costs to move the waste rock back to the pits would be approximately $550M to $600M using Marathon's mining fleet.
- The most economical and environmentally acceptable option to backfill an open pit occurs when a second pit is developed nearby and the waste rock from the second pit is placed in the exhausted open pit. In Marathon's case, due to reasons of Project scale and economy, both pits are mined simultaneously and are exhausted at approximately the same time, leaving little or no opportunity to place waste rock from one pit into the other. Marathon will continue to evaluate this potential alternative as engineering and mine planning proceed.

Backfilling with Tailings

Depositing tailings in an exhausted open pit is a safe method of tailings disposal, particularly if tailings are PAG. There may be two mechanisms that can be considered for this alternative: an exhausted open pit is used to deposit tailings as part of the operational plan; or tailings are excavated from within the TMF and deposited within an exhausted pit at the end of the mine life.

The first alternative is typically a good solution for tailings disposal provided an exhausted open pit is available for this purpose during the operational life of the Project. Technical considerations include potential contamination of groundwater resources surrounding the pit, the need for a permanent water cover over the tailings (e.g., in the event the tailings are acid-generating), and that the final form of the rehabilitation will be similar to the physical conditions and long-term risks associated with flooding of the pit (exposed high-walls, ingress / egress requirements, barricades and signage, and slope stability). From an economics, regulatory, and environmental perspective, this alternative is generally preferred over other options.

The second alternative is synonymous with backfilling with waste rock post-mining. It will require years of equipment operation to move the tailings to the pit, which will in turn create environmental impacts, noting that there is a substantial long-term environmental benefit where permanent dams would otherwise need to be maintained to store the tailings at surface, especially if potentially acid-generating. Unless the tailings can be safely stacked above the lowest elevation of the pit crest, the final form of the rehabilitation is likely be similar to the physical conditions and long-term risks associated with flooding of the pit (exposed high-walls, ingress / egress requirements, barricades and signage, and slope stability). Economically, this alternative would carry a very high cost due to the material handling costs associated with rehandling the tailings.

Summary

Table 2.50 summarizes the assessment of alternatives related to rehabilitation methods for the open pits. Marathon's current plan to rehabilitate the open pits is to flood the pits, create ingress / egress areas, design the pit slopes for appropriate factors of safety for long term stability, and place barricades and signage along remaining highwalls. Marathon plans to partially backfill the Leprechaun open pit with tailings once the pit is exhausted in Year 9; however, this will only fill a portion of the open pit and therefore the remaining volume of the pit will be flooded.

Table 2.50 Summary of Project Alternatives Analysis – Open Pit Rehabilitation Methods

Determining Factors	Options Considered		
	Flooding	Backfilling with Waste Rock	Backfilling with Tailings
Technically Feasible (including regulatory factors)	Yes	Yes	Yes
Economically Feasible (including market factors)	Yes	No	Yes – for a portion of the Leprechaun pit once that pit is exhausted
Environmental Considerations	Ingress/egress areas will be incorporated into the design	-	-
Socio-economic Considerations	-	-	-
Implications of Failure / Malfunctions of Option	-	-	-
Preferred Option – carried forward in the assessment	✓	✗	✓

2.11.13.2 Open Pit Flooding

As described in the preceding section, flooding is the preferred option for rehabilitation of the open pits. Groundwater and surface water modelling completed for the EIS (see Chapter 6 and 7) have determined that the open pits will take in the range of 40 years to fill naturally. If no other actions were to be taken, this would mean the open pits would represent a health and safety hazard to people and wildlife in the area and, based on the ARD/ML assessment to date, some of the pit wall rock would likely generate acidic drainage within that timeframe.

As planned, the tailings generated from the process plant to the pit in Years 10 through 12 of operation will be deposited in the Leprechaun pit. In addition, Marathon is proposing to redirect water collected within the water management infrastructure system to the open pits to aid in flooding. However, even with these measures, it is expected to take over 30 years to fill the pits.

An alternative to allowing the pits to flood naturally is to pump water from the nearby lakes to fill each pit. The requirements to do so are modelled and assessed in Chapter 7. This would reduce the flooding time to approximately eight years based on the pumping rates considered. Water would be withdrawn from Victoria Lake Reservoir to fill Leprechaun pit, and from Valentine Lake to fill Marathon pit. The rates of withdrawal are not expected to have a substantial effect on either waterbody. Filling the open pits via pumping from the nearby lakes will support:

- Faster filling of the pits, reducing the length of time of health and safety liability related to people and wildlife associated with the deep open pits
- An earlier return to post-closure water distribution and balance across the site
- A reduction in the potential for ARD generation from the exposed pit wall rock, and therefore improved overall water quality within the pits
- An overall shorter closure period as the pit filling can commence in Year 9/10 of operation and therefore will only extend 5 years past planned operation, which is also within the expected post-closure monitoring period

Summary

Marathon's preferred option is to supplement natural pit flooding using available contact water, tailings and tailings effluent, and ultimately pumping from the two nearby lakes to reduce the flooding periods, improve risks associated with water quality and pit accessibility, and reduce the closure period overall. Table 2.51 summarizes the assessment of alternatives related to flooding the open pits.

Determining Factors	**Options Considered**	
	Natural Flooding	**Pumping from Lakes**
Technically Feasible (including regulatory factors)	Yes	Yes
Economically Feasible (including market factors)	Yes	Yes
Environmental Considerations	Duration of risks for health and safety, decreased pit water quality	Shorter closure period
Socio-economic Considerations	-	-
Implications of Failure / Malfunctions of Option	-	-
Preferred Option – carried forward in the assessment	✗	✓

2.11.13.3 Tailings Management Facility Rehabilitation

As described in Section 2.11.6, evaluation of alternatives for the TMF location and management method have resulted in a TMF design that includes thickened tailings disposal within an engineered tailings impoundment. The impoundment will be created with rockfill dams constructed in stages using downstream embankment construction. TMF rehabilitation alternatives discussed in this section relate to this design only, and do not consider rehabilitation alternatives for other design options. Further, the rehabilitation alternatives do not consider potential ARD- / ML-related issues as, based on the testing completed to date, the tailings are not expected to be acid-generating.

Tailings Impoundment

Tailings impoundment rehabilitation alternatives for the TMF have been considered as follows:

- Removal of the tailings and dam materials for in-pit disposal
- Rehabilitation via cover and revegetation in-place. Within this alternative there is an option to leave the tailings pond as-is or reduce the size of the pond.
- Monitor and/or improve tailings density to achieve ‘landform’ classification for the tailings deposit.

The considerations regarding the removal of tailings and tailings dam materials for in-pit disposal are outlined in the previous section regarding open pit rehabilitation and are not repeated here. The primary advantages of removing the tailings for final disposal in an open pit is the removal of the physical component, as well as the removal of the dams that would otherwise require long-term monitoring and maintenance.

In-place rehabilitation via overburden cover and revegetation is a common rehabilitation method that is made easier considering the thickened tailings deposition method proposed for Project. As the tailings is delivered at approximately 65% solids by weight, and an overall tailings beach angle of 3% is expected to be achieved, the upper surface of the tailings deposit will quickly be suitable for equipment travel with little or no improvement to deliver and place suitable overburden material and revegetate the tailings surface to create a dry cover. The overall 3% slope and dry cover will act collectively to limit water ingress to the tailings deposit, further protecting water quality in the long term. Note that the crest and downstream slope are not covered and revegetated to allow the dam structure to properly drain (for stability), and to allow inspection and monitoring in accordance with CDA guidelines.

With the dry cover alternative, there are options with respect to the area of wet cover left in place post-closure. During operation, the area and volume of the tailings pond is controlled via the deposition of tailings to contain or reduce the size of the pond. During operation, controlling the pond area and volume is related to water recycling requirements to the mill, management of substantial precipitation and runoff events, and management of water quality with respect to environmental discharges via the water treatment plant and polishing pond. At closure, the operational pond area could be maintained, or the pond area can be reduced using infill and/or changing the spillway elevation. The primary consideration in selecting the preferred option is environmental and potential failures, which in this case are related. Leaving a larger, deeper pond within the impoundment provides more tailings cover; however, due to climate conditions carries more risk with respect to tailings re-suspension, erosion, dam piping, and overtopping in the event the spillway becomes blocked (e.g., beaver dam).

If achievable, designation of the tailings impoundment as a ‘landform’ means that the tailings have densified autonomously, or through engineering means, such that the factor of safety of the overall tailings deposit is no longer relying on the engineered dams to remain in place. The CDA guidelines outline the requirements for landform designation at closure. In this case, the overburden cover and revegetation of the tailings impoundment would be completed, and the crest and downstream slope of the dam would also be revegetated.

Summary

Marathon has selected rehabilitation in place as the preferred rehabilitation method for the TMF. Landform classification for the TMF would be the preferred option; however, the technical feasibility of this alternative will require operational and even initial closure monitoring (while the Project is still operating and sending tailings to the Leprechaun open pit).

In comparison between removal of the tailings to an open pit versus rehabilitation in place, the following points are considered:

- Both options are technically feasible; however, the costs associated with excavating, hauling, and dumping the tailings in the Marathon open pit would substantially impact the economical viability of the Project. Note that based on contracted earthworks rates, the cost to move approximately 60 million tonnes of tailings and tailings dam materials to the Marathon open pit would cost approximately $450M. These costs would impair or eliminate the ability to raise capital in the market to develop the Project.
- There are environmental pros and cons to both alternatives. Removing the tailings to the pit will require several years of equipment operation, resulting in fuel usage and air emissions, including dust. However, if completed, the post-closure aesthetics and water quality are improved and potential environmental effects if a future dam failure were to occur are eliminated. For rehabilitation in place, the risk associated with a potential future dam failure remains (noting they are less than for slurry tailings scenarios), and the physical tailings deposit and dams will remain (e.g., aesthetics).
- If the tailings were to be moved to the pit, employment would be generated for several years to operate and manage the equipment required for this task. However, this alternative will likely mean failure of the Project to proceed, and therefore the Project construction, operation, and decommissioning, rehabilitation and closure employment and overall economic benefit of the Project will not be realized. For rehabilitation in-place, it is understood that stakeholders do not wish to have a TMF left in place with an associated risk of future failure. The mitigation measures that will reduce the long-term risk to this are the use of thickened tailings deposition by Marathon and the increased TMF design requirements put in place by regulators, and the financial assurance required the NL government to cover long-term maintenance and inspection / monitoring of the dams.
- In terms of failure or malfunction, again, the relocation of tailings eliminates the long-term risk of dam failure relative to the rehabilitation in-place alternative.

Ultimately, the economic feasibility of these two alternatives is the deciding factor. Table 2.52 summarizes the assessment of TMF rehabilitation alternatives.

Table 2.51 Summary of Project Alternatives Analysis – TMF Rehabilitation

Determining Factors	Options Considered		
	Relocation of Tailings at Mining Cessation	**Rehabilitate In-Place**	**Landform Classification**
Technically Feasible (including regulatory factors)	Yes	Yes	Unknown
Economically Feasible (including market factors)	No – cost to move tailings to open pit not economically feasible	Yes	
Environmental Considerations	-	-	
Socio-economic Considerations	-	-	
Implications of Failure / Malfunctions of Option	-	-	Risks reduced
Preferred Option – carried forward in the assessment	✗	✓	This would be a preferred option if future monitoring indicates this is technically feasible

Polishing Pond and Water Treatment Plant

Based on current rehabilitation planning, it is anticipated that the polishing pond and water treatment plant will be removed as part of the closure rehabilitation activities once water discharge quality from the tailings pond is sufficient for direct discharge. Alternatively, if water quality within the closure (smaller) tailings pond requires additional retention prior to release to the environment, the polishing pond could be left in place. In this case, the water treatment plant would be removed.

These two alternatives are both technically and economically feasible, and similar in terms of the environmental and socio-economic effects. Leaving the polishing pond in place increases the risk of failure due to the presence of additional dams; however, this increased risk and the consequences of failure are not substantially higher. While there are alternatives to this rehabilitation component, a selection of the preferred option cannot be made until further operating experience is gained and the closure design is completed.

Progressive Rehabilitation

Progressive opportunities for the current tailings design and deposition plan will be limited to smaller areas that will become inactive with respect to tailings deposition. Further consideration will be given to progressive rehabilitation opportunities and alternatives during the Feasibility and Detailed Engineering design phases of the Project.

Post-Closure Monitoring

Post-closure monitoring activities are governed by the condition or state in which the various mine components remain after closure activities are completed. In the case of the TMF for the Project, the alternatives respecting post-closure monitoring activities can only be determined and selected once a final closure plan is determined.

2.11.13.4 Waste Rock Pile Rehabilitation

As identified in Section 2.11.3 respecting the management of waste rock, Marathon has determined that on-land waste rock piles are the best option for the Project. Rehabilitation alternatives for these waste rock piles have been considered as follows:

- Disposal in-pit at the end of the mine life
- Progressive and closure rehabilitation via cover and revegetation in-place.

The considerations regarding in-pit disposal at the end of the mine life, or once the open pit is exhausted, is outlined in the previous section regarding open pit rehabilitation and is not repeated here. This is considered a technically viable solution and would create jobs for an extended period of time; however, it not considered a viable management option based on the environmental effects and economics.

Progressive and final (closure) rehabilitation through revegetation in-place is a common rehabilitation method in modern mining practice. Best management practices require that the pre-development design of the waste rock pile address key rehabilitation considerations, including stable slopes for application of overburden and revegetation, benching for access and breaks in the slope, and footprint and geometry related to post-closure aesthetics and surface water runoff.

As provincial regulations require the revegetation of mine site components where feasible, there are no other alternatives to consider for an on-land pile. Specific alternatives may be considered in terms of the application of organics / topsoil / overburden as cover and growth medium for the revegetation process, and the species type and variety of plants to use in the revegetation process. These considerations will be addressed during revegetation trials conducted during the operation phase as progressive rehabilitation takes place, and in consultation with the appropriate regulators.

Summary

Marathon has selected rehabilitation in-place as the preferred rehabilitation method for the waste rock piles due to the environmental impacts generated and the substantial costs (sufficient to make the overall Project uneconomical) from moving the waste rock material back to the open pit at the end of the mine life. Table 2.53 summarizes the assessment of waste rock pile rehabilitation alternatives.

Table 2.52 Summary of Project Alternatives Analysis – Waste Rock Pile Rehabilitation

Determining Factors	Options Considered	
	Relocation of Waste Rock to Pit	Rehabilitate In-Place
Technically Feasible (including regulatory factors)	Yes	Yes
Economically Feasible (including market factors)	No – substantial costs to relocate rock would make Project economically unfeasible	Yes

Table 2.52 Summary of Project Alternatives Analysis – Waste Rock Pile Rehabilitation

Determining Factors	Options Considered	
	Relocation of Waste Rock to Pit	Rehabilitate In-Place
Environmental Considerations	-	-
Socio-economic Considerations	-	-
Implications of Failure / Malfunctions of Option	-	-
Preferred Option – carried forward in the assessment	✗	✓

2.11.13.5 Overburden and Organic Stockpile Rehabilitation

Overburden and organic stockpiles will be used for progressive and final rehabilitation of the mine components. A materials balance will be completed as part of the formal Rehabilitation and Closure Plan, which will consider materials movement and storage requirements over the life of the mine and will consider the volume of overburden and organic soil requirements for rehabilitation. It is generally expected that the materials in the overburden and organic soils stockpile will be used for rehabilitation and therefore these stockpiles will not exist once closure activities are complete. The disturbed footprint left by the stockpile will be contoured, scarified, and revegetated once the stockpile is depleted. There are no rehabilitation alternatives considered for these components of the Project.

2.11.13.6 Ore Stockpile Rehabilitation

Two LGO stockpiles, one for each open pit, and one HGO stockpile will be developed to manage ore grades destined for the process plant. The stockpiles will be placed on a prepared pad, which is expected to be constructed of rockfill placed on natural overburden or bedrock. Alternatives for rehabilitation consider the following:

- The stockpiles are depleted once ore is processed at the mill, leaving only the rockfill pad.
- For several potential reasons (e.g., drop in gold prices making the ore uneconomical to process), the ore materials are left on the stockpile.

Assuming that the ore stockpiles are depleted, the rockfill pad will be recontoured to blend to the surrounding terrain, covered with overburden / organics and revegetated. There are no alternatives considered for this rehabilitation approach when the stockpiles are depleted.

If the stockpiles are not depleted, there are alternatives that may be considered. NLDNR requires that the Rehabilitation and Closure Plan consider closure concepts based on this case and include sufficient closure costs in the estimate for this conservative case. The alternatives that are generally considered in the case where stockpiles are not depleted are as follows:

- The ore is moved to a waste rock pile or to the exhausted open pit, and the remaining pad is rehabilitated as noted above.
- The ore is left in place and covered with overburden / organics and revegetated.

Both options are technically feasible, and the selection of the preferred option is likely to be based on economic and environmental factors. If the ore materials are not potentially acid-generating, there are no substantive environmental considerations for either option. However, if the ore materials are potentially acid-generating, leaving the ore in place and covering will require a more robust cover (likely a geosynthetic liner) prior to the soil cover and revegetation to mitigate potential ARD / ML issues. Leaving the ore in place in either case will likely require contouring and expansion of the stockpile footprint, as design slopes for temporary stockpiles are typically steeper than for permanent material piles. The cover, whether lined or not, and other work, including revegetation, is costly and would usually be weighed against the cost of moving the material to a waste rock pile or open pit. In the case of potentially acid-generating ore materials, the best option in terms of long term ARD / ML mitigation is usually to move the material to an exhausted open pit, where it would be permanently covered by water (flooded).

Summary

Table 2.54 summarizes the assessment of alternatives related rehabilitation methods for the ore stockpiles. Marathon's current plan is to mill the stockpiled material and complete the simple rehabilitation of the pad as described above. Regardless of market factors, the HGO will be milled as it is located close to the mill and it would be less expensive to mill and sell the recovered gold than to cover or relocate the material for rehabilitation. However, as per NLDIET's requirements, the formal Rehabilitation and Closure Plan will assume the most conservative approach for the LGO stockpiles, in the event the material is not milled.

Based on ARD/ML testing to date, the LGO materials from the Leprechaun pit are not expected to be acid-generating. The LGO from the Marathon pit is conservatively estimated to comprise 50% PAG material.

Table 2.53 Summary of Project Alternatives Analysis – Low-Grade Ore Stockpile Rehabilitation Methods

Determining Factors	Options Considered		
	Material Relocated	**Rehabilitated In Place**	**Mill Ore and Rehabilitate**
Technically Feasible (including regulatory factors)	Yes	Yes	Yes
Economically Feasible (including market factors)	Depends on volume of material left on stockpile	Yes	Yes
Environmental Considerations	Better if LGO is PAG	Largest rehab footprint	Reduces rehab footprint
Socio-economic Considerations	Potentially shorter mill life	Potentially shorter mill life	Longer mill life (employment)
Implications of Failure / Malfunctions of Option	-	-	-
Preferred Option – carried forward in the assessment	✗	✗	✓

2.11.13.7 Site Roads

Haulage roads and site roads will be decommissioned across the site upon cessation of mining as part of the closure rehabilitation activities. The exception is that some roads will be left in place for the purpose of conducting post-closure monitoring and maintenance. At the conclusion of the post-closure monitoring period, Marathon will consult with the appropriate regulators (NLDIET and NLDECCM, possibly others) to determine if these roads will be rehabilitated or left as-is.

The method of rehabilitating the site roads includes removal of culverts and recontouring the roadbed materials to match into the adjacent topography. The disturbed ground is then covered with overburden materials where required and revegetated. There are no alternatives considered for the rehabilitation of site roads.

2.11.13.8 Access Road

The access road to the site, which extends from just west of the Exploits River Bridge approximately 8 km southwest of Millertown, to the Project site is an existing gravel road of approximately 4 to 5 m in width, which includes bridges and culverts at water crossings, and ditching in some areas. The road is owned and operated by the Province of NL for the purposes of forestry access and NL Hydro’s access to the Victoria Dam. The road is also used by exploration companies, outfitters, cabin owners, and recreational users (e.g., hunting, fishing, snowmobiling).

Based on Marathon’s consultation with NLDFFA and NL Hydro, the access road is expected to continue to be needed by many users, including the future, continued need to access the Victoria Dam and forestry management areas. As such, Marathon will not complete rehabilitation of the access road to the Project, and no other options have been considered.

2.11.13.9 Revegetation Alternatives

Many of the rehabilitation alternatives discussed above involve the eventual revegetation of the component or area. Revegetation has traditionally involved placement of overburden to create sufficient growth medium to allow ‘temporary’ revegetation using grasses for to limit erosion and dust lift-off, and to allow subsequent natural revegetation of the area. As mine rehabilitation techniques evolve, improved methods incorporate natural aesthetics and the re-introduction of native plant species to achieve results that a much closer to the pre-existing conditions at a much earlier stage post-closure.

Marathon has not completed study work at the current stage of Project development to determine which alternatives may be best suited to the eventual progressive rehabilitation of the Project site. Marathon is committed to working with regulators, Indigenous groups, and interest groups such (e.g., Ducks Unlimited) to consider revegetation alternatives as they can be practically applied to the rehabilitation of the Project. Marathon will commence revegetation trials early in the operational life of the mine as areas are identified for progressive rehabilitation, and consultation, research, and application during vegetation trials may consider alternatives such as:

- Using seeds from native plant and tree species in direct revegetation

- Transplanting native plant and tree species to rehabilitation areas
- Use of plant and tree islands to promote natural revegetation
- Use of terrain cover options – rock outcrops, boulder piles or fields, and creation or recreation of small ponds, streams, and/or wetlands
- Determining scales for potential use of the alternatives above to enhance the rehabilitation methods and benefits for natural elements, including wildlife

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3.0 REGULATORY, INDIGENOUS AND STAKEHOLDER CONSULTATION AND ENGAGEMENT

3.1 OVERVIEW

Marathon is committed to operating the Project within a sustainable development framework which reduces harm to the environment, contributes to local communities, respects human and Indigenous rights, and adheres to openness and transparency in operations. One of the key principles of sustainable development is meaningful engagement with the individuals, communities, groups and organizations interested in or potentially affected by the Project in order to build and maintain positive, long term and mutually beneficial relationships.

Consistent with its corporate values (Respect, Accountability, Transparency, Inclusion and Prosperity) Marathon is committed to ensuring that those whose interests may be affected by the Project, including Indigenous groups and stakeholders (regulators, communities, associations and non-governmental organizations), are appropriately informed and meaningfully engaged regarding the company's ongoing and planned activities.

The following key components of Marathon's approach to engagement are outlined in its Indigenous Relations Policy and Community Relations Policy (Appendix 1C):

- Open, honest, transparent, respectful dialogue with people and communities over the life of the Project
- Timely, ongoing transmission of relevant Project–related information
- Respect for input of Indigenous groups, and communities and other stakeholders
- Inclusive, culturally sensitive and appropriate methods of engagement
- Acknowledgement of, and responsiveness to, identified issues and concerns
- Integration of feedback from Indigenous groups, communities and stakeholders into Project planning and design, the assessment of effects, and the development and implementation of mitigation

Marathon has undertaken engagement initiatives in relation to the Project and the Environmental Impact Statement (EIS), with further engagement in progress or being planned. The overall objectives of Marathon's engagement and consultation efforts are to:

- Provide Project information and updates on a regular and continuing basis
- Engage Indigenous groups and stakeholders throughout the environmental assessment process and over the life of the Project
- Identify issues or concerns by Indigenous groups and stakeholders early in the process
- Integrate input from Indigenous groups, communities and stakeholders into account in project planning and execution, identification of potential Project-related effects and design and implementation of mitigation
- Demonstrate how issues and concerns raised during engagement have been addressed

3.2 EIS GUIDELINES: ENGAGEMENT

In July 2019, the Canadian Environmental Assessment Agency (now the Impact Assessment Agency of Canada [IAAC]) issued EIS Guidelines for the Project. The Federal EIS Guidelines (Appendix 1A) specify information requirements and potential issues that are to be addressed in the EIS, including required information regarding the Project, aspects of the existing biophysical and socio-economic environments, Indigenous and stakeholder engagement, and analysis of potential Project-environmental interactions, associated mitigation measures, and effects remaining after the application of mitigation. The Federal EIS Guidelines have formed a key part of the issues scoping component of EIS planning and preparation.

The Federal EIS Guidelines outline general principles and specific requirements regarding public participation and engagement with Indigenous groups as part of the Environmental Assessment (EA) of the Project. Specifically, Section 4 of the EIS Guidelines states:

"The EIS will describe the ongoing and proposed public participation activities that the proponent will undertake or that it has already conducted on the project. It will provide a description of efforts made to distribute project information and provide a description of information and materials that were distributed during the consultation process. The EIS will indicate the methods used, where the consultation was held, the persons and organizations consulted, the concerns voiced and the extent to which this information was incorporated in the design of the project as well as in the EIS. The EIS will provide a summary of key issues raised related to the project and its potential effects to the environment as well as describe any outstanding issues and ways to address them."

On February 10, 2020, the Newfoundland and Labrador (NL) Department of Environment, Climate Change and Municipalities (NLDECCM) issued Final Provincial EIS Guidelines (Appendix 1B). The Provincial EIS Guidelines also require that Marathon engage in active public participation with potentially affected stakeholders (communities, individuals and organizations). Section 4.1.15 of the Provincial EIS Guidelines states that the EIS shall:

> "….*describe a planned program of public participation and consultation, including, but not limited to the following: a) an opportunity for interested members of the public to meet with the proponent at a place adjacent to or within the geographical area of the undertaking, or as the minister may determine, in order to:*
>
> *i. provide information concerning the undertaking to the people whose environment may be affected by the undertaking;*
> *ii. describe the rationale for the gold mine, impacts to wildlife, impacts to tourism, and any other pertinent details to address public concerns;*
> *iii. record and respond to the concerns of the local community raised during the public meeting regarding the environmental and socioeconomic effects of the undertaking, and to describe those concerns and the proponent's response to those concerns in a separate section of the EIS; and*
> *iv. conduct the meeting in compliance with the legislation and with divisional policy included in Appendix A."*

Marathon has implemented an expansive approach to engagement which encompasses relevant government departments and agencies, Indigenous groups, and stakeholder organizations, including communities, business and industry organizations, fish and wildlife organizations, environmental non-governmental organizations, and individuals, including cabin owners. All engagement activities have been documented and issues and concerns identified during engagement have been recorded.

This chapter describes previous, ongoing and planned consultation and engagement initiatives related to the Project. It also describes questions and comments raised regarding the Project, indicates where and how these are addressed in the EIS.

3.3 GOVERNMENT DEPARTMENTS AND AGENCIES

Marathon has been consulting with federal and provincial regulators since initiating site exploration activities in 2010. Initial Project-related meetings were held to present the Project concept and to request information and guidance from regulators while developing the Environmental Assessment Registration / Project Description (submitted April 2019).

The initial meeting with the Environmental Assessment Committee (EAC) and Marathon was held on August 9, 2019, with a follow-up meeting on February 25, 2020. At each meeting of the EAC, Marathon presented the Project as currently conceived, and highlighted changes and updates to the Project components, infrastructure and design. Representatives of the provincial and federal departments asked questions about the Project and highlighted, from their department's perspective, key aspects and concerns upon which Marathon should focus the assessment.

A site visit was also held with eight representatives of the EAC (alternative representatives in some cases). EAC representatives drove to site and were escorted on a helicopter tour of the Project Area by Mr. James Powell, Marathon's VP of Regulatory and Government Affairs. The group also met on site to discuss questions and review the features observed during the helicopter tour, and to tour the existing exploration camp.

Marathon has continued to meet with representatives from individual provincial and federal departments and agencies throughout the preparation of the EIS, particularly to seek clarification on interpretation and application of the requirements of the Federal and Provincial EIS Guidelines. Outcomes of regulatory consultation to date and regulatory review processes (of the Project description and EIS guidelines) have been incorporated as applicable throughout the EIS, including in VC selection, approach to baseline studies, modelling methodology, proposed mitigation measures, and depth and focus of the various VC assessments.

Regulatory consultation on the Project has included meetings with the EAC as noted above and meetings (in person and virtual) with individual and multiple departments as applicable, depending on the subject matter. Key topics of interest / concern raised by government agencies are highlighted in Table 3.1. Marathon will continue to consult with government departments and agencies throughout the EIS review process and during preparation of follow-up and monitoring programs. To date, the following federal and provincial government departments have been involved in regulatory consultation on the Project:

- Federal Government
  - IAAC
  - Fisheries and Oceans Canada (DFO)
  - Environment and Climate Change Canada (ECCC)
  - Transport Canada
- Provincial Government
  - Department of Industry, Energy and Technology (NLDIET)
    - Mines Branch
    - Energy Branch
    - Economics and Benefits Division
  - Department of Fisheries, Forestry and Agriculture (NLDFFA)
    - Wildlife Division
    - Fisheries and Aquaculture Division
  - Department of Environment, Climate Change and Municipalities (NLDECCM)
    - Environmental Assessment Division
    - Climate Change Branch
    - Pollution Prevention Division
    - Water Resources Management Division
  - Department of Tourism, Culture, Arts and Recreation
    - Provincial Archaeology Office
    - Sector Diversification Division
  - Department of Health and Community Services
  - Office for the Status of Women

Table 3.1 Key Topics of Interest / Concern to Government Agencies

Government Agencies	Interest / Concern	Marathon Response
NLDFFA – Wildlife Division	Potential Project-related adverse effects on caribou, in particular migration of the Buchans herd	Marathon has held several meetings with the NLDFFA Wildlife Division (NLDFFA-WD) to discuss the Project and its potential effects on caribou and other wildlife. Marathon consulted with NLDFFA-WD in planning and executing field programs, and in proposing potential mitigation measures to reduce adverse effects of the Project on wildlife and associated habitat (e.g., caribou, bats, marten). NLDFFA-WD has provided Marathon with datasets (including caribou collar data) and studies to help inform the assessment of potential Project-related effects on caribou and other wildlife, in particular related to migratory patterns of caribou herds in the vicinity of the Project and the presence of resident caribou. Additionally, Marathon engaged Stantec to conduct caribou-specific field studies in the vicinity of the Project: caribou remote camera surveys in 2019 and 2020, and a post-calving aerial survey in 2020. These field programs are summarized in Baseline Study Appendix 2 (BSA.2), which also contains the complete survey reports. Potential Project-related effects on caribou have been assessed in the EIS (Chapter 11), with planned mitigation measures and a proposed adaptive management approach, to be refined through further consultation with NLDFFA-WD.

Table 3.1 Key Topics of Interest / Concern to Government Agencies

Government Agencies	Interest / Concern	Marathon Response
NLECCM – Water Resources Division	Potential for major accidental release of tailings and tailings water from the tailings management facility (TMF) due to an accidental dam breach to result in a cascade failure of the Victoria Dam, or for other Project activities (e.g. blasting) to affect the integrity of the Victoria Dam and the TMF	The proposed TMF was previously sited to the east of Leprechaun pit, upgradient of Victoria Dam and Victoria Lake Reservoir. Following a secondary siting alternatives review, the TMF location was shifted to address potential issues related to impacts to Victoria Dam and Victoria Lake Reservoir associated with a failure or breach of the TMF dams. Marathon engaged Golder to conduct the following studies related to dam safety: • Dam Breach Assessment and Inundation Study – Valentine Gold Tailings Management Facility (2020) • Dam Breach Assimilative Capacity Study for the Valentine Gold Tailings Management Facility (2020) • Valentine Gold Project Blast Impact Assessment (2020) These assessments (provided in BSA.1 Dam Safety) have informed the Dam Infrastructure VC (Chapter 19) and the assessment of accidental events (Chapter 21). Results from surface water and groundwater modelling reports (provided in Appendices 6A, 7A, 7B and 7C) addressing potential effects on surface water quality and quantity and subsequent potential effects on the Victoria Dam and Victoria Lake Reservoir are also considered in the assessment of Dam Infrastructure (Chapter 19).
DFO	Authorization requirements pursuant to the *Fisheries Act* including those related to Habitat Alteration, Disruption or Destruction (HADD), prohibitions against the death of fish, and provisions for maintaining adequate flow and fish passage	Marathon has held numerous meetings with DFO regarding assessing fish habitat and planning a habitat offsetting project for habitat that may be altered, disturbed or destroyed. Project infrastructure has been reconfigured and/or relocated to avoid fish habitat to the extent practicable. Where alteration, disruption or destruction of fish habitat cannot be avoided, habitat will be offset through a habitat offsetting project. Marathon completed a review and update of Project design and layout to reduce the overall footprint of the Project and related potential adverse effects on fish and fish habitat, including reconfiguring the waste rock piles primarily to avoid fish habitat. The TMF location alternatives study considered fish and fish habitat as a key aspect in the evaluation of location options. Marathon plans to maintain fish passage where practicable, including maintaining flows in watercourses and sizing and designing culverts appropriately, as described in Chapter 2.

Table 3.1 Key Topics of Interest / Concern to Government Agencies

Government Agencies	Interest / Concern	Marathon Response
ECCC	The MDMER pursuant to the *Fisheries Act* prohibits the owner or operator of a mine from depositing waste rock, acutely lethal effluent or effluent of any pH and containing any concentration of a prescribed deleterious substance into water frequented by fish, except as authorized through amendment to Schedule 2 of the MDMER to designate a waterbody as a tailings impoundment area	The initially proposed TMF was sited where it would overlap with a small pond and stream in the central area of the site. Following a secondary siting review, the planned TMF location was shifted to avoid placement of tailings in fish habitat.

3.4 INDIGENOUS GROUPS

3.4.1 Newfoundland and Labrador Indigenous Groups

The Federal EIS Guidelines (Part 2, Section 5) identify Qalipu Mi'kmaq First Nation (Qalipu) and Miawpukek First Nation (Miawpukek) as Indigenous groups that may be affected by the Project. No other Indigenous groups have come forward or have been identified by either level of government or by Marathon as having an interest in, or being potentially affected by, the Project.

A profile of each group is provided in Chapter 17 (Indigenous Groups) and the location of each Indigenous group is presented in Figure 3-1.

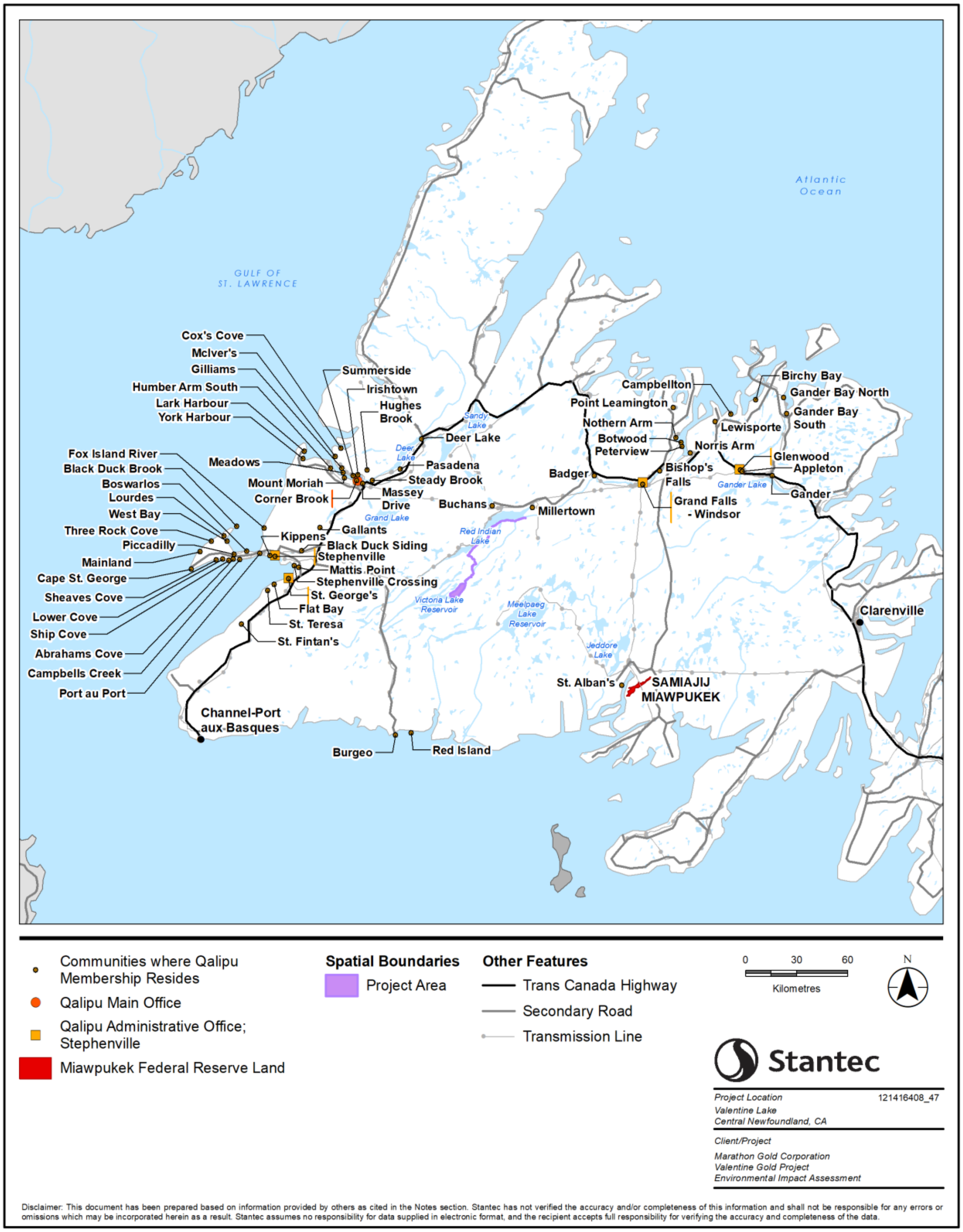


Figure 3-1 Location of Indigenous Groups

3.4.2 Indigenous Engagement: Methodology and Approach

The Federal EIS Guidelines (Part 2, Section 5) direct Marathon to engage with Qalipu and Miawpukek to obtain their views on:

- "*the project; and*
- *effects of changes to the environment on Indigenous peoples (health and socio-economic conditions; physical and cultural heritage, including any structure, site or thing that is of historical, archaeological, paleontological or architectural significance; and current use of lands and resources for traditional purposes) pursuant to paragraph 5(1)(c) of CEAA 2012."*

The Federal EIS Guidelines further stipulate the scope and content of Indigenous engagement (Part 2, Section 5):

> *"In order to allow the Indigenous groups to engage and provide views on the above, the proponent will provide the Indigenous groups with the following timely and relevant:*
>
> - *opportunities to learn about the project including providing information about the proposed project (including but not limited to project design, location, potential effects, mitigation measures and follow-up and monitoring programs); and*
> - *opportunities to provide input on the overall project; effects of changes to the environment on Indigenous peoples pursuant to paragraph 5 (1)(c) of CEAA, 2012 and potential adverse impacts of the project on Indigenous interests.*
>
> *The proponent will structure its engagement activities to provide adequate time for groups to review and comment on the relevant information. Engagement activities are to be appropriate to the groups' needs, arranged through discussions with the groups and in keeping with established consultation protocols, where available. The EIS will describe all efforts, successful or not, taken to solicit the information required from groups to support the preparation of the EIS. With respect to engagement activities, the EIS will document:*
>
> - *the engagement activities undertaken with each group prior to the submission of the EIS, including the date and means of engagement (e.g. meeting, mail, telephone);*
> - *document the main issues and comments raised during the engagement activities by each group and the proponent's responses (effort should be made to collating like issues together along VCs identified in the EIS);*
> - *any future planned engagement activities;*
> - *where and how Indigenous groups' perspectives were integrated into and/or contributed to decisions regarding the project, design, construction, operation, decommissioning, abandonment, maintenance, follow-up and monitoring and associated potential effects (paragraph 5(1)(c)) and the associated mitigation utilized to manage those effects. The effects and mitigation measures should be clearly linked to VCs in the EIS as well as to specific project components or activities; and*

- *how engagement activities by the proponent allowed groups to understand the project and evaluate its impacts on their communities, activities, and interests. Where impacts are identified, provide a discussion of how those would be managed or mitigated (and provide this information for each Indigenous group separately).”*

Consistent with the Federal EIS Guidelines, Marathon’s Indigenous engagement activities have been focused on establishing open, meaningful communication and information exchange through continuing dialogue with Qalipu and Miawpukek. The objectives of Indigenous engagement generally are to:

- Ensure that Qalipu and Miawpukek have access to Project-related information on a timely, culturally appropriate and continuing basis and in a manner that is responsive to community needs, interests and circumstances
- Establish a process of ongoing dialogue between Marathon and each group so that each group has meaningful and continuing opportunities to understand the Project and to identify and determine its potential effects upon its interests and activities
- Enable Marathon and each group to work together to discuss potential impacts on activities and interests and potential measures to mitigate, prevent or otherwise address adverse effects

Marathon has made considerable efforts to provide each Indigenous group with opportunities to learn about the Project, including its location, design, potential effects and proposed mitigation measures, to provide input respecting the potential effects of the Project upon Indigenous interests and activities and to discuss potential mitigation, avoidance and monitoring measures. Throughout engagement, Indigenous groups have been given reasonable opportunities to provide Marathon with their views on:

- Indigenous activities or interests in or near the Project Area or elsewhere that might be relevant to the assessment of the Project and its potential effects
- The effects of changes to the environment on their health and socio-economic conditions, physical and cultural heritage and current use of lands and resources for traditional purposes pursuant to paragraph 5(1)(c) of CEAA 2012

In addition, Marathon has invited each group to share Indigenous knowledge relevant to the existing environment and the assessment of the potential effects of the Project and proposed mitigation measures, and has taken into account relevant Indigenous knowledge to which it has access or that has been acquired through engagement or through publicly available materials. Throughout the engagement process, Marathon has identified, documented and responded to questions and concerns about the Project and its potential effects, including whether and how these might have implications for Indigenous groups and their activities and interests.

Marathon’s Indigenous engagement process has been developed in concert with each group, taking into account their views as to the type, nature and frequency of engagement. The approach to engagement is based upon consistent and regular contact and information exchange designed to enable each Indigenous group to understand the Project and identify potential effects on their communities, activities, and asserted or established Indigenous rights. Considerable efforts have been made to provide each Indigenous group with opportunities to ask questions and provide comments regarding the Project and its potential effects and to comment on proposed mitigation measures. More specifically, Marathon's engagement activities with each group have included the following:

- **Information Sharing Initiatives:** transmission of, and opportunities to review, Project-related documentation including EIS baseline information, newsletters, notices and other materials (e.g., press releases), related to the Project, Marathon's corporate operations, and employment and business opportunities
- **Meetings:** meetings and offers to meet with Indigenous leadership, community members and other groups in person (by video, conference calls, or webcast) to discuss the Project and associated regulatory processes, issues and concerns and potential mitigation measures, and holding a Project review workshop to provide information related to the Project's proposed layout and design
- **Land and Resource Use Studies:** offers of funding to conduct land and resource use studies and to collect Indigenous knowledge to enhance Marathon's understanding of the potential Project effects on Indigenous interests and activities, and to incorporate into the EIS
- **Avoidance, Mitigation and Monitoring Initiatives:** discussion with representatives of each Indigenous group of potential mitigation, monitoring and avoidance measures to address potential effects

All engagement activities have been documented, with the following information provided in this chapter:

- A log of engagement activities undertaken with each of Qalipu and Miawpukek up to September 4, 2020 (Appendix 3A.1, 3A.2)
- Identification of issues and concerns raised during engagement activities by each group, including responses and EIS references

In addition, comments and concerns expressed by Indigenous groups during engagement have been taken into account, as applicable, in the various EIS chapters.

An overview of Marathon's engagement activities with each group is provided below.

3.4.3 Indigenous Engagement – Qalipu Mi'kmaq First Nation

Marathon's engagement with Qalipu commenced prior to submission of the EA Project Description / Registration. By correspondence dated April 4, 2019, Marathon provided Qalipu with a Project status update and expressed an interest in a meeting to discuss the Project. An introductory meeting was held on May 2, 2019 with Chief Brendan Mitchell, several Ward Councillors, and members of Qalipu executive and the Qalipu Development Corporation (QDC). The purpose of the meeting was to exchange information on the Project and on Qalipu's needs and interests. In subsequent correspondence dated September 19, 2019, Marathon provided updated Project information and expressed its commitment to meaningful engagement with Qalipu respecting project design, potential environmental effects, employment and business opportunities.

Marathon has made considerable efforts to develop a constructive relationship with Qalipu through meetings (in person, by conference or video call) and correspondence to provide ongoing Project-related information and to discuss issues and concerns as detailed in Appendix 3A.1.

Key components of Marathon's engagement with Qalipu include the activities described below.

3.4.3.1 Information Exchange

Marathon has provided Qalipu on with all relevant Project-related information (e.g., presentations, pictorial depictions of the Project site and Project Area, reports, maps, press releases and notices relating to employment and business opportunities) on a timely basis through written correspondence, e-mails, telephone calls and meetings. Qalipu has also been provided with an opportunity to review and comment on EIS baseline information (existing conditions) respecting Indigenous land and resource use in Central Region and Qalipu's responses have been incorporated into the description of the existing environment (Chapter 17). Marathon also offered to provide Qalipu with completed baseline studies in advance of the submission of the EIS in order to facilitate participation in the EA process. Marathon has committed to provide Qalipu with both a hard copy of the EIS (without appendices), Summary of the EIS and an electronic version of both the EIS (with appendices) and Summary of the EIS. Hard copies of the EIS appendices will be made available to Council upon request.

3.4.3.2 Meetings

Marathon met with Chief, Council and some individual members of Qalipu in January 2020, to provide a Project update and discuss issues and concerns. Qalipu executive and members were also invited to attend public engagement sessions in February and May 2020. In response to COVID-19 restrictions and with the agreement of Qalipu, a virtual meeting held exclusively for members on June 23, 2020 to provide Project-related information and to discuss the EA process including potential effects and mitigation measures. Participants were invited to submit comments directly during the webcast or following. The presentation was subsequently made available to Qalipu members through Marathon's website. A total of 10 members of Qalipu viewed the presentation (either during or subsequent to the virtual session). Participants were able to submit questions and comments and these were either answered during the session or by follow-up e-mail. The presentation has been posted to Marathon's website and will remain available for viewing for one year. Qalipu has been advised that individuals may access this presentation at their convenience and provide comments at any time, which will be taken into consideration by Marathon. In addition, Marathon has offered to provide a copy of the presentation at the request of any member of Qalipu.

Where feasible, meeting materials have been provided in advance or at the time of meetings. Marathon has offered to meet with representatives of Qalipu at any time during the EA process and throughout the life of the Project to discuss specific aspects of the Project. Opportunities for feedback and comment are not limited to meetings – Marathon has expressed its commitment to take into account feedback from and input of Qalipu throughout the life of the Project. Marathon has also met with representatives of the QDC to discuss Project-related contracting opportunities.

3.4.3.3 Project Review Workshop

To facilitate the incorporation of Indigenous perspectives into Project planning and design, in December 2019, Marathon held a one-day Project Review Workshop in Grand Falls-Windsor with representatives of Qalipu and Miawpukek. Participants were provided with workshop materials in advance and given the opportunity to discuss Project layout, components / infrastructure and potential environmental effects, including effects upon Indigenous interests. The information generated and discussed at the Workshop sessions, including specific environmental concerns raised by Qalipu, was incorporated into Project planning and design for the Project's Pre-feasibility Study (Ausenco 2020) and the EIS. Workshop materials, a summary of the Workshop proceedings, and correspondence indicating how Workshop discussions have been taken into account by Marathon are included in Appendix 3B.

3.4.3.4 Land and Resource Use Study

Marathon provided funding to Qalipu to conduct a Collection of Current Land Use and Traditional Knowledge Study (ATK Study) in the late spring / early summer 2020 to enhance Marathon's understanding of Qalipu members' land and resource use in the Project Area, and relevant Indigenous knowledge. As a result of COVID-19 restrictions, in-person interviews could not be conducted and the study was conducted through an on-line questionnaire with mapping components. Twenty-two members of Qalipu participated in the ATK Study, which examined the patterns, frequency and timing of memberships' land and resource use activities in the Central Region. The ATK Study is contained in Appendix 17A and the results of the study have been incorporated as appropriate into the EIS. As noted in the ATK Study, active participant land use in the Project Area appears to be limited, with only one participant identifying hunting and fishing activities in the area. However, Marathon will continue to work with Qalipu to enhance Marathon's understanding of Qalipu's land and resource use in the area of the Project and Indigenous knowledge. Issues identified in the ATK Study, together with Marathon's responses, are set out in Table 3.2.

3.4.3.5 Socio-Economic Agreement

In April 2020, Marathon and Qalipu commenced negotiations with a view to concluding a socio-economic agreement by fall 2020. The agreement, if concluded will provide a framework for the relationship of the Parties over the life of the Project and will addresses matters such environmental stewardship and monitoring, ongoing engagement, and economic opportunities (education and training, employment, and contracting).

It is Marathon's intention to continue active engagement to maintain a constructive, collaborative relationship with Qalipu throughout the life of the Project. Marathon plans to hold a workshop with representatives of Qalipu in fall 2020 to discuss mitigation measures and will meet with Qalipu membership following submission of the EIS to provide an overview of the assessment findings. Marathon is also discussing participation in monitoring and research initiatives with Qalipu and has invited a representative of Qalipu to assist in the collection of samples for a country foods survey. Engagement and information exchange related to employment and business opportunities is ongoing and will continue throughout Project execution. Marathon has also committed to engage with Qalipu during the development of the Gender Equity and Diversity Plan, which will address matters such as employment, training and business opportunities for underrepresented groups including women and Indigenous persons.

Issues Identified During Engagement

Qalipu members have identified both positive and adverse potential Project-related effects. Adverse effects include potential effects on fish and wildlife (particularly caribou) and restrictions on the current use of lands and resources for traditional purposes. Positive effects include enhanced employment and business opportunities. Through ongoing engagement, it is Marathon's understanding that the principal issues identified by Qalipu are as follows:

- Need for continuing engagement and cooperation
- Access to economic opportunities, with specific reference to education and training, employment and access to contracting opportunities
- Environmental stewardship and involvement in monitoring initiatives
- Potential adverse effects on wildlife (particularly caribou) and resulting effects on current use of land and resources
- Potential effects on water quality and quantity and fish habitat
- Design of tailings facility and use of cyanide
- Socio-economic effects including positive effects on employment and business opportunities

Table 3.2 sets out the issues identified by Qalipu during engagement, including comments contained in the ATK Study and Marathon's responses, as well as associated EIS references. It should be noted that Table 3.2 reflects the concerns and comments expressed by Qalipu members during engagement activities specifically directed at Qalipu. Since Qalipu members reside in communities throughout the Central Region, it is possible that Qalipu members attended community information sessions in December 2019, February 2020 and/or May 2020. Since participants at these information sessions were not specifically asked to self-identify as members of Qalipu, any questions or comments that may have been expressed by Qalipu members at the public information sessions are included in Section 3.5.

Table 3.2 Qalipu Issues and Concerns Raised During Engagement

Issue/Concern	Marathon Response / Action / Mitigation	EIS Reference
The Project should be subject to environmental assessment under the IAA rather than CEAA 2012	Since EA Registration occurred prior to the coming into force of the *Impact Assessment Act* (IAA), Marathon could elect to continue to proceed under CEAA 2012 or the IAA. Marathon continued under CEAA 2012 due to the uncertain nature of requirements and timelines under the IAA. However, Marathon has reviewed the requirements of IAA and the EIS has been informed by aspects of the IAA.	Chapter 1, Section 1.4
Need to balance economic benefits against potential adverse environmental effects	Marathon is committed to the sustainable development of the Project, reducing adverse environmental effects and enhancing benefits.	Chapter 15, Section 15.4
Education and Training – will Marathon establish a training fund and offer training programs.	Marathon will work with Qalipu and various educational facilities to identify training needs and training facilities. This matter will be addressed in both the socio-economic agreement with Qalipu, if concluded, and the Project's Gender Equity and Diversity Plan, developed for the approval of the Province. Marathon will engage with Qalipu during the development of this Plan.	Chapter 15, Section 15.4, Chapter 23, Section 23.3

Table 3.2 Qalipu Issues and Concerns Raised During Engagement

Issue/Concern	Marathon Response / Action / Mitigation	EIS Reference
Employment – what are the targets for women's employment, including Indigenous women?	Marathon will develop a Gender Equity and Diversity Plan as part of the Benefits Plan which will be developed for the approval of the Province. The Gender Equity and Diversity Plan will be developed in consultation with relevant industry associations and stakeholders and will address employment targets for women. Marathon will engage with both Qalipu and Miawpukek with respect to access to employment and business opportunities on the part of Indigenous persons, including Indigenous women.	Chapter 15, Section 15.4 Chapter 23, Section 23.3
Indigenous Engagement – Need for engagement over the long term	Marathon is committed to ongoing engagement with Indigenous groups and stakeholders over the life of the Project. To that end, Marathon and Qalipu have entered into negotiations with a view to concluding a socio-economic agreement that will provide a framework for the Parties' relationship through all phases of the Project.	Chapter 3, Section 3.4
Youth – need to involve youth due to their interest in both the environmental and socio-economic aspects of the Project	Marathon agrees that it will be important to engage youth in discussions of Project effects and will address this in the Gender Equity and Diversity Plan. Marathon will engage with Qalipu during the development of this Plan.	Chapter 3, Section 3.4 Chapter 23 Section 23.3
Environmental Monitoring – interest of Qalipu in involvement in environmental monitoring	Marathon is committed to working with Qalipu and will address this matter as part of ongoing negotiations towards a socio- economic agreement.	Chapter 3, Section 3.4, Chapter 23, Section 23.3
Wildlife – impact on Caribou migration routes	Marathon is working with NLDFFA, Wildlife DIvision to gain a better understanding of the migratory patterns of caribou herds in the vicinity of the Project. Potential impacts will be assessed in the EIS and mitigation measures will be tailored to identified adverse effects. Marathon presented a preliminary overview of potential mitigation measures at a virtual Qalipu membership meeting on June 23 and will continue to engage with Qalipu on this matter.	Chapter 11, Section 11.4 and 11.5
Tailings – Management of tailings facility and use of earthen dams	Tailings will be managed for the first 9 years in an engineered impoundment using lined, earthen (rockfill) dams. Once mining within the Leprechaun open pit is completed in Year 9, Marathon will use the pit for tailings disposal (about 25% of tailings volume). Through the EA and engineering processes, Marathon will continue to assess tailings management alternatives that could improve on the current design.	Chapter 2, Section 2.3
Processing – use of cyanide	Cyanide is used in nearly all gold mining operations and best practices for cyanide use and management are well understood. Its use and disposal are also stringently regulated. Cyanide will be imported to the site in dry form, mixed to a slurry within the mill, used within the process, and destroyed via a SO_2 cyanide destruct unit prior to discharge of the tailings to the TMF.	Chapter 2, Section 2.3

Table 3.2 Qalipu Issues and Concerns Raised During Engagement

Issue/Concern	Marathon Response / Action / Mitigation	EIS Reference
Water Quality – Treatment	Potential effects on surrounding waterbodies are addressed in detail in the EIS. Water contacting Project features or used within the Project processes will be managed and treated prior to release to the environment, and the quality of water to be discharged will be monitored for compliance with regulatory requirements. There are various types of water to be managed and treated across the site (contact, surface water run-off and ground water). To reduce freshwater usage, water will be reused / recycled to the extent practicable.	Chapter 7, Section 7.4
Processing – Heap Leach	Based on comments provided during Indigenous and stakeholder engagement, and further engineering and economic assessment during the Prefeasibility Study, Marathon will not use heap leach processing for the Project, and all ore will be milled.	Chapter 2, Section 2.1
Project Layout – relocation of Project infrastructure to reduce Project footprint	While there are constraints upon Marathon's ability to relocate infrastructure (topography, existing waterbodies, legal constraints), based on comments provided during Indigenous and stakeholder engagement, consultation with regulators, and subsequent engineering review, the Project layout has been reconfigured to reduce adverse effects.	Chapter 2, Section 2.2
Tailings Pond – likelihood and consequences of breach	With proper design, construction, operation and maintenance in accordance with the Canadian Dam Association guidelines, the likelihood of a tailings pond breach is very low. For this Project, Marathon will employ downstream dam raise construction using lined, rockfill dam, and incorporate thickened tailings deposition with a relatively small tailings pond. These design parameters will help stabilize the tailings impoundment and reduce the risks associated with failures. In addition, the geotechnical conditions at the site are ideal for dam foundations, and central NL is in a very low risk area with respect to seismic activity. The added advantage of being at the watershed divide helps reduce flooding risk (dam overtopping) as a result of significant precipitation events and larger scale effects of climate change. Overall, this combination of attributes results in very low risk in terms of failure. In the unlikely event of a dam failure, the relatively low gradient of the Victoria River immediately downstream of the TMF will aid in reducing the extent of tailings inundation. Effects on water quality and higher water levels resulting from a dam failure would likely affect the Victoria River and a small portion of Red Indian Lake, however it is not expected that adverse effects will extend beyond Red Indian Lake.	Chapter 21, Section 21.5
Tailings Facility – what happens to the Tailings pond in the long term?	In Year 9 of operations, tailings deposition activities will be moved from the TMF to the exhausted Leprechaun Pit. Rehabilitation and closure of the TMF will commence in year 10 of operations, including revegetation and construction of the closure spillway which will reduce water ponding within the tailings impoundment. During the rehabilitation phase, testwork will be conducted to determine if the tailings have sufficiently consolidated to consider the TMF a landform. At the same time, the water draining from the TMF will be monitored to determine if continued holding or treatment of the water is required for some period of time (the water treatment plant and polishing pond will remain in place as required to treat the water from the TMF). Noting that testwork to date indicates very low likelihood of acid rock	Chapter 2, Section 2.6 Chapter 23, Section 23.3

Table 3.2 Qalipu Issues and Concerns Raised During Engagement

Issue/Concern	Marathon Response / Action / Mitigation	EIS Reference
	drainage or metal leaching issues with the tailings, Marathon is optimistic, prior to the final closure of the Project Site, that the TMF will be considered a landform with water drainage that is suitable for release to the environment. This would mean that the dams are no long considered dams for the purpose of holding the tailings in place, and the TMF would be considered stable in perpetuity. Further testwork, engineering and monitoring will be required to confirm this approach. In the event the TMF cannot be considered to be a landform based on the Canadian Dam Association requirements, Marathon will be responsible for monitoring and maintaining the dam in perpetuity. The Province requires that Marathon post Financial Assurance in advance of Project construction to ensure sufficient funds are in place in the event that Marathon is unable to continue this work for any reason (e.g., bankruptcy). Were this to occur, the Province would be able to hire a third party to complete monitoring and maintenance of the TMF.	
Tailings – has a geo-membrane been considered?	The TMF dam design incorporates a continuous geosynthetic liner system that will be applied to the upstream face of the rockfill dam slope. Properly graded materials and/or geomembrane will be utilized to protect the liner, which will serve to contain the tailings and effluent with the tailings impoundment upstream of the tailings dam.	Chapter 2, Section 2.3
Tailings – what are detox tailings?	Cyanide will be used within the milling process to extract gold from the ore. Prior to release of tailings effluent from the mill, the tailings effluent will be treated via a SO_2 cyanide destruction system that will reduce cyanide levels to less than 1 ppm. After this process the tailings are thickened and pumped to the TMF and referred to as “detoxified tailings”.	Chapter 2, Section 2.3
Project infrastructure - disposition of camp infrastructure at end of mine life	No decision has been made respecting the disposition of accommodations camp infrastructure. Infrastructure will be removed at end of mine life and may be either sold or demolished and recycled/disposed of at an approved facility.	Chapter 2, Section 2.6
Project operations – impact of blasting upon dam integrity	The EIS considers potential adverse effects from blasting on the Project dams (Chapter 2) and the Victoria Dam (Chapter 19). The factors of safety regarding stability of the Project dams consider both natural seismic and blasting induced seismic loads. A determination of the theoretical seismic loads from blasting on the Victoria Dam (approximately 4 km from the open pits), has been conducted and the estimated vibrational loads are well below criteria established for damage of structures. Blast monitoring will be conducted at the site, and at the Victoria Dam to ensure vibrational loads are as low as predicted.	Chapter 19, Section 19.5
Corporate Operations – likelihood of future expansion	Marathon is continuing with exploration programs which are targeting existing and potential exploration targets of interest (see press release regarding the 2020 drill program dated February 3, 2020 on the Marathon website). Marathon is optimistic that other economical deposits exist on the property and will continue to explore, noting that it generally takes 5 to 10 years from discovery of a deposit to having sufficient data to show it is an economical deposit.	n/a

Table 3.2 Qalipu Issues and Concerns Raised During Engagement

Issue/Concern	Marathon Response / Action / Mitigation	EIS Reference
Rehabilitation and Closure – need to ensure remediation of Project Area	Marathon is required to post Financial Assurance to the Province, which would cover the cost of the rehabilitation and closure of the site if Marathon is not able to do so for any reason (e.g., bankruptcy). This cost – which is reviewed and approved by the NL Department of Industry, Energy, and Technology – will be in the tens of millions of dollars for the Project, and Marathon will be required to provide these funds prior to construction. This is a requirement that the NL government put in place to ensure that the public is not responsible for the costs associated with rehabilitating a mine site where the owner fails to do so.	Chapter 2, Section 2.6
Air Quality – negative impact of tree clearing coupled with increased emissions	Atmospheric Environment is a Valued Component within the EIS and the potential effects of the Project are fully assessed in the EIS. Marathon will install and monitor air quality monitoring stations around the mine site and will report results to the regulators. The Project will also be subject to Greenhouse Gas Emissions regulations (including progressive reduction in GHG emissions) as set by the province.	Chapter 5, Section 5.4 and 5.5
Impact on Plants and Wildlife – potential introduction of invasive species	Areas to be cleared of vegetation will be limited to those required for construction and operation. Disturbed and temporarily cleared areas not required for operation will be revegetated with a mix of regionally suitable, non-invasive (free of weeds) seed mixtures and plants as growing conditions permit. To diminish the risk of transferring invasive plant and animal (insect) species, equipment will be inspected and cleaned to remove vegetative matter attached to the machinery as required (e.g., with a high-pressure washer) before being transported to the site.	Chapter 9, Section 9.4 and 9.5
Fish and Fish Habitat – interference with water courses through use of culverts	Design will avoid fish and fish habitat to the extent possible. Where unavoidable, mitigation measures will be employed to reduce adverse effects, including selecting equipment types, sizes and installation methods (countersunk or bottomless) that accommodate continued fish passage at stream crossings.	Chapter 8, Section 8.5
Current Use of Lands and Resources for Traditional Purposes – limitations on access	Due to the relatively small size of the Project footprint and the low level of activity identified in the Project Area by Qalipu members in the area, Marathon does not anticipate any significant adverse effects on the current use of lands and resources for traditional purposes. Workers will be prohibited from bringing hunting and fishing gear to accommodations camp and therefore there should be no increased competition for resources. Marathon will continue to engage with Qalipu to ensure that any effects on land use are avoided or reduced.	Chapter 17, Section 17.5

3.4.4 Indigenous Engagement – Miawpukek

Marathon’s outreach to Miawpukek commenced prior to submission of the EA Project Description/ Registration. By correspondence dated April 4, 2019, Marathon provided Miawpukek with a Project status update and expressed an interest in a meeting to discuss the Project. An introductory meeting was held on July 30, 2019 with Chief Mi’sel Joe and several members of Miawpukek executive. The purpose of the meeting was to exchange information on the Project and on the needs and interests of Miawpukek. In subsequent correspondence dated September 13, 2019, Marathon provided updated Project information and expressed its commitment to meaningful engagement with Miawpukek respecting project design, potential environmental impacts, employment and business opportunities.

Marathon has made considerable efforts to develop a constructive relationship with Miawpukek through meetings (in person, and by conference or video call) to provide ongoing Project-related information and to discuss issues and concerns as detailed in Appendix 3B.

Key components of Marathon’s engagement with Miawpukek include the activities described below.

3.4.4.1 Information Exchange

Marathon has provided Miawpukek with relevant corporate and Project-related information (e.g., presentations, pictorial depictions of the Project site and Project area, maps, newsletters, notices and press releases relating to employment and business opportunities) on a timely basis through written correspondence, e-mails, telephone calls and meetings. Miawpukek has been provided with an opportunity to review and comment on EIS baseline information (existing conditions) respecting Indigenous groups, and Miawpukek’s responses have been incorporated into the description of the existing environment (Chapter 17). Marathon also offered to provide Miawpukek with completed baseline studies in advance of the submission of the EIS in order to facilitate participation in the EA process. Marathon has committed to provide Qalipu with both a hard copy of the EIS (without appendices) and the Summary of the EIS and an electronic version of both the EIS (with appendices) and the Summary of the EIS. Hard copies of the EIS appendices will also be made available to Council upon request.

3.4.4.2 Meetings

Subsequent to the meeting of July 30, 2019, Marathon has made many offers to meet with Chief, Council and the community to provide a Project update and discuss issues and concerns. A community meeting was scheduled to take place on April 2, 2020. Unfortunately, due to the imposition of COVID-19 restrictions by the Province and the temporary closure of the Reserve, the planned meeting could not take place. In place of a face-to-face meeting, Marathon has held several conference calls with Miawpukek leadership and with Miawpukek representatives to provide Project updates, discuss potential environmental effects and associated mitigation measures, Indigenous land and resource use, and possible involvement of Miawpukek in monitoring initiatives.

In addition, Miawpukek leadership and community members were invited to attend public engagement sessions in February and May 2020. In place of the proposed April in-person community meeting, a virtual meeting, planned in consultation with Miawpukek and exclusively for Miawpukek members, was held on June 24, 2020. The purpose of the virtual meeting was to provide members with Project-related information and the opportunity to discuss the EA process, including potential effects and mitigation measures. Participants were invited to submit comments directly during the webcast and questions were either answered during the session or by follow-up e-mail. While the webcast was attended by only a few Miawpukek members, the presentation has been posted to the Marathon website and Miawpukek has been advised that individuals may access this presentation at their convenience and provide comments at any time which will be taken into consideration by Marathon. The presentation will remain available for reviewing for one year. In addition, Marathon has offered to provide a copy of the presentation at the request of any member of Miawpukek.

On July 14, 2020, Marathon met with representatives of Miawpukek in St. John's to review EIS baseline information relating to Miawpukek and to discuss Miawpukek membership's land and resource use in Central Region and opportunities for ongoing and future cooperation in monitoring, research and related matters. At the request of Miawpukek, the meeting was also attended by a representative of the Canadian Parks and Wilderness Society (CPAWS) who has been involved in various research initiatives with Miawpukek. The meeting was productive, and comments and insights provided by Miawpukek at this meeting have been taken into account, as applicable, in the EIS. Issues identified by Miawpukek at this meeting, together with Marathon's responses, are set out in Table 3.3.

Where feasible, meeting materials have been provided in advance or at the time of the meetings. Marathon has offered to meet with representatives of Miawpukek at any time during the EA process and throughout the life of the Project to discuss specific aspects of the Project. Opportunities for feedback and comment are not limited to meetings - Marathon has expressed its commitment to take the feedback and input of Miawpukek into account throughout the life of Project

3.4.4.3 Project Review Workshop

To facilitate the incorporation of Indigenous perspectives into Project planning and design, in December 2019, Marathon held a one-day Project Review Workshop in Grand Falls-Windsor with representatives of Qalipu and Miawpukek. Participants were provided with workshop materials in advance and given the opportunity to discuss Project layout, components/infrastructure and potential environmental effects, including effects on Indigenous interests. The information generated and discussed at the Workshop session, including specific environmental concerns raised by Miawpukek, was incorporated in Project planning and design for the Project's Prefeasibility Study (Ausenco 2020) and the EIS. Workshop materials, a summary of the Workshop proceedings, and correspondence indicating how Workshop discussions have been incorporated and resulted in altered Project design are included in Appendix 3B.

3.4.4.4 Land and Resource Use Information Exchange

On July 14, 2020, Marathon met with representatives of Miawpukek to discuss Miawpukek's patterns of land and resource use in the Central Region, including the Project Area. As noted above, the meeting was also attended by a representative of CPAWS who has been involved in various research initiatives with Miawpukek. Information provided by Miawpukek at this session has been incorporated into the description of the existing environment (Chapter 17). While Miawpukek has indicated that its current use of the Project area and surroundings has declined in recent years, Marathon remains prepared to support the conduct of a land and resource use study to enhance Marathon's understanding Miawpukek's land and resource use in the Project Area and relevant Indigenous knowledge. Should this study proceed, results will be used to inform the development of monitoring and follow-up programs and to guide Marathon's future engagement with Miawpukek. Whether or not the study proceeds, Marathon has offered to continue to work with Miawpukek to augment Marathon's understanding of Miawpukek's Indigenous knowledge and Miawpukek's interests and activities in the area of the Project throughout the life of the Project.

3.4.4.5 Involvement in Monitoring Initiatives and Economic Opportunities

Marathon and Miawpukek have discussed potential involvement of Miawpukek in Marathon's monitoring initiatives, including inviting a representative of Miawpukek to assist in the collection of samples for a country food survey. In addition, the parties have also discussed Miawpukek's access to employment and business opportunities. Marathon has committed to engaging with Miawpukek during the development of the Gender Equity and Diversity Plan, which will address matters such as employment, training and business opportunities for underrepresented groups including women and Indigenous persons.

Marathon values its relationship with Miawpukek and will continue to engage with Miawpukek throughout the life of the Project. Marathon plans to hold a workshop with representatives of Miawpukek in fall 2020 to discuss mitigation measures and will meet with Miawpukek leadership and community members following submission of the EIS to provide an overview of assessment findings. Marathon is also discussing participation in monitoring and research initiatives with Miawpukek. Engagement and information exchange related to employment and business opportunities is ongoing and will continue throughout Project execution. Marathon has also committed to engaging with Miawpukek during the development of the Gender Equity and Diversity Plan, which will address matters such as employment, training and business opportunities for underrepresented groups including women and Indigenous persons.

Issues Identified During Engagement

Through ongoing engagement, it is Marathon's understanding that the principal issues which have been identified by Miawpukek are as follows:

- Need for continuing engagement and cooperation
- Access to economic opportunities, with specific reference to education and training and access to contracting opportunities
- Involvement in ongoing environmental monitoring initiatives
- Potential adverse effects on wildlife, particularly caribou and salmon, and resulting effects on current use of land and resources
- Effects on Species at Risk
- Water treatment, potential adverse effects on aquatic life
- Design of tailings facility, use of cyanide

Table 3.3 sets out the issues and concerns identified by Miawpukek during engagement activities to date and Marathon's responses and associated EIS references. It should be noted that the table below reflects the specific concerns and comments voiced by Miawpukek and its members during engagement activities specifically directed at Miawpukek. Since a majority of Miawpukek members reside outside the reserve, it is possible that members of Miawpukek also attended community information sessions held in February and May 2020, without self-identifying as members of Miawpukek. Any questions raised or issues identified by Miawpukek members at these community information sessions are included in Section 3.5.

Table 3.3 Miawpukek Issues and Concerns Raised During Engagement

Issue/Comment	Marathon Response/Action/ Mitigation	EIS Reference
Wildlife – Potential impacts on pine marten and caribou migration as a result of increased industrial activity in the Central Region	Marathon is working with NLDFFA, Wildlife Division to gain a better understanding of the migratory patterns of caribou herds in the vicinity of the Project. Potential impacts will be assessed in the EIS and mitigation measures will be tailored to identified adverse effects. Marathon presented a preliminary overview of potential mitigation measures at a virtual meeting on June 24, 2020, and will continue to engage with Miawpukek on this matter.	Chapter 11, Section 11.4 and 11.5 Chapter 12, Section 12.4 and 12.5
Plants and Birds – Interests of Miawpukek extend beyond caribou and include plants and waterfowl	Miawpukek land and resource use, including use of plants and harvesting of waterfowl has been discussed at various meetings with Marathon and Miawpukek has had the opportunity to provide information as to its land and resource use through its review of baseline information. This information has been incorporated into the EIS, and the potential adverse effects of the Project on plants and waterfowl as well as associated mitigation measures are addressed in the EIS.	Chapter 17, Section 17.5
Species at risk – use of buffer zones as a potential mitigation measure	Plant species: no plant species at risk were observed in the Project area during field surveys at site. Should a species at risk be identified during Project construction and/or operation, applicable mitigation measures, to be adhered to throughout the Project, will be developed in consultation with federal and provincial regulators. These may include determining appropriate setbacks/buffers and/or a species at risk transplant program, if applicable. Additional mitigation measures are described in Section 9.4. Animal species: based on the available habitat in the Project Area, American marten (Newfoundland population), Northern long-eared brown bat, and little brown bat have the potential to occur. Sensitive areas (e.g., wetlands, hibernacula, mineral licks, roosts) will be identified prior to construction and appropriate buffers will be flagged and maintained, where feasible, around these areas. Caves, sinkholes, fissures, or other underground cavities that are uncovered as part of environmental surveys, exploration and other site preparation activities will be reported to NLDFFA Wildlife Division and further inspected to determine the likelihood of being used by overwintering bats. Additional mitigation measures are described in Section 12.4.	Chapter 9, Section 9.4 and 9.5
Monitoring – potential involvement of Miawpukek in on-site environmental monitoring	Marathon will continue to discuss involvement in monitoring with Miawpukek and has communicated its interest in including Miawpukek in monitoring.	Chapter 3, Section 3.4 Chapter 23, Section 23.3
Indigenous Engagement – need for ongoing engagement	Marathon is committed to continuing engagement with Miawpukek to enhance its understanding of Miawpukek's use of land and resources in the Project area and to discuss its views respecting the Project. Marathon will continue to work with Miawpukek to build a positive relationship over the life of the Project.	Chapter 3, Section 3.4

Table 3.3 Miawpukek Issues and Concerns Raised During Engagement

Issue/Comment	Marathon Response/Action/ Mitigation	EIS Reference
Corporate Operations – impact of COVID-19	Exploration on site was temporarily suspended as a result of COVID-19. However, site exploration was continued in June when the work and exploration camp could safely continue under a rigorous framework of social distancing, and cleaning of exploration camp facilities.	Chapter 14, Section 14.5
Project Description – size of Project footprint	The primary Project footprint is the mine site, which is approximately 6 km in length and 1 to 2 km wide. The footprint includes the site road, stockpiles, pits and tailing facility. The previous site plan had a larger footprint; however, this plan has been revised taking into account the concerns of Indigenous groups and stakeholders and consultation with regulators.	Chapter 2, Section 2.1 and 2.2
Wildlife – potential impacts of the Project upon caribou migration, moose and salmon	The EIS addresses potential adverse effects of the Project on fish (including salmon) and wildlife (including caribou).	Chapter 11, Section 11.5; Chapter 8, Section 8.5; Chapter 12, Section 12.5
Indigenous groups – Potential impact on Miawpukek land and resource use	Marathon is committed to working with Miawpukek to enhance its understanding of potential impacts on Indigenous land and resource use. This matter is addressed in the EIS and Marathon will continue to work with Miawpukek over the life of the Project to avoid or reduce adverse effects on land and resource use and other Indigenous interests.	Chapter 17, Section 17.5
Water Quality – Treatment	Potential effects on surrounding waterbodies and water quality are addressed in detail in the EIS. All water contacting Project features or used within the Project processes will be managed and treated prior to release to the environment and the quality of water to be discharged will be monitored for compliance with regulatory requirements. There are various types of water to be managed and treated across the site (contact, surface water runoff and ground water). To reduce freshwater usage, water will be reused / recycled to the extent practicable.	Chapter 7, Section 7.4
Socio-Economic Impacts – access to economic opportunities	Marathon will continue to provide notice of employment and business opportunities to Miawpukek. Marathon will engage with Miawpukek in the development of the Gender Equity and Diversity Plan, which will address access to economic opportunities by Indigenous persons.	Chapter 3, Section 3.4 Chapter 15, Section 15.4 and 15.9;
Tailings – treatment of tailings, accidental events, rehabilitation and closure	Treatment of Tailings: • Tailings will be managed for the first 9 years in an engineered impoundment using lined, earthen (rockfill) dams. Once mining within the Leprechaun open pit is completed in Year 9, Marathon will use the pit for tailings disposal (about 25% of tailings volume). Through the EA and engineering processes, Marathon will continue to assess tailings management alternatives that could improve on the current design. Accidental Events: • With proper design, construction, operation and maintenance in accordance with the Canadian Dam Association guidelines, the likelihood of a tailings pond breach is very low. For this Project, Marathon will employ downstream dam raise	Chapter 2, Section 2.6 Chapter 21, Section 21.5

Table 3.3 Miawpukek Issues and Concerns Raised During Engagement

Issue/Comment	Marathon Response/Action/ Mitigation	EIS Reference
	construction using lined, rockfill dam, and incorporate thickened tailings deposition with a relatively small tailings pond. These design parameters will help stabilize the tailings impoundment and reduce the risks associated with failures. In addition, the geotechnical conditions at the site are ideal for dam foundations, and central NL is in a very low risk area with respect to seismic activity. The added advantage of being at the watershed divide helps minimize flooding risk (dam overtopping) as a result of significant precipitation events and larger scale effects of climate change. Overall, this combination of attributes results in very low risk in terms of failure. In the unlikely event of a dam failure, the relatively low gradient of the Victoria River immediately downstream of the TMF will aid in reducing the extent of tailings inundation. Effects on water quality and higher water levels resulting from a dam failure would likely affect the Victoria River and a small portion of Red Indian Lake; however, it is not expected that adverse effects would extend beyond Red Indian Lake. Rehabilitation and Closure • In Year 9 of operations, tailings deposition activities will be moved from the TMF to the exhausted Leprechaun Pit. Rehabilitation and closure of the TMF will commence in year 10 of operations, including revegetation and construction of the closure spillway which will essentially eliminate water ponding within the tailings impoundment. During the rehabilitation phase, testwork will be conducted to determine if the tailings have sufficiently consolidated to consider the TMF a landform. At the same time, the water draining from the TMF will be monitored to determine if continued holding or treatment of the water is required for some period of time (the water treatment plant and polishing pond will remain in place as required to treat the water from the TMF). Noting that testwork to date indicates very low likelihood of Acid Rock Drainage or metal leaching issues with the tailings, Marathon is optimistic, prior to the final closure of the Project Site, that the TMF will be considered a landform with water drainage that is suitable for release to the environment. This would mean that the dams are no long considered dams for the purpose of holding the tailings in place, and the TMF would be considered stable in perpetuity. Further testwork, engineering and monitoring will be required to confirm this approach. In the event the TMF cannot be considered to be a landform based on the Canadian Dam Association requirements, Marathon will be responsible for monitoring and maintaining the dam in perpetuity. The Province requires that Marathon post Financial Assurance in advance of Project construction to ensure sufficient funds are in place in the event that Marathon is unable to continue this work for any reason (e.g., bankruptcy). Were this to occur, the Province would be able to hire a third party to complete monitoring and maintenance of the TMF.	

Table 3.3 Miawpukek Issues and Concerns Raised During Engagement

Issue/Comment	Marathon Response/Action/ Mitigation	EIS Reference
Historic and Cultural Sites – potential loss of historic and cultural sites	Marathon has assessed potential effects of the Project on historic resources and has concluded that any residual effects resulting from the Project on historic resources will be limited to the Project Area in the construction phase, where first-time ground disturbance could occur. There are no known registered archaeological sites within the Project Area; however, 24 locations with high potential for historic resources have been identified in association with waterbodies and watercourses within the LAA. One of these locations lies within the Project Area, however does not overlap with the footprint of Project infrastructure. The potential for Project-related effects on historic resources within the LAA is reduced given the effects of past logging activities and hydroelectric development, which may have led to the loss or disturbance of historic resources along waterways. Mitigation measures will reduce the risk of presently unknown sites being inadvertently disturbed or lost. Measures will also be implemented to identify and mitigate the unexpected discovery of historic resources.	Chapter 18, Section 18.5
Environmental Assessment Process – need for front-end involvement and capacity funding	Marathon has actively engaged Miawpukek, commencing prior to Project Registration. Engagement activities have included meetings, offers to meet and conference calls. To facilitate Miawpukek's participation in the EA process, Marathon has provided Miawpukek with Project-related information, including existing environment information relating to VC-Indigenous groups, and has offered to provide Miawpukek with completed baseline studies in advance of EIS submission. Marathon is committed to continuing to work with Miawpukek throughout the EA process in order to understand and respond to any potential Project-related effects on Miawpukek's interests and activities. While Miawpukek has indicated that its use of the Project Area has declined over past years, Marathon has made a continuing offer to support the conduct of a land and resource use study, the results of which could assist Miawpukek in meaningfully participating in the EA process. Marathon has also stated its intention to work with Miawpukek in the development and implementation of monitoring initiatives; however, issues of capacity funding are more properly directed to federal authorities.	Chapter 1, Section 1.4; Chapter 3, Section 3.4

3.5 COMMUNITY AND STAKEHOLDER ENGAGEMENT

3.5.1 Overview

Community and stakeholder engagement encompasses the public participation activities which have been undertaken by Marathon in relation to a wide range of individuals, groups and organizations, including:

- Communities
- Fish and Wildlife Organizations
- Environmental NGOs
- Trade and Industry Groups

- Cabin owners
- Individuals

The Provincial EIS Guidelines provide guidance respecting the proponent's obligations in relation to public participation and how public input is to be gathered, recorded and incorporated into the EIS. Section 4.1.15 requires the EIS to describe a planned program of public participation and consultation consists, as a minimum, of the following:

> *" a) an opportunity for interested members of the public to meet with the proponent at a place adjacent to or within the geographical area of the undertaking, or as the minister may determine, in order to:*
>
> *i. provide information concerning the undertaking to the people whose environment may be affected by the undertaking;*
> *ii. describe the rationale for the gold mine, impacts to wildlife, impacts to tourism, and any other pertinent details to address public concerns;*
> *iii. record and respond to the concerns of the local community raised during the public meeting regarding the environmental and socioeconomic effects of the undertaking, and to describe those concerns and the proponent's response to those concerns in a separate section of the EIS; and*
> *iv. conduct the meeting in compliance with the legislation and with divisional policy included in Appendix A."*

Section 2.3.1 of the Provincial EIS Guidelines further provide that, "The EIS describe all public consultation activities undertaken by the Proponent during, the EA. It should describe key stakeholder groups, summarize comments heard, identify key issues of concern raised by the public and the Proponent's responses." All public engagement activities, issues and concerns raised by stakeholders as well as Marathon's responses, are to be documented and incorporated into the EIS as appropriate. (EIS Guidelines, Sections 2.3, 3.3, Appendix A).

Marathon's approach to engagement with stakeholders has been developed consistent with its core corporate values and has been based upon the timely and transparent sharing of all relevant Project-related information, ongoing opportunities for dialogue, identification and responsiveness to issues and concerns and consideration of stakeholder input into Project planning and design.

Key community and stakeholder engagement activities have included:

- Information sharing through Marathon's website, social media, quarterly newsletters and direct mailouts
- Meetings in person, by conference and video calls and virtual meetings to provide corporate and project updates and information on the environmental assessment process
- Exit surveys and questionnaires to enable community residents and members of organizations to provide input and feedback

The following sections provide a description of the activities which have been undertaken to date.

3.5.2 Community Engagement

Commencing prior to Project EA Registration, Marathon has worked diligently with communities in the Central Region to build relationships, to ensure that the communities and residents are informed of the Project and provided with an opportunity to express issues and concerns, and to reduce adverse effects and maximize benefits for local residents and businesses. Particular focus has been placed on the six communities closest to the proposed Project site: the Towns of Buchans, Millertown, Badger, Grand-Falls Windsor and Bishop's Falls and the Local Service District of Buchans Junction.

Marathon began the formal process of stakeholder engagement in March 2019 by meeting with the public at three centralized community meetings (Buchans, Millertown, and Grand Falls-Windsor). The purpose of these meetings was to brief local residents, governments, and other interested parties on management's development plans for the project and to answer questions concerning the potential effects of the project.

The Project was registered for environmental assessment on April 5, 2019. Since that time, Marathon has actively engaged the communities through regular and ongoing communications (e-mails, conference calls, quarterly newsletters, social media) which are designed to inform the communities of Project-related developments, the progress of environmental assessment and future employment and contracting opportunities.

Marathon has also conducted several rounds of community meetings. In December 2019, Marathon met with the Mayors and Town Councils of Bishop's Falls, Badger, Millertown and Buchans to provide a project update, including the ongoing environmental assessment process, and to discuss planned future engagement activities. In February 2020, Marathon Gold held community information sessions in Buchans, Millertown, Badger, Bishop's Falls, Grand Falls-Windsor, and Buchans Junction to provide a corporate and Project update and to discuss community issues and concerns.

While the imposition of COVID-19 restrictions by the province on March 23, 2020 prevented subsequent public meetings in the communities, Marathon held virtual public meetings on May 26 and May 27. Communities were consulted in advance as to the acceptability of the virtual meeting concept and the Towns, Local Service District and Marathon worked together to promote the meetings both within the communities and across the Central Region. Session 1 (May 26) consisted of a power point presentation detailing corporate information and providing an overview of changes to the Project layout and design since the EA Registration. Session 2 (May 27) focussed on the environmental assessment process – the structure of the Environmental Impact Statement, valued components and an overview of potential effects and mitigation measures. Participants at the webcast were able to submit questions and comments during the presentations. The presentations were then posted on the Marathon website where they will remain for a year for viewing and submission of comments by those individuals and organizations which were not able to attend the webcasts.

The community meetings and presentations have been well received and all communities have expressed strong support for the project as evidenced by the exit surveys which were administered following the February round of public meetings (Appendix 3C). Additional meetings (whether in person or virtual) are planned for the fall of 2020 to discuss the EIS, predicted Project effects and associated mitigation measures and planned monitoring and follow-up programs.

Marathon's efforts to build and maintain positive relationships with the six communities has been formally expressed in the conclusion of Community Cooperation Agreements. Five agreements have been concluded and the sixth is under negotiation. These agreements, formalize Marathon's relationships with each of these communities over the life of the Project. They describe the path forward by which Marathon and each community will cooperate to achieve effective engagement, maximize local benefits, and advance local needs, priorities and interests. The relationships with communities will be further strengthened by the conclusion of the NL Benefits Agreement with the Province which will define the employment and procurement targets and economic benefits flowing to the Province from the Marathon's approach to community engagement also includes a community investment and sponsorship component pursuant to which Marathon has extended support for a wide range of community initiatives, programs and measures.

All engagement activities have been documented and a complete inventory of these activities (by each community) up to September 4, 2020 is contained in Appendix 3A, Tables3A.3 – 3A.8. Issues and responses generated over the course of engagement with each community are set out in Tables 3.4 to 3.9. Issues and responses generated during the virtual meetings (which were livecast and attended by individuals throughout the Province) are set out in Table 3.10.

3.5.2.1 Community Survey

As part of the community meetings in each of the six communities in February 2020, participants were asked to complete a brief exit survey on a voluntary, anonymous basis. The survey was intended to serve three principal purposes:

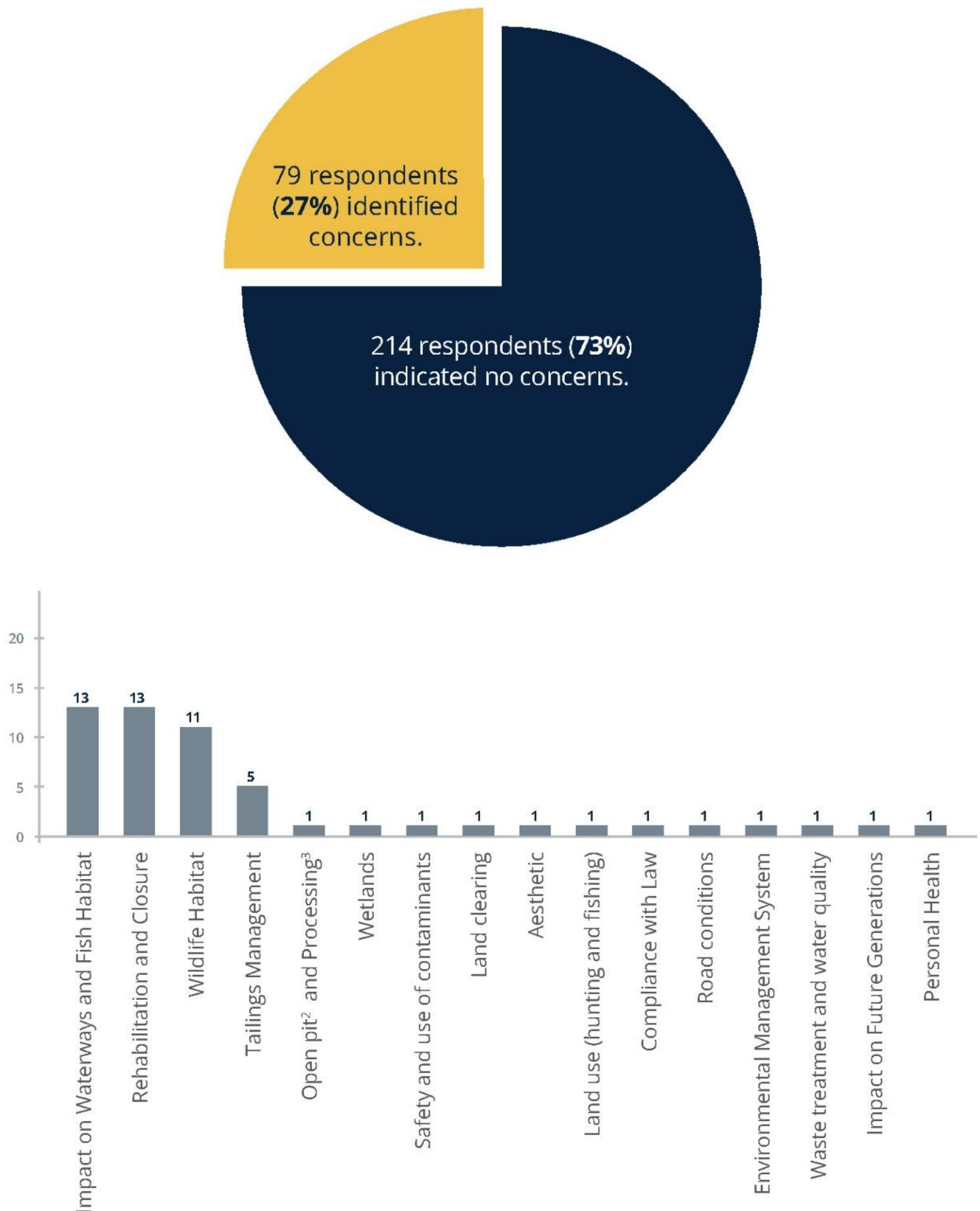
- To provide preliminary baseline information respecting community issues and concerns which could be incorporated into the EIS
- To assist in the planning and implementation of Marathon's ongoing engagement strategy
- To focus the content and emphasis of future communications with communities and residents.

A full report on the results of the survey is contained in Appendix 3C.

A total of 348 individuals attended the February community meetings: Buchans Junction (21); Millertown (21); Buchans (46); Badger (65); Bishop's Falls (48); Grand Falls Windsor (151). While the majority of participants were from one of these communities, a number of respondents resided in other communities: Roberts Arm (4); Botwood (13); Norris Arm (12); Witless Bay (1); Paradise (1); Harbour Main (1); Point Leamington (9); Clarenville (1); South Brook (3); Summerford (1); Lewisporte (2), Northern Arm (1); St. Philips (1); and Springdale (1).

A total of 293 surveys were completed: Buchans Junction (18); Millertown (21); Buchans (46); Badger (54); Bishop's Falls (35); Grand Falls-Windsor (119). 77.5% of respondents were male and 22.5% were female. The median age of survey respondents was 41 years.

An overview of the aggregated survey results confirms a high level of community support for the Project. As shown in Figure 3-2, a minority of respondents identified concerns related to the biophysical and community (socio-economic) effects of the Project. Figure 3-2 depicts the specific biophysical concerns identified by respondents. Figure 3-3 depicts the socio-economic concerns identified by respondents.



1 - Respondents identified multiple issues
2 - The concern was not specified but may be related to aesthetic concerns about the landscape
3 - Concern not specified but may be related to use of cyanide

Figure 3-2 Biophysical Concerns Identified by Respondents

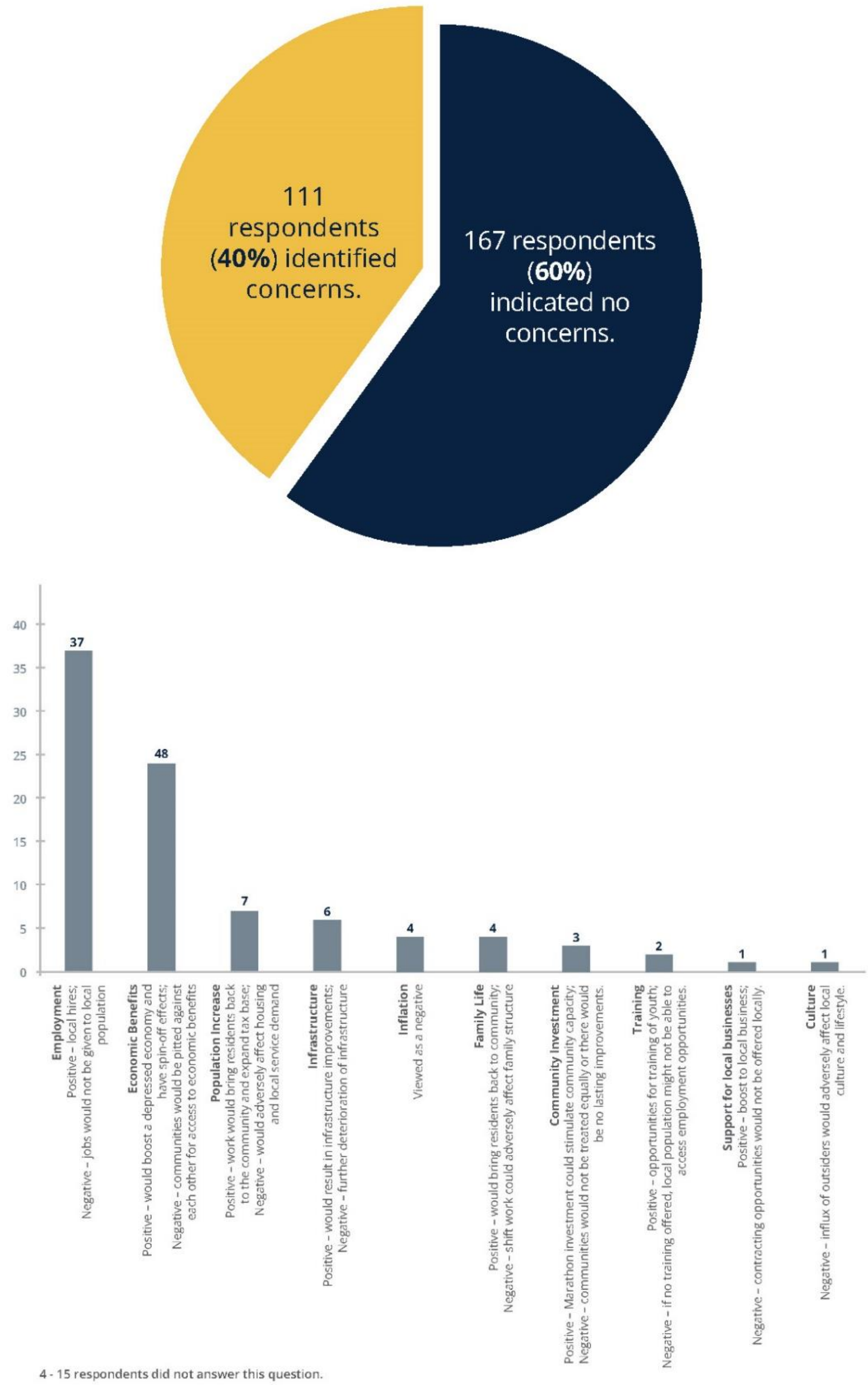


Figure 3-3 Socio-economic Concerns Identified by Respondents

Respondents generally noted potential biophysical concerns as negative, however did not elaborate on the content of the concern. In contrast, socio-economic effects were explicitly described as either positive or both positive and negative. For example, while jobs were identified as a principal concern, the increase in employment rates in the region was viewed as positive, subject only to the concern that the local population would not benefit from hiring opportunities.

On an aggregate basis, responses expressing concerns respecting potential adverse biophysical effects were outweighed by responses citing the positive effects of the Project, particularly with respect to employment and business opportunities. Additionally, several respondents indicated that any concerns were alleviated by Marathon's corporate values and could be addressed through compliance with environmental regulations. All respondents indicated a high level of satisfaction with Marathon's approach to community engagement.

It is Marathon's intention to administer community surveys on an annual basis in order to ensure a continuing understanding of and responsiveness to community interests and concerns.

3.5.2.2 Community Issues and Concerns

Town of Buchans

As part of its planned program of public participation and consultation, Marathon regularly engages with the Town of Buchans through meetings, calls, correspondence, and the transmission of Project-related information, including information related to employment and business opportunities. Marathon and the Town have concluded a Community Cooperation Agreement which establishes the framework for a constructive relationship based on cooperation and collaboration. In addition, through its sponsorship and community investment program, Marathon has made a significant contribution to community infrastructure and initiatives, including the provision of funding directed at community COVID-19 measures such as support for seniors and food security.

A detailed inventory of Marathon's engagement activities with the Town of Buchans is set out in Appendix 3A, Table 3A.3. Table 3.4 provides a record of the issues and concerns identified by residents of Buchans over the course of engagement, together with Marathon's response and the associated EIS reference.

Table 3.4 Issues and Concerns Raised During Engagement – Buchans

Issue/Concern	Marathon Response/Action/Mitigation	EIS Reference
Community Infrastructure - Supply of medical services to mine personnel	Appropriate emergency medical infrastructure, equipment and personnel will be established at the Project site. Marathon is currently engaged in discussions with Buchans, Millertown and Central Health with respect to the use of the A. M. Guy Memorial Hospital to supply certain services to mine personnel.	Chapter 13, Section 13.4 and 13.5

Table 3.4 Issues and Concerns Raised During Engagement – Buchans

Issue/Concern	Marathon Response/Action/Mitigation	EIS Reference
Employment and Training – need to ensure local residents are fairly represented in workforce	Marathon is committed to maximizing local benefits through hiring of local residents. As per the Benefits Agreement, Marathon and its contractors will respect local hiring preferences and Marathon will make reasonable efforts to unbundle contracts to increase opportunities for local businesses. Marathon will work with local institutions to identify training programs, which in turn will contribute to the creation of a sustainable workforce for the life of the Project.	Chapter 15, Section 15.4 Chapter 23, Section 23.3
Need for ongoing engagement	Marathon is committed to developing and maintaining relationships with communities closest to the mine site through ongoing engagement, including through the conclusion of Community Cooperation Agreements.	Chapter 3, Section 3.5 Chapter 23, Section 23.3
Air Quality – dust, including dust from tailings	Air emissions are subject to rigorous regulatory standards and Marathon will be required to comply with specific thresholds. Marathon will implement mitigation measures related to air quality and will monitor and report on air quality throughout the life of the Project.	Chapter 5, Section 5.5.1 Chapter 23, Section 23.3
Tailings pond and polishing pond – impact on water	Potential effects on surrounding waterbodies are addressed in detail in the EIS. All water contacting Project features or used within the Project processes will be managed and treated prior to release to the environment, and the quality of water to be discharged will be monitored for compliance with regulatory requirements. There are various types of water to be managed and treated across the site (contact, surface water runoff and ground water). To reduce freshwater usage, water will be reused / recycled to the extent practicable. With proper design, construction, operation and maintenance in accordance with the Canadian Dam Association guidelines, the likelihood of a tailings pond breach is very low. For this Project, Marathon will employ downstream dam raise construction using lined, rockfill dam, and incorporating thickened tailings deposition with a relatively small tailings pond, all of which are design parameters that help stabilize the tailings impoundment and reduce the risks associated with failures. In addition, the geotechnical conditions at the site are ideal for dam foundations, and central NL is in a very low risk area with respect to seismic activity. The added advantage of being at the watershed divide helps minimize flooding risk (dam overtopping) as a result of significant precipitation events and larger scale effects of climate change. Overall, this combination of attributes makes the Project TMF very low risk in terms of failure. In the unlikely event of a dam failure, the relatively low gradient of the Victoria River immediately downstream of the TMF will aid in reducing the extent of tailings inundation. Effects on water quality and higher water levels are likely to affect the Victoria River and a small portion of Red Indian Lake; however, it is not expected that adverse effects will extend beyond Red Indian Lake.	Chapter 7, Section 7.4 Chapter 23, Section 23.3

Table 3.4 Issues and Concerns Raised During Engagement – Buchans

Issue/Concern	Marathon Response/Action/Mitigation	EIS Reference
Use of Cyanide	Cyanide is used in nearly all gold mining operations, and best practices for cyanide use and management are well understood. Cyanide will be imported to the site in dry form, mixed to a slurry within the mill, used within the process, and destroyed via a SO_2 cyanide destruct unit prior to discharge of the tailings to the TMF.	Chapter 2, Section 2.3
Rehabilitation and Closure – potential long term effects on fish and wildlife and downstream effects on tourism	Marathon is required to post "Financial Assurance" to the Province, which will cover the cost of the rehabilitation and closure of the site if Marathon is not able to do so for any reason (e.g. bankruptcy). This cost – which is reviewed and approved by the Department of Industry, Energy, and Technology – will be in the tens of millions of dollars for Marathon's proposed project, and Marathon will be required to provide these funds prior to construction. This is a requirement that the NL government put in place to ensure that the public is not responsible for the costs associated with rehabilitating a mine site where the owner fails to do so. The provincial government requires a Rehabilitation and Closure Plan that addresses the long term physical and chemical stability of the site using current best practices. It also requires revegetation of the site. While Marathon acknowledges the site will not look as it does today, testing indicates acid rock drainage and metal leaching should not be an issue, and with proper design and rehabilitation, the site should not pose long-term effects on the natural environment, or tourism in the area.	Chapter 2, Section 2.6 Chapter 23, Section 23.3
Treatment of Effluent	All effluent created by the Project must be managed and treated prior to release to the environment. As ARD/ML is not anticipated to be a substantial concern, all site contact water will be managed and treated through ditching and sedimentation ponds. Process effluent leaving the mill, after passing through the cyanide destruct process, will be deposited in the tailings pond. Much of the water from the tailings pond will be recycled to the mill, however excess water that will be released to the environment will be treated in a water treatment plant and they held in the polishing pond for five days for further natural attenuation prior to release.	Chapter 2, Section 2.3 Chapter 7, Section 7.4
Special Status of Buchans, Millertown and Buchans Junction as the 3 communities closest to the mine site.	Marathon is committed to maximizing local benefits and this principle will be incorporated into the provincial Benefits Agreement.	Chapter 15, Section 15.9

Town of Millertown

As part of its planned program of public participation and consultation, Marathon regularly engages with the Town of Millertown through meetings, calls, correspondence and the transmission of Project-related information, including information related to employment and business opportunities. Marathon and the Town are negotiating a Community Cooperation Agreement which will establish the framework for a constructive relationship based on cooperation and collaboration. In addition, through its sponsorship and community investment program, Marathon has made a significant contribution to community infrastructure and initiatives, including the provision of funding directed at community COVID-19 measures such as food security and support for local organizations whose fund-raising capacity has been impaired due to COVID-19 restrictions.

A detailed inventory of Marathon's engagement activities with the Town of Millertown is set out in Appendix 3A, Table 3A.4. Table 3.5 provides a record of the issues and concerns identified by residents of Millertown over the course of engagement, together with Marathon's response and the associated EIS reference.

Table 3.5 Issues and Concerns Raised During Engagement – Millertown

Issue/Concern	Marathon Response/Action/Mitigation	EIS Reference
Employment and Training – need to ensure that local residents are represented in workforce	Marathon is committed to maximizing local benefits through hiring of local residents. As per the Benefits Agreement with the Province, Marathon and its contractors will respect local hiring preferences and Marathon will make reasonable efforts to unbundle contracts to increase opportunities for local businesses. Marathon will work with local institutions to identify training programs, which in turn will contribute to the creation of a sustainable workforce for the life of the Project.	Chapter 15, Section 15.4
Special Status of Buchans, Millertown and Buchans Junction as the 3 communities closest to the mine site	Marathon is committed to maximizing local benefits and this principle will be incorporated into the provincial Benefits Agreement.	Chapter 15, Section 15.9
Need for ongoing engagement	Marathon is committed to developing and maintaining relationships with communities closest to the mine site through ongoing engagement, including through the conclusion of Community Cooperation Agreements	Chapter 3, Section 3.5
Resource Estimate – Preliminary Economic Estimate (PEA) and current resource assessment	The resources estimate released in the PEA has been updated to reflect continued drilling to increase the confidence of the estimate. The regulatory requirements for the PEA and PFS are different in terms of the resources that can be included in the mine plan. In the PEA, all resources including inferred can be considered in the mine plan, whereas inferred resources can't be included in the PFS mine plan. Marathon's continued exploration work converted a good deal of the inferred resources to higher confidence categories, however there remains slightly less than 1 million ounces of gold resource in the inferred category that is not included in the PFS mine plan [follow-up note: this does not mean that the open pits will need to be expanded to realize this resource, so much as captured within the existing pit shell].	Chapter 1, Section 1.1.
Corporate Operations – will exploration continue once the mine is in production?	Marathon is continuing with exploration programs which are targeting existing and potential exploration targets of interest (see press release regarding the 2020 drill program dated February 3, 2020 on the Marathon website). Marathon is optimistic that other economical deposits exist on the property and will continue to explore, noting that it generally takes 5 to 10 years from discovery of a deposit to having sufficient data to show it is an economical deposit.	n/a

Table 3.5 Issues and Concerns Raised During Engagement – Millertown

Issue/Concern	Marathon Response/Action/Mitigation	EIS Reference
Corporate Operations – will Marathon consider buying another company or is Marathon looking for a takeover bid?	Marathon is committed to developing the Valentine Gold Project and is moving forward through the EA process, engineering process, and building a team to put the Project into operation. Purchase of another company and/or property would only serve to dilute Marathon's resources and this is not in line with the company's strategy.	n/a
How is Marathon engaging with Indigenous groups?	The federal EIS Guidelines identify Qalipu and Miawpukek as Indigenous groups potentially affected by the Project. Marathon has engaged with both groups by providing Project-related information and discussing issues and concerns in order to enhance its understanding of how each group may be affected by the Project. Marathon values its relationship with each Indigenous group and is committed to maintaining positive relations with each over the life of the Project.	Chapter 3, Section 3.4
Wildlife – has Marathon considered how any impacts on caribou could be mitigated?	Marathon is working with the Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture (NLDFFA), Wildlife Division to gain a better understanding of the migratory patterns of caribou herds in the vicinity of the Project. Potential adverse effects are assessed in the EIS and mitigation measures tailored to identified adverse effects. Marathon presented a preliminary overview of potential mitigation measures at a virtual meeting on May 27 and will hold meetings in the fall to provide additional information. Marathon will continue to engage with the communities on this matter.	Chapter 11, Section 11.5
Employment & Training – what is the policy on local hires?	Marathon is committed to maximizing local benefits, which means a hiring priority for residents of communities close to the Project. This commitment will be detailed in the Benefits Plan which will be developed for the approval of the Province and will be binding on Marathon and its contractors. Marathon will report regularly on local hires.	Chapter 15, Section 15.4
Workplace conditions – what will salaries be like?	Salaries will be in line with mining industry standards in the province: well-paying jobs with benefits.	Chapter 15, Section 15.4
Employment & Training – will there be training and mentorship opportunities?	All job opportunities will require some level of training. Marathon will provide information regarding anticipated/projected Project-related employment prior to the start of construction or operations, as appropriate. To the extent possible, the list will include job descriptions, NOC codes, and a high-level indication of required skills, certifications, etc. This list will be updated as appropriate through life of Project. Marathon will work with local communities, Indigenous groups, and stakeholders to identify potential training needs and opportunities as the Project progresses.	Chapter 15, Section 15.4
EA Process – does the schedule present any issues?	Adherence to the schedule is critical for the success of the Project, and Marathon encourages communities and groups to facilitate the process through comments to regulators.	Chapter 1, Section 1.4; Chapter 2, Section 2.2

Table 3.5 Issues and Concerns Raised During Engagement – Millertown

Issue/Concern	Marathon Response/Action/Mitigation	EIS Reference
Engagement – will the community continue to receive information in a timely manner?	Marathon is committed to meaningful and continuing community engagement. Marathon will continue to provide Project related information through social media, quarterly newsletters and mailouts. Marathon will also continue to hold community meetings and plans to return to each community in the fall of 2020 to provide an overview of the EIS. Marathon is committed to developing and maintaining relationships with communities closest to the mine site through ongoing engagement, including through the conclusion of Community Cooperation Agreements.	Chapter 3, Section 3.1. Chapter 15, Section 15.4
Contracting and Procurement – will there be opportunities for local businesses?	Marathon will work with the community to identify potential opportunities for the supply of goods and services to the mine. Marathon will also develop procurement policies that will have provisions respecting hiring of local businesses and sizing of contract packages to address local business capacity.	Chapter 15, Section 15.4

Local Service District of Buchans Junction

As part of its planned program of public participation and consultation, Marathon regularly engages with the Local Service District of Buchans Junction through meetings, calls, correspondence and the transmission of Project-related information, including information related to employment and business opportunities. Marathon and the Local Service District have concluded a Community Cooperation Agreement which establishes the framework for a constructive relationship based on cooperation and collaboration. In addition, through its sponsorship and community investment program, Marathon has made a significant contribution to community infrastructure and initiatives, including the provision of funding directed at community COVID-19 measures such as food security and the purchase of PPE for the volunteer fire department.

A detailed inventory of Marathon's engagement activities with the Local Service District of Buchans Junction is set out in Appendix 3A, Table 3A.5. Table 3.6 provides a record of the issues and concerns identified by residents of Buchans Junction over the course of engagement, together with Marathon's response and the associated EIS reference.

Table 3.6 Issues and Concerns Raised During Engagement – Buchans Junction

Issue/Concern	Marathon Response/Action/Mitigation	EIS Reference
Project components – what will happen to waste rock and overburden?	Some of the waste rock generated from the open pits will be used for construction of building pads, roads, and TMF dams. The remainder of the waste rock will be placed in permanent waste rock piles that will be sloped and benched for safety and aesthetics and these piles will be revegetated progressively over the operational life of the Project. Similarly, some overburden will be used for site development and construction including water management infrastructure and TMF dams. The remainder of the overburden will be stored in stockpiles for use in progressive and closure rehabilitation of the site. It is expected that all overburden will be utilized and therefore there will not be any stockpiles left post-closure.	Chapter 2, Section 2.3 and 2.6

Table 3.6 Issues and Concerns Raised During Engagement – Buchans Junction

Issue/Concern	Marathon Response/Action/Mitigation	EIS Reference
Project effects – is there any concern about Acid Rock Drainage or heavy metals?	ARD/ML testing has been ongoing for approximately 2 years and results to date indicate that only small amounts of the waste rock and ore are potentially acid generating. These small amounts are not expected to generate acid drainage or leach metals as they will be mixed with the other rock which is highly buffering. ARD/ML testing will continue for at least 1 to 2 years, in order to confirm the results found to date. Overall, the rocks within the Valentine Gold pits are not expected to be acid generating and naturally contain low levels of heavy metals.	Chapter 2, Section 2.3.
Employment and Training – what sort of training will be required?	All job opportunities will require some level of training. Marathon will provide information on estimated labour force requirements as project planning proceeds, including information in the EIS. Marathon will work with local communities, Indigenous groups, and stakeholders to identify potential training needs and opportunities as the Project progresses.	Chapter 15, Section 15.4
Project schedule – when will the Project start?	If the Project is released from environmental assessment in a timely manner and subsequent associated regulatory authorizations are issued efficiently, construction could start as early as late fall, 2021.	Chapter 2, Section 2.2
Project – what is the life of mine?	Based on current resources and economics, the projected operational life of mine is 12 years. However, exploration is continuing and given current indicators of the presence of other potential gold deposits, the life of mine may be extended.	Chapter 2, Section 2.2
Local Benefits – priority should be given to Buchans, Millertown and Buchans Junction as the communities closest to the mine site	Marathon is committed to maximizing local benefits and this principle will be incorporated into the provincial Benefits Agreement.	Chapter 15, Section 15.4
Engagement	Marathon is committed to meaningful and continuing community engagement. Marathon will continue to provide Project related information through social media, quarterly newsletters and mailouts. Marathon will also continue to hold community meetings and plans to return to each community in the fall of 2020 to provide an overview of the EIS. Marathon is committed to developing and maintaining relationships with communities closest to the mine site through ongoing engagement, including through the conclusion of Community Cooperation Agreements.	Chapter 3, Section 3.5

Town of Badger

As part of its planned program of public participation and consultation, Marathon regularly engages with the Town of Badger through meetings, calls, correspondence and the transmission of Project-related information, including information related to employment and business opportunities. Marathon and the Town have concluded a Community Cooperation Agreement which establishes the framework for a constructive relationship based on cooperation and collaboration. In addition, through its sponsorship and community investment program, Marathon has worked with the Town to identify opportunities for support and Marathon has also provided funding to the Town to address certain of the impacts of COVID-19 through support for educational initiatives.

A detailed inventory of Marathon's engagement activities with the Town of Badger is set out in Appendix 3A, Table 3A.6. Table 3.7. provides a record of the issues and concerns identified by residents of Badger over the course of engagement, together with Marathon's response and the associated EIS reference.

Table 3.7 Issues and Concerns Raised During Engagement – Badger

Issue/Concern	Marathon Response/Action/Mitigation	EIS Reference
Wildlife – what will be the impact on moose hunting in the area	Adverse effects on moose hunting in the area are expected to be low. The Project footprint overlaps only 1% of the moose management area, hunting will not be permitted on the site or in the immediate vicinity for safety of the workforce on site. The Project workforce will be bussed back and forth to site, will stay in accommodations on site during rotation, and will not have the opportunity to hunt (hunting will also be prohibited by employees while working). There will be some increase in traffic on the access road from Millertown which may impact hunting opportunity immediately adjacent to the road.	Chapter 16, Section 16.5
Procurement – will there be a supplier workshop in Badger?	Marathon met with Exploits Chamber of Commerce members with an interest in early works contracts in October 2019. Future supplier/contractor engagement and workshops will be held as the Project advances towards construction.	Chapter 3, Section 3.1
Project components – shipping of ore. Where will the staging area be?	Ore will be processed on the Project site to produce gold bars. Gold bars will be shipped from the site in secure trucks. No ore will be shipped from the site.	Chapter 2, Section 2.3
Employment – will employees be Marathon employees or contract employees?	Marathon's operational workforce will be direct employees with some exceptions currently envisioned for specialized services such as explosives and blasting management.	Chapter 15, Section 15.5
Project components – Will the mine be open pit or underground?	The mine will be developed as conventional open pit operations for the 2 deposits, Leprechaun and Marathon.	Chapter 2, Section 2.2
Project components – are there other metals such as silver present?	There are no silver or other metals of value present in the ore.	Chapter 2, Section 2.1
Tailings – how will tailings be managed?	Tailings will be managed for the first 9 years in an engineered impoundment using lined, earthen (rockfill) dams. Once mining within the Leprechaun open pit is completed in Year 9, Marathon will use the pit for tailings disposal (about 25% of tailings volume). Through the EA and engineering processes, Marathon will continue to assess tailings management alternatives that could improve on the current design.	Chapter 2, Section 2.3

Table 3.7 Issues and Concerns Raised During Engagement – Badger

Issue/Concern	Marathon Response/Action/Mitigation	EIS Reference
Engagement – need for continuing engagement	Marathon is committed to meaningful and continuing community engagement. Marathon will continue to provide Project related information through social media, quarterly newsletters and mailouts. Marathon will also continue to hold community meetings and plans to return to each community in the fall of 2020 to provide an overview of the EIS. Marathon is committed to developing and maintaining relationships with communities closest to the mine site through ongoing engagement, including through the conclusion of Community Cooperation Agreements.	Chapter 3, Section 3.5
Life of Mine	Based on current resources and economics, the projected operational life of mine is 12 years. However, exploration is continuing and given current indicators of the presence of other potential gold deposits, the life of mine may be extended.	Chapter 2, Section 2.2
Indigenous Employment – will employment preferences be given to Qalipu members?	Marathon will prepare a Gender Equity & Diversity Plan which will address employment and contracting opportunities and related matters in relation to Indigenous persons and members of underrepresented groups. Marathon has committed to engage with each Indigenous group during the development of this Plan.	Chapter 15, Section 15.4
EA Process – is there a mechanism for preliminary approval while environmental assessment is ongoing?	No work can proceed on the Project as the Project scope is defined within the EA until the Project is released from EA and the required sectoral permits are obtained for any activity.	Chapter 1, Section 1.4
How many drills are in operation this year during exploration?	There will be a maximum of 3 drills.	n/a

Town of Bishop's Falls

As part of its planned program of public participation and consultation, Marathon regularly engages with the Town of Bishop's Falls through meetings, calls, correspondence and the transmission of Project-related information, including information related to employment and business opportunities. Marathon and the Town have concluded a Community Cooperation Agreement which establishes the framework for a constructive relationship based on cooperation and collaboration. In addition, through its sponsorship and community investment program, Marathon has made a significant contribution to community infrastructure and initiatives, including the provision of funding directed at community COVID-19 measures such as food security and educational initiatives.

A detailed inventory of Marathon's engagement activities with the Town of Bishop's Falls is set out in Appendix 3A, Table 3A7. Table 3.8. provides a record of the issues and concerns identified by residents of Bishop's Falls over the course of engagement, together with Marathon's response and the associated EIS reference.

Table 3.8 Issues and Concerns Raised During Engagement – Bishop's Falls

Issue/Concern	Marathon Response/Action/Mitigation	EIS Reference
Project Components – will use of Botwood Port be considered?	Botwood Port will be taken into consideration in terms of logistics planning; however, no decisions have been made.	Chapter 2, Section 2.2
Are there any major hurdles to date?	The major hurdle to date is transitioning the company from a focus on exploration to a focus on development and the need to move the Project forward quickly to take advantage of the current gold market. The principal current hurdle is pushing through the EA schedule.	Chapter 2, Section 2.2
Project financing – is there sufficient financing to proceed with the Project?	Project financing will be completed in 2021 based on the results of the Feasibility Study. The financing mechanisms will depend on market conditions and related factors. Marathon's current treasury is sufficient to complete the engineering, environmental, and corporate mandates to bring the Project to the construction-ready stage. Further financing is required to secure the capital and initial sustaining capital required to develop the Project.	n/a
Project components – Where will the gold be processed?	Ore will be processed on the Project site to produce gold bars. Gold bars will be shipped from the site in secure trucks.	Chapter 2, Section 2.3
What is the life of mine?	Based on current resources and economics, the projected operational life of mine is 12 years. However, exploration is continuing and given current indicators of the presence of other potential gold deposits, the life of mine may be extended.	Chapter 2, Section 2.2
Workplace Conditions – where will workers be accommodated?	An accommodations camp will be established on site. Workers will remain at the accommodations camp for the duration of their rotation.	Chapter 2, Section 2.3
Project components – if the heap leach process is not used, what will replace it?	The low-grade ore that would have been processed via heap leach will now be processed through the mill primarily. A small percentage of the lowest grade ore may end up as waste rock depending on mining and grade factors over the life of the mine. In order to manage low-grade materials that would have been otherwise heap leached, low-grade ore stockpiles are required to be developed, as is standard in nearly all open pit mine operations. These ore stockpiles take up significantly less footprint than the heap leach pile and associated infrastructure.	Chapter 2, Section 2.1
Water Quality – what are the impacts on waterbodies?	Potential effects on surrounding waterbodies are addressed in detail in the EIS. All water contacting Project features or used within the Project processes will be managed and treated prior to release to the environment, and the quality of water to be discharged will be monitored for compliance with regulatory requirements. There are various types of water to be managed and treated across the site (contact, surface water runoff and ground water). To reduce freshwater usage, water will be reused / recycled to the extent practicable.	Chapter 7, Section 7.4

Table 3.8 Issues and Concerns Raised During Engagement – Bishop's Falls

Issue/Concern	Marathon Response/Action/Mitigation	EIS Reference
Project components – how will the ore be transported to the mill?	Ore will be transported by 90 tonne haul trucks.	Chapter 2, Section 2.3
Tailings – what are the risks?	With proper design, construction, operation and maintenance in accordance with the Canadian Dam Association guidelines, the likelihood of a tailings pond breach is very low. For this Project, Marathon will employ downstream dam raise construction using lined, rockfill dam, and incorporating thickened tailings deposition with a relatively small tailings pond, all of which are design parameters that help stabilize the tailings impoundment and reduce the risks associated with failures. In addition, the geotechnical conditions at the site are ideal for dam foundations, and central NL is in a very low risk area with respect to seismic activity. The added advantage of being at the watershed divide helps minimize flooding risk (dam overtopping) as a result of significant precipitation events and larger scale effects of climate change. Overall, this combination of attributes makes the Project TMF very low risk in terms of failure. In the unlikely event of a dam failure, the relatively low gradient of the Victoria River immediately downstream of the TMF will aid in reducing the extent of tailings inundation. Effects on water quality and higher water levels are likely to affect the Victoria River and a small portion of Red Indian Lake, however it is not expected that adverse effects will extend beyond Red Indian Lake.	Chapter 21, Section 21.5
Project components – how many ponds will there be?	Water and effluent management ponds will include the tailings and polishing ponds within the TMF, and numerous small sedimentation ponds across the site that will be used to manage and passively treat site contact water (surface and groundwater contacting the Project components).	Chapter 2, Section 2.3
Indigenous Employment – will Indigenous groups be given preferences?	Marathon will prepare a Diversity Plan which will address employment and contracting opportunities and related matters in relation to Indigenous persons and members of underrepresented groups. Marathon has committed to engage with each Indigenous group during the development of this plan.	Chapter 15, Section 15.4
Workplace conditions – how long are the proposed shifts?	Shifts will be 12 hours in length to operate 24 hours per day. As the workforce will be accommodated on site due to the distance from the nearest community rotations will be required and will range from 2 to 3 weeks depending on the position.	Chapter 2, Section 2.2

Table 3.8 Issues and Concerns Raised During Engagement – Bishop's Falls

Issue/Concern	Marathon Response/Action/Mitigation	EIS Reference
Engagement – need for continuing engagement	Marathon is committed to meaningful and continuing community engagement. Marathon will continue to provide Project related information through social media, quarterly newsletters and mailouts. Marathon will also continue to hold community meetings and plans to return to each community in the fall of 2020 to provide an overview of the EIS. Marathon is committed to developing and maintaining relationships with communities closest to the mine site through ongoing engagement, including through the conclusion of Community Cooperation Agreements.	Chapter 3, Section 3.5

Town of Grand-Falls Windsor

As part of its planned program of public participation and consultation, Marathon regularly engages with the Town of Grand Falls-Windsor through meetings, calls, correspondence and the transmission of Project-related information, including information related to employment and business opportunities. Marathon and the Town have concluded a Community Cooperation Agreement which establishes the framework for a constructive relationship based on cooperation and collaboration. In addition, through its sponsorship and community investment program, Marathon has made a significant contribution to community infrastructure and initiatives, including the provision of funding directed at community COVID-19 measures such as the Special Olympics Program and food security.

A detailed inventory of Marathon's engagement activities with the Town of Grand Falls-Windsor is set out in Appendix 3A, Table .3A8. Table 3.9 provides a record of the issues and concerns identified by residents of Grand Falls-Windsor over the course of engagement, together with Marathon's response and the associated EIS reference.

Table 3.9 Issues and Concerns Raised During Engagement – Town of Grand Falls-Windsor

Issue/Concern	Marathon Response/Action/Mitigation	EIS Reference
Corporate Operations – where might new, additional mines be located?	Marathon is continuing with exploration programs which are targeting existing and potential exploration targets of interest (see press release regarding the 2020 drill program dated February 3, 2020 on the Marathon website). Marathon is optimistic that other economical deposits exist on the property and will continue to explore, noting that it generally takes 5 to 10 years from discovery of a deposit to having sufficient data to show it is an economical deposit.	n/a
Project components – will pits be mined simultaneously?	Pits will be mined concurrently; however, it is expected that the Leprechaun pit will be exhausted first and will be used for tailings disposal after Year 9 of operations.	Chapter 2, Section 2.5
Operations – has an EPCM contractor been chosen?	An EPCM contractor will not be selected until feasibility level engineering has been completed.	Chapter 15, Section 15.4

Table 3.9 Issues and Concerns Raised During Engagement – Town of Grand Falls-Windsor

Issue/Concern	Marathon Response/Action/Mitigation	EIS Reference
Workplace Conditions – have wage categories been determined?	Wage categories have not been determined, however will be market-based.	Chapter 15, Section 15.4
Operations – will there be an office in Central Newfoundland?	An office has been established in Grand Falls – Windsor. Future plans and requirements for office space and other physical infrastructure outside the mine site has not been determined.	n/a
Operations – what are the plans for medical services on site?	Appropriate emergency medical infrastructure, equipment and personnel will be established at the Project site. Marathon is currently engaged in discussions with Buchans, Millertown and Central Health with respect to the use of the A. M. Guy Memorial Hospital in Buchans to supply certain services to mine personnel.	Chapter 13, Section 13.4 and 13.5
Project financing - Is there sufficient financing to start the Project?	Project financing will be completed in 2021 based on the results of the Feasibility Study. The financing mechanisms will depend on market conditions and related factors. Marathon's current treasury is sufficient to complete the engineering, environmental, and corporate mandates to bring the Project to the construction-ready stage. Further financing is required to secure the capital and initial sustaining capital required to develop the Project.	n/a
Engagement – need for continuing engagement	Marathon is committed to meaningful and continuing community engagement. Marathon will continue to provide Project related information through social media, quarterly newsletters and mailouts. Marathon will also continue to hold community meetings and and plans to return to each community in the fall of 2020 to provide an overview of the EIS. Marathon is committed to developing and maintaining relationships with communities closest to the mine site through ongoing engagement, including through the conclusion of Community Cooperation Agreements.	Chapter 13, Section 13.5

3.5.2.3 Virtual Public Information Sessions

In March 2020, the Province imposed Level 5 restrictions in response to the declaration of a global COVID-19 pandemic. As a result, Marathon was unable to hold in-person meetings in the various communities. As an alternative, after consultation with the community governments, Marathon elected to hold virtual meetings on May 26th and 27th. The event was livecast over 2 days (with simultaneous transmission on local television). The purpose of the meetings was to provide a corporate and Project update (Day 1) and an overview of the environmental process and content and structure of the EIS (Day 2).

The meetings were advertised throughout the province in both print and social media as well as by radio. In advance of the meetings, posters were provided to each community, which were then posted at readily accessible locations (e.g., Town Halls, local convenience stores, gas stations) which remained open during the COVID-19 restrictions. Advertisement were made via local radio stations (VOCM and KROCK), and via Roger's Local Channel 9 which also televised the presentations. The event was also promoted by community representatives on community Facebook pages and other social media. Direct invitations were issued to the six communities, Miawpukek and Qalipu, fish and wildlife associations, environmental NGOs, political representatives, industry associations and specific individuals. Both during and subsequent to the sessions, members of the public were afforded the opportunity to ask questions and provide comments and responses were provided either during the session or by follow-up e-mail. A permanent record of the sessions has been maintained by Marathon and the presentations will be available on Marathon's website for viewing and submission of comments for one year. In addition, Marathon has offered to provide a copy of the presentation to any individual who requests it.

Table 3.10 set out the issues and concerns which were identified by participants and Marathon's responses as associated EIS reference during the virtual meetings.

Table 3.10 Issues and Concerns Raised During Virtual Public Information Sessions

Issue/Concern	Marathon Response/Action/Mitigation	EIS Reference
When and where can I send a resume?	While the Project has not commenced, Marathon has established a data bank to collect resumes as there are hirings at all stages. Resumes can be sent to careers@marathon-gold.com and will remain on file to be considered as employment opportunities occur.	n/a
What is the plan for drilling this year?	The drilling plan for 2020 includes 44,000 metres of drill focussed on the Sprite Corridor, footwall zones, and four other exploration targets of interest. Further details are provided in a press release dated February 3, 2020, which is available on Marathon's website.	n/a
What is your tentative date to start up drilling plans? Can Matt discuss and ensure shareholders that he will not dilute shareholders with anymore private placements? Why have we not seen any insider buying from him?	Drilling at the Marathon camp restarted on June 9th when NL went to Alert Level 3 and following the introduction of COVID-19 safety protocols. As Marathon's strategy is to develop the Valentine Project into a successful mine, project financing will be required with both equity and debt. The CEO's personal purchases of Marathon stock are detailed on the public SEDI filings.	n/a
When do you anticipate the resumption of drilling given the impact of the virus?	The exploration camp was temporarily shut down on March 14, 2020 to ensure worker safety. Plans to reopen were developed, taking into consideration provincial policies and guidelines. Marathon has developed protocols to ensure safety which were circulated to Indigenous groups and communities for informational purposes. Marathon is guided by the principle of zero harm to people and will proceed cautiously and in alignment with provincial authorities. Since the virtual meetings, following the provincial movement to Level 3, on June 10, Marathon restarted exploration work.	n/a

Table 3.10 Issues and Concerns Raised During Virtual Public Information Sessions

Issue/Concern	Marathon Response/Action/Mitigation	EIS Reference
Could you touch briefly on any recent measure of interest Marathon has received from current gold producers concerning a partnership or outright take over for the Valentine Lake project?	Marathon's goal is the development of the Valentine Project into a successful mining operation and there are no plans for a partnership or takeover bid at this time.	n/a
What will the average wage be for equipment operators?	Salary classifications have not been determined. It is expected that the average salary across all employment types at the site will be in the range of $100,000 including overtime and burden. However, this is a very high-level estimate based on other mine operations in NL and Canada.	Chapter 15, Section 15.5
How much drilling do you think you can get in the rest of 2020 if province re-open into phase 3 mid June?	Marathon is optimistic that it can complete the full drilling program outlined in the press release dated February 3, 2020. This includes 44,000 metres of drill focussed on the Sprite Corridor, footwall zones, and four other exploration targets of interest.	n/a
Other than increased capacity, is there any difference/improvement in recovery rates wrt Phase 1 vs Phase 2 milling?	There is a small (less than 1%) difference in overall recovery between the two phases. The higher throughput rates of the second phase (4 million tonnes per annum) versus the first phase (2.5 Mtpa) is achieved by having a coarser grind up front (150 microns versus 75 microns). To maintain the high recoveries during the second phase with that coarser grind, a flotation circuit is dropped in. Phase 1 is low capital expenditures (capex) high operating expenditures (opex) due to the finer grinding). Phase 2 is higher capex (due to the installation of the flotation circuit) but lower opex. This is designed to minimize capital expenditures upfront. Recovery is essentially flat between the two flow sheets. Gold production remains relatively consistent through both phases as ore grade in the first couple of years is projected to be higher than average, compensating for the lower throughput of Phase 1.	Chapter 2, Section 2.3
If the EIS is submitted in Q3 of 2020, does the government have a mandated time limit to review and approve?	The provincial and federal governments have mandated time limits to review and approve; however, these time limits are for government time only, and do not include the time needed for the proponent to prepare responses to information requests or any additional information that may be required.	Chapter 2, Section 2.2
When do you expect to appoint your engineering contractor?	Marathon expects to appoint a lead consultant for the Feasibility Study in the next few weeks. That is the next stage of engineering studies.	n/a
Can you explain what "Detox tailings means?	Cyanide will be used within the milling process to extract gold from the ore. Prior to release of tailings effluent from the mill, the tailings effluent will be treated via a SO_2 cyanide destruction system that will reduce cyanide levels to less than 1 ppm. After this process the tailings are thickened and pumped to the TMF and referred to as "detoxified tailings".	Chapter 2, Section 2.5

Table 3.10 Issues and Concerns Raised During Virtual Public Information Sessions

Issue/Concern	Marathon Response/Action/Mitigation	EIS Reference
There is no mention of lab personnel as I can see thus far. Are there plans to test the quality of the product in an on-site lab or will the samples be tested externally?	A laboratory will be built at the site to assay drill cuttings for grade control and reconcilliation during operations. Gold product will be melted and poured into bars, which will be sent to a smelter for final refinement and quality testing.	Chapter 2, Section 2.3
When do you anticipate needing first power from NL Hydro?	Currently Marathon is looking at first power, mid to late 2022. We are consulting with NL Hydro as to when power will be needed - no firm date yet.	n/a
When you start hiring equipment operators will you be willing to hire someone with little to no experience or will you have to have a certain number of years experience?	Marathon expects to hire equipment operators with a range of experience. Marathon expects to hire some operators with little or no experience, however will work with local educational institutions to provide training/apprenticeship programs to train operators to ensure a sustainable workforce over the life of the project.	Chapter 2, Section 2.2
Are there going to be any delays on the start up time for the hiring of heavy equipment operators?	The schedule shown in the presentation outlines the currently expected timelines for the start of construction, and the start of operations. As with any project, there are certain risks that may impact the actual dates of these milestones, however Marathon is working very hard to meet or exceed these dates. Marathon will continue to inform all stakeholders on the progress of the project and provide employment opportunity updates.	Chapter 2, Section 2.2
What degree has Covid-19 impacted the project overall?	Environmental Assessment is the critical path for the Project for the time being. Marathon employees are currently working from home. COVID has not seriously affected our ability to prepare the Environmental Impact Statement. We are able to work to schedule so no discernible impacts noted so far.	Chapter 2, Section 2.9 Chapter 14, Section 14.5
Would the discovery of another deposit alter the final Feasibility Study or is solely based on the Marathon and Leprechaun deposits?	No, the drilling planned for 2020 and in the next year or two is intended to identify potential new zones of mineralization (like the Berry Zone). However, it takes many years of exploration to determine if a deposit is of sufficient size and grade to be mined. To use the Marathon deposit as an example, from discovery it took 5 to 6 years to complete the exploration required to show it was a viable, economical deposit. With the Feasibility Study work commencing in Q3 2020, and finishing in early 2021, only Leprechaun and Marathon will be included in the study.	n/a
Understanding this is an Open Pit Resource for the purposes of getting the project approved, does the geometry of the deposit lend itself to transitioning to an UG operation, if the resource continues at depth?	As noted, the exploration and engineering/feasibility studies to date have been focussed solely on the open pit resources and a project description that exploits those resources. Marathon's exploration drilling to date shows that gold mineralization extends below planned open pit depths of approximately 300 m, to depths greater than 1,000 m where drilling was extended. These results are generally positive, however, substantial exploration work is needed to determine if the resource potential and grades are sufficient to support a transition to underground mining. Currently, the exploration program is focussed on expanding potential open pit resources in new areas such as the Berry Zone.	Chapter 2 Section 2.3

Table 3.10 Issues and Concerns Raised During Virtual Public Information Sessions

Issue/Concern	Marathon Response/Action/Mitigation	EIS Reference
Is hiring going to be based on how close I live to the site?	Marathon will develop a formal hiring framework which will formalize some principles around hiring. A key principle will be proximity to the Project. Buchans, Millertown and Buchans Junction are closest to the Project and Marathon want to ensure that the Project has a meaningful and positive effect on these communities. Marathon will conclude a Benefits Agreement with the Province which will likely reflect this principle. The overriding objective is to maximize local benefits.	Chapter 15, Section 15.4
I am a HR person currently working with the Federal Government in Labour Relations and have done staffing discipline, as well. Will this be of interest for employment within Marathon Gold?	Marathon will require HR personnel as the project moves forward, however it has not developed a specific schedule for these hires or specific requirements for these roles in terms of education and experience. Marathon will advertise positions as required and draw from its resume database as employment opportunities arise.	Chapter 15, Section 15.4
Will copies of the EIS be available to the public other than online?	Hard copies of the EIS will be available at public viewing centres in the Project vicinity. These locations have yet to be determined, however are generally municipal buildings, libraries, or other locations that are open to the public.	n/a
When would we expect to see a request for contracts for the start of the construction phase at end of 2021?	Marathon anticipates initiation of the tendering process for the construction phase in mid to Q3 2021 based on the anticipated construction start of January 2022.	Chapter 2, Section 2.2
What happens to the tailings pond in the long term?	In Year 9 of operations, tailings deposition will move from the TMF to the exhausted Leprechaun Pit. Rehabilitation and closure of the TMF will commence in year 10 of operations, including revegetation and construction of the closure spillway which will essentially eliminate water ponding within the tailings impoundment. During the rehabilitation phase, testwork will be conducted to determine if the tailings have sufficiently consolidated to consider the TMF a landform. At the same time, the water draining from the TMF will be monitored to determine if continued holding or treatment of the water is required for some period of time (the water treatment plant and polishing pond will remain in place as required to treat the water from the TMF). Noting that our testwork to date indicate low likelihood that we have any Acid Rock Drainage or Metal Leaching issues with the tailings, we are optimistic that prior to the final closure of the Project Site, that the TMF will be considered a landform with water drainage that is suitable for release to the environment. This would mean that the dams are no long considered dams for the purpose of holding the tailings in place, and that the TMF would be considered stable in perpetuity. Further testwork, engineering, and monitoring will be required to confirm this approach. In the event the TMF can not be consider a landform based on the Canadian Dam Association requirements, Marathon will be responsible for monitoring and maintenance of the dam in perpetuity. In the event that Marathon is unable to continue this work for any reason (e.g. bankruptcy), the Province	Chapter 2, Section 2.6 Chapter 23, Section 23.3

Table 3.10 Issues and Concerns Raised During Virtual Public Information Sessions

Issue/Concern	Marathon Response/Action/Mitigation	EIS Reference
	requires Financial Assurance to be posted by Marathon that will ensure sufficient funds are held such that the Province would be able to hire a third party to complete the monitoring and maintenance of the TMF.	
What is likelihood of future expansion?	Marathon is continuing with exploration programs which are targeting existing and potential exploration targets of interest. Marathon is optimistic that other economical deposits exist on the property and exploration will continue, noting that it generally takes 5 to 10 years from discovery of a deposit to having sufficient data to show it is an economical deposit.	n/a
Seems like a great project economically with large profit margins. I just hope an appropriate amount of those profits are being set aside for harm prevention and remediation of this area. Thank you for the information session.	Marathon is required to post "Financial Assurance" to the Province, which will cover the cost of the rehabilitation and closure of the site if Marathon is not able to do so for any reason (e.g. bankruptcy). This cost - which is reviewed and approved by the Department of Natural Resources - will be in the tens of millions of dollars for Marathon's proposed project, and we will be required to provide these funds prior to construction. This is a policy/requirement that the NL government put in place to ensure that the public is not responsible for the costs associated with rehabilitating a mine site where the owner doesn't do what is required (e.g. the former Hope Brook Gold Mine).	Chapter 2, Section 2.6
Has a Geo-membrane liner been considered?	The Prefeasibility-level TMF dam design incorporates a continuous geosynthetic liner system that will be applied to the upstream face of the rockfill dam slope. Properly graded materials and/or geomembrane will be utilized to protect the liner, which will serve to contain the tailings and effluent with the tailings impoundment upstream of the tailings dam.	Chapter 2, Section 2.4
Fish and Fish Habitat – Magnitude of downstream impacts in the event of dam breach or accidental event or malfunction such as a ground water aquafer fracture or chemical spill - the potential risk to fish and fish habitat and the potential threat to wildlife and human life – need to plan for worst-case scenarios, and mitigate for them in advance.	The primary mitigation measures to address these accidental events include: • Extensive site investigations (e.g., geotechnical, hydrogeological) and collection of baseline data (e.g., hydrology) for use in the design of dams and other facilities. • Design dams and other features in accordance with best practices (e.g., Canadian Dam Association Guidelines and Technical Bulletins). • Appropriate monitoring programs during construction, and subsequent monitoring and inspection during operations. Planning for the worst-case scenarios involves a rigorous environmental management system (EMS) which identifies the monitoring requirements for all aspects of the project, and contains emergency response plans for potential accidental event scenarios. Marathon is committed to developing an EMS and having the equipment, supplies, and trained personnel on site to address potential accidental events.	Chapter 21, Section 21.5

It is Marathon's intention to hold further community sessions (whether in person or virtually) to discuss the EIS, predicted environmental effects and proposed mitigation measures in the fall of 2020. In the interim, community engagement will continue consistent with the terms of individual Community Cooperation

Agreements and through the provision of Project-related information, regular conference calls with community representatives, social media updates, quarterly newsletters, and the transmission of information respecting economic opportunities.

3.5.3 Stakeholder Groups

As part of the EIS preparation, Marathon has engaged with key stakeholders and environmental non-government organizations (ENGOs) that have traditionally been engaged in or expressed an interest in industrial developments in the Province and their potential effects on both the biophysical and socio-economic environment. Key environmental non-governmental organizations include CPAWS and the Nature Conservancy of Canada. While Marathon provided Project related information to other environmental organizations such as Nature NL and the Sierra Club of Canada, only CPAWS expressed an interest in active engagement. The Nature Conservancy of Canada has asked only to be provided with ongoing Project information. Engagement activities with these stakeholders have included the ongoing provision of Project-related information including newsletters, notices of and invitations to public information sessions and conference calls. In addition, Marathon has met jointly with CPAWS and Miawpukek to discuss issues of common concern.

Fish and wildlife organizations constitute a key stakeholder group, and Marathon engages with these stakeholders on an ongoing basis to keep them apprised of activities in the Project area and to discuss any issues and concerns. These organizations include the Newfoundland and Labrador Outfitters Association (NLOA), the Environment Resources Management Association (ERMA), the Atlantic Salmon Federation (ASF), the Salmonid Council of Newfoundland (SCNL) and the Salmonid Association of Eastern Newfoundland (SAEN). Engagement activities include the ongoing provision of Project-related information, notices of and invitations to public information sessions, face-to-face meetings and conference calls. In addition, these organizations have been consulted on EIS baseline information.

A complete inventory of engagement activities with the various stakeholder groups is contained in Appendix 3A, Table 3A.9 and Table 3A.10. A summary of the key questions and issues raised through these engagement activities together Marathon’s responses and the relevant EIS reference is set out in Table 3.11 below.

Table 3.11 Issues and Concerns Raised During Stakeholder Engagement

Stakeholder Organization	Issues/Concerns	Marathon's Response/Action/Mitigation	EIS Reference
Salmonid Organizations – ASF, SCNL, SAEN, ERMA	Project Design – Tailings Management and Consideration of Alternatives	Tailings will be managed for the first 9 years in an engineered impoundment using lined, earthen (rockfill) dams. Once mining within the Leprechaun open pit is completed in Year 9, Marathon will use the pit for tailings disposal (about 25% of tailings volume). Through the EA and engineering processes, Marathon will continue to assess tailings management alternatives that could improve on the current design. With proper design, construction, operation and maintenance in accordance with the Canadian Dam Association guidelines, the likelihood of a tailings pond breach is very low. For this Project, Marathon will employ downstream dam raise construction using lined, rockfill dam, and incorporating thickened tailings deposition with a relatively small tailings pond, all of which are design parameters that help stabilize the tailings impoundment and reduce the risks associated with failures. In addition, the geotechnical conditions at the site are ideal for dam foundations, and central NL is in a very low risk area with respect to seismic activity. The added advantage of being at the watershed divide helps minimize flooding risk (dam overtopping) as a result of significant precipitation events and larger scale effects of climate change. Overall, this combination of attributes makes the Project TMF very low risk in terms of failure. In the unlikely event of a dam failure, the relatively low gradient of the Victoria River immediately downstream of the TMF will aid in reducing the extent of tailings inundation. Effects on water quality and higher water levels are likely to affect the Victoria River and a small portion of Red Indian Lake, however it is not expected that adverse effects will extend beyond Red Indian Lake. TMF location and design alternatives are extensively addressed in the EIS.	Chapter 2, Section 2.3 and 2.11
	Air Quality and Climate Change – impact of GHG emissions	The atmospheric environment is a Valued Component within the EIS, and the potential effects of the Project are fully assessed in the EIS. Marathon will install and monitor air quality monitoring stations around the Project Area and will report results to the regulators. The Project will also be subject to Greenhouse Gas Emissions regulations (including progressive reduction in GHG emissions) as set by the Province.	Chapter 5, Section 5.5

Table 3.11 Issues and Concerns Raised During Stakeholder Engagement

Stakeholder Organization	Issues/Concerns	Marathon's Response/Action/Mitigation	EIS Reference
	Emergency Response – does the proximity of the proposed mine to other mining operations pose a special threat in the event of a breach of the tailings pond?	The only other mine in proximity to the Valentine Gold Project is the dormant Duck Pond Mine. A failure of the Duck Pond TMF would potentially send effluent into a drainage system that flows into the Exploits River approximately 4 km downstream of the Millertown dam. This is approximately 70 km downstream of any potential confluence of effluent that would discharge from the TMF for Marathon's Project. Based on the inundation study completed, any impacts from a TMF failure at Marathon's Project, would not interact with an unlikely simultaneous failure at Duck Pond Mine. To Marathon's knowledge there are no special circumstances or threats related to the proximity of the Duck Pond Mine.	
	Water Quality – potential contamination	Potential effects on surrounding waterbodies are addressed in detail in the EIS. All water contacting Project features or used within the Project processes will be managed and treated prior to release to the environment, and the quality of water to be discharged will be monitored for compliance with regulatory requirements. There are various types of water to be managed and treated across the site (contact, surface water runoff and ground water). Every effort will be made to reuse and recycle water, reducing freshwater usage.	Chapter 7, Section 7.4
	Project components – Pit stability	The geological stability of the open pit has and will continue to be studied to protect the mine employees who will work in the pit, the environment, and the viability of the Project. In terms of the overall project, a failure of the pit wall(s) could result in failure (e.g., bankruptcy) of the Project even if no effects on personnel or the environment.	Chapter 21, Section 21.5
	Fish and Fish Habitat – habitat compensation	Marathon has reconfigured the site layout and design to avoid or reduce alteration, disruption or destruction of fish habitat to the extent practicable. Marathon is required to offset fish habitat alteration, disruption or destruction and we are considering a number of different offsetting projects that may be suitable, in consultation with DFO and stakeholders, including the salmonid groups.	Chapter 8, Section 8.4

Table 3.11 Issues and Concerns Raised During Stakeholder Engagement

Stakeholder Organization	Issues/Concerns	Marathon's Response/Action/Mitigation	EIS Reference
	Project Components – what is the potential for Acid Rock Drainage	ARD/ML testing has been ongoing for approximately 2 years and results to date indicates that only small amounts of the waste rock and ore are potentially acid generating. These small amounts are not expected to generate acid drainage or leach metals as they will be mixed with the other rock which is highly buffering. ARD/ML testing will continue for at least 1 to 2 years, in order to confirm the results found to date. Overall, the rocks within the Valentine Gold pits are not expected to be acid generating and naturally contain low levels of heavy metals	Chapter 2, Section 2.3
	Project Components – use of cyanide	Cyanide is used in nearly all gold mining operations and best practices for cyanide use and management are well understood. Cyanide will be imported to the site in dry form, mixed to a slurry within the mill, used within the process, and destroyed via a SO_2 cyanide destruct unit prior to discharge of the tailings to the TMF.	Chapter 2, Section 2.3
Newfoundland and Labrador Outfitters Association	Project Components – what is the source of power for mining operations?	The Project will be powered from NL Hydro's electrical grid with a tie-in near the Star Lake generating station.	Chapter 2, Section 2.3
	Project description - what is the size of the Project footprint	The primary Project footprint is the mine site which is approximately 6 km in length and 1 to 2 km wide. The footprint includes the site road, stockpiles, pits and tailing facility. The previous site plan had a larger footprint, however this plan has been revised taking into account the concerns of Indigenous groups and stakeholders and consultation with regulators.	Chapter 2, Section 2.2
	Wildlilfe – potential impact of noise and waste rock and interference with caribou migration	Marathon is working with NLDFFA, Wildlife Division, to gain a better understanding of the migratory patterns of caribou herds in the vicinity of the Project. Components of the Project (like noise and physical features) and their potential effects on caribou migration are being carefully assessed and the results are provided in the EIS, together with proposed mitigation measures to reduce these potential effects.	Chapter 11, Section 11.5

Table 3.11 Issues and Concerns Raised During Stakeholder Engagement

Stakeholder Organization	Issues/Concerns	Marathon's Response/Action/Mitigation	EIS Reference
	Engagement – what other groups have been engaged	Consistent with its corporate values, Marathon has implemented a comprehensive engagement strategy which includes engagement with communities, Indigenous groups, various salmonid associations, industry groups, environmental organizations, cabin owners and others interested in or likely to be affected by the Project. Marathon will continue to engage with groups by providing ongoing Project information and meeting on request to discuss specific issues of concern.	Chapter 3, Section 3.1
	Project description – life of mine	Based on current resources and economics, the projected operational life of mine is 12 years. However, exploration is continuing and given current indicators of the presence of other potential gold deposits, the life of mine may be extended.	Chapter 2, Section 2.2
	Socio-economic Impacts – general support for Project but need to compensate if outfitting operations are impaired	Marathon will continue to engage with NLOA and individual outfitters and if any outfitting operations are impacted by the Project, Marathon will work with the outfitter(s) directly to determine appropriate steps to address the issues).	Chapter 15, Section 15.4
	Corporate Operations – impact of market downturn due to COVID-19	The downturn in the market due to COVID-19 had a generally positive impact on gold prices and companies working within the gold space as it is generally considered a safe-haven investment in times of market decline and/or volatility.	n/a
CPAWS	Project Description – When will the PFS be completed?	The PFS was completed in late spring, 2020.	n/a
	Wildlife – what information has been provided by the Province on caribou?	Marathon is working with NLDFFA, Wildlife Division, to gain a better understanding of the migratory patterns of caribou herds in the vicinity of the Project. Wildlife has provided caribou collar data for the herds in the area of the Project. Marathon has also conducted caribou surveys. Marathon will continue to engage with CPAWS and other stakeholders on this matter.	Chapter 11, Section 11.2

Table 3.11 Issues and Concerns Raised During Stakeholder Engagement

Stakeholder Organization	Issues/Concerns	Marathon's Response/Action/Mitigation	EIS Reference
	Project schedule – what is the length of the construction period? What is the life of mine?	The construction period is anticipated to take between 16 – 20 months. Based on current resources and economics, the projected operation life of mine is 12 years. However, exploration is continuing and given current indicators of the presence of other potential gold deposits, the life of mine may be extended.	Chapter 2, Section 2.2
	Project schedule – life of mine – rehabilitation and closure	The closure rehabilitation phase will begin when production ceases. Active rehabilitation will take one to two years and following this, there will be six to ten years of post-closure monitoring to ensure the chemical and physical stability of the rehabilitation measures. If there are dams (based on CDA guidelines) remaining at the site post-closure, there will be 100 years of monitoring and maintenance.	Chapter 2, Section 2.2
	Project description – alteration of existing forestry roads	The existing access road to the site (forestry road) will be upgraded in some areas to a consistent width, proper ditching, appropriately sized culverts and bridge improvements.	Chapter 2, Section 2.3
	Project description – use of roads and frequency of truck movement	The frequency of truck traffic will be greatest during construction. During operations, personnel will be bussed to site which will significantly limit traffic. Approximately 6 – 7 trucks a day will travel to site to bring food, fuel and other supplies.	Chapter 13, Section 13.5
	Project area – ongoing forestry operations	Forestry operations are currently focused in areas to the northeast of Quinn Lake and are not in close proximity to the Project Area. The Department of Forestry plans forest harvesting areas and is aware of Marathon's proposed Project and use of the existing forestry road.	Chapter 16, Section 16.5
	Project description - processing method if heap leach process is not used	The low-grade ore that would have been processed via heap leach will now be processed through the mill primarily. A small percentage of the lowest grade ore may end up as waste rock depending on mining and grade factors over the life of the mine. In order to manage low-grade materials that would have been otherwise heap leached, low-grade ore stockpiles are required to be developed, as is standard in nearly all open pit mine operations. These ore stockpiles take up significantly less footprint than the heap leach pile and associated infrastructure.	Chapter 2, Section 2.1

Table 3.11 Issues and Concerns Raised During Stakeholder Engagement

Stakeholder Organization	Issues/Concerns	Marathon's Response/Action/Mitigation	EIS Reference
	Water Quality – protection of small ponds	There will be no discharge of waste into fish bearing ponds. Potential effects on surrounding waterbodies are addressed in detail in the EIS. All water contacting Project features or used within the Project processes will be managed and treated prior to release to the environment, and the quality of water to be discharged will be monitored for compliance with regulatory requirements. There are various types of water to be managed and treated across the site (contact, surface water runoff and ground water). Every effort will be made to reuse and recycle water, reducing freshwater usage.	Chapter 7, Section 7.4
	Accidental Events – impact of dam failure on water quality	With proper design, construction, operation and maintenance in accordance with the Canadian Dam Association guidelines, the likelihood of a tailings pond breach is very low. For this Project, Marathon is employing downstream dam raise construction using lined, rockfill dam, and incorporating thickened tailings deposition with a relatively small tailings pond, all of which are design parameters that help stabilize the tailings impoundment and reduce the risks associated with failures. In addition, the geotechnical conditions at the site are ideal for dam foundations, and central NL is in a very low risk area with respect to seismic activity. The added advantage of being at the watershed divide helps minimize flooding risk (dam overtopping) as a result of significant precipitation events and larger scale effects of climate change. Overall, this combination of attributes makes the Project TMF very low risk in terms of failure. In the unlikely event of a dam failure, the relatively low gradient of the Victoria River immediately downstream of the TMF will aid in reducing the extent of tailings inundation. Effects on water quality and higher water levels are likely to affect the Victoria River and a small portion of Red Indian Lake, however it is not expected that effects will extend beyond Red Indian Lake.	Chapter 21, Section 21.5
	Project description – how will tailings be transported?	Tailings will be transported from the mill to the TMF by pipeline, pumped as a thickened slurry at approximately 65% solids by weight.	Chapter 2, Section 2.3
	Wildlife – collection of caribou data	Marathon has reviewed caribou data provided by the Province and has conducted caribou surveys over the past year related to migration and population. Marathon will continue to complete surveys and collect data on caribou and expects this type of monitoring to continue through the life of the Project.	Chapter 11, Section 11.2

It is Marathon's intention to continue to engage with these groups as the Project progresses, through the continuing transmission of Project-related information and meetings as requested to discuss potential environmental effects and associated mitigation measures. Marathon will also engage with these stakeholder organizations in the development and implementation of monitoring and follow-up programs.

3.5.3.1 Cabin Owners

There are 14 cabin lots registered with the provincial Crown Lands Division within the Land and Resource Use LAA. There are two cabins located within the Project Area, one is registered with Crown Lands Division and the other is currently understood to not have legal claim to the land it occupies. Marathon has been informally engaging with cabin owners for many years and the feedback has generally been positive as Marathon has been maintaining the access road used by the cabin owners, including snow clearing. Also, when a spring storm and runoff event made the road impassable in numerous locations due to significant washouts, Marathon's contractor fixed the road to provide access and where needed, fixed cabin-owners' driveway/access.

Marathon has been in communication with most cabin owners and is working to ensure all cabin owners are receiving Project information and other communications from Marathon. Further, Marathon is engaging directly with the two cabin owners within the Project Area to address the issues associated with their proximity to the Project, and potential effects of the Project on their use of their cabins. Marathon will also be engaging with cabin owners along the access road to discuss the potential effects of the Project on the use of their cabins.

3.5.3.2 Individual Outfitters

Marathon has been engaging with Notch Mountain Outfitters (NMO) for many years as this outfitter operated a remote, fly-in satellite outfitters camp on Valentine Lake. NMO has not used that outfitters camp for many years and has adjusted their hunting activities based on Marathon's activities on site, and increased hunting pressure in the general area due to Marathon's maintenance of the access road. In June 2019, Marathon met with NMO to discuss Marathon's proposed Project. At the time, NMO requested Marathon's support in their request to the province to move the moose licences allotted to the Valentine Lake remote outfitters camp over to NMO's main outfitters camp on the Lloyd's River near the outflow to Red Indian Lake. Marathon discussed the matter with a representative from Outdoor Product Development – Hunting and Angling (Outfitting), Department of Tourism, Culture, Industry and Innovation, and the licence move was completed.

Marathon has continued to engage and communicate with NMO through 2020 to better understand the overall impact to NMO's outfitting business and address their concerns.

3.5.3.3 Industry and Trade Organizations

Marathon has met or engaged with various industry and trade organizations since the fall of 2019, including QDC, Exploits Chamber of Commerce, Trades NL and the Office to Advance Women Apprentices NL. Engagement with these groups has been focused upon potential economic benefits of the Project (education and training, employment and business opportunities). These organizations have indicated support for the Project and Marathon will work with these groups as well as Indigenous groups and communities in the preparation of the Benefits Plan and the Gender Equity and Diversity Plan in order to ensure maximum benefits for the residents of Central Region and the Province.