APPENDIX 2A

Water Management Plan Update for the Berry Pit Expansion

SUPPLIED AS A SEPARATE DOCUMENT

APPENDIX 2B

Assessment Acid Rock Drainage / Metal Leaching Assessment of the Berry Deposit Report

SUPPLIED AS A SEPARATE DOCUMENT

APPENDIX 2C

Valentine Gold Project – Explosives Storage Facility Location

TERRANE
GEOSCIENCE INC.

100 – 5435 Portland Place
Halifax, NS, B3K 2Z8
terranegeoscience.com

TO: Jamie Powell, M.Eng., P.Eng., VP Regulatory and Government Affairs (Marathon Gold)

FROM: Tony Gilman, M. Sc., P. Geo, P. Eng. (Terrane Geoscience)

REVIEW: Greg Healy, M.Sc.E., P. Eng., P. Geo. (Terrane Geoscience)

DATE: June 26, 2023

RE: Valentine Gold Project – Explosives Storage Facility Location Assessment

1.0 INTRODUCTION

Terrane Geoscience Inc (Terrane) is pleased to provide Marathon Gold Corp (Marathon) with a memorandum on the proposed relocation of the explosive's storage facility to the site of the former Marathon Gold exploration camp.

The purpose of this memorandum is to comment on the proposed placement of the explosives storage facility at the former exploration camp relative to the Victoria Dam, owned by Newfoundland & Labrador Hydro (NL Hydro).

2.0 BACKGROUND

Construction and early site works for the Valentine Gold Project commenced in Fall, 2022. As part of this work, blasting for construction material is currently underway at the proposed Leprechaun open pit. Marathon's Environmental Assessment Permit (EAP) requires blast monitoring be conducted for nearby major infrastructure. At this stage of the project this includes the Victoria Dam, but will later include project specific infrastructure (e.g. tailings management facility).

Since construction began, Terrane has been involved in providing Marathon with reviews of ground acceleration/blast monitoring, a review of DynoConsult's proposed blast plan, and a review of seismograph results for the first quarter of 2023.

Herein, Terrane have used the National Standard of Canada, Explosives – Quantity Distances manual (CAN/BNQ, 2015) to evaluate the distance critical infrastructure must be located from the proposed explosives storage location to be deemed safe for a given quantity of explosives.

3.0 VICTORIA DAM

The Victoria Dam is a river diversion dam constructed as part of the Bay D'Espoir Hydroelectric development by Newfoundland and Labrador Hydro (Read and Cole, 1972) to divert water from the Victoria River to the White Bear drainage basin. Construction records summarized by Read and Cole (1972) indicate that the dam was constructed as a zoned, rolled earth fill structure with a central impervious core and a cut-off trench sealed on cleaned and locally grouted bedrock.

100 – 5435 Portland Place
Halifax, NS, B3K 2Z8
terranegeoscience.com

Newfoundland and Labrador Hydro (NLH) risk assessments of the Victoria Dam rate the structure as an Extreme risk based on the vertical chimney drain structure construction and the variable foundation materials (i.e. glacial till overburden and bedrock) at the site.

4.0 QUANTITY-DISTANCES MANUAL

The National Standard of Canada, Explosives – Quantity Distances manual is published by the Standards Council of Canada and the Bureau de normalization de Quebec (BNQ), with the most recent version from 2015 (CAN/BNQ, 2015).

The Quantity-Distance manual ("the manual" or "the standard") was developed to establish minimum separation distances to be used between potential explosion sites (PES) and exposed sites (ES), to reduce the risk of life and property. As stated in the standard:

> "*This standard applies to all locations where a quantity of stored or manufactured explosives has the potential, if its contents were to explode, to create a blast that could be associated with the projection of fragments or debris, or with a fire hazard.*"

Within the Quantity-Distances standard PES's (potential explosion sites) are classified based on their potential effects (PE). All PESs are to be classified into one of the following PE categories:

- PE1: Mass explosion hazard;
- PE2: Projection hazard, but not a mass explosion hazard;
- PE3: Fire hazard and a secondary blast of projection hazard (or both), but not a mass explosion hazard; or
- PE4: Local fire hazard.

PE classifications of a PES is to be determined in conjunction with the authority having jurisdiction, for the Marathon site we have assumed a PE classification of PE1 which represents the highest hazard classification/ is the most restrictive class.

To determine minimum separation distances, the Quantity-Distances manual provides a series of tables (Q-D tables) based on each of the PE categories. Separation distances are measured from the nearest point of the PES to the nearest point of the ES along a straight line regardless of topography, barricades, or any intervening buildings or structures.

Exposed sites (ES) for a PE1 classification are divided into eight separation classes (D1 – D8) depending on the ES use and the level of protection at the ES and PES as defined in Table C.1 of the standard (See Appendix A). The most restrictive PE1 separation distance classification is D8 and is used for vulnerable buildings or infrastructure. For the purposes of this assessment, we have assumed the Victoria Dam is "vulnerable infrastructure".

TERRANE
GEOSCIENCE INC.

100 – 5435 Portland Place
Halifax, NS, B3K 2Z8
terranegeoscience.com

5.0 EXPLORATION CAMP SITE

The proposed new location of the explosive's storage site (DWG No. 1) is at the former exploration camp/temporary construction camp. The proposed PES at the former exploration camp is located approximately 2,345 m from the ES at the Victoria dam.

Marathon and their blast contractor, Dyno Nobel, are proposing to store 110,000 kg of bulk emulsion on site. The material to be stored, unsensitized bulk emulsion has a TNT equivalency rating of 75% (Dyno Nobel, personnel communication, April 27, 2023). This results in a Net Explosives Quantity (NEQ) of 0.75 x 110,000 kg or 82,500 kg to be stored at the site. Further, the emulsion to be stored on site is classified as a 1.5D class product meaning that it can only be detonated by adding both a booster and a detonator cap.

The distance requirements outlined in the standard (see Table 1 and Table C.2; Appendix A) are determined by comparing the NEQ stored on a site to the exposed site D classification. As stated above the Marathon site has been assumed to be a class D8 site and a total of 82,500 kg of NEQ will be stored on site. This results in a Q-D value of 2,000 m. Meaning that any critical infrastructure ES's must at least 2,000 m from the PES.

Table 1 – Q-D Table for PE1 – Potential Explosion Sites (adapted from CAN/BNQ, 2015)

NEQ, in kg	Quantity Distance (Q-D), in m							
	D1	D2	D3	D4	D5	D6	D7	D8
10 000	18	52	175	175	320	240	480	960
12 000	19	55	185	185	340	255	510	1 020
14 000	20	58	195	195	360	270	540	1 080
16 000	21	61	205	205	375	280	560	1 120
18 000	21	63	210	210	390	295	590	1 180
20 000	22	66	220	220	405	305	610	1 220
25 000	24	71	235	235	435	325	650	1 300
30 000	25	75	250	250	460	345	690	1 380
35 000	27	79	265	265	485	365	730	1 460
40 000	28	83	275	275	510	380	760	1 520
50 000	30	89	295	295	550	410	820	1 640
60 000	32	94	315	315	580	435	870	1 740
70 000	33	99	330	330	610	460	920	1 840
80 000	35	105	345	345	640	480	960	1 920
90 000	36	110	360	360	670	500	1 000	2 000
100 000	38	115	375	375	690	520	1 040	2 080
120 000	40	120	395	395	730	550	1 100	2 200
140 000	42	125	420	420	770	580	1 160	2 320
160 000	44	135	435	435	810	610	1 220	2 420
180 000	46	140	455	455	840	630	1 260	2 520
200 000	47	145	470	470	870	650	1 300	2 600
250 000	51	155	510	510	940	700	1 400	2 800

100 – 5435 Portland Place
Halifax, NS, B3K 2Z8
terranegeoscience.com

As a general note, all explosives storage sites across Canada are licensed through the Federal Government Explosives Regulatory Division , and location of each site is determined by Quantity-Distances Manual. The distances reported in the manual have been developed to provide a factor of safety against damage to life and property.

6.0 RISK

If we are to look at the risk of using the former exploration camp location as an explosive storage location, relative to the Victoria dam (Figure 1) the likelihood of an event would be very unlikely and the consequence would be significant. This would result in a Medium risk.

Likelihood \ Impact	Negligible	Minor	Moderate	Significant	Severe
Very Likely	Low Med	Medium	Med Hi	High	High
Likely	Low	Low Med	Medium	Med Hi	High
Possible	Low	Low Med	Medium	Med Hi	Med Hi
Unlikely	Low	Low Med	Low Med	Medium	Med Hi
Very Unlikely	Low	Low	Low Med	Medium	Medium

Figure 1 – Risk Matrix Table.

7.0 CONSLUSIONS AND RECOMMENDATIONS

Based on a review of the Quantity-Distances standard it is our opinion that an explosives storage facility located at the former exploration camp represents an appropriately low risk to the Victoria dam.

If further analysis is required advanced modelling of a potential blast accident could be performed to further confirm this.

TERRANE
GEOSCIENCE INC.

100 – 5435 Portland Place
Halifax, NS, B3K 2Z8
terranegeoscience.com

8.0 CLOSURE

We trust that this memorandum meets the needs of Marathon. Should you have any questions please do not hesitate to contact us.

Yours sincerely,

Terrane Geoscience Inc.

Greg Healy, M.Sc.E, P. Eng., P.Geo
Intermediate Geological Engineer
ghealy@terranegeoscience.com

Tony Gilman, M.Sc., P. Eng., P. Geo.
Senior Rock Mechanics Engineer
tgilman@terranegeoscience.com

LICENSED PROFESSIONAL ENGINEER
05261
Tony Gilman
SIGNATURE
6-26-23
DATE
NEWFOUNDLAND & LABRADOR

PROVINCE OF NEWFOUNDLAND AND LABRADOR
PEGNL
PERMIT HOLDER
This Permit Allows
TERRANE GEOSCIENCE INC.
To practice Professional Geoscience
in Newfoundland and Labrador.
Permit No. as issued by PEGNL V0446
which is valid for the year 2023

100 – 5435 Portland Place
Halifax, NS, B3K 2Z8
terranegeoscience.com

9.0 REFERENCES

National Standard of Canada and Bureau De Normalization Du Quebec (2015). Explosives – Quantity Distances Manual. CAN/BNQ 2910-510/2015.

Read, W.S. and Cole, L.J., (1972). The Bay d'Espoir Hydro Electric Development, Newfoundland and Labrador Power Commission, presented at the Canadian Electrical Association Engineering and operating Division Hydraulic Power Section, Montreal.

TERRANE
GEOSCIENCE INC.

100 – 5435 Portland Place
Halifax, NS, B3K 2Z8
terranegeoscience.com

APPENDIX A – Q-D Manual

APPENDIX 2D

Surface Detonation Impact on Dam

DynoConsult

Surface detonation impact on dam

Valentine Gold Project – Victoria dam
Marathon Gold Corporation
June 9, 2023

Paul P. Kuznik, P.Eng, *DynoConsult manager – Canada*
3665, boul. De la Grande Allée | Boisbriand, QC J7H 1H5
Ph: 514.292.3503 | **E:** paul.kuznik@am.dynonobel.com

DYNO®
Dyno Nobel
Groundbreaking Performance®

Contents

Introduction

It's our pleasure to present you our impact analysis report regarding the above-mentioned project. The purpose of this analysis is to establish a risk level related to a surface detonation of the emulsion storage facility and the magazine site on the adjacent NL Hydro structure – Victoria dam (earth dam and concrete spillway).

Project description

The Valentine Gold project is in its early construction stages and involves the construction of the Leprechaun and Marathon open pits including all supporting structures such as a camp and a process plant. For the pit developments, a new plant and explosives storage facilities must be constructed.

- The proposed emulsion plant is to be constructed at 2 382 m from the Victoria Dam and is to store on the inside a quantity of 110 000 kg of un-gassed or unsensitized bulk emulsion.
- The magazines are to be located at 1 929 m from the Victoria Dam and are to store a quantity of 10 000 kg of packaged explosives.

Figure 1 presents a plan of proposed plant and magazine site including the dam location and their relative distances.

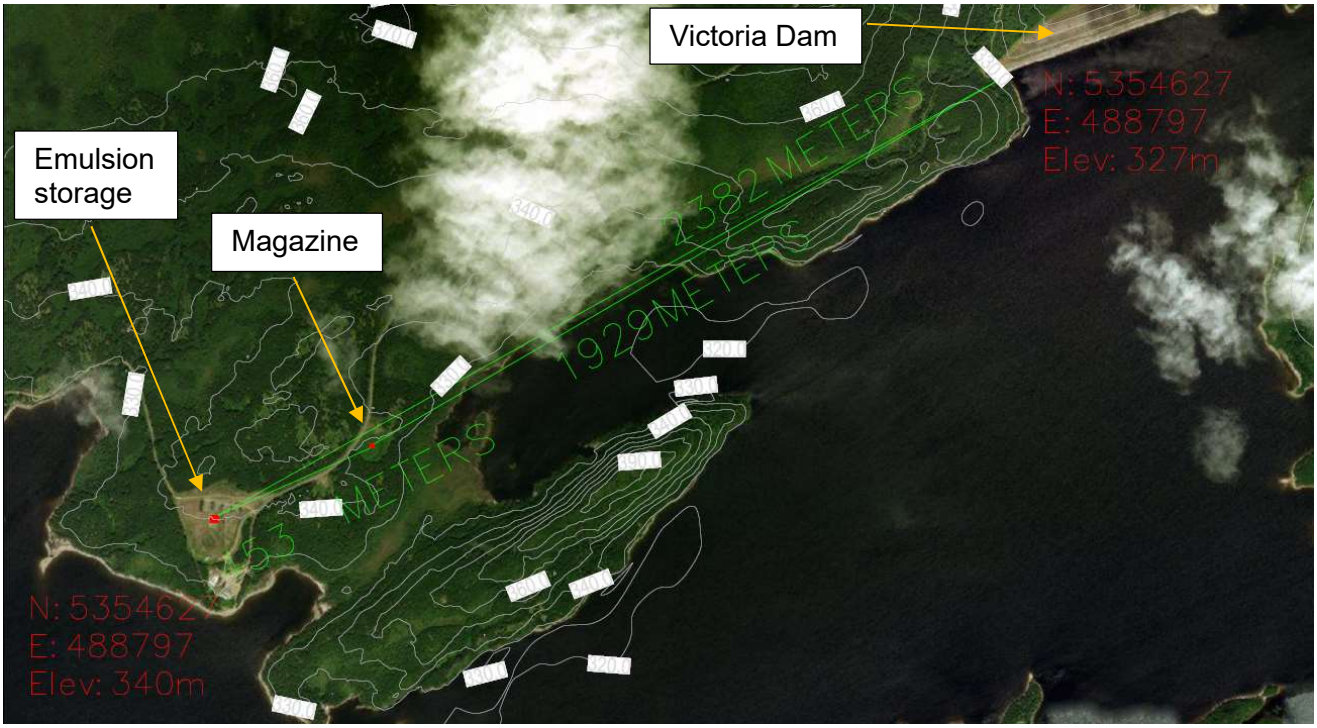

Figure 1: Valentine Gold project – proposed storage site and Victoria Dam location.

Recommended vibration and air overpressure limits

Based on all provided documentation; 2020 blast impact assessment by Golder Associates Ltd. titled, *Marathon Gold Corporation, Valentine Gold Project, Blast Impact Assessment*, 2022 memorandum on blast monitoring and data review by Terrane Geoscience inc. titled, *Valentine Gold Project – Monitoring of Ground Acceleration and Blasting Impacts on the Victoria Dam, NL* and 2022 e-mail including written comments from NL Hydro Engineering Services titled *Meeting Next Week - July 27th*, the proposed recommended vibrations limits for the Victoria Dam are:

Table 1: Recommended vibration limits

Consultant / owner	Maximum threshold (mm/s)	Trigger point (mm/s)
Golder Associates Ltd	50	35
Terrane Geoscience inc.	50	35
NL Hydro	20 to 25	14 to 17.5

The above-mentioned documentation does not include any information regarding maximum allowable air overpressure. Available literature indicates that same as with ground vibrations, air overpressure can produce structure rattling and, in extreme cases, cracking and other damage. In contrast to ground vibration, air overpressure is relatively ineffective at producing whole-structure or racking-type responses in small structures such as homes. In terms of racking response, an air overpressure of about 145 dB(L) is equivalent to a ground vibration of 12.7 mm/s in the structure resonance range of 4–12 Hz. Most of the studies reported by Siskind et al. concluded that an impulsive-event sound level of 140 dB(L) represents a reasonable threshold for glass or plaster damage. A similar value is proposed by Pompetzki, where he equates the German threshold for glass or plaster damage of 0.6 kN/m^2, according to DIN 1055 (4), with a maximum level of 143 dB(L).

Conventional noise criteria (for steady-state noise sources) and limits established for repetitive impulsive noise (such as for shooting ranges) do not apply to air overpressure from blasting. The US Bureau of Mines' RI 8485 and the regulations issued by the US Office of Surface Mining and Reclamation Enforcement specify a safe overpressure of 133 dB(L) for impulsive air overpressure when recording is accomplished with equipment having a frequency range response of at least 2–200 Hz. They further reported that an impulsive event sound level of 140 dB(L) represents a reasonable threshold for glass and plaster damage. Damage risk to structures, other than cosmetic plaster cracks and glass breaking, has not been of interest to air overpressure researchers because of the extremely high overpressures required (175 dB(L) or more) and the non-existence of such overpressure under typical blasting situations.

Based on the above-mentioned studies, an unplanned surface detonation of emulsion storage and/or magazine site, is not a typical blast that can generate similar effects but behaves in a very different way. The above-mentioned values are associated with structures such as homes and do not apply to an earth structure that by design is engineered to withstand great forces from all directions. Additionally, given a surface detonation, site topography, distance and other factors contribute to dissipation of those pressures. Due to lack of specific data, we will compare the surface detonation and verify how it compares to a maximum value of 175 dB(L).

Predicted vibration and air overpressure levels

As of today, there is limited site-specific information that can be used to confidently predict future vibration levels. Many factors come into play, but as Golder Associates Ltd. suggested, the proposed attenuation model can be predicted using the following equation:

$$PPV = 1140\left(\frac{D}{\sqrt{W}}\right)^{-1.60}$$

For an average free face conditions in typical confinement environment, the proposed site-specific constant K of 1140 should be considered as a conservative value. Considering a surface detonation of an un-gassed bulk emulsion that is not confined and doesn't detonate at its peak because it is not sensitized, we suggest using a lower K value for predicted vibration calculation.

When we use the maximum explosive quantity of 110 000 kg at a distance of 2 382 m from the earth dam, using the above-mentioned equation, we can estimate that the predicted vibration level at the Victoria Dam would be 49 mm/s. Now as indicated above, an unconfined charge of unsensitized product will not generate the same values as a typical confined, good quality explosive. Based on our in-field testing of a surface detonation in the province of Quebec, we have determined that a reduction of K factor in the range of 63% should be used (K = 425). Therefore, the vibration estimate should be closer to **18 mm/s**. All these values are lower than the proposed limits provided by Golder Associates Ltd, Terrane Geoscience inc. and NL Hydro.

Regarding a maximum quantity of explosives of 10 000 kg that can be stored in the magazines, following the same analogy as noted above, we can estimate to reach values of **3.7 mm/sec**. These values are lower than the limits proposed by all.

It is to be noted that the appropriate site ground factors should be established following the first test blasts and introduced to the appropriate vibration prediction formulas, in order to better predict future blasts and avoid adverse effects.

Concerning air overpressure, various equations are available for predictions. We chose to use 2 different ones to get a better understanding of the possible impact on the Victoria dam. One equation comes from Perkins for an open air, no confinement blast. Second is the USBM RI 8485 equation for metal mines. Both these equations allow us to predict an air overpressure of 158 dB(L) or 133 dB(L) respectively, using a maximum load of 110 000 kg at a distance of 2 382 m. For a maximum load of 10 000 kg at a distance of 1 929 m, we estimate 151 dB(L) and 129 dB(L) respectively. All these values are lower than the noted maximum value of 175 dB(L) and slightly higher than a limit for reasonable threshold for glass and plaster damage. Since the Victoria Dam does not compare to those limits, we can conclude that a maximum value of **158 dB(L)** is not damageable to the earth dam.

Quantity-distance Principles validation

As a secondary validation, we looked into using the Quantity-Distance Principles to determine the risk level and safe distances from any exposed site (building, road, power lines, etc.) in case of a surface detonation of the emulsion storage facility as well as the magazine. Considering the risk of mass explosion and using the maximum stored quantities mentioned in the project description of this report, we can assume that a D8 classification needs to be considered. Based on provided explosive quantities, safe distances for D8 classification are 960 m and 2 200 m respectively from the source of explosion.

This allows us to conclude the following:

- Non-reinforced structures will only suffer superficial damage
- Large, exposed glass surfaces may break in a proportion of 50% or more
- A high degree of protection against fatality and injuries is offered for personnel. All injuries will only be caused by glass fragments

Consequently, there are no risks for the earth dam if the storage facilities would be to detonate on the surface with maximum quantities stored within them.

Conclusions

Based on a review of available data using empirical common guidelines, known equations and similar smaller scale in-field testing, it is our conclusion that in the case of an unplanned detonation of the emulsion storage facility and/or magazine site, there is no risk for the Victoria dam. This includes all damage coming from ground vibration and air overpressure generated by the surface detonation.

We trust this summary report is to your satisfaction and meets your present requirements. Please do not hesitate to contact us, should any questions arise.

Sincerely,

Paul P. Kuznik, P.Eng
DynoConsult Manager – Canada
paul.kuznik@am.dynonobel.com
Mobile: 514-292-3503

APPENDIX 2E

Mitigation Measures - Approved Project and Project Expansion

Table 1 Summary of Mitigation Measures from the Approved Project

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
	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.	✓	-	-	S. 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).	✓	-	-	S. 8.4 S. 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.	✓	-	-	S. 7.4 S. 8.4 S. 9.4

Table 1 Summary of Mitigation Measures from the Approved Project

Category	Mitigation	C	O	D	EIS Section Reference
Site Clearing, Site Preparation and Erosion and Sediment Control	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.	✓	-	-	S. 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.	✓	-	-	S. 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.	✓	-	-	S. 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.	✓	-	-	S. 8.4
	Merchantable timber will be salvaged and used, or it will be made available to local communities for fuelwood.	✓	-	-	S. 9.4 S. 16.4
	Construction materials (soils and rock) will not be sourced from locations known to contain invasive plant species.	✓	-	-	S. 9.4
	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.	✓	-	-	S. 9.4 S. 10.4 S. 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.	✓	-	-	S. 9.4
	Grading will be directed away from wetlands, where possible, and will be reduced within wetland boundaries unless required for site specific purposes.	✓	-	-	S. 9.4
	Ground level cutting / mowing / mulching of wetland vegetation will be conducted instead of grubbing, where practicable.	✓	-	-	S. 9.4

Table 1 Summary of Mitigation Measures from the Approved Project

Category	Mitigation	C	O	D	EIS Section Reference
Site Clearing, Site Preparation and Erosion and Sediment Control	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	✓	-	-	S. 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.	✓	✓	-	S. 8.4 S. 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.	✓	✓	✓	S. 16.4 S. 17.4
	Movement of equipment / vehicles will be restricted to defined work areas and roads, and specified corridors between work areas.	✓	✓	✓	S. 8.4 S. 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.	✓	✓	✓	S. 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.	✓	✓	-	S. 9.4
Soil Management	During excavation, organic and mineral topsoil will be separated from cleared trees and brush and stored for future use during rehabilitation.	✓	-	-	S. 9.4
	Care will be taken to reduce topsoil and subsoil mixing during excavation.	✓	-	-	S. 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.	✓	-	-	S. 9.4
	Organic and mineral topsoil will be stored and kept separate from subsoil or rock material used for construction.	✓	✓	-	S. 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.	✓	✓	-	S. 8.4 S. 9.4

Table 1 Summary of Mitigation Measures from the Approved Project

Category	Mitigation	C	O	D	EIS Section Reference
Soil Management	Topsoil and organics will be stored in stable piles to decrease compaction effects.	✓	✓	-	S. 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.	✓	✓	-	S. 9.4
	Longer term stockpiles will be seeded to reduce erosion due to wind and precipitation.	✓	✓	-	S. 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 RCP.	✓	✓	✓	S. 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.	✓	✓	✓	S. 6.4 S. 8.4 S. 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.	✓	-	-	S. 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.	✓	-	-	S. 8.4
	Waste material (i.e., organic waste material, waste rock or construction debris) material will be stabilized or contained.	✓	✓	✓	S. 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.	✓	-	✓	S. 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.	✓	-	-	S. 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.	✓	-	-	S. 8.4

Table 1 Summary of Mitigation Measures from the Approved Project

Category	Mitigation	C	O	D	EIS Section Reference
Works In or Near Fish Habitat	Use of explosives in or near water will be avoided, however, if required, will follow DFO blasting guidelines.	✓	-	-	S. 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.	✓	-	-	S. 8.4
	Fish screens and/or other barriers will be installed and maintained to prevent fish from entering water withdrawal intakes.	✓	✓	✓	S. 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.	✓	✓	-	S. 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.	✓	✓	-	S. 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.	✓	✓	-	S. 19.4 S. 20
	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 (NL DECC).	✓	✓	-	S. 19.4
	Blasting activities will be limited to only those areas required to achieve foundation grades for site development or open pit pioneering.	✓	-	-	S. 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.	✓	✓	-	S. 19.4
	Engagement with NL Hydro regarding blasting requirements, timing, vibration thresholds and monitoring	✓	✓	-	S. 19.4

Table 1 Summary of Mitigation Measures from the Approved Project

Category	Mitigation	C	O	D	EIS Section Reference
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.	✓	✓	✓	S. 5.4 S. 8.4 S. 9.4 S. 10.4
	The application of dust suppressants other than water to roads as an alternative option to watering will be considered in consultation with NLDECC. 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 NLDECC prior to application. These suppressants, if required, will be applied, as per the manufacturer's recommendations.	✓	✓	✓	S. 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.	✓	✓	✓	S. 5.4
	When loading stockpiles, drop heights will be reduced to be as close to the pile as possible.	✓	✓	-	S. 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.	✓	✓	-	S. 5.4 S. 9.4
	Conveyors will be covered to reduce fugitive dust emissions.	-	✓	-	S. 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	-	✓	-	S. 5.4

Table 1 Summary of Mitigation Measures from the Approved Project

Category	Mitigation	C	O	D	EIS Section Reference
Air Emissions	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.	✓	✓	✓	S. 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	✓	✓	✓	S. 5.4
	Vehicles and heavy equipment will be maintained in good working order and will be equipped with appropriate mufflers to reduce noise.	✓	✓	✓	S. 5.4 S. 10.4 S. 11.4 S. 12.4
	Haul roads and infrastructure will be designed to reduce transportation and haul distances where possible.	✓	✓	-	S. 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.	✓	✓	✓	S. 7.4 S. 8.4 S. 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.	✓	✓	✓	S. 9.4 S. 10.4 S. 11.4
	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.	✓	✓	✓	S. 5.4 S. 10.4 S. 11.4 S. 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	✓	✓	✓	S. 11.4 S. 12.4

Table 1 Summary of Mitigation Measures from the Approved Project

Category	Mitigation	C	O	D	EIS Section Reference
Vehicles / Equipment / Roads	Project-related air traffic (helicopter, airplane) will maintain a minimum ferrying altitude of 500 m to the extent feasible.	✓	✓	✓	S. 11.4 S. 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.	✓	✓	✓	S. 10.4 S. 11.4 S. 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.	✓	✓	✓	S. 10.4 S. 11.4 S. 12.4 S. 16.4 S. 17.4
	Project vehicles will be driven by trained and competent drivers who will use approved routes.	✓	✓	✓	S. 21.5.6
	Driving safety will be a part of the employee orientation program.	✓	✓	✓	S. 21.5.6
	Highway laws will be obeyed, including seasonal weight restrictions, speed limits, traffic signage and requirements for permit for oversized loads.	✓	✓	✓	S. 21.5.6
	Project vehicles will be manually inspected on a regular schedule to confirm serviceability	✓	✓	✓	S. 21.5.6
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.	✓	✓	✓	S. 5.4 S. 10.4 S. 11.4 S. 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.	✓	✓	✓	S. 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.	✓	✓	✓	S. 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.	✓	✓	✓	S. 5.4 S. 10.4 S. 11.4 S. 12.4
	Full cut-off luminaires will be used wherever practicable to reduce glare, light trespass and sky glow from Project lighting.	✓	✓	✓	S. 5.4

Table 1 Summary of Mitigation Measures from the Approved Project

Category	Mitigation	C	O	D	EIS Section Reference
Noise Emissions	Project facilities and infrastructure will be designed to limit noise emissions.	-	✓	-	S. 5.4 S. 10.4 S. 11.4 S. 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.	✓	✓	-	S. 5.4 S. 12.4 S. 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.	✓	✓	✓	S. 6.4 S. 8.4 S. 9.4
	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.	✓	✓	✓	S. 7.4 S. 8.4
	Existing drainage patterns will be maintained to the extent feasible with the use of culverts and bridges.	✓	✓	-	S. 7.4 S. 8.4 S. 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.	✓	-	-	S. 7.4
	Project water storage features (i.e., sedimentation ponds) will be used to attenuate peak discharges to the environment.	✓	✓	✓	S. 7.4 S. 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.	✓	-	-	S. 6.4
	Water management ditches will be designed to allow wildlife crossing opportunities, aligned with wildlife trails where practicable.	✓	✓	✓	S. 11.4 S. 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.	✓	✓	-	S. 8.4

Table 1 Summary of Mitigation Measures from the Approved Project

Category	Mitigation	C	O	D	EIS Section Reference
Site Water Management	Site ditching will be designed to reduce erosion and sedimentation through use of rock check dams, silt fences, plunge pools, and grading as appropriate.	✓	✓	✓	S. 8.4 S. 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.	✓	✓	-	S. 8.4
	Culverts will be inspected periodically to remove accumulated material and debris upstream and downstream of the culverts.	✓	✓	✓	S. 7.4 S. 8.4 S. 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.	✓	✓	-	S. 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.	✓	✓	✓	S. 6.4 S. 7.4 S. 8.4
	Where possible, contact water will be recycled for use on-site (e.g., dust suppression).	✓	✓	✓	S. 7.4
	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.	✓	✓	✓	S. 7.4 S. 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.	-	-	✓	S. 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.	-	✓	-	S. 7.4 S. 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.	✓	✓	✓	S. 7.4 S. 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.	✓	✓	✓	S. 7.4 S. 8.4

Table 1 Summary of Mitigation Measures from the Approved Project

Category	Mitigation	C	O	D	EIS Section Reference
Site Water Management	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.	✓	✓	✓	S. 7.4 S. 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.	✓	✓	✓	S. 7.4 S. 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).	✓	✓	✓	S. 7.4 S. 8.4
	Effluent discharge rates will be maintained to below the highest rate used in the Assimilative Capacity Assessment (Appendix 7C).	✓	✓	✓	S. 7.4 S. 8.4
	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.	✓	✓	✓	S. 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.	✓	✓	✓	S. 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	✓	✓	✓	S. 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.	✓	✓	✓	S. 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.	✓	✓	✓	S. 21.5.1

Table 1 Summary of Mitigation Measures from the Approved Project

Category	Mitigation	C	O	D	EIS Section Reference
Tailings Management	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).	-	✓	✓	S. 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.	-	✓	✓	S. 7.4 S. 21.5.1
	The TMF closure spillway will be upgraded to meet closure requirements developed during detailed design.	-	-	✓	S. 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.	-	✓	-	S. 5.4
	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.	✓	✓	✓	S. 7.4 S. 8.4
	Shallow groundwater seepage from the TMF will be intercepted by seepage collection ditches and pumped back to the TMF via sump pumps.	✓	✓	✓	S. 6.4 S. 7.4 S. 8.4
	Contact and process water from the TMF will be recycled for ore processing to the extent possible.	-	✓	-	S. 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.	-	✓	✓	S. 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.	-	✓	-	S. 6.4 S. 8.4 S. 10.4 S. 11.4 S. 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.	-	✓	-	S. 7.4 S. 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.	-	✓	✓	S. 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.	✓	✓	✓	S. 21.5.1

Table 1 Summary of Mitigation Measures from the Approved Project

Category	Mitigation	C	O	D	EIS Section Reference
Tailings Management	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.	-	✓	-	S. 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.	-	✓	-	S. 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.	✓	✓	✓	S. 12.4
	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.	✓	✓	✓	S. 9.4 S. 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.	✓	✓	✓	S. 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.	✓	✓	-	S. 7.4 S. 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.	✓	-	-	S. 7.4 S. 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.	-	✓	-	S. 8.4 S. 21.5.3
	Sumps and sump pumps will be installed in reagent storage areas for spillage control.	-	✓	-	S. 21.5.3
	Appropriate ventilation, fire and safety protection, eyewash stations, and Safety Data Sheet stations will be located throughout storage facilities for reagents.	-	✓	-	S. 14.4 S. 21.5.3

Table 1 Summary of Mitigation Measures from the Approved Project

Category	Mitigation	C	O	D	EIS Section Reference
Materials Handling and Waste Management	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.*	✓	✓	✓	S. 5.4 S. 8.4 S. 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.	✓	✓	✓	S. 8.4 S. 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.	✓	✓	✓	S. 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*	✓	✓	✓	S. 21.5.3
	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.	✓	✓	✓	S. 8.4 S. 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.	✓	✓	✓	S. 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 NL Department of Fisheries, Forestry and Agriculture-Wildlife Division (NLDFFA-Wildlife Division) and potentially developed under an adaptive management approach as described in S. 11.9.	✓	✓	✓	S. 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.	✓	✓	✓	S. 11.4 S. 12.4

Table 1 Summary of Mitigation Measures from the Approved Project

Category	Mitigation	C	O	D	EIS Section Reference
Wildlife / Avifauna Management	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).	✓	✓	✓	S. 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.	✓	✓	-	S. 11.4
	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.	✓	✓	✓	S. 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.	✓	✓	✓	S. 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.	✓	✓	✓	S. 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.	✓	✓	✓	S. 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.	✓	✓	-	S. 11.4
	Observations of bat colonies, potential hibernacula sites, sick or dead bats will be reported to NLDFFA-Wildlife Division at 709-637-2025. Bat sightings can also be reported to the toll-free bat hotline: 1-833-434-2287 (BATS).	✓	✓	✓	S. 12.4
Wildlife / Avifauna Management	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.	✓	-	-	S. 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	✓	✓	✓	S. 12.4

Table 1 Summary of Mitigation Measures from the Approved Project

Category	Mitigation	C	O	D	EIS Section Reference
	to remain, NLDFFA-Wildlife Division will be contacted to develop an approved removal plan.				
	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.	✓	✓	✓	S. 12.4
	Use of sticky traps for problem rodents will be avoided, as bats are often attracted to these.	✓	✓	✓	S. 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.	✓	-	-	S. 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.	✓	-	-	S. 12.4
	Pets will be prohibited on site.	✓	✓	✓	S. 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.	✓	✓	✓	S. 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.	✓	-	-	S. 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.	✓	✓	✓	S. 10.4
Wildlife / Avifauna Management	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.	✓	✓	✓	S. 10.4 S. 16.4
	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.	✓	✓	-	S. 10.4

Table 1 Summary of Mitigation Measures from the Approved Project

Category	Mitigation	C	O	D	EIS Section Reference
	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.	✓	✓	-	S. 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.	✓	✓	✓	S. 8.4 S. 11.4 S. 12.4 S. 16.4 S. 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.	✓	✓	✓	S. 13.4 S. 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	✓	✓	✓	S. 13.4 S. 14.4 S. 17.4
	Marathon will provide an Employee Assistance Program to Project personnel.	✓	✓	✓	S. 13.4 S. 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.	✓	✓	✓	S. 13.4 S. 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.	✓	✓	✓	S. 13.4
Employment and Expenditures	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.	✓	✓	✓	S. 11.4 S. 16.4 S. 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.	✓	✓	✓	S. 13.4
	A Gender Equity and Diversity Plan will be implemented that meets the approval of the Minister of the Department of Industry, Energy and Technology (DIET) and Minister Responsible for the Status of Women and Marathon will engage with both Indigenous	✓	✓	✓	S. 14.4 S. 15.4 S. 17.4

Table 1 Summary of Mitigation Measures from the Approved Project

Category	Mitigation	C	O	D	EIS Section Reference
	groups during the development of the Plan. A business access strategy for members of underrepresented populations will be included in the plan.				
	A Benefits Agreement will be implemented that meets the approval of the Minister of DIET and Minister Responsible for the Status of Women.	✓	✓	✓	S. 14.4 S. 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.	✓	✓	✓	S. 14.4 S. 15.4 S. 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.	✓	✓	✓	S. 15.4
	On-the-job training programs and apprenticeship opportunities will be made available.	✓	✓	✓	S. 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.	✓	✓	✓	S. 15.4
	Procurement packages will be developed with consideration for capacity and capabilities of local and regional Indigenous and non-Indigenous businesses.	✓	✓	✓	S. 14.4 S. 15.4 S. 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.	✓	✓	✓	S. 15.4
Site Facilities and Services	An accommodations camp will accommodate construction, operation and closure workers.	✓	✓	✓	S. 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.	✓	✓	✓	S. 13.4
	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.	✓	✓	✓	S. 12.4 S. 13.4
	Security services will be established on-site.	✓	✓	✓	S. 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.	✓	✓	✓	S. 13.4 S. 14.4

Table 1 Summary of Mitigation Measures from the Approved Project

Category	Mitigation	C	O	D	EIS Section Reference
	Marathon will implement COVID-19 protocols as necessary.	✓			S. 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.	✓	✓	✓	S. 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.	✓	✓	✓	S. 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.	✓	✓	-	S. 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.	✓	-	-	S. 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.	✓	✓	✓	S. 16.4
Engagement with Stakeholders, Indigenous Groups and the Public	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.	✓	✓	✓	S. 16.4 S. 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.	✓	✓	✓	S. 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	✓	-	-	S. 17.4

Table 1 Summary of Mitigation Measures from the Approved Project

Category	Mitigation	C	O	D	EIS Section Reference
	activities, to consider this early and throughout Project planning, design and implementation.				
	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.	✓	✓	✓	S. 13.4
Rehabilitation and Closure	Marathon will develop a Rehabilitation and Closure Plan (RCP) that meets the requirements of NLDIET, NLDECC, and NLDFFA-Wildlife Division. The plan will be reviewed and updated regularly until implemented.	✓	✓	✓	S. 8.4 S. 9.4 S. 10.4 S. 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.	✓	✓	✓	S. 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.	✓	✓	✓	S. 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.	-	✓	✓	S. 6.4 S. 7.4 S. 9.4
Rehabilitation and Closure	Measures will be taken to address public health and safety requirements throughout rehabilitation and closure.	✓	✓	✓	S. 15.4 S. 16.4
	Desired land and resource end-uses will be considered in the preparation of the RCP.	-	-	✓	S. 16.4 S. 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.	-	-	✓	S. 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.	-	-	✓	S. 11.4 S. 12.4

Table 1 Summary of Mitigation Measures from the Approved Project

Category	Mitigation	C	O	D	EIS Section Reference
	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.	-	-	✓	S. 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.	-	-	✓	S. 8.4 S. 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.	-	-	✓	S. 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.	-	-	✓	S. 7.4 S. 8.4
	Open pit filling will be accelerated at closure, which will return groundwater levels to baseline conditions in a shorter timeframe.	-	-	✓	S. 6.4
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.	✓	✓	✓	S. 13.4
	Mandatory safety orientations will be provided for employees.	✓	✓	✓	S. 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.	✓	✓	✓	S. 13.4
	Appropriate project personnel will be trained in fuel handling, equipment maintenance and fire prevention and response measures.	✓	✓	✓	S. 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.	✓	✓	✓	S. 13.4

Table 1 Summary of Mitigation Measures from the Approved Project

Category	Mitigation	C	O	D	EIS Section Reference
	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.	✓	✓	✓	S. 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. 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.	✓	-	-	Section 18.4
Discovery and Protection of Heritage Resources	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.	✓	-	-	S. 17.4

Table 1 Summary of Mitigation Measures from the Approved Project

Category	Mitigation	C	O	D	EIS Section Reference
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.	✓	✓	✓	S. 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.	✓	✓	✓	S. 22.3.1
	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.	✓	✓	✓	S. 22.3.1
	Work activities will include allowance / procedures for delays due to poor weather.	✓	✓	✓	S. 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.	✓	✓	✓	S. 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.	✓	✓	✓	S. 22.3.1
Effects of the Environment on the Project – Weather and Climate Change	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.	✓	✓	✓	S. 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.	✓	✓	✓	S. 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.	✓	✓	✓	S. 22.3.2
	Implementation of site-specific erosion and sedimentation control plans that will be developed during detailed design phase of the Project.	✓	✓	✓	S. 22.3.2

Table 1 Summary of Mitigation Measures from the Approved Project

Category	Mitigation	C	O	D	EIS Section Reference
	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.	✓	-	-	S. 22.3.2
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.	✓	✓	✓	S. 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.	✓	✓	✓	S. 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.	✓	✓	✓	S. 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.	✓	✓	✓	S. 22.3.3

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

Table 2 Additional Mitigation Measures Committed to by Marathon During the Review of the Valentine Gold EIS (Through Information Requirements and Amendments)

Category	Mitigation	C	O	D
Site Clearing, Site Preparation and Erosion and Sediment Control	Removal of vegetation, where required, will be scheduled outside the migratory bird breeding season to the extent practicable.	✓	-	-
	If vegetation clearing is required during the migratory bird breeding season, experienced environmental monitors will inspect the areas to assess occupancy before removal; 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.	✓	-	-
	If active nests are found, appropriate buffers/setback distances from nests will be established and remain in place until fledging has occurred.	✓	-	-
	Trees that provide actual or potential avifauna habitat will be retained where safe to do so and technically feasible, including retention of snags or tall isolated trees that are potential habitat for Olive-sided Flycatcher and other migratory species.	✓	-	-
	Identifying sensitive avifauna areas prior to construction and flagging and maintaining appropriate buffers around these areas, where feasible.	✓	-	-
	In practice not all vegetation will be cleared within the mine site, and Marathon has committed to limiting the Project footprint and cleared areas to the extent practicable.	✓	-	-
	The boundaries of areas to be cleared will be well marked prior to the start of clearing activities.	✓	-	-
	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.	✓	-	-
	Merchantable timber will be salvaged and used, or it will be made available to local communities for fuelwood.	✓	-	-
	Ground level cutting / mowing / mulching of wetland vegetation will be conducted instead of grubbing, where practicable.	✓	-	-
	Marathon will not use the gabbro unit as construction rock.	✓	-	-
	Potentially acid generating (PAG) rock will not be used in construction.	✓	-	-
	Non-PAG metasedimentary rock, excavated from the south end of each pit, will be used for construction.	✓	-	-
	Fill materials used throughout the life of the mine will be sourced locally when possible, which will reduce the probability of import or further spread of potentially invasive plant species.	✓	✓	✓
	Marathon will preferentially mill PAG ore and stockpile non-PAG ore.	✓	✓	✓

Table 2 Additional Mitigation Measures Committed to by Marathon During the Review of the Valentine Gold EIS (Through Information Requirements and Amendments)

Category	Mitigation	C	O	D
Site Clearing, Site Preparation and Erosion and Sediment Control	PAG and non-PAG materials will be blended, and the blended material will be encapsulated with non-PAG rock within the waste rock piles.	✓	✓	✓
	The planned mitigation for PAG waste rock will be to properly encapsulate/blend these materials within the waste rock pile to prevent acid generation long-term.	✓	✓	✓
	If in the later years of operation, mined PAG waste cannot be properly encapsulated/blended within the waste rock pile, the excess of PAG material will be stockpiled separately (with drainage management) and moved back to the pit for closure. In the event this scenario develops, the most likely option for the temporary storage of the PAG waste rock (that cannot be properly encapsulated/blended) is at a designated location on the waste rock pile. Secondary options for temporary storage, expected to be only two to three years (maximum), may include material stockpile areas that are no longer required (e.g., if sufficient low-grade ore has been processed to create space on the pad) or expansion of an existing stockpile area specifically for this purpose, noting waste rock generated in the later years of mining operations are significantly lower.	✓	✓	✓
	All of the boreholes within the open pits will be removed; the boreholes within the footprint of the waste rock pile, overburden stockpile and low-grade ore stockpiles will be decommissioned.	✓	-	-
	Efforts will be made to locate open exploration boreholes within the footprints of these facilities prior to construction and decommission them to eliminate pathways for contaminants from these features to enter groundwater.	✓	-	-
Soil Management	Soil stockpiles will be constructed and maintained in lifts to achieve flatter slopes and to permit benching.	✓	✓	-
	If soil removal from a stockpile during the breeding season has resulted in a vertical or near-vertical face, the vertical face will be knocked down with an excavator to make it unattractive to swallows.	✓	✓	-
	If a nest is found during soil stockpile development, this area (plus buffer) of the stockpile will be avoided until fledging has occurred; drawing down of soil stockpiles for progressive and ultimate rehabilitation will occur outside of breeding bird season, to the extent practicable.	✓	✓	-
Works In or Near Fish Habitat	Marathon will be completing additional baseline aquatic data collection in 2021, including Valentine Lake and Victoria Lake Reservoir. Ouananiche and brook trout will be collected using established standardized sampling techniques. Aging structures (i.e., otoliths) will be collected and length, weight, and sex determined. Data will be analyzed for size (weight, length) at age.	✓	-	-
	Marathon will monitor for changes over time in fish populations, fish tissue, and benthic invertebrate communities, as required by the Metal and Diamond Mining Effluent Regulations.	✓	✓	✓
	A Fish Habitat Offsetting Plan is being developed in consultation with DFO and will be implemented to offset the residual loss of fish habitat resulting from the Project after avoidance and mitigation have been applied.	✓		
Works In or Near Fish Habitat	Marathon will continue to consult with DFO regarding the selection of an offsetting project and development of the associated plan to counterbalance HADD of fish habitat resulting from the Project.	✓	-	-

Table 2 Additional Mitigation Measures Committed to by Marathon During the Review of the Valentine Gold EIS (Through Information Requirements and Amendments)

Category	Mitigation	C	O	D
	Water quality sampling will continue to be conducted on Victoria Lake Reservoir, Valentine Lake and Victoria River in the spring, summer and fall of 2021 to continue to document baseline conditions in the ultimate receivers.	✓	-	-
	The results of the additional water quality sampling would be made available to Environment and Climate Change Canada through the environmental effects monitoring program under the Metal and Diamond Mining Effluent Regulations.	✓	-	-
	Marathon will undertake baseline environmental effects monitoring (EEM) sediment monitoring in 2021 and will continue sediment monitoring in keeping with EEM requirements under MDMER throughout mine life.	✓	✓	✓
	As required under Metal and Diamond Mining Effluent Regulations (MDMER), further sediment samples will be collected in depositional sedimentation exposure areas in effluent mixing zones and in reference areas to support environmental effects monitoring (EEM) for benthic invertebrate communities.	✓	✓	✓
Blasting	During bird breeding season, blasting will occur outside of the prominent bird singing / calling and activity period of sunrise to approximately 9:30 am.	✓	✓	-
Vehicles / Equipment / Roads	The Traffic Management Plan will include standard mitigation to protect pedestrians in the communities of Millertown and Buchans Junction, and in other communities where Project-related traffic will occur.	✓	✓	✓
	Marathon will work closely with nearby communities to review and revise procedures should concerns arise or if issues are identified regarding traffic management.	✓	✓	✓
	Employees and contractors will be required to review and follow procedures within the Traffic Management Plan.	✓	✓	✓
	A shuttle bus system will be used, with pick-up and drop off times scheduled to occur earlier than the existing observed a.m. peak hour for local traffic and later than the observed p.m. peak hour, if needed.	✓	✓	✓
	The use of fog lights, high beams, and compression or engine brakes will be reduced to the extent possible when driving through communities.	✓	✓	✓
	Environmental protection plans/environmental management plans that describe mitigation measures to address potential impacts to human health (including the Traffic Management Plan; refer to Marathon's response to DHCS-06 for key mitigation) will be provided to applicable regulators for review.	✓	✓	✓
Light Emissions	To the extent feasible without affecting safe mine operations, exterior lighting will be reduced and/or have limited time of operation during sensitive wildlife periods (e.g., migration).	✓	✓	✓
	Permanent lighting at the tailings management facility (TMF) and polishing pond will be minimal, as it is only needed for specific infrastructure (e.g., decant pump, water treatment plant), reducing the attractiveness of these water features to avifauna.	-	✓	-
	With the proposed mitigation and proper light design that incorporates guidance from IES and CIE, the levels of light emissions (light trespass and glare) will be maintained at levels representative of rural areas beyond the Project Area.	✓	✓	✓

Table 2 Additional Mitigation Measures Committed to by Marathon During the Review of the Valentine Gold EIS (Through Information Requirements and Amendments)

Category	Mitigation	C	O	D
Site Water Management	Real-time groundwater monitoring stations will be installed downgradient of the TMF dam, at shallow and deep monitoring stations.	✓	-	-
	Additional monitoring wells will be installed downgradient of the waste rock piles and Tailings Management Facility prior to the development of the Project to characterize the water quality and water levels downgradient of the Project.	✓	-	-
	Criteria for altering the pumping rate would be developed in consultation with regulators to protect flows and water levels as required and reduce potential effects on fish and fish habitat.	-	✓	-
	The Water Management Plan will be updated as needed to reflect final detailed Project design.	✓	✓	✓
	The Water Management Plan will include adaptive management processes which will set trigger thresholds for mitigation measures, and clear and well-defined thresholds, as defined in regulatory permitting, as to when regulatory and stakeholder notification and engagement is required.	✓	✓	✓
	Marathon will update the water quality model upon completion of the additional static tests and analysis of the first full year of field bin testing (started in Sept 2020).	✓	✓	-
	Marathon will update the water quality model, including the requested sensitivity analysis, upon completion of the ARD block model for Marathon pit and analysis of the first full year of field bin testing.	✓	✓	-
	Contact water will be collected and monitored during operation and treated, if required (adaptive management).	-	✓	-
	Water quality predictions will be updated based on available results of kinetic tests, if required.	✓	✓	-
	Marathon will provide the above information and analysis to regulators, including NRCan, for review and comment via the proposed ARD/ML Management Plan. This plan will be a living document and will continue to be updated as required as additional ARD/ML information is obtained through the construction and operation phases of the Project.	✓	✓	-
Tailings Management	Monitoring would be required following a TMF failure and could include delineation of extent of physical tailings, plume delineation, tailings depth, surface and ground water quality, soil and sediment quality, physical fish habitat characteristics, benthic invertebrate community composition, fish tissue studies, fish population studies, and toxicity to aquatic organisms.	-	✓	-
	In the case of a TMF failure, the follow-up monitoring program would continue until it was determined that the remediation strategies undertaken had performed as anticipated, in consultation with appropriate regulators.	-	✓	-
	The tailings and sedimentation ponds will not contain fish, and the continuous deposition of tailings (in the TMF pond) will limit the likelihood that invertebrates will be present within the TMF. Similarly, routine maintenance (clearing out of sediment build-up) in the sedimentation ponds will reduce the potential presence of invertebrates.	-	✓	-
	Embankments of the TMF and polishing pond will be maintained free of vegetation, limiting the attraction of waterfowl and/or wildlife to these ponds for foraging or breeding.	✓	✓	-

Table 2 Additional Mitigation Measures Committed to by Marathon During the Review of the Valentine Gold EIS (Through Information Requirements and Amendments)

Category	Mitigation	C	O	D
	If problematic avifauna use of the Tailings Management Facility (TMF) is observed, adaptative management measures will be implemented.	✓	✓	-
	Marathon is committed to being a signatory to the International Cyanide Management Code and is designing the process facility and process water management system in this context.	-	✓	-
Materials Handling and Waste Management	When results from all additional static tests become available, Marathon will update the summary tables and assess the information with regards to the ARD/ML Management Plan.	✓	-	-
	It is agreed that averaging of samples needs to be completed for ARD block model inputs (e.g., samples will be averaged within a block before use in the block model).	✓	-	-
	Marathon is committed to completing the work necessary to address the Acid Rock Drainage / Metal Leaching (ARD/ML) testing gaps identified in the EIS program prior to mine development.	✓	-	-
	When the test work is complete, Marathon will provide an ARD/ML Management Plan, as committed.	✓	-	-
	During construction and operation, sampling of cuttings from a reverse circulation (RC) drilling program used for mine planning will be collected from 5 m depth intervals of approximately 20 m deep to 40 m holes spaced 25 m by 25 m. These samples will be tested at the on-site laboratory for sulphur, inorganic carbon, and trace elements. A split of one in every ten samples will be analyzed at an external laboratory for standard static tests (ABA [acid-base accounting], SFE [Shake Flask Extraction] and trace elements). The split sampling frequency may change depending on the results compared with the on-site test results (reconciliation). This additional data will be integrated with the ARD block model to improve the accuracy (quantity and delineation) of PAG (potentially acid generating) and non-PAG rock 3 to 4 months ahead of mining.	✓	✓	-
	As mining progresses, samples will also be collected from blast hole cuttings for testing to reconcile the data within the ARD block model.	-	✓	-
Materials Handling and Waste Management	The ARD block model will be integrated with the mine block model to forecast the ARD potential for mine rock within the pit, and plan for ARD management at the waste rock stockpile (planning and creation of areas for encapsulation, etc.). ARD data will be incorporated in the mine block model to support planning of mining block size, drill hole patterns, and tracking of materials during excavation, such that PAG materials can be managed. The final ARD/ML data collected from the blast holes will confirm the rock handling plan for that specific mining block and will be used within the ARD and mining block models to better understand and predict the requirements for ARD/ML management as mining progresses.	✓	✓	-
	When results from all additional static tests become available, Marathon will select samples for kinetic tests and update Tables IR-21.1 to IR-21.4, which will be considered in the Acid Rock Drainage / Metal Leaching (ARD/ML) Management Plan.	✓	✓	-
	The leachate samples are collected by Marathon staff on a monthly basis (or more often when containers filled) during the snow-free period. Leachates are subject to field measurement of volume, temperature, pH, and conductivity at the time of sample collection. Marathon ships the leachate samples in coolers with ice to Bureau	✓	✓	-

Table 2 Additional Mitigation Measures Committed to by Marathon During the Review of the Valentine Gold EIS (Through Information Requirements and Amendments)

Category	Mitigation	C	O	D
	Veritas Laboratory, St. John's, Newfoundland. The leachates are analyzed by the laboratory for pH, total dissolved solids (TDS), alkalinity, sulphate, fluoride, and dissolved metals.			
	Marathon is committed to gathering the requested information and is currently progressing on additional testing per NRCan recommendations. This information will be used in development of the Acid Rock Drainage (ARD) block model and updates to the water quality model to develop the Acid Rock Drainage/Metal Leaching (ARD/ML) Management Plan, which will be completed for the permitting under the Newfoundland and Labrador (NL) Mining Act (NLDIET) and will be shared with NRCan as it becomes available.	✓	✓	-
	New samples for kinetic tests will be selected / composed and characterized once static testing is complete. At that time, Marathon will update Tables B-1 and B-2 from Baseline Study Appendix (BSA) 5 of the EIS and Tables IR- 21.1 to IR-21.4 (provided in response to Federal Information Requirements issued on February 10, 2021), adding the new kinetic test samples with updated statistics per rock type based on all static testing.	✓	✓	-
	Marathon commits to analyzing new kinetic test samples for ABA (acid-base accounting), SFE (Shake Flask Extraction) and trace metals, net acid generating test, mineralogy, and particle size distribution. The leachates from net-acid generating testing will be analyzed for metals and sulfate.	✓	✓	-
	Marathon will provide static and kinetic test results for the new samples prior to development of the Acid Rock Drainage / Metal Leaching (ARD/ML) Management Plan during the permitting stage and update Appendix IR-20.A (provided in response to Federal Information Requirements issued on February 10, 2021).	✓	✓	-
Materials Handling and Waste Management	Marathon is committed to completing the work necessary to address ARD/ML testing gaps identified in the EIS prior to mine development. The results of this work are required for final design and permitting under the Newfoundland and Labrador (NL) Mining Act (NLDIET) and will be shared with NRCan as they become available. This includes a continuation of on-going laboratory and field tests, additional static testing of samples, additional kinetic testing of PAG materials including a composite sample of gabbro and generate an ARD block model for the Marathon pit to provide production schedules for ARD classes of rock and ore and to improve the estimates of PAG material exposures on pit walls.	✓	✓	-
Wildlife / Avifauna Management	A Wildlife Response Plan (WRP) will be developed and implemented as part of the Project's Environmental Protection Plan (EPP). The WRP will be developed through liaison with Environment and Climate Change Canada – Canadian Wildlife Service (ECCC-CWS) and in accordance with guidelines for effective wildlife response plans, and will include protocols for scenarios, such as should frequent bird interactions occur at the site or a migratory bird be found stranded at site. The Project will have full-time On-Site Environmental Monitors (OSEMs) who will inspect worksites and activities for conformance with the EPP. The OSEMs will be notified if birds are found injured or dead at the site and will inform regulators (e.g., ECCC-CWS), if applicable.	✓	✓	✓
	The Wildlife Response Plan will be developed through liaison with ECCC-CWS and in consideration of guidelines for effective wildlife response plans, and will include protocols for scenarios, such as should frequent bird interactions occur at the site or a migratory bird be found stranded at site.	✓	✓	✓

Table 2 Additional Mitigation Measures Committed to by Marathon During the Review of the Valentine Gold EIS (Through Information Requirements and Amendments)

Category	Mitigation	C	O	D
	A site monitoring plan will be developed and included in the Avifauna Management Plan. The monitoring plan will be developed in consultation with Environment and Climate Change Canada – Canadian Wildlife Service (ECCC-CWS), and with consideration of the recommendations provided by ECCC-CWS.	✓	✓	✓
	Environmental monitors will be notified if birds are found injured or dead at the site and regulators will be informed, if applicable.	✓	✓	✓
	Workers will be required to notify the Environmental Technicians if / when a bird is found injured or dead at the site and Marathon will inform ECCC-CWS. If frequent bird interactions with Project lighting are observed (which may include the discovery of dead or injured birds), further mitigation will be implemented.	✓	✓	✓
	If a bird stranding incident occurs, or if an injured bird is located, ECCC-CWS will be notified. In this instance, the proponent will adhere to procedures for handling and documenting stranded birds encountered on infrastructure offshore Atlantic Canada (which may be modified for use onshore, through consultation with ECCC-CWS).	✓	✓	✓
	The requirement for a bird handling permit will be determined in consultation with ECCC-CWS and, if required, obtained prior to Project initiation.	✓	✓	✓
	Mitigation measures will be implemented for on-site distribution power lines, at locations that are determined, during the course of operations, to be high risk areas for avifauna.	✓	✓	✓
	Mitigation measures may include the implementation of avoidance devices, such as power line markers with reflective and/or glow in the dark components. If power line markers are used, monitoring will occur after installation to evaluate their efficacy.	✓	✓	✓
Wildlife / Avifauna Management	An avifauna pre-construction field program was undertaken in summer 2021. The survey data processing, analysis and interpretation is ongoing and will be provided to Environment and Climate Change Canada – Canadian Wildlife Service (ECCC-CWS) when completed.	✓	-	-
	Mitigation related to avifauna will be further reviewed by Marathon once final results of the 2021 survey are available, to determine if any further modifications to mitigation measures are applicable.	✓	✓	✓
	Although not anticipated at this time, any additional mitigation measures identified would be included in the Avifauna Management Plan, which will be a component of the Environmental Protection Plan for the Project. ECCC-CWS will have an opportunity to review the Avifauna Management Plan during Project permitting.	✓	✓	✓
	Site staff will receive training on active nest disturbance and associated avian response behaviour and will be required to check facilities, equipment and vehicles for evidence of nesting prior to use.	✓	✓	✓
	Pre-construction bird surveys required as part of the proposed EEM program will be conducted in 2021.	✓	-	-
	Employees and contractors will be instructed to report any active nests discovered in the Project Area to on-site environmental staff, and appropriate action or follow-up will adhere to the Avifauna Management Plan.	✓	✓	✓
	The Avifauna Management Plan to be developed and implemented for this Project will outline the adaptative management strategies to be employed and thresholds for triggering adaptive measures, which may include	✓	✓	-

Table 2 Additional Mitigation Measures Committed to by Marathon During the Review of the Valentine Gold EIS (Through Information Requirements and Amendments)

Category	Mitigation	C	O	D
	deterrents and exclusionary measures. Bird deterrents may include visual deterrents such as scarecrows, falcon effigies, kites or eye-safe lasers, and auditory deterrents such as noise cannons, wailers or other noise makers.			
	If bird use of the TMF or polishing ponds continues after the implementation of these deterrent measures, additional mitigation measures may be required. These may include exclusionary measures, which could include the use of bird deterrent floating balls, which cover the water's surface, thus preventing birds from landing and interacting with the effluent. Another option could involve the installation of bird netting over ponds, which also prevents waterfowl from landing on these.	✓	✓	-
	Should avifauna use, such as nesting, occur in the TMF and/or polishing pond despite the implementation of proactive mitigation measures, Marathon will notify CWS and consult with CWS regarding the implementation of additional adaptive mitigation measures.	✓	✓	-
	Mitigation measures outlined in Table 6.3 of the Caribou Supplemental Information report (Appendix G) will be used to reduce Project effects on caribou moving through the mine site.	✓	✓	✓
	An area-based matrix will be used (including distances) to direct specific management actions based on information being gathered from the caribou monitoring program (i.e., data driven management triggers).	✓	✓	✓
	An adaptive approach will be used that will propose monitoring thresholds for each mitigation, and exceedance of any threshold will trigger management actions.	✓	✓	✓
	The detailed Caribou Protection and Environmental Effects Monitoring Plan will be developed as the Project progresses. NLDFFA – Wildlife Division will be consulted regarding development of the monitoring thresholds.	✓	✓	✓
Wildlife / Avifauna Management	Marathon is committed to completing post-calving/population surveys in 2021 and beyond and will continue to work with NLDFFA – Wildlife Division to confirm appropriate survey protocols.	✓	✓	✓
	Marathon will observe changes in species status prior to and during Project commencement and consider potential implications to the Project, including whether additional mitigation may be necessary to protect the species and its residence.	✓	✓	✓
	Other mitigation measures, such as the use of the transplantation of lichen or distribution of caribou pellets (including design considerations and location), will be discussed with the NLDFFA – Wildlife Division.	✓	✓	✓
	During sensitive periods (pre-calving, calving, and post-calving seasons), Grey River collars will be monitored frequently to assess proximity to the Project, as well, Marathon staff will be on alert within the Project site and advise of observations of caribou.	✓	✓	✓
	Appropriate management responses will be determined in consultation with NLDFFA – Wildlife Division and adapted as required to address potential adverse effects of the Project on the Grey River herd.	✓	✓	✓
	Any wildlife (e.g., birds and bats) collisions with Project infrastructure or equipment will be reported to the Environmental Technician and the NLDFFA – Wildlife Division.	✓	✓	✓

Table 2 Additional Mitigation Measures Committed to by Marathon During the Review of the Valentine Gold EIS (Through Information Requirements and Amendments)

Category	Mitigation	C	O	D
	Marathon is planning to transplant nodding water nymph to a location outside of the Project Area that aligns with the pH and water depth of the current habitat as closely as possible. If enough plant material and appropriate recipient sites are available, the plant will be transplanted to multiple sites. A monitoring plan for evaluating the success of transplantation of nodding water nymph will be developed.	✓	✓	-
	During field surveys to complete the transplant of nodding water nymph, the recorded location of *Ludwigia palustris* will be revisited and searched. If the species is found, photographs and, if possible without damaging the plant, a specimen will be taken to further confirm identification.	✓	✓	-
	Should the presence of this species (*Ludwigia palustris*) be confirmed, a possible transplantation program will be discussed with the NLDFFA – Wildlife Division.	✓	✓	-
	If a species not previously listed under the *Species at Risk Act* or provincial *Endangered Species Act* becomes listed under either of these Acts, this species and its residence will require protection. It is also recognized that the Committee on the Status of Endangered Wildlife in Canada may change the status of a species prior to or during Project construction and/or operations. Marathon will observe changes to species' status prior to and/or during proposed Project activities and review its Project activities in consideration of applicable species / habitat restrictions and species recovery strategies.	✓	✓	✓
	Adaptive management measures will be implemented should locations of high frequency wildlife-vehicle interactions be identified for pine marten.	✓	✓	✓
	The Environmental Protection Plan will include the requirement to report any sightings of marten to the on-site Environment Team and the NLDFFA – Wildlife Division.	✓	✓	✓
Wildlife / Avifauna Management	The follow-up program for marten will include conducting hair snag trap surveys. These surveys will be repeated during construction and operation, and again during or after decommissioning, to assess changes in marten presence compared to existing conditions.	✓	✓	✓
	A Country Foods Monitoring Program (CFMP) will be implemented to verify the EIS predictions by monitoring the quality of aquatic and terrestrial country foods harvested from within the LAA over the life of the Project, including the post-closure monitoring period.	✓	✓	✓
	Ongoing monitoring related to country foods will be employed and, should the need for further mitigation measures be identified, these would be developed in collaboration with Indigenous groups and stakeholders.	✓	✓	✓
Engagement with Stakeholders, Indigenous Groups and the Public	Marathon will continue to actively engage with the Newfoundland and Labrador Outfitters Association (NLOA) to monitor and mitigate potential adverse environmental effects upon wildlife and associated effects on outfitting activities via an Outfitter Environmental Effects Monitoring Plan (OEEMP).	✓	✓	✓
	Marathon is working with an outfitter directly affected by the Project activities to develop and implement agreed upon mitigations.	✓	✓	✓

Table 2 Additional Mitigation Measures Committed to by Marathon During the Review of the Valentine Gold EIS (Through Information Requirements and Amendments)

Category	Mitigation	C	O	D
	Marathon will consult with the appropriate regulators and the NLOA to address the decommissioning of new access created by the Project through the RCP.	-	-	✓
	Any Indigenous knowledge or land and resource use information provided by MFN post-EIS submission will be taken into account in the development of monitoring programs, including monitoring of air and water quality and potential impacts upon country foods. Marathon has invited MFN to participate in monitoring measures and intends to work in a spirit of cooperation with MFN as the Project progresses.[1]	✓	✓	✓
	Marathon will develop a grievance mechanism which will afford a process to address grievances on the part of Indigenous groups or Indigenous persons resulting from the effects of the Project on land and resource use, health, socio-economic conditions, and heritage resources.	✓	✓	✓
	Marathon has developed a formal Grievance Process which will enable Miawpukek or Qalipu (either as a collective or through individual members) or any stakeholder to bring any concerns and complaints to the attention of Marathon, including concerns relating to adverse effects on country foods, for appropriate resolution.	✓	✓	✓
	The Grievance Process is based on the international standards set out in the "Protect, Respect and Remedy" framework articulated by the Special Representative to the Secretary General of the United Nations on Business and Human Rights, and has been informed by best practices such as those described in Operational Level Grievance Mechanisms (IPIECA 2012), Addressing Grievances from Project-Affected Communities (IFC Practice Note 2009), Handling and Resolving Local Grievances (ICMM 2019), and the IRMA Standard for Responsible Mining IRMA-STD-001 (2018). It has been designed to comply with the six overarching principles for non-judicial processes recommended by the United Nations.	✓	✓	✓
Engagement with Stakeholders, Indigenous Groups and the Public	The Grievance Process will provide an accessible, timely, efficient and transparent procedure to resolve stakeholder and Indigenous concerns which will not, however, supplant or replace judicial or administrative remedies which may otherwise be available.	✓	✓	✓
	The Grievance Process will be published on Marathon's website and a copy will be provided to external stakeholders and Qalipu and Miawpukek. In addition, Marathon will meet with Indigenous groups and external stakeholders to explain the scope and operation of the procedure.	✓	✓	✓
	Grievances will be tracked, and Marathon will report periodically to external stakeholders and Indigenous groups on its implementation. A Grievance Report setting out the number and types of grievances, resolutions, and any associated changes in policy or procedures will be published annually.	✓	✓	✓
	Marathon invited each Indigenous group to participate in the collection of samples (i.e., big game, small game, fish and flora) to establish baseline information for the CFMP.	✓	✓	✓

[1] Applicable information from Qalipu was incorporated into the EIS, as Qalipu First Nation's Natural Resources Division provided Marathon with a report on Current Land Use and Aboriginal Traditional Knowledge prior to completion of the EIS.

Table 2 Additional Mitigation Measures Committed to by Marathon During the Review of the Valentine Gold EIS (Through Information Requirements and Amendments)

Category	Mitigation	C	O	D
	Marathon has committed to involve each group, consistent with each group's interest, in the implementation of monitoring measures.	✓	✓	✓
	Marathon has entered into a Socio-Economic Agreement with Qalipu which contains provisions on cooperative Environmental Stewardship respecting monitoring, environmental research, and the development and implementation of mitigation measures.	✓	✓	✓
	A Traditional Knowledge and Traditional Land Use Study funded by Marathon is being carried out by Miawpukek and the results of the study will be used to augment Marathon's understanding of Miawpukek's land and resource use in proximity to the Project Area and to inform further development of mitigation measures, if required.	✓	✓	✓
	Marathon and Miawpukek have concluded a Memorandum of Understanding which establishes a formal process for ongoing engagement and provides for the negotiation of a Socio-Economic Agreement which will include provisions on Environmental Stewardship.	✓	✓	✓
	Marathon is a regular participant in the quarterly meetings of Mi'kmaq Alsumk Mowimsikik Koqoey Association (MAMKA) and will share relevant information related to the results of environmental monitoring with each Indigenous group separately and through MAMKA.	✓	✓	✓
	Results from the Country Foods Monitoring Plan will be reviewed and shared with Qalipu and Miawpukek.	✓	✓	✓
	Should the results from sequential monitoring events suggest contaminant concentrations in country foods may be increasing due to Project effects (i.e., even with the proactive mitigation measures that will have been implemented), potential additional (adaptive) mitigative measures such as restrictions on harvesting of country foods from specific areas, country food consumption advisories) will be identified and implemented through engagement and collaboration with both groups.	✓	✓	✓
Rehabilitation and Closure	If an endemic seed mix is not commercially available, an appropriate seed mix will be selected based on an evaluation of included species. Seed mixes that include invasive species or non-endemic species that are not already widely established in the areas around the Project Area will not be used for the Project.	✓	✓	✓
	Two post-closure water treatment options may be employed to address the predicted post-closure exceedances: (1) conversion of the perimeter conveyance ditches into subsurface flow Permeable Reactive Barrier (PRB) trenches; and/or (2) conversion of the perimeter conveyance ditches into subsurface "French Drains" to convey effluent to an engineered wetland treatment system. Full details will be provided in the RCP.	-	-	✓
	To support the design of the PRB and the engineered wetland system, pilot scale treatment studies will be conducted towards the end of mine operation to evaluate the treatment efficiency and to better define the systems' design parameters.	-	✓	✓
	Based on current materials balance over the life of mine, all of the stockpiled overburden will be used during rehabilitation and closure.	-	-	✓
	The waste rock pile will be covered by growth medium / overburden during rehabilitation, further reducing the risk of ARD/ML.	-	-	✓

Table 2 Additional Mitigation Measures Committed to by Marathon During the Review of the Valentine Gold EIS (Through Information Requirements and Amendments)

Category	Mitigation	C	O	D
	Soil covers and revegetation will be used as applicable to limit infiltration and oxygen flux as part of progressive and final rehabilitation and closure.	-	-	✓
	Excess PAG rock (waste rock or low-grade ore) remaining at closure will be relocated to the mined-out pit, where it will be permanently flooded.	-	-	✓
	Regardless of where PAG waste rock is temporarily stored, the preferred closure option is to return the waste to the pit to be permanently submerged. Alternative closure scenarios may be considered (such as engineered covers) as the final closure plan is reviewed (internally and by regulators) prior to closure.	-	-	✓
	Marathon will develop a passive treatment testing (pilot) program to be implemented during operation to assess the effectiveness and performance of the proposed passive treatment methods. The passive treatment testing program will be described in the RCP submitted to NL DIET.	-	✓	-
	Marathon will consult with regulators and stakeholders regarding the progress and results of passive treatment pilot testing and the application of passive treatment to closure/post-closure phases.	-	✓	-
	Marathon will develop a passive treatment assessment program as part of its RCP to NL DIET, noting the final RCP (as finalized towards the end of the mine life) is subject to a provincial Environmental Assessment prior to approval and implementation.	-	✓	✓
Accidental Event Prevention and Response	Notification procedures in the event of an accident or malfunction of the water management infrastructure will be clearly defined in emergency response and preparedness plans for all water management infrastructure and the tailings management facility. The plan would include the immediate notification of key stakeholders, including Nalcor, and the applicable regulators, including DFO. The notification procedure would be implemented by the Environment Manager at the site.	✓	✓	✓
	The Emergency Response and Spill Contingency Plan will contain additional details regarding management, mitigation and remediation of adverse effects resulting from accidental events or malfunction.	✓	✓	✓

Table 3 Additional Mitigation Measures Specific to the Project Expansion

Category	Mitigation	C	O	D
General	Existing follow-up, monitoring and mitigation plans established for the Approved Project will be updated to reflect Project Expansion activities, as applicable, and both the Approved Project and Project Expansion will be included in plans that are to be developed for the Operation phase. These include: • Water Management Plan (Appendix 2A) • Acid Rock Drainage / Metal Leaching Management Plan (Proposed Revision to Address the Berry Pit Expansion) (Appendix 2F) • Caribou Protection and Environmental Effects Monitoring Plan (Appendix 10B) • Environmental Protection Plan • Avifauna Management Plan • Air Emissions Management Plan (including Greenhouse Gas Emissions) • Erosion and Sediment Control Plan • Wildlife Management Plan • Soils and Rock Management Plan • Historic Resources Protection Plan • Hazardous Materials & Products Program and a Hazardous Waste Storage and Tracking SOP • Traffic Management Plan • Waste Management Plan • Environmental Effects Monitoring Plan (MDMER) • Tailings / Effluent Release Emergency Response Plan (MDMER) • Fish Rescue Plan • Explosives and Blasting Management Plan • TMF Operations, Maintenance and Surveillance Manual • Accidents and Malfunctions Prevention and Response Plan • Emergency Response Plan • Wildlife Response Plan • Current Use of Lands and Resources for Traditional Purposes – Indigenous Communications Plan • Outfitters Environmental Effects Monitoring Plan • Gender Equity, Diversity and Inclusion Plan • Benefits Agreement • Rehabilitation and Closure Plan	✓	✓	✓
Site Clearing, Site Preparation and Erosion and Sediment Control	No additional mitigation measures have been identified.	-	-	-

Table 3 Additional Mitigation Measures Specific to the Project Expansion

Category	Mitigation	C	O	D
Soil Management	No additional mitigation measures have been identified.	-	-	-
Works In or Near Fish Habitat	Marathon will develop and implement a Fish Habitat Offsetting Plan in consultation with Fisheries and Oceans Canada (DFO) that will counterbalance Project Expansion-related loss of fish habitat following application of avoidance and mitigation measures.	✓		-
Blasting	Relocation of the explosives storage facility is supported by risk assessment reports from Terrane Geosciences and DynoConsult (Appendix 2C and 2D). Mitigation measures identified for the previous location (i.e., that presented in the EIS) are still valid. No additional mitigation measures have been identified.	-	-	-
Vehicles / Equipment / Roads	No additional mitigation measures have been identified.	-	-	-
Light Emissions	No additional mitigation measures have been identified.	-	-	-
Site Water Management	A rock fill drain will be constructed under the Berry waste rock pile to manage contact water pumped from the Berry pit to sedimentation pond BER-SP-05.	-	✓	✓
	The ARD/ML Management Plan and Water Management Plan will include details with respect to monitoring contact water for POPC and PAG material.	✓	✓	✓
	No additional mitigation measures have been identified for groundwater resources.	-		
Tailings Management	The mined out southern basin of the Berry pit will be partially backfilled with tailings. While not strictly a mitigation measure, it is considered a permanent storage solution for tailings that will not require active treatment or management.	-	✓	-
Materials Handling and Waste Management	No additional mitigation measures have been identified.	-	-	-
Wildlife / Avifauna Management	In addition to suspension of activities at the Marathon pit as previously committed to, reduced activities at the Berry pit may be required during spring and fall migration periods to reduce potential sensory disturbance effects on caribou movement. The Caribou Protection and Environmental Effects Monitoring Plan (CPEEMP) will be reviewed and revised in consultation with NLDFFA – Wildlife Division to address Project Expansion activities, including during caribou migration.	✓	✓	✓
Engagement with Stakeholders, Indigenous Groups and the Public	No additional mitigation measures have been identified.	-	-	-

Table 3 Additional Mitigation Measures Specific to the Project Expansion

Category	Mitigation	C	O	D
Rehabilitation and Closure	No additional mitigation measures have been identified. The Rehabilitation and Closure Plan is a standalone document that will be updated to address Project Expansion activities and will be updated every five years over the life of the combined Projects.	-	✓	✓
Accidental Event Prevention and Response	No additional mitigation measures have been identified.	-	-	-

APPENDIX 2F

Acid Rock Drainage / Metal Leaching Management Plan (Proposed Revision to Address the Berry Pit Expansion)

Valentine Gold Project: Acid Rock Drainage Metal Leaching Management Plan (Proposed Revisions to Address the Addition of the Berry Pit Expansion)

Marathon Gold Corporation
36 Lombard Street
Suite 600
Toronto, ON M5C 2X3

August 2023

The conclusions in the Report titled Valentine Gold Project: ARD/ML Management Plan are Stantec's professional opinion, as of the time of the Report, and concerning the scope described in the Report. The opinions in the document are based on conditions and information existing at the time the scope of work was conducted and do not take into account any subsequent changes. The Report relates solely to the specific project for which Stantec was retained and the stated purpose for which the Report was prepared. The Report is not to be used or relied on for any variation or extension of the project, or for any other project or purpose, and any unauthorized use or reliance is at the recipient's own risk.

Stantec has assumed all information received from Marathon Gold (the "Client") and third parties in the preparation of the Report to be correct. While Stantec has exercised a customary level of judgment or due diligence in the use of such information, Stantec assumes no responsibility for the consequences of any error or omission contained therein.

This Report is intended solely for use by the Client in accordance with Stantec's contract with the Client. While the Report may be provided by the Client to applicable authorities having jurisdiction and to other third parties in connection with the project, Stantec disclaims any legal duty based upon warranty, reliance or any other theory to any third party, and will not be liable to such third party for any damages or losses of any kind that may result.

DRAFT

Updated by: _____

Signature

Brenda L. Bailey Ph.D., P.Geo (NFLD)

Printed Name

Table of Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

List of Acronyms and Abbreviations

ABA	acid base accounting
Al	aluminum
AP	acid potential
ARD	acid rock drainage
As	arsenic
CCME	Canadian Council of Ministers of the Environment
Cd	cadmium
CN(T)	total cyanide
CN_{WAD}	weak acid dissociable cyanide
Cu	copper
CWQG-FAL	Canadian Water Quality Guidelines for Protection of Freshwater Aquatic Life
DOC	dissolved organic carbon
EA	environmental assessment
EIS	environmental impact statement
EPP	environmental protection plan
F	fluoride
FDP	final discharge point
Fe	iron
HCT	humidity cell test
Hg	mercury
HGO	high-grade ore
IAAC	Impact Assessment Agency of Canada
ICP-MS	inductively coupled plasma mass spectrometry
IR	Information Requirement
LGO	Low-grade ore
Marathon	Marathon Gold Corporation
MDD	Mineral Development Division
MDMER	*Metal and Diamond Mining Effluent Regulation*
ML	metal leaching
Mn	manganese
Mt	million tonnes
Mo	molybdenum
NAG	net acid generation

NL	Newfoundland and Labrador
NLDECC	Newfoundland and Labrador Department of Environment and Climate Change
NLDIET	Newfoundland and Labrador Department of Industry, Energy, and Technology
non-PAG	non-potentially acid generating
NP	neutralization potential
NPP	net neutralization potential
NPR	neutralization potential ratio
P	phosphorus
PAG	potentially acid generating
Pb	lead
QA/QC	quality assurance / quality control
RC	reverse circulation
RCP	Rehabilitation and Closure Plan
SFE	shake flask extraction
Se	selenium
Stantec	Stantec Consulting Ltd.
t	tonnes
the Project	Valentine Gold Project
TMF	tailings management facility
tpd	tonnes per day
TSS	total suspended solids
Zn	zinc

1.0 INTRODUCTION

A Metal Leaching and Acid Rock Drainage (ARD/ML) Management Plan has been finalized and approved in March 2023 for the Valentine Gold Project (the Project). The scope of the Project considered in the approved ARD/ML Management Plan is as assessed in the Valentine Gold Project Environmental Impact Statement (EIS; Marathon 2020) and released from the provincial environmental assessment (EA) process in March 2022 and given conditional approval to proceed by the federal government in August 2022. The following document represents the proposed changes to the ARD/ML Management Plan to address the proposed Berry Pit Expansion. Until the Berry Pit Expansion is approved by federal and provincial governments and this revised version of the plan is approved by regulators, the ARD/ML Management Plan finalized in March 2023 is the active plan to be followed.

Marathon Gold Corporation (Marathon) is developing an open pit gold mine in central Newfoundland, the Valentine Gold Project (the Approved Project). An Environmental Impact Statement (EIS) for the Project was submitted to the Impact Assessment Agency of Canada (IAAC) on September 29, 2020, and to the Environmental Assessment (EA) Division of the Newfoundland and Labrador Department of Environment and Climate Change (NLDECC) on November 3, 2020, by Marathon. The Approved Project was released from the provincial EA process in March 2022 and was given conditional approval to proceed by the federal government in August 2022. Construction of the Approved Project was initiated in October 2022.

Based on recent and successful geological exploration and assessment work and associated feasibility assessment, Marathon is proposing the development of a third open pit within the mine site of the Valentine Gold Project (the Approved Project). The Berry Pit Expansion (the Project Expansion) is proposed to include an open pit (Berry pit), new stockpiles for waste rock and topsoil, expansion of the low-grade ore and overburden stockpiles associated with Marathon pit, and additional water management infrastructure. In addition, while the Approved Project planned for tailings to be disposed of in the exhausted Leprechaun pit near the end of mine life, it is proposed as part of the Project Expansion that tailings would instead be disposed of in the Berry pit from Year 10 of the mine life onwards, reducing the distance that tailings would need to be transported by pipeline. Waste rock will also be deposited in the proposed Berry pit.

This updated ARD/ML Management applies to both the Approved Project and the Project Expansion and for simplicity this document refers to both ‘projects’ as the ‘Project’.

The construction and operation of the Project are governed by an Environmental and Social Management System, which includes tools such as the corporate environmental and social policies, construction, and operational environmental protection plans (EPPs), environmental management plans, and monitoring plans. In general, these plans are considered living documents that are updated as needed throughout the life of a project to reflect the latest project, regulatory and environmental information.

As a component of the Environmental and Social Management System, the objective of this Acid Rock Drainage and Metal Leaching (ARD/ML) Management Plan is to:

- identify Project components with the potential to generate ARD/ML
- establish and update screening criteria for identification of ARD/ML
- describe measures to manage potentially acid generating and/or metal leaching materials to avoid or reduce potential environmental effects
- describe monitoring programs to evaluate ARD/ML predictions and the effectiveness of management measures
- identify adaptive management measures/processes that may be employed should monitoring determine that additional or new mitigation measures are required

This ARD/ML Management Plan is a live document, which will be updated throughout the life of the Project. The ARD/ML Management Plan will also need to be updated in consideration of on-going ARD/ML testing and analysis and requirements identified through the permitting process.

1.1 PROJECT OVERVIEW AND CONTEXT

The Project is located in a rural area of central Newfoundland, southwest of the Town of Millertown, Newfoundland and Labrador (NL) (Figure 1.1). The Project consists of three open pits, waste rock piles, ore stockpiling and crushing areas, conventional milling and processing facilities, a tailings management facility (TMF), staff accommodations, and supporting infrastructure including roads, on-site power lines, buildings, and water and effluent management facilities (Figure 1.2). The mine site is currently accessible year-round by an existing public access road (mine access road) that has been maintained by Marathon since 2010. The existing access road will be upgraded and maintained as part of Project construction and operation.

The mine site is subdivided into four components, from north to south, the Marathon Complex, the Berry Complex, the process plant and TMF Complex, and the Leprechaun Complex. The major Project facilities include the Leprechaun, Marathon, and Berry open pits, process plant, TMF, waste rock piles, high-grade ore (HGO) and low-grade ore (LGO) stockpiles, topsoil, and overburden stockpiles. The operational mine life is 14.4 years. Ore from the open pits will be mined for approximately 13 years, stockpiled, and processed continuously at the plant. The plant will continue to operate for another year and a quarter by processing ore from the LGO stockpiles. Tailings will be deposited in the TMF for the first nine years of operation and into the Berry southern basin for the last 5.75 years of operation.

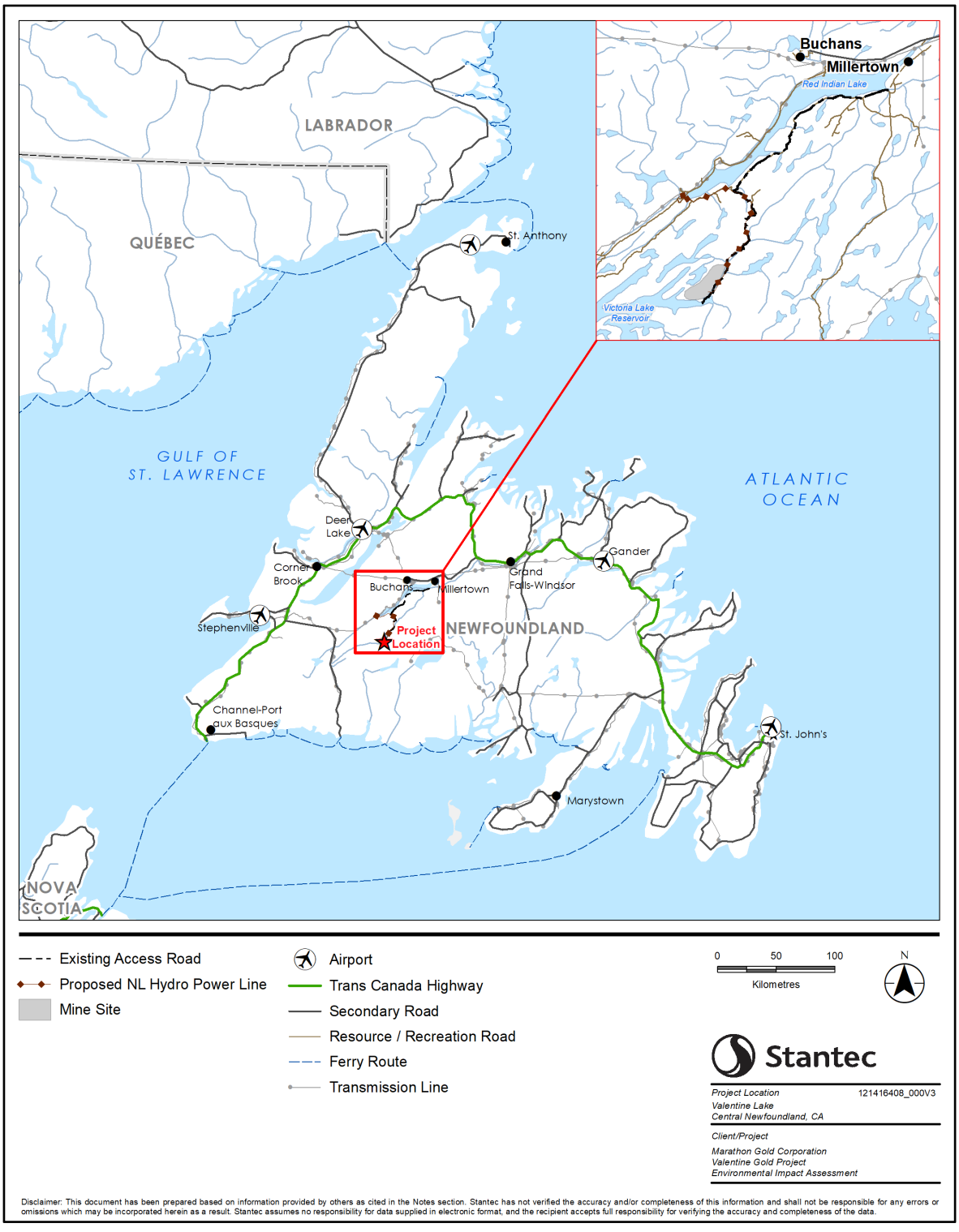

Figure 1.1 Location of Valentine Gold Project

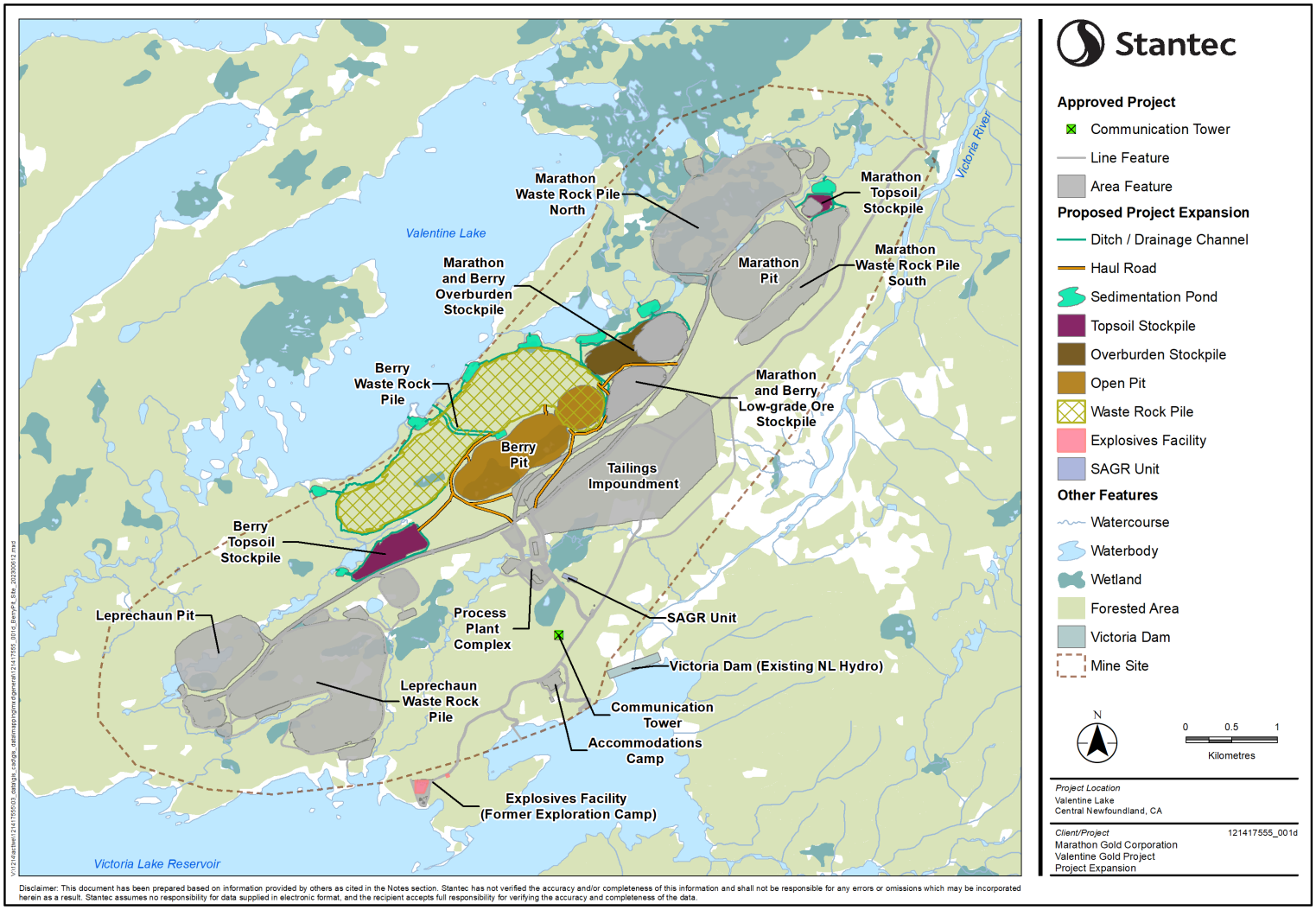

Figure 1.2 Valentine Gold Project Components of the Project (Approved Project and Project Expansion)

1.2 SCOPE

This Project-specific ARD/ML Management Plan has been designed to identify and manage potentially acid generating (PAG) materials and to mitigate adverse effects on the receiving environment that could result from known or potential sources of ARD/ML. The Plan describes operational requirements for management of PAG materials to reduce the risk of ARD/ML generation, and documents the steps, decisions, and actions to be taken to identify and manage PAG materials throughout the life of the Project. The Plan addresses the management of potential PAG materials throughout Project construction, operation and rehabilitation and closure as described in Section 2.1 and for each of the Project components listed in Section 2.2.

1.3 OBJECTIVES

The overall objective of the ARD/ML Management Plan is to document the protocols to be employed to reduce the risk of long-term adverse effects on the receiving environment that may result from the exposure of mine materials, such as overburden, waste rock, ore, low-grade ore, and tailings. To achieve this overall objective, the ARD/ML Management Plan:

- Identifies the federal and provincial legislation, regulations and standards relevant to the management of PAG materials
- Identifies other Project-specific management and monitoring plans relevant to the management of ARD/ML
- Outlines the roles and responsibilities of Project team members in the implementation of this ARD/ML Management Plan
- Provides an overview of the Project phases and components included within the scope of this Plan
- Characterizes the ARD/ML potential of the materials exposed by the Project
- Outlines the procedures to monitor and document geochemical characterization of the Project components, including pre-production testing, analysis and on-site testing and criteria
- Documents the material management methods to be followed to reduce the risk of ARD/ML generation from each Project component
- Outlines the procedures to monitor contact water quality for early identification of conditions indicative of ARD/ML
- Describes the adaptive management approach to mitigation measures for each Project component
- Identifies regulatory reporting requirements
- Documents triggers and procedures for revisions to the ARD/ML Management Plan

1.4 RELATED PLANS AND DOCUMENTS

Geochemical characterization conducted to support this ARD/ML Management Plan considers recommendations provided in “Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials” (MEND Manual) produced by MEND for ARD/ML prediction (Price 2009). This manual was used in developing the geochemical study design and establishing ARD classification for the Project.

ARD/ML investigations also considered the federal "Environmental Code of Practice for Metal Mines" prepared by Environment and Climate Change Canada (Environment Canada 2009).

Several other Project-specific management and monitoring plans that relate to the management of ARD/ML are in preparation and are listed in Table 1.1. The information included in Table 1.1 will be reviewed and updated as needed.

Table 1.1 Management and Monitoring Plans Related to the ARD/ML Management Plan

Management / Monitoring Plan	Scope and Relationship to the ARD/ML Management Plan
Development Plan	Submission of a Development Plan is a requirement for mining projects under the Newfoundland and Labrador (NL) *Mining Act*. The Development Plan will include an overall description of the Project – ownership, geology, mining and processing, tailings management, ARD/ML management, and infrastructure, as well as the plans and schedules and other details for construction and operation of the Project. The Development Plan must describe ARD potential and management requirements for all phases of a project, and this document is updated per a schedule developed in consultation with the NL Department of Industry, Energy, and Technology – Mineral Development Division (NLDIET – MDD), or as required based on changes to a project.
Rehabilitation and Closure Plan	A Rehabilitation and Closure Plan (RCP) is also a requirement under the NL *Mining Act* and describes the approach and plans for rehabilitation and closure of the project. The RCP will include details pertaining to the three key stages of rehabilitation activities that occur over the life span of the Project, which include: • progressive rehabilitation • closure rehabilitation • post-closure monitoring and treatment The RCP must describe ARD potential and management requirements for all phases of a project, specifically addressing the requirements for mine rehabilitation and closure and post-closure to avoid or reduce risk to the environment in long term. The RCP is required to be reviewed and updated regularly, or as required based on changes to a project, and reviewed by NLDIET-MDD).
Construction Environmental Protection Plan	The purpose of the EPP is to outline protection and response measures associated with potential environmental effects related to Project construction activities. The EPP also describes practical procedures required of all personnel (i.e., Marathon employees, contractors, and suppliers) to reduce or eliminate potential adverse environmental effects, as well as instructions for addressing planned and unplanned activities/events associated with Project construction. The EPP is closely linked to other management and monitoring plans (such as the ARD/ML Management Plan) as it describes practical procedures required to reduce or eliminate potential adverse environmental effects, as well as instructions for addressing planned and unplanned activities/events associated with Project construction. The key linkage between the Construction EPP and the ARD/ML Management Plan is the identification and use of appropriate non-PAG materials for construction.

Table 1.1 Management and Monitoring Plans Related to the ARD/ML Management Plan

Management / Monitoring Plan	Scope and Relationship to the ARD/ML Management Plan
Water Management Plan	The Water Management Plan includes the water management design for the Project, which has been developed to reduce operational risks and environmental effects of the Project. Objectives of the Plan include reducing water inventory requiring management through perimeter berms to divert external noncontact runoff; reducing the number of final discharge points (FDPs) through grading of ditches and construction of diversion channels to combine discharge points and water management ponds; maintaining flow to fish-bearing streams and wetlands by maintaining pre-development catchments to the extent feasible; and reducing water management costs during operation through grading and gravitational drainage and thereby reducing pumping requirements. The Water Management Plan is linked to the ARD/ML Management Plan through the water monitoring associated with Project components (waste rock piles, TMF and ore and overburden stockpiles) that may contribute to ARD/ML. Operationally, the contact water management procedures described in Section 4.2 will be a component under the Water Management Plan.
Tailings Management and Deposition Plan	This plan includes operational procedures and management objectives with respect to handling of tailings and effluent within the TMF. The plan will describe the methods for tailings deposition within the TMF that will address storage volumes and areas, dam raises (not with tailings) seasonal deposition considerations, dam stability and liner protection, ARD/ML management, water management, dust management, and other requirements for the safe and efficient management of tailings. The Tailings Management and Depositional Plan will include ARD/ML considerations and is thereby linked to the ARD/ML Management Plan.
Groundwater Monitoring Plan	A primary potential effect of mine operation on groundwater quality is the increase in concentrations of chemical parameters in seepage from the waste rock piles and TMF to groundwater, although the effect is likely limited given the long groundwater travel time (decades to centuries) to discharge points, and potential for natural attenuation of the parameters along the groundwater flow paths. The purpose of the groundwater monitoring plan is to provide a framework for monitoring potential changes in groundwater quantity and quality and to distinguish naturally occurring changes from changes related to the Project. Results of the Groundwater Monitoring Plan will be considered in the on-going management of PAG material associated with the Project and will help to identify the need for further mitigation and adaptive management measures.

Table 1.1 Management and Monitoring Plans Related to the ARD/ML Management Plan

Management / Monitoring Plan	Scope and Relationship to the ARD/ML Management Plan
Surface Water Monitoring Plan	The objective of the Surface Water Monitoring Plan is to confirm compliance with regulatory requirements, evaluate predictions of Project effects on surface water quality and quantity, and determine if additional mitigation or response measures are required. The proposed monitoring program includes surface water quality and quantity monitoring at effluent discharges, downstream receiving locations, water treatment plant inlets and outlets, reference sites and visual inspections of facility infrastructure. Results of the Surface Water Monitoring Plan will be considered in the on-going management of PAG material associated with the Project and will help to identify the need for further mitigation and adaptive management measures.

1.5 REGULATORY ENVIRONMENT

Several federal and provincial acts and regulations govern the requirements related to avoiding and reducing potential effects of mining on the environment and that relate directly to ARD/ML.

1.5.1 ARD/ML Assessment and Management

Per the NL *Mining Act*, Marathon shall not be permitted to operate the Project until all plans required under the Act have been submitted to the satisfaction of the Minister. While Section 4 of the *Mining Act* only specifically requires a Development Plan and a Rehabilitation and Closure Plan, the associated guidelines for these plans sets out requirements for ARD/ML assessment and management including the design, management, and rehabilitation of waste rock piles, ore and overburden stockpiles, TMF, open pits, and water management components (Mineral Development Division, 2020). These plans also address the design and rehabilitation of all other mine components – haul roads, site roads, ore pad, crusher, processing facilities, mine services and associated infrastructure and any associated ARD/ML management requirements that may apply.

Through the provincial requirements identified above, Marathon will not be permitted to proceed with the Project until the proponent has demonstrated to NLDIET that ARD/ML risks associated with the Project have been appropriately identified and procedures are in place to manage those risks.

1.5.2 Water Quality

The *Fisheries Act* regulates the protection of fish and fish habitat including water quality. Pursuant to the *Fisheries Act*, the Metal and Diamond Mining Effluent Regulation (MDMER) regulates potential adverse effects to fish and fish habitat. The release of metals liberated through ARD/ML has the potential to contravene the deleterious substance provisions of and the prohibition against killing fish (by means other than fishing) under the *Fisheries Act*.

Water quality criteria applicable to ARD/ML include the following:

- Schedule 4 of MDMER enacted under the *Fisheries Act* (SOR/2002-222 2020)
- Schedule C of Newfoundland and Labrador Regulation 65/03 *Environmental Control Water and Sewage Regulations*, 2003 under the *Water Resources Act* (O.C. 2003-231) (NLR 65/03 2003)

Schedule C of the Newfoundland and Labrador Regulation 65/03 refers to Sections 3, 19.1, and 20 and Schedule 4 of the MDMER as follows:

"A person primarily in the Metal Mining Industry shall comply with sections 3 and 19.1 and 20 and Schedule 4 of the Metal Mining Effluent Regulations (Canada) SOR/2002-222, including any changes or amendments to those sections of and that schedule to those regulations over time."

Therefore, the MDMER are the primary water quality criteria considered in the ARD/ML Management Plan.

Canadian Water Quality Guidelines for Protection of Freshwater Aquatic Life (CWQG-FAL) (Canadian Council of Ministers of the Environment [CCME] 2020) are used in ARD/ML assessment as screening criteria, which are not directly applicable to mine discharges.

1.6 ROLES AND RESPONSIBILITIES

Management of ARD/ML requires interdisciplinary coordination from several departments during mine construction, operation, and decommissioning, rehabilitation, and closure, including the mine engineering, and environmental teams. Table 1.2 provides an overview of the roles and responsibilities at various levels of the Project team.

Table 1.2 Roles and Responsibilities for Implementation of the ARD/ML Management Plan

Position	Role/Responsibility
Mine Manager / Chief Mine Engineer	Understands the objectives of the ARD/ML Management Plan. Maintains records of source location, deposition location, and characteristics of PAG mine rock. Under the advisement of the Environment Manager, ensures only non-PAG mine rock is used for construction. Communicates plan for managing mine rock to site personnel. Ensures site personnel involved in blasting and excavation are trained in implementation of the ARD/ML Management Plan.
Mine Superintendent	Responsible for executing the ARD/ML Management Plan, including directing site personnel in fulfillment of the mine plan for management of mine rock according to the ARD/ML Management Plan. Responsible for managing data collection and conducting quality assurance/ quality control (QA/QC) of reporting geochemical data. Ensures mine and laboratory technicians are trained in sampling and testing.

Table 1.2 Roles and Responsibilities for Implementation of the ARD/ML Management Plan

Position	Role/Responsibility
Mine and Laboratory Technicians	Understand the objective of the ARD/ML Management Plan and follows direction of the Mine Superintendent and Environmental Superintendent. Responsible for collecting mine rock samples in support of the ARD/ML Management Plan, recording field data, submitting samples to the laboratory, conducting QC/QA or the results and maintaining a database.
Construction Manager	Understands the objectives of the ARD/ML Management Plan. Works with the Mine Engineering/Management team to manage non-PAG mine rock for use in construction. Coordinates with the Mine Engineering and Environmental teams to address testing requirements for any earthworks construction materials that require ARD/ML evaluation prior to use.
Environmental Manager	Responsible for updating ARD/ML Management Plan as needed. Liaises with and reports to regulators on compliance with conditions of authorizations/permits.
Environmental Superintendent / Coordinator	Supports and advises personnel in adhering to the ARD/ML Management Plan. Responsible for monitoring and reporting on adherence with the ARD/ML Management Plan and compliance with regulatory requirements and conditions of authorization. Responsible for reporting results of water quality and mine rock sampling in accordance with conditions of authorization and MDMER. Ensures environmental technicians are trained in sampling and testing.
Environmental Technicians	Responsible for collecting, recording, and submitting water quality samples to the laboratory.
Equipment Operators	Understand the objective of the ARD/ML Management Plan and follow direction of the Site Superintendent.

2.0 PROJECT DEVELOPMENT AND COMPONENTS

2.1 PROJECT DEVELOPMENT

2.1.1 Construction Phase

Project construction began in October 2022 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 24 to 28-month period.

2.1.2 Operation Phase

Standard surface mining techniques will be used to mine material from the Marathon, Berry, 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 or in the Berry open pit, and phased development of the TMF. The Marathon, Berry, and Leprechaun pits will be mined simultaneously.

For the first 3 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 tonnes (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 slurry will be treated to reduce cyanide concentrations prior to disposal to the TMF. Tailings will be disposed in an engineered TMF for Year 1 through 9 and will be deposited into the southern basin of Berry pit from Year 10 to the end of operation (Year 15).

2.1.3 Rehabilitation and Closure Phase

Once mining ends, 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 revegetated. The open pits will be flooded with surface water runoff, precipitation, and groundwater seepage. Excess site contact water will be directed to the pits where practicable to expedite pit flooding. 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 RCP details methods to be used for progressive and closure rehabilitation and post-closure monitoring.

2.2 PROJECT COMPONENTS AND ACTIVITIES

2.2.1 Overburden Stockpiles

Approximately 3.1 Mt of overburden will be excavated from the Leprechaun open pit, 8.5 Mt from the Berry open pit, and 6.7 Mt from the Marathon open pit. Overburden will be placed in a managed stockpile and will be retained for use in progressive and closure rehabilitation activities. Drainage from the Marathon and Berry overburden pile will flow to Valentine Lake and drainage from the Leprechaun overburden pile will flow to Victoria Lake Reservoir via engineered ditches and sedimentation ponds that make up the operational site-wide water management system. After closure, the overall direction of flow and the environmental receivers remain the same regardless of whether the ponds are decommissioned and some of the diches are rerouted to the open pits and/or rehabilitated.

2.2.2 Construction Material

Construction rock will be primarily sourced from waste rock generated during development of the open pits. Waste rock types have been characterized with respect to ARD potential as described in Section 3.2 prior to use in construction to verify that only non-PAG material with low metal leaching potential is used in construction.

2.2.3 Waste Rock Piles

The Leprechaun waste rock pile will be located southeast of the Leprechaun open pit, the Berry waste rock pile northwest of the Berry open pit, and the Marathon waste rock pile northwest of the Marathon open pit. Up to 158 Mt, 162 Mt, and 207 Mt of waste rock will be excavated from the Leprechaun, Berry, and Marathon open pits, respectively. Waste rock piles will be constructed in accordance with design recommendations for lift heights, slopes, and benching, and assume an overall final closure slope angle of 30 degrees. To accomplish this, the waste rock piles will be constructed by placing single lifts of 15 m, with a 35-degree face angle and a 6.1 m safety bench using bottom-up construction.

As part of progressive and closure rehabilitation, the waste rock piles will be appropriately sloped and benched and covered with overburden and organic soils (0.3 m of each) and revegetated to reduce the risk of ARD/ML. The design of the waste rock pile slopes and placement of these materials is presented in Valentine Gold Rehabilitation and Closure Plan (no reference provided as this document will be updated regularly). Drainage from the Marathon waste rock pile will flow to Valentine Lake and the Victoria River, Berry waste rock pile will flow to Valentine Lake, and drainage from Leprechaun waste rock pile will flow toward Victoria Lake Reservoir via engineered ditches and sedimentation ponds that make up the operational site-wide water management system. After closure, the overall direction of flow and the environmental receivers remain the same regardless of whether the ponds are decommissioned and some of the diches are rerouted to the open pits and/or rehabilitated.

2.2.4 Low Grade Ore Stockpiles

Low grade ore (LGO) 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. The Marathon/Berry LGO stockpile has a capacity of 7.0 Mt and the Leprechaun LGO stockpile has a capacity of 4.1 Mt. LGO will be placed on engineered pads with runoff collection systems, which allows for water treatment, if required. Drainage from the Marathon/Berry LGO stockpile will flow to Valentine Lake and drainage from the Leprechaun LGO stockpile will flow toward Victoria Lake Reservoir during operation. At closure, the LGO stockpiles will be removed and associated ponds and diches will be decommissioned.

2.2.5 High Grade Ore Stockpiles

High grade ore (HGO) from the Leprechaun, Berry and Marathon deposits will be stockpiled together. Approximately 29.7% of the material will on average originate from Leprechaun, 28.5% of the material will originate from Berry, and 41.7% of the material will originate from Marathon. The HGO stockpile will have a capacity of 1.5 Mt and will be placed on an engineered pad with runoff collection systems. During operation, drainage from the HGO stockpile flows by gravity to the TMF pond. The HGO stockpile will receive ore for a total of five years (two years prior to and three years following mill construction). HGO will be reclaimed to the mill over the subsequent seven years, and then be decommissioned.

2.2.6 Open Pits

Figure 2.1 shows the Marathon ARD block model and pit geometry above the estimated pit flood level of 330 m. Materials characterized as PAG will be exposed in the pit walls during operation. Based on the most recent ARD block model, PAG gabbro constitutes only 0.2% of total gabbro tonnage within the pit. During the post-closure period, only materials within the south-east highwall above the flooded water level within the pits will remain exposed and these rock types are predicted to be composed of non-PAG conglomerates. The north-west wall contains gabbro that may be above the expected level of the pit lake, although samples of gabbro in this area were non-PAG.

Water quality predictions show that the ARD/ML effects of exposed PAG material on the pit lake water discharge is low. If it is determined that sufficient PAG material is above flooded elevation of the pit, adaptive measures will be triggered to address PAG exposed in the highwalls, whether PAG or other rock types, as described in Section 5.1.7.

Mine water discharged from the Marathon open pit will flow to the Victoria River, whereas mine water from the Leprechaun open pit will flow to Victoria Lake Reservoir. The open pits will be flooded and PAG material exposed in the pit walls will be submerged preventing ARD from these materials in the post-closure period. Drainage from the flooded pits will flow to the same receptors as during operation.

The northern Berry basin will be backfilled with waste rock up to ground surface at elevation of 418 m asl. Waste rock will continue to be stockpiled on top of the northern basin. The Berry southern basin will be filled with tailings up to 404 m asl with a 10% beach slope that extends to where the southern and central pit basins meet (348 m asl). The central basin will be backfilled with waste rock up to an elevation of 414 m asl. The Berry pit will be allowed to flood to the spillway elevations of 418 m (central and southern) and 400m northern. The southern, central, and northern basins will receive groundwater seepage, direct precipitation and, for the northern basin, waste rock stockpile infiltration and surface water runoff. Mine water from the Berry pit will flow to Valentine Lake.

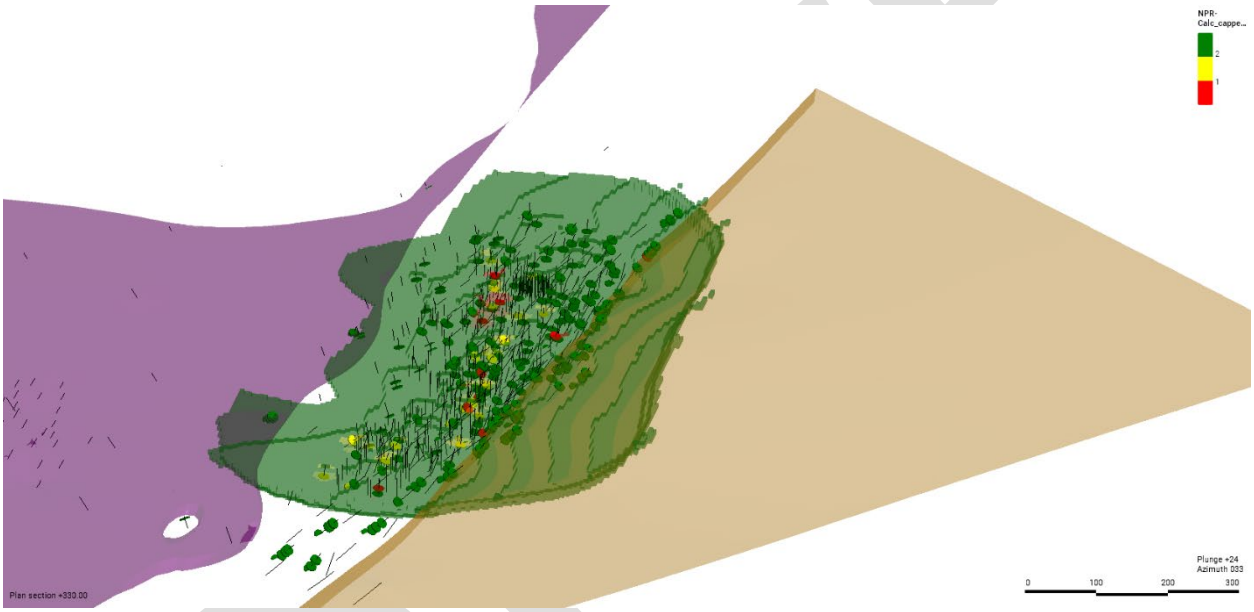

Figure 2.1 Marathon ARD Block Model and Pit Geometry Above the Estimated Flooded Level of 330 m

2.2.7 Tailings

Approximately 51.6 Mt of tailings will be produced during processing of both HGO and LGO with tailings originating from the Leprechaun pit (29%), Berry pit (28%) and the remainder from the Marathon pit (43%). Ore from the three open pits will be blended during handling, crushing, milling, and processing such that tailings deposition will be a ‘composite’ of materials from three pits. Blending the materials from the pits is necessary to achieve the grades required for the process design and production requirements for the Project.

Tailings will be managed for the first 9 years of operation in the TMF (31.6 Mt of tailings). After Year 9 of the operation phase, tailings will be transported as slurry to the southern basin of the Berry pit until cessation of the milling operation (20.0 Mt of tailings). After tailings disposal transitions to the Berry pit, tailings beaches formed in the TMF will be covered with overburden and organics and revegetated. Tailings contained in the Berry pit will be flooded.

Water produced by the TMF will be reclaimed to the mill process plant to satisfy the process water demand and limit the volume of discharge from the tailings impoundment to the environment. Water from the TMF not used in ore processing will be treated via the water treatment plant and discharged to a SAGR® unit prior to discharge to Victoria Lake Reservoir during operation. During closure, drainage from the TMF will flow to the Victoria River.

2.2.8 Water Management

As described in the Water Management Plan (refer to Table 1.1), water management across the site will be implemented to divert non-contact water where feasible. Contact water treatment will focus on sedimentation, as this will reduce total suspended solids (TSS) and the particulate fraction of metals. Water management in each of the four site complexes (Marathon, Berry, Process Plant and TMF, and Leprechaun) will function 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, LGO stockpiles, overburden stockpiles, open pits and site infrastructure where required.

3.0 ARD/ML CHARACTERIZATION

3.1 INFORMATION AND DATA SOURCES

The following documents related to ARD/ML have been prepared to support the geochemical evaluation of the Project:

- Stantec Consulting Ltd. (Stantec). 2018. Preliminary Results of Phase I ARD/ML Assessment. Final report prepared for Marathon Gold Corp. on 23 March 2018. (Also submitted as Baseline Study Appendix 5, Attachment 5-A of the EIS).
- Stantec Consulting Ltd. (Stantec). 2020. Acid Rock Drainage/Metal Leaching (ARD/ML) Assessment. Final report prepared for Marathon Gold Corp. on 22 September 2020. (Also submitted as Baseline Study Appendix 5, Attachment 5-B of the EIS).
- Stantec Consulting Ltd. (Stantec). 2020. Valentine Gold Project Water Quality and Water Quality Modelling Report: Leprechaun Complex and Process Plant &TMF Complex. Final report prepared for Marathon Gold Corp. on 23 September 2020. (Also submitted as Appendix 7A of the EIS).
- Stantec Consulting Ltd. (Stantec). 2020. Valentine Gold Project Water Quality and Water Quality Modelling Report: Marathon Complex. Final report prepared for Marathon Gold Corp. on 25 September 2020. (Also submitted as Appendix 7B of the EIS).
- Marathon 2022. ARD/ML Management Plan (preliminary). January 2022
- Stantec Consulting Ltd. (Stantec 2022). Phase III ARD/ML Acid Rock Drainage/Metal Leaching (ARD/ML) Assessment. September 2022.
- Marathon 2023. ARD/ML Management Plan Update Version 2. March 2023

Some lithologies, which were separately assessed in the EIS, are currently combined as indicated in Table 3.1and Table 3.2. For example, sediments and sediments with quartz-tourmaline-pyrite veins are currently combined in Leprechaun model. For the Marathon deposit, an ARD block model was developed in addition to the geological block model. Further development of the geological block model allowed separation of mafic dykes and non-ore quartz vein zones included in the ARD block model as presented in Table 3.2 However, gabbro volume was combined with quartz-porphyry in the ARD block model due to limited spatial coverage. The volume of gabbro will be refined as data becomes available and verified in the field through geological mapping and confirmatory sampling. Tonnages of PAG materials were estimated by either of the following two methods.

- The first method involved multiplying the fraction of PAG samples by lithology tonnage extracted from the most recent geological model (referred to as sample count tonnage in Table 3.1and Table 3.2). This method is less accurate, however more conservative and allows estimation of PAG tonnages for gabbro and overburden.
- In the second method, direct tonnage output was derived from the ARD block model, which should be more accurate than estimates from sample count.

Since the submission of the EIS, Marathon has proposed to add the Berry deposit to the Project. The additional testing and data analysis includes the following:

- Static tests and analysis for 425 samples from the Berry pit
- Twelve humidity cell tests (HCTs), six of which contain the average composition of the waste rock lithologies, HGO and LGO, and the other six containing PAG or ML of waste rock lithologies, HGO, LGO and overburden
- Four HCTs containing carbonate depleted PAG waste rock and ore (started in 2023)
- A subaqueous and ageing column of tailings sample from on-going metallurgical work (started in 2023)
- Commencement of six field leaching bins (FLBs) containing waste rock lithologies, HGO and LGO

Table 3.3 presents the tonnages of major lithologies calculated from the geological block models.

.

Table 3.1 Tonnages of lithological units from geological block model of the Leprechaun deposit and numbers of samples per unit

Block Model Lithology	Material type	2021 geological block model Tonnage, Mt	Suggested frequency per Table 8-2, MEND (2009)	# of samples tested to date	samples with NPR<2 (PAG + uncertain)		Tonnage of materials with NPR<2 (PAG + uncertain)	
Units		**Mt**	**#**	**#**	**#**	**%**	**Mt**	**%**
Leprechaun Deposit								
Metasediments*	Waste Rock	41.2	80	80	1	1.3%	0.52	1.0%
Trondhjemite**	Waste Rock	110	80	112	1	0.9%	1.0	
High Grade Ore	Ore	12.4	80	81	3	3.7%	0.46	3.7%
Low Grade Ore	Ore	5.0	26	28	1	3.6%	0.18	3.6%
Overburden	Waste	3.1	26	29	1	3.4%	0.11	3.4%
Total		171.7	292	330	7	2.1%	2.2	1.3%

Notes:
*Sample count and geological model includes conglomerate and sediments with QTP veins (QZ-STQP).
**Sample count geological model includes Trondhjemite/Granodiorite, Mafic dykes and non-ore QTP veins in Trondhjemite/Granodiorite and Mafic dykes.

Table 3.2 Tonnages of lithological units from geological and ARD block models of the Marathon deposit and numbers of samples per unit

Block Model Lithology	Material type	2021 geological block model Tonnage, Mt	ARD BM output Tonnage, Mt	# of samples tested	Suggested frequency per Table 8-2, MEND (2009)	samples with NPR<2 (PAG + uncertain)		blocks with NPR<2 (PAG + uncertain)	Sample count tonnage with NPR<2, Mt	ARD BM NPR<2 Tonnage, Mt
Metasediments*	Waste Rock	33.4	37.9	94	80	0	0%	0%	0	0
Gabbro (GB)	Waste Rock	8.3	13.4	39	26	1	2.6%	0.2%	0.3	0.03
Mafic Dike	Waste Rock	-	2.3	215	26	2	0.9%	0.4%	0.02	0.01
QEPOR**	Waste Rock	136.1	124.1	654	80	31	4.7%	1.9%	5.8	2.1
High Grade Ore	Ore	21.1	21.1	370	80	187	51%	23%	10.7	3.1
Low Grade Ore	Ore	8.6	8.6	338	26	166	49%	18%	4.2	1.1
QTP, Au<0.3 g/t	Waste	-	1.8	299	26	22	7.4%	15%	0.1	0.28
Overburden	Waste	7.6	5.8	30	26	3	10%	not modeled	0.6	not modeled
Total		215.0	215.0	2039	370	412	20%	4%	21.8	6.7

Notes:

*Sample count and geological model includes conglomerate and sediments with QTP veins (QZ-STQP).

**Sample count and geological model includes Quartz Porphyry Varieties, Mafic Dike and non-ore QTP veins in Quartz Porphyry and Mafic Dike. In ARD block model, Quartz Porphyry (QEPOR) includes Quartz Porphyry Varieties.

*** Tonnage from 2022 geological block model, which was not included in the ARD block model.

Table 3.3 Tonnages of lithological units from geological block model for the Berry deposit and numbers of samples per unit

Block Model Lithology	Material type	Geological block model Tonnage, Mt		# of samples tested	Suggested frequency per Table 8-2, MEND (2009)	samples with NPR<2 (PAG + uncertain)		Sample count tonnage with NPR<2, Mt
Metasediments*	Waste Rock	44.1		83	80	1	1%	0.5
Mafic Dike	Waste Rock	7.6		42	26	1	2%	0.2
QEPOR**	Waste Rock	105		108	80	20	19%	19.2
QTP, Au<0.3 g/t	Waste	3.5		30	26	6	20%	0.7
High Grade Ore	Ore	10		85	80	49	58%	12.2
Low Grade Ore	Ore	5		32	29	13	41%	3.5
Overburden	Waste	8.5		45	26	0	0%	0
Total		184.0		425	347	90	21%	36

Notes:

*Sample count and geological model includes conglomerate and sediments with QTP veins (QZ-STQP).

**Sample count and geological model includes Quartz Porphyry Varieties, Mafic Dike and non-ore QTP veins in Quartz Porphyry and Mafic Dike. In ARD block model, Quartz Porphyry (QEPOR) includes Quartz Porphyry Varieties.

3.2 ARD/ML ASSESSMENT SUMMARY

This section summarizes the ARD/ML characterization of materials excavated or exposed by the Project.

3.2.1 Marathon Deposit

- Overburden: The estimated percentage of PAG (neutralization potential ratio [NPR] <1) plus uncertain waste rock (1<NPR<2) is 10% of the total tonnage. The test results show no exceedances of MDMER limits observed in leachates from overburden. In SFE tests, fluoride (F), aluminum (Al), arsenic (As), cadmium (Cd), copper (Cu), iron (Fe), manganese (Mn), molybdenum (Mo), lead (Pb), selenium (Se), and zinc (Zn) exceeded respective CWQG-FAL, however recent kinetic testing confirmed that only Cd, Mn, Se, and Zn exceeding CWQG-FAL thresholds.
- Waste Rock: The overall percentage of PAG rock (NPR<2) is estimated to be between 1.5% and 4% based on the ARD block model and sample count methods, respectively. Sediments are classified as non-PAG rock regardless of method used. The geological and ARD block models provide the following percentages of PAG rock tonnages in modeled lithologies: quartz zones of non-ore QTP veins (7.4-15%), Quartz Porphyry varieties (1.9% - 4.7%), gabbro (0.2% - 2.6%) and mafic dykes (0.4 - 0.9%). PAG QTP veins, Quartz Eye Porphyry (QE-POR) and gabbro are not expected to generate acidity within 31, 45 and 4.7 years of exposure, respectively. These estimates of ARD onset are based on neutralization potential (NP) depletion times in HCTs containing PAG rock from the respective lithologies (Stantec 2022, Appendix B, Table B-8).
  There are no exceedances of MDMER limits observed in kinetic tests and SFE, except for the humidity cell test (HCT) containing the only PAG sample of gabbro. Leachates from this cell show MDMER exceedances for As under neutral conditions (before ARD onset) and for Cu and Ni when/if ARD occurs. Drillhole logs indicate that PAG gabbro with is rare and occurs in short intervals up to 2 m, which likely results in mixing PAG and non-PAG rock during mining. Other waste rock lithologies show CWQG-FAL exceedances for Al, P, Cu, Mn, Pb, Hg, Se, and Zn in leachates from kinetic tests. Exceedances for Pb, Hg, Zn and P are single events which are attributed to laboratory error or first flush at week zero of kinetic tests (Stantec 2022).
- LGO:18% to 49% of the low-grade ore is conservatively classified as PAG (NPR<2) based on ARD block model and sample count methods, respectively. The average ARD onset time in PAG LGO is between 14 and 22 years based on average inputs from humidity cells (Stantec 2022). Comparison of laboratory and field kinetic test shows that field NP depletion time is ~13 times greater than estimated based on laboratory rates. Overall estimates of ARD onset time indicate that PAG LGO is unlikely to produce ARD before the material is processed. There are no exceedances of MDMER limits observed in LGO leachates under neutral conditions. Exceedances of CWQG-FAL for Al, Cd, Cu, P, Pb, Se, and Zn were observed in field and/or laboratory kinetic tests. A marginal exceedance of MDMER for Cu was observed in one carbonate depleted HCT used to simulate acidic conditions in the LGO.
- HGO: Between 23% and 51% of Marathon high-grade ore is conservatively classified as PAG material (NPR<2) based ARD block model and sample count methods, respectively. The ARD onset time is approximately 14 years and was reevaluated using estimates from HCT containing PAG HGO

(Stantec 2022). The HGO stockpile is only required for the first 5 years of operation. In addition, continuous withdrawal of ore to the mill and replenishment with new materials from the open pits will further reduce the risk of ARD. There are no exceedances of MDMER limits or CWQG-FAL observed in recent HCT containing PAG HGO under neutral conditions. Under mildly acidic conditions (pH~5), PAG HGO shows MDMER limits for Cu up to 1.3x in exceedances of carbonate depleted humidity cell. In addition to Cu exceedances of CWQG-FAL for Zn (3.7x) Cd (3.5x) and marginally for Al in leachates from this kinetic test.

The updated tests summarized above improve the confidence in the interpretation of ARD/ML test results and the related predictions and mitigation measures presented in the EIS. Additionally, there is a reduction in ARD risk for waste rock within the Marathon deposit. Recent results show metal leaching risks for:

- As leaching above MDMER limits from the sample of PAG gabbro under neutral conditions and Cu and Ni under acidic conditions.
- Cu that may be above MDMER limits in PAG pockets of LGO and HGO if acidic conditions develop.

3.2.2 Leprechaun Deposit

- Overburden: Overburden has only one sample of 29 that classifies as uncertain, contributing to 3.4% of the total tonnage. There are no exceedances of MDMER limits observed in leachates from overburden, including the latest test results. No exceedances of the MDMER limits are observed in SFE, however Al, As, Cu, Fe, Pb, and Zn are above the CWQG-FAL's.
- Waste rock: The overall estimated percentage of PAG (1<NPR) and uncertain waste rock (1<NPR<2) is 1.0% of the total rock tonnage (Table 3.1). There are no exceedances of MDMER limits observed in SFE, humidity cells, and field bins, including the results of the latest kinetic tests. PAG rock is only associated with quartz zones of non-ore QTP veins in Sediment (SQTP) and in Trondhjemite/Granodiorite (QZ-TQTP), while all samples of pure trondhjemite/granodiorite and sediments, are non-PAG. Samples of mafic dykes, even with non-ore QTP veins are all non-PAG. Therefore, operational testing of non-PAG lithologies will be revisited after the initial phase of confirmatory sampling of the Leprechaun pit. There are no exceedances of MDMER limits observed in SFE, humidity cells, and field bins, including results from the latest kinetic tests. Waste rock shows exceedances of CWQG-FAL for F, Al, P, Cu, Pb, Se, and Zn based in leachates from kinetic tests. Exceedances for Pb, Zn and P are single events which are attributed to laboratory error or first flush in samples containing non-ore QTP veins (QZ-TQTP and QZ – QTP). Concentrations of identified PoPC (Parameters of Potential Concern) typically decline below the respective CWQG-FAL threshold in most of kinetic tests during the testing periods.
- LGO: Approximately 3.6% of low-grade ore would classify as PAG. Estimates time of NP depletion time of LGO are approximately 33 and 287 years for laboratory and field conditions, respectively. Therefore, isolated PAG pockets in the low-grade stockpile are not expected to generate ARD before the stockpile is processed in the mill. No exceedances of the MDMER limits are observed in leachates from LGO. Kinetic testing shows exceedances of CWQG-FAL thresholds for Al, P and Se.

- HGO: Only 3.7% of Leprechaun high-grade ore is conservatively classified as PAG (NPR<2). There are no exceedances of MDMER limits observed in SFE and in recent HCT from high grade ore. A single exceedance of CWQG for Zn was observed in week 8 of humidity cell testing and likely attributed to analytical error.

The updated results summarized above improve the confidence in the ARD/ML predictions presented in the EIS. As a consequence of this update, materials from the Leprechaun deposit show a slight increase in the percentage of waste rock and overburden material classifying as PAG and uncertain; however, there is also a significant reduction in ARD risks for LGO and HGO. Metal leaching risks are similar to that presented in the EIS.

3.2.3 Berry Deposit

- Overburden: 30 samples were tested for ABA (acid-base accounting) and all samples had an NPR above 2, therefore Berry overburden is considered non-PAG. No MDMER exceedances are observed in the SFE results, however Al, F, Cu, As, Zn, Fe, Pb, Se, Cd, Mn, and Ni are above the CWQG-FAL's.

- Waste rock: The overall estimated percentage of PAG (NPR<1) and uncertain waste rock (1<NPR<2) is 11% based on 263 ABA test results for the Berry deposit waste rock. All waste rock units have some PAG samples, however the QE-POR and QTP units have the highest percentage of PAG samples, with 19% and 20%, respectively. In the SFE tests, waste rock lithologies show moderate ML potential for F, Al, As, Cd, Cu, Fe, Mo, and Zn.

- LGO: 13 of 32 LGO samples have an NPR below 2, therefore 41% of samples are classified as PAG material. Concentrations of Al, As, Ag and Zn exceed CWQG-FAL thresholds in the 16 SFE tests for LGO.

- HGO: In 49 of 85 samples of HGO, NPR is below 2, therefore roughly 58% of high-grade ore are classified as PAG. Concentrations of Al, F, Zn, Fe, Cd, Pb, Mn and Se exceed respective CWQG-FAL thresholds in the 44 SFE tests.

Kinetic tests on samples from the Berry pit have been initiated, and results from the first 20 weeks indicate a low to moderate metal leaching potential. Additional data analysis and interpretation will be completed once the kinetic tests have stabilized.

Compared to the Marathon and Leprechaun deposits on the Project, the Berry deposit has the highest percentage of PAG material, primarily from the QE-POR and QTP, based only on the proportion of PAG samples from the static test program. The estimated proportion of PAG material will be refined after additional carbon and sulphur analysis of samples collected from the Berry pit. This data will be used to develop an ARD block model and refine the volume and distribution of PAG.

3.2.4 Tailings

Based on the ARD block model, 23% or less of Marathon ore blocks are classified as PAG, and all of Leprechaun ore blocks are non-PAG (Table 3-1 and 3-2). Composite samples of tailings from Marathon, Berry, and Leprechaun deposits are classified as non-PAG and are not expected to generate ARD. One additional sample of tailings was tested and classified as non-PAG.

Sensitivity analysis of tailings chemistry indicates that tailings are not expected to be PAG as a result of mixing of Marathon, Berry, and Leprechaun ores (refer to response to IR-21, Appendix A in Marathon 2022). During operation, the TMF pond will likely exceed the MDMER limits for As, Cu, and total cyanide (CN(T)), sourced from process water. Seepage from the TMF is predicted to exceed MDMER limits for Cu in post-closure. The water quality model results confirm exceedances of CWQG for Al, Ag, As, F, Fe, Cd, Cl, CN_{WAD} (a surrogate for CN_{Free}), Cr, Hg, Mn, Mo, P, Pb, un-ionized ammonia, total ammonia, NH_3+NH_4, nitrite, and Se, Tl, U, Zn, in discharge from the TMF pond (Stantec 2020b; Stantec 2023). An assimilative capacity study indicates that TMF pond effluent treated for all parameters to meet MDMER discharge limits would also be below the CWQG thresholds or background concentrations within 300 m of the regulatory mixing zone (Stantec 2020d; Stantec 2023).

3.2.5 Open Pits

Materials characterized as PAG will be exposed in the Marathon pit walls during operation, however the majority of these materials are not expected to generate ARD before the pits are flooded during the mine closure period based on ARD onset estimates. In post-closure, only materials within the highwall above the flooded elevation of the pit lake will remain exposed. As described in Section 2.2.6, exposed rock types are mostly represented by conglomerates that showed a low risk of ARD/ML based on testing completed to date. Minor amounts of gabbro may be exposed on the north-western wall of the flooded pit. This area had samples of gabbro that were non-PAG, however, gabbro does have some ARD/ML potential. Gabbro has not been identified in the Berry pit drill programs and based on the geology is not expected. Management of potential ARD/ML from minor amounts of gabbro is further discussed in Section 4.1.4.

During tailings deposition, elevated concentrations of As, Ag, Al, Cd, Cu, Cr, Fe, Mn, Hg, unionized and total NH_3, and total and free CN (operation), nitrate, nitrite, Se, Zn are predicted in the Berry pit lake water during discharge of tailings slurry from the Plant and overflow from tailings pond in the final years of operation. Concentrations of these parameters show a significant decline during closure before the pit lake is full, due to degradation and dilution with groundwater. No exceedances of MDMER guidelines are predicted in mine water or pit lake overflow from the Marathon, Leprechaun and Berry sites based on probabilistic water quality modeling (Stantec 2020b and 2020c; Stantec 2023).

3.3 PRE-PRODUCTION TESTING AND ANALYSIS

Pre-production ARD/ML laboratory testing and analysis will guide final design of Project components and management of mined, processed, and exposed rock materials. Additional ARD/ML work will be used, along with the results obtained to date, to refine the ARD/ML mitigation measures related to waste rock management, stockpile management, and tailings management via this ARD/ML Management Plan, such that PAG materials are managed to avoid or limit potential long-term effects. The continuing pre-production testing and analysis program is detailed as follows:

- Confirmatory testing of rock from Leprechaun, Berry and Marathon starter pits that will be used as construction material including development of the TMF and subsequent TMF dam raises
- Field kinetic (bin) tests of composite materials initiated in 2020 and 2023 will be continued for a minimum of 2 years and will then be assessed to determine if continuation of the tests is warranted.
- An ARD block model for the Berry deposit will be generated and the Marathon and Berry ARD block models will be integrated with the mine block model to forecast the ARD potential for mine rock within the pit, and plan for ARD management at the waste rock pile (e.g., planning and creation of areas for encapsulation).
- Water quality predictions will also be updated during the detailed engineering based on results of the additional testing and analysis, including results from static tests, humidity cells, field kinetic tests, and ARD block model for the Marathon and Berry pits.

4.0 ARD/ML MANAGEMENT

4.1 SAMPLING, TESTING AND ARD CLASSIFICATION OF SOLIDS

4.1.1 Operational Sampling

During construction and operation, sampling will be conducted to refine the ARD block model and improve the accuracy (quantity and delineation) of PAG and non-PAG materials. Sampling is planned to be conducted at rate indicated in Table 4.1. The details of sampling of each material are discussed in Section 4.1.4.

Table 4.1 Summary of Operational Sampling Program

Component	Estimated Tonnage	Sampling Rate	Estimated number of Samples (Life of Mine)
Overburden	18.3 Mt	1 per 50,000 t	366
Waste / Construction Rock	527 Mt	1 per 9,000 t	~58,555[1]
Low Grade Ore	16.2 Mt	1 per 9,000 t	~1,800[1]
High Grade Ore	35.4 Mt	1 per 9,000 t	~3,933[1]
Tailings (End of Pipe)	51.6 Mt	1 per 48,000 t (Year 1 to 3) 1 per 77,000 t (Year 4 to 14.4)	~ 620
Tailings (Beaches)	TBD	1 per 10,000 m^2 at closure	~250

Notes:
[1] sampling rate may be reduced during operation following reconciliation of the ARD block model and results from the confirmatory sampling program.
Mt million tonnes
TBD to be determined

4.1.2 Laboratory Analyses

Samples will be tested at the on-site laboratory for sulphur, total inorganic carbon, and trace elements (by portable X-ray fluorescence or a similar method). A split of one in every ten samples will be analyzed at an external laboratory for standard static tests including ABA, SFE, and total metals. The split sampling frequency may change depending on the reconciliation of external laboratory results and on-site test results.

Samples that are sent to the external lab will be tested according to methods consistent with Price (2009):

- ABA package including, modified Sobek NP with siderite correction, carbonate NP calculated from total inorganic carbon, fizz rating, paste pH, total sulphur by LECO, sulphate sulphur by HCl extraction and acid potential (AP) calculated from the difference between total and sulphate sulphur
- SFE testing method, involving continuous mixing of a crushed sample (85% passing 6.3 mm) with deionized water (1:3 rock to water ratio) for 24 hours, and leachate analysis by inductively coupled plasma mass spectrometry (ICP-MS) for trace elements. In addition, SFE leachates will be analyzed for pH, alkalinity and acidity by titration, and sulphate by colourimetry.
- Total metals by aqua regia digestion with ICP-MS detection.

4.1.3 ARD Screening Criteria

ARD potential is required for classification and management of mine materials. ARD potential is evaluated using the NPR that is calculated as the ratio between NP and AP. Samples are classified as non-PAG if NPR >2 and classified as PAG if NPR <2. Preliminary acid generating potential of the samples is determined using total inorganic carbon (TIC) and total sulphur data generated by the on-site laboratory. Values of NP, AP, and NPR are calculated using the following equations (Price 2009):

$$NPR = \frac{NP}{AP} \qquad NP = \%\ total\ inorganic\ carbon\ x\ 83.33 \qquad AP = \%\ sulphur\ x\ 31.25$$

Comparison of siderite corrected NP and carbonate NP typically produce similar results when carbonate NP is greater than 40 kg calcium carbonate ($CaCO_3$) per tonne for the Leprechaun deposit and greater than 20 kg $CaCO_3$ per tonne for the Marathon deposit. At lower carbonate NP, siderite corrected NP results are greater than carbonate NP. Carbonate NP is selected for ARD/ML assessment for the Project because it results in more conservative ARD classification of samples (Stantec 2020a). The exception for using TIC for calculation of NP could be for the graphitic metasediments (mudstones), which occur outside the design footprint of the open pits, however, could be found in prospects for construction materials. These rock types should be tested for carbonate content using HCl evolution method and as input instead of TIC for calculation of NP and ARD classification.

4.1.4 Material Management

4.1.4.1 Overburden

Most of overburden from the Leprechaun, Berry and Marathon deposits is non-PAG with 3.4%, 0% and 10% of samples conservatively classified as PAG (NPR<2), respectively. Confirmatory samples will be collected and tested as overburden is excavated at rate of one sample per 50,000 t per MEND Manual recommending a frequency of 50,000 t to 100,000 t “where all the rock is either PAG or non-PAG and the purpose of sampling is documenting the elemental concentrations and ABA parameters” (Price 2009, page 8-23). If PAG overburden is identified by testing, it will be segregated from non-PAG overburden and placed in the waste rock pile in accordance with the management protocols for PAG waste rock.

4.1.4.2 Construction Rock

Non-PAG waste rock generated during open pit development will be used for construction of pads, roads, and building foundations, or will be placed in the waste rock pile. Based on the current development plan, all waste rock will be used for construction during the construction phase of the Project. Geochemical characterization indicates that coarse sediments (conglomerates) without QTP veins from both deposits could be good sources of non-PAG rock. In addition, pure trondhjemite/granodiorite, without non-ore QTP and of mafic dykes from Leprechaun pit do not contain PAG samples. All these lithologies and do not show exceedances MDMER limits or CWQG-FAL thresholds in average concentrations from kinetic tests,

except for marginal exceedance for CWQG-FAL for aluminum, which is also above this threshold at the baseline conditions. Sources of rock will be tested and further evaluated prior to use in construction to confirm that only non-PAG material with a low potential to generate metal leaching is used in construction.

During pit development and excavation of waste rock for construction, confirmatory samples of cuttings from reverse circulation (RC) drilling in material that are identified as construction material will be collected from 5 m depth intervals from holes spaced at 25 m by 25 m, as is common practice in open pit mines. Any material characterized as PAG will be excluded from use in construction and will be managed as described in Section 4.1.4.3.

4.1.4.3 Waste Rock

A higher proportion of PAG waste will be generated from Berry open pit development compared to Leprechaun and Marathon open pits as described in Section 3.2. As such, an ARD Block Model for the Marathon deposit will be updated based on confirmatory and operational sampling and testing as described in this section, and a new ARD block model for Berry deposit will be generated. A similar confirmatory and operational sampling approach will be applied to the Leprechaun pit; however, ARD classification will be prescribed by the mine / resource block model to forecast the location and timing of PAG waste to be mined from the pit and to plan for ARD management.

Confirmatory samples of cuttings from RC drilling in material identified as waste rock will be collected from 5 m depth intervals from holes spaced on a 25 m by 25 m grid. This additional data will be integrated with the Marathon and Berry ARD block models to improve the accuracy (quantity and delineation) of PAG and non-PAG rock 3 to 4 months ahead of mining. As mining progresses, samples will also be collected from blast hole cuttings for additional testing to confirm the data within the block models prior to mining. The sampling rate may be reduced following validation of the ARD block models based on ARD/ML QP recommendations and approval under the *Mining Act*. The ARD block models will be considered validated when PAG rock is identified with a minimum accuracy of 95% in a calendar year.

The Mine Superintendent (and/or designates) will work with the mine geology and surveying teams to review the ARD block model data, complete geological/mine mapping, and use 3D mine mapping to identify PAG zones and confirm through additional testing. PAG waste rock will be demarcated (stakes, paint, etc.) prior to and post-blast. The material characterized as PAG waste rock (NPR <2), extending to the adjacent borehole samples with NPR greater than two (Figure 4-1), will be marked after the blast, excavated, and dispatched to the waste rock pile. A process will be set to clearly communicate to the equipment operators what material is PAG prior to excavation and haul to the waste rock pile or open pit.

Similarly, at the waste rock pile, the mine geologist and survey team will demarcate bench geometries (toes, offsets, etc.) and disposal locations for waste rock to achieve the blending and encapsulation requirements within the pile. A process will also be set at the waste rock pile to communicate to the equipment operators where and how materials will be placed. PAG rock will be deposited no closer than 9.1 m (bench width 6.1 m + 50% safety factor) from final lift face and over a non-PAG truck load (Figure 4.2). Surveying of the overall waste rock pile and the placement locations for PAG materials will ensure these materials are properly placed within the pile and tracked to ensure PAG materials in successive benches are segregated.

The method of waste rock pile construction such as end-dumping and paddock fill will depend on the bench geometry, PAG volume, and other constraints at time of mining. The starter lift will be more efficiently constructed by paddock method until the initial lift reaches full height (e.g., 15 m for waste rock pile). After the full height is reached, end-dumping will likely be the preferred method of deposition.

In the paddock deposition method, grading will provide partial mixing of the top portions of PAG/non-PAG loads. During end-dumping, PAG rock mixes with non-PAG rock as the end-dumped material rolls down the lift face (Figure 4.2).

A portion of PAG and non-PAG rock loads will be mixed on the pile face and during grading each lift of the stockpile. This mixture will be encapsulated with non-PAG rock (buffer) and deposited as described previously. The blended PAG and non-PAG will be covered with a non-PAG layer forming the final topmost lift(s) of the stockpile. Non-PAG rock will reduce oxygen flux into the interior of the pile and provide alkalinity to infiltrating water.

The maximum thickness of the PAG layer for blending was estimated to be 2.1 m using the approach described in Day (2021). The maximum thickness was rounded down to 2 m for ease of measurement with no reduction in protection. Therefore, starter lift layers containing PAG rock should not exceed 2 m and should be covered with a layer of non-PAG rock of the same thickness. The topmost lift of the WSFs will be covered with a minimum of 2 m of non-PAG rock. There are successful examples of blending with waste rock that contain higher contents of PAG material than predicted for the Marathon waste rock pile. For example, at the Quintette Coal Project (British Columbia) blending of PAG and non-PAG waste rock was selected due to the low overall percentage of PAG waste rock (12%). In addition, PAG rock had been mined historically at the same location without specialized engineering controls to address the potential for acidification, however no ARD has been detected by drainage monitoring (Day, 2021). Field tests including pore gas monitoring will be initiated to evaluate effectiveness of the proposed waste rock blending and encapsulation methods as material becomes available during early operations phase.

The exception from the rock management, which is discussed in the previous paragraph, will be PAG gabbro lithology (NPR <2). This material may result in leaching arsenic above the MDMER limit upon exposure. PAG gabbro will be segregated during excavation and transported to the footprint of the LGO stockpile, allowing for treatment in case of development of ARD/ML. This material will be returned to the Marathon pit when mining is complete. Other lithologies in Marathon, Berry or Leprechaun waste rock stockpiles are not expected to produce seepage that exceeds MDMER limits based on water quality

modeling prediction (Stantec 2020 b and c; Stantec 2023). The assimilative capacity assessment showed that the levels of the PoPC in the receiving water bodies from waste rock discharges meet the CWQG thresholds at the edge of mixing zone (Stantec 2020d; Stantec 2023). Water quality predictions will be verified by monitoring and the need for mitigation will be evaluated as part of adaptive management discussed in Section 5.0.

The waste rock piles will be developed from the bottom up, in lifts with specified slopes and benching per closure requirements and will be progressively rehabilitated over the operations phase of the Project. As part of the progressive and closure rehabilitation, the waste rock piles will be covered with soil, and revegetated, further inhibiting oxygen and water migration through the piles.

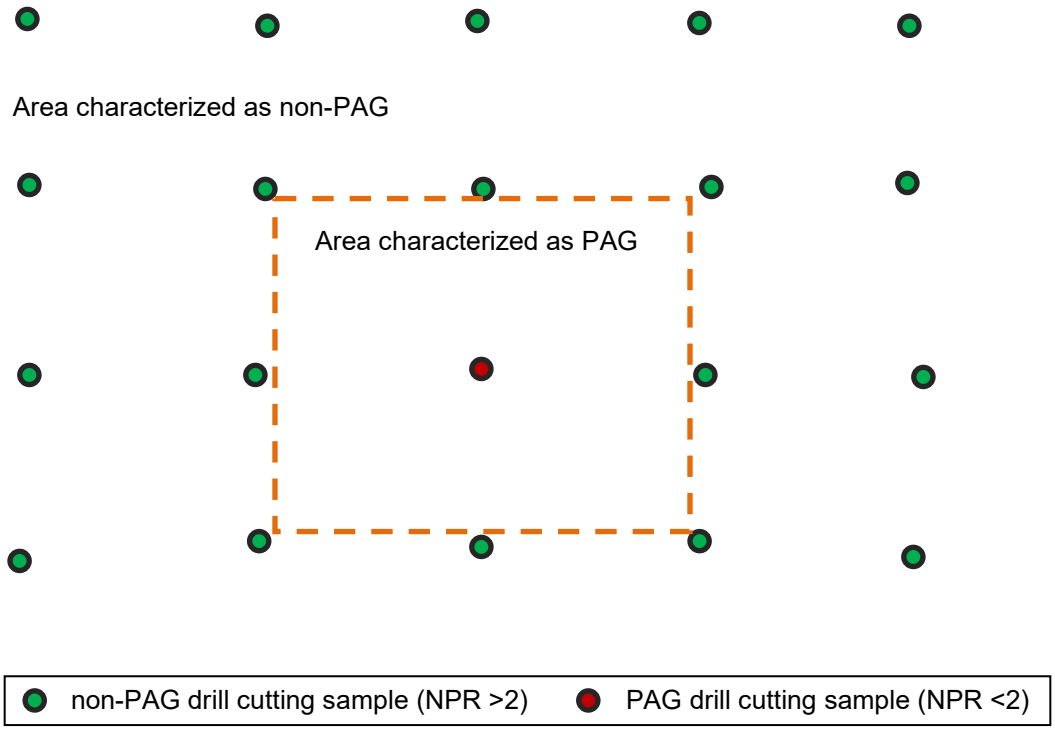

Figure 4.1 Delineation of PAG Material Based on Drill Cuttings (Plan View)

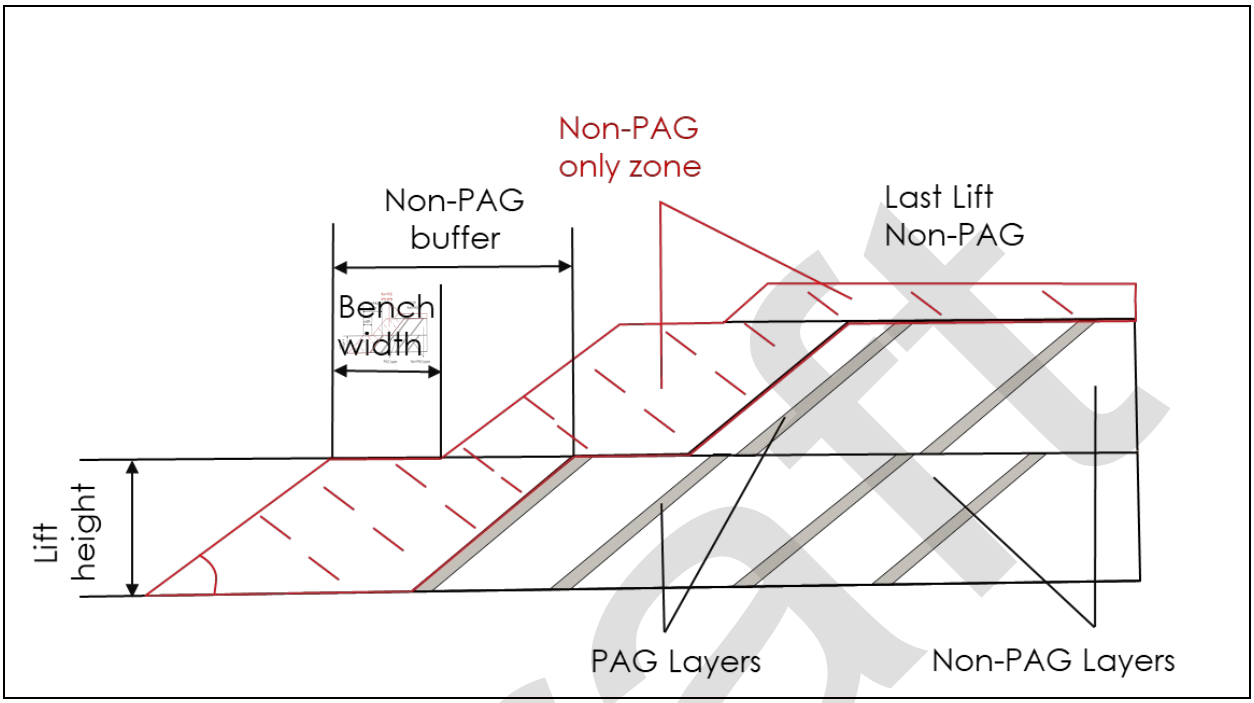

Figure 4.2 Conceptual Cross-Section of Waste Rock Pile

4.1.4.4 Low Grade Ore

Up to 49% and 60% of the Marathon and Berry LGO is classified as potentially non-PAG while most of LGO from Leprechaun (96%) predominantly is non-PAG with excess of NP. Therefore, ARD risk related to Leprechaun LGO stockpile is low and does not require specific ARD management. ARD and associated metal leaching from Marathon and Berry's LGO is unlikely to occur before all the LGO has been processed at the mill. Nevertheless, non-PAG LGO will be preferentially stockpiled and PAG LGO will be preferentially directed to the mill feed, as long as the grade requirement for the mill feed is met to further reduce ARD/ML risks.

4.1.4.5 High Grade Ore

Approximately 4%, 58% and 51% of HGO samples from Leprechaun, Berry, and Marathon pits, respectively, are conservatively classified as PAG. The overall mixture of HGO is classified as non-PAG due to excess NP, and the HGO stockpile is not expected to generate ARD during its lifetime of 9 years. Even though ARD is not expected, to limit exposure of PAG high grade ore within the stockpile, PAG HGO will be preferentially directed to the mill feed, while non-PAG high grade ore will be allocated to the stockpile, as long as the grade requirement for the mill feed is met.

4.1.4.6 Tailings

Tailings will be deposited in the TMF during Year 1 to 9/10 of operation and in the Berry pit during the last five and a quarter years of operation. During operation, samples of thickened tailings representative of end-of-pipe discharge will be collected weekly. This will result in a sampling rate of one sample per approximately 50,000 t during Years 1 to 3 and one sample per 77,000 t starting in Year 4.

Tailings beaches in the TMF will be rehabilitated prior to closure when tailings deposition transitions to the Leprechaun pit. Testing of composite samples of tailings and additional assessment of the ARD block model indicate that combined Marathon ore (LGO and HGO) will be non-PAG (NPR>2) for all years of mining without segregation and blending for the purposes of ARD/ML management. Therefore, even if ore from Marathon was not mixed with Leprechaun ore, the tailings is not expected to be acid generating. However, to further reduce risks of PAG tailings, non-PAG LGO will be preferentially stockpiled and in the unlikely event that operational management and monitoring indicate exposed PAG tailings within the TMF in the final year prior to closure of the TMF, this non-PAG LGO will be processed to produce tailings which will then be used to cover any areas of PAG tailings. The approach of preferentially stockpiling non-PAG LGO will create a non-PAG layer of tailings on the surface of the TMF. This non-PAG layer is expected to consume oxygen, reducing oxygen diffusion into tailings deposited earlier. Once the TMF is full and ready for closure, tailings will be directed to the Leprechaun pit for final disposal.

Tailings deposited in the Berry pit will be flooded as quickly as practicable limiting further oxidation and ARD/ML. Based on the water balance modeling, this should occur within one year after dewatering ceases (Stantec 2023). Additional investigation and assessment, such as one-dimensional modelling or unsaturated column tests, will be initiated once closure designs and experimental materials are available in the first years of operation. These investigations will be designed to assess the efficacy of the closure and rehabilitation plan for tailings in the TMF.

Prior to rehabilitation (soil cover and revegetation) of the tailings beaches, a confirmatory sampling program will be conducted to verify the tailings exposed at closure are non-PAG. A minimum of one tailings sample will be collected for every 10,000 m^2 (100 m x 100 m) from exposed beaches and composed over a depth interval from surface to 0.5 m deep, where most of oxygen is consumed and ARD could occur in PAG patches. If a PAG sample is identified, additional samples will be collected at closer spacing to identify the extent of PAG tailings and further mitigation measures, as described in Section 5, may be required. The tailings sampling program will be reviewed annually and updated as additional information becomes available. In closure, exposed tailings will be covered with overburden and organic soil materials and revegetated. Water from the tailings impoundment will be channeled to release directly to the environment once testing confirms that water quality meets the appropriate guidelines for release. Subsequently, the emergency spillway will be lowered/breached to allow passive drainage from the facility as a closure spillway and complete removal of the supernatant pond. Toe seepage from the TMF is predicted to require additional treatment in closure and post-closure, and two seepage treatment options may be employed to comply with MDMER: (1) conversion of the perimeter conveyance ditches into subsurface flow Permeable Reactive Barrier (PRB) trenches; and/or (2) conversion of the perimeter conveyance ditches into subsurface “French Drains” to convey effluent to an engineered wetland treatment system (for further details refer to response to IR DIET-05 in Appendix A, Marathon 2022) .

4.1.4.7 Open Pits

Further updates of the Marathon ARD block model and generation of the Berry ARD block model combined with operational monitoring will allow mapping of PAG materials on pit walls/benches. At closure, the majority of these materials will be saturated following accelerated flooding of open pits to reduce the risk of ARD/ML generation.

Modelling of water quality discharges from open pits considers potential ARD/ML from pit walls and rock rubble accumulated on pit benches, as well as backfilled waste rock and tailings in the Berry pit. The results of current modelling indicate that discharges from the pits are expected to be near-neutral and will not exceed MDMER limits. This modelling will be updated as additional information becomes available as part of detailed engineering and permitting.

4.2 CONTACT WATER MONITORING, TESTING AND ANALYSIS

A contact water monitoring program will be established to verify the prediction that that ARD/ML should not occur and identify any potential early-stage ARD/ML. Details of this monitoring program are included in the Surface Water Management Plan (Table 1.1). The proposed monitoring program includes surface quality monitoring at effluent discharges, downstream receivers, water treatment plant inlets and outlets and reference sites and visual inspections of facility infrastructure. FDPs will be sampled weekly as part of contact water monitoring.

Seepage monitoring locations from overburden, waste rock, LGO stockpiles, open pits and TMF will be identified (e.g., sumps, ditches) to trace potential ARD/ML sources before it appears at discharge locations. The current plan is to sample seepage monitoring locations on monthly basis. A detailed sampling schedule will be developed and incorporated into future updates of this Plan when exact seepage monitoring locations are established during detailed engineering. Details regarding the testing and screening criteria to detect potential early-stage ARD/ML are presented in this section.

4.2.1 Laboratory Analyses

Field measurements of pH, temperature, conductivity, oxidation-reduction potential, dissolved oxygen, and turbidity will be completed, and samples will be collected for laboratory analysis of the following parameters:

- Physical parameters (pH and conductivity), total hardness, total dissolved solids, TSS, alkalinity, acidity, ammonia nitrogen and selected anions (chloride, fluoride, bromide, sulphate, nitrate, and nitrite)
- Total metals
- Dissolved metals
- Dissolved organic carbon

This list will cover the MDMER requirements for effluent testing and a set of relevant parameters with CWQG-FAL including input values for calculations of site-specific guidelines (pH, temperature, hardness and dissolved organic carbon (DOC)) for linkage with the Surface Water Monitoring Plan.

4.2.2 Screening Criteria

Screening criteria proposed for contact water samples are presented in Table 4.2. Contact water sample results from the laboratory analyses described above will be screened against a value that is 75% of the maximum authorized monthly mean concentration for parameters included in Schedule 4 of the MDMER. In addition to the screening criteria presented in Table 4.2, effluent samples from each final FDP will be tested for acute lethality in accordance with the MDMER.

Table 4.2 Proposed Screening Criteria

Parameter (units)	Screening Criteria
TSS (mg/L)	11.25
Un-ionized ammonia as N (mg/L)	0.375
CN(T) (µg/L)	375
As (µg/L)	50
Cu (µg/L)	75
Pb (µg/L)	60
Ni (µg/L)	187
Zn (µg/L)	300
Radium 226 (Bq/L)	0.278

5.0 ADAPTIVE MANAGEMENT

Marathon will use an adaptive management framework that allows for adjustment of mitigation measures and management actions in response to monitoring results. The adaptive management framework establishes a process to evaluate monitoring outcomes relative to desired goals for specific mitigation measures as well as broader Project effects.

The premise of adaptive management is to use a cycle of planning, implementation, monitoring, and analysis / learning to systematically determine whether mitigation measures are effective relative to the goals and objectives, while allowing for adjustments to mitigation when monitoring results indicate that the goals and objectives are not being achieved.

The adaptive management framework includes the basic elements functioning together as a feedback system. This framework is inherently linked to each mitigation or management measure, and broadly to each monitoring objective. The basic elements are illustrated in Figure 5.1 and summarized as follows:

- Plan: states the goal, which is supported by targets and performance indicators and presents current actions for ARD/ML management.
- Monitor: seeks to collect data/information on the performance indicators and to report on standard or additional action in respect of the targets/triggers.
- Is adaptive management triggered? This is a logical element defining whether additional mitigation action(s) is needed to meet the performance targets/indicators or that the current material management plan is working.
- Select and evaluate mitigation options: This element corresponds to the evaluation of the effectiveness of a mitigation action in terms of meeting the target. Typically, mitigation measures that meet the target will result in no change to the Plan; whereas mitigation measures that do not meet the target will be reviewed in detail to identify the root cause of the deficiency and to identify adaptations needed to meet the target. This element can include consultation and engagement with regulators regarding monitoring results and proposed corrective actions
- Implement mitigation: the 'doing' of specific actions, such as implementing one or more mitigation measures. This element circles back to the ‘Monitor’ element as part of understanding whether the corrective actions are effective in achieving the stated goal.

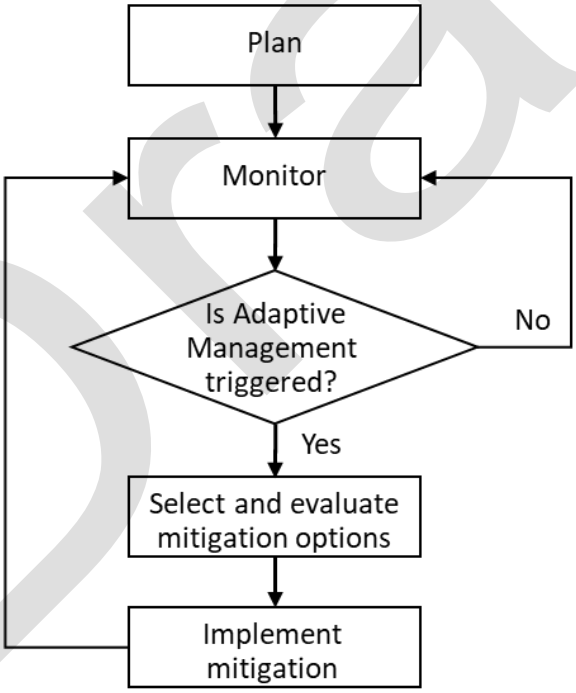

Figure 5.1 Adaptive Management Flow Diagram

Adaptive management will be key to the effective integration of new information acquired through the construction, operation, and closure phases of the Project into the ARD/ML Management Plan.
The adaptive management actions will be triggered if planned management activities for the prevention of ARD/ML are not effective. The triggers will include:

- Percentages of PAG materials produced does not allow for planned ARD management proposed in Section 4.1.4 (e.g., potential for development of ARD in an LGO stockpile).
- Contact water quality screening criteria in any site contact water and at discharge points are exceeded by values in monitoring results during a consecutive number of sampling events (e.g., three consecutive measurements).

The potential adaptive mitigation options for specific mine components/materials are outlined in the following separate sections.

5.1.1 Overburden

As described in Section 4.1.4.1, most of overburden from the Leprechaun, Berry and Marathon deposits is classified as non-PAG with 3.4%, 0%, and 10% of samples classifying as PAG, respectively. PAG overburden will be segregated from non-PAG overburden that will be stockpiled for rehabilitation and encapsulated in the waste rock pile in accordance with the management protocols for PAG waste rock.

If additional overburden materials are identified as PAG through further testing, as most overburden will be stripped in the first five years of mining, waste rock piles are expected to be able to accommodate this additional PAG overburden, particularly within the Leprechaun waste rock pile. In the unlikely event that the waste rock piles do not have capacity to accommodate the additional PAG material, the excess will be segregated and stored in the footprint of the overburden stockpile and moved to the open pits at the closure. The ARD QP must approve the “temporary” stockpiling of PAG overburden in the overburden stockpile. The amount of PAG overburden in the stockpile will be reported in the annual report.

If testing of contact water discharge quality from overburden stockpiles exceeds trigger levels identified in Section 4.2, the adaptive management protocol will be implemented to address the drainage water quality issue.

Any reduction in the volume of overburden available for progressive and final rehabilitation will need to be reviewed and adaptive management applied with respect to the materials required for rehabilitation. These potential issues will be considered within the relevant documents listed in Section 1.4.

5.1.2 Construction Rock

The amount of waste rock needed for use as construction materials is small compared to the total volume of waste rock generated from the open pits. The predicted volume of PAG material within waste rock is also relatively low, up to 3.7%, 11%, and 1% from the Marathon, Berry and Leprechaun pits, respectively.

Even if the amount of PAG waste rock expected from the pits increased significantly, the risk is low that a change in the amount of PAG waste rock would affect the availability of non-PAG rock for construction. The only adaptive management considered to maintain the required supply of non-PAG rock during construction (or during periodic TMF dam raises) may be selective/targeted excavation of non-PAG materials if the scheduled requirements for construction rock do not align with the mine plan (to be assessed in part via the ARD block model).

5.1.3 Waste Rock

In consideration of the risk that additional test work (pre-development and confirmatory) determines that PAG waste rock will require additional management beyond that described in Section 4.1.4.3, an estimate of the maximum percentage of PAG waste rock that could be theoretically managed by blending has been completed. The estimate considered factors that limit neutralization of net potential acidity from PAG rock by an excess of NP from non-PAG rock for the Marathon pit, as follows:

- Non-PAG (NPR>2) waste rock has an average Net Neutralization Potential (NNP = NP-AP) of 65.8 kg $CaCO_3$/t indicating for excess of NP, while average excess of AP in PAG rock with NPR<1 is 13.9 kg $CaCO_3$/t. In order to keep NPR of the PAG/Non-PAG mixture above 2, the excess of NP per tonne of non-PAG rock should be twice that of AP excess in PAG rock. This condition results in 2.4 tonnes of PAG per tonne of non-PAG waste rock (65.8 kg $CaCO_3$/t / (13.9 kg $CaCO_3$/t × 2) = 2.37 or ~ 2.4) based on ABA results.
- Kinetic availability of NP was evaluated by comparing the average alkalinity production rate from the last month of humidity cells that contain major rock types from Marathon pit (M QE-POR, M AQPOR and M CG) with the acidity production rate from last month from the carbonate depleted cell (M QPOR-PAG CO3DP, Appendix D in Stantec 2022). The average alkalinity production rate from non-PAG rock (8 mg $CaCO_3$ /kg/week) is 4 times the average acidity production rate (2 mg $CaCO_3$/kg/week) from PAG rock.
- Static tests provide the lowest ratio of PAG:non-PAG materials (2.4:1) of the two-test metrics (ratios) indicating an excess of NP in non-PAG waste rock is a limiting factor for ARD prevention.
- Using the lowest ratio (2.4:1), a conservative estimate is that the mixture/blend of waste rock within the Marathon stockpiles could be up to 70% PAG waste rock while still maintaining neutral conditions.
- The risk that the waste rock production profile will be 70% PAG rock is low based on current estimates for total waste rock volume, with a slightly increased risk in the last years of mining due to mineralized porphyry units at the bottom of Marathon pit.
- Adaptive management will be triggered where estimated/expected PAG volumes exceed the capacity of the waste rock pile to accommodate those materials in any period or if blending and encapsulation requirements for < 55% PAG cannot be met.
- As mining progresses, the ARD block model will be updated and reviewed to further refine the waste rock production profile to adequately plan for waste rock management in the final years of mining.

Similar calculations were done for the Berry site:

- Non-PAG (NPR>2) waste rock has an average Net Neutralization Potential (NNP = NP-AP) of 60.8 kg $CaCO_3$/t indicating excess of NP, while average NNP in PAG rock with NPR<1 is -11.1 kg $CaCO_3$/t. In order to keep NPR of the PAG/Non-PAG mixture above 2, the excess of NP per tonne of non-PAG rock should be twice that of AP excess in PAG rock. This condition results in 5.48 tonnes of PAG per tonne of non-PAG waste rock (60.8 kg $CaCO_3$/t /(Abs(-11.1 kg $CaCO_3$/t) × 2) = 5.48 kg $CaCO_3$/t) based on ABA results.
- Kinetic availability of NP was evaluated by comparing the average alkalinity production rate from the last month of humidity cells that contain major rock types from Marathon pit (B QE-POR, B QPOR and B CG) with the acidity production rate from the last month from the carbonate depleted cell (M QPOR-PAG CO3DP, Appendix D in Stantec 2022). The average alkalinity production rate from non-PAG rock (8 mg $CaCO_3$ /kg/week) is 4 times the average acidity production rate (less than 1 mg $CaCO_3$/kg/week) from PAG rock.

Similar calculations could be done for Leprechaun waste, however there is only one PAG sample (NPR<1) from Leprechaun waste rock and no data on acidity production rates. As a result, the estimated limit of 70% PAG rock mixture/blend for the Marathon waste rock pile (above) can be conservatively applied to Leprechaun waste rock pile.

Estimated limits for PAG rock management for all deposits may be refined as more data are accumulated from on-going kinetic testing and operational monitoring. These limits will be considered with the mine plan to determine if additional mitigation is required to manage PAG rock within the waste rock piles. Marathon will also track PAG materials within the stockpiles using detailed surveying and 3D modeling of the piles and the PAG materials placed within the piles to ensure the materials are properly placed and managed, respecting the blending and encapsulation requirements.

The development of the piles will be assessed at least twice annually to consider short term and longer term PAG rock management capacity within the pile relative to the estimate and schedule of PAG materials expected in that period based on the ARD block model for Marathon pit, the ARD block model for Berry pit to be developed in future, or the volumetric estimates for Leprechaun. If waste rock deposition planning indicates that excess PAG materials are generated that cannot be adequately accommodated through encapsulation/blending within the waste rock pile, or in exhausted areas of the pit due to spatial or safety limitations in the final year or two of mining, options to store these materials in temporary locations nearby the pit (waste rock pile or available / expanded stockpile areas) will be evaluated. Noting the quantity of waste rock generated in later years of mining operations is significantly reduced, the preferred closure option for managing excess waste rock is to return the waste to the pit to be permanently submerged. However, alternative closure scenarios may be considered (such as engineered covers) as the closure plan is finalized and reviewed (internally and by regulators) prior to mine closure.

If testing of contact water quality from the waste rock piles exceeds trigger levels identified in Section 4.2, additional sampling, testing and assessment of the source will be required and further mitigation and management measures may be required, such as segregation of problematic rock or water flow, engineered covers, water treatment and other options.

5.1.4 Low Grade Ore

In consideration of the risk that additional test work (pre-development and confirmatory) indicates that the percentage of PAG LGO could create management challenges within the LGO stockpiles, an estimate of the maximum percentage of PAG LGO that could be theoretically managed has been completed.
The estimate considered factors that limit neutralization of net potential acidity from PAG LGO by an excess of NP from non-PAG LGO that originates from the Marathon pit, as follows:

- Non-PAG (NPR>2) LGO has an average NNP (NNP = NP-AP) of 47.1 kg $CaCO_3$/t, while average excess of AP in PAG LGO (NPR<1) is -14.8 kg $CaCO_3$/t. In order to keep NPR of the PAG/Non-PAG mixture above 2, the excess NP (47.1 kg $CaCO_3$/t) from non-PAG LGO should be double the excess of AP (14.8 kg $CaCO_3$/t) from PAG LGO. This translates to a requirement of 1.6 tonnes of PAG LGO per tonne of non-PAG LGO based on static testing.
- The alkalinity production rate from Marathon's LGO humidity cell during the last month of HCT operation (20 mg $CaCO_3$/kg/week, M-LGO Met) under neutral pH conditions is 5 times greater than the average acidity production rate (4 mg $CaCO_3$/kg/week) from the carbonate depleted cell during the last month of HCT operation, which simulates acidic conditions in random pockets of the Marathon's LGO stockpile (M-LGO CNP DPL).
- Static tests provide the lowest ratio of PAG: non-PAG materials (1.6:1) of the two-test metrics indicating that the excess of NP in non-PAG LGO is a limiting factor for ARD prevention.
- The ratio (1.6:1) indicates that the mixture/blend in the Marathon LGO stockpile can contain up to 61% PAG material during a rolling 2.8-year period (i.e., the minimum ARD onset time from sensitivity analysis presented in IR 21b in Appendix A, Marathon 2022) to maintain neutral drainage.

Similar analysis is conducted for the LGO stockpile at the Berry site:

- Non-PAG (NPR>2) LGO has an average NNP (NNP = NP-AP) of 53.3 kg $CaCO_3$/t, while average NNP in PAG LGO (NPR<1) is -22.9 kg $CaCO_3$/t, indicating excess AP. In order to keep NPR of the PAG/Non-PAG mixture above 2, the excess NP (53.3 kg $CaCO_3$/t) from non-PAG LGO should be double the excess of AP (22.9 kg $CaCO_3$/t) from PAG LGO. This translates to a requirement of 2.32 tonnes of PAG LGO per tonne of non-PAG LGO based on static testing.
- Additional calculations will be completed once the kinetic tests have been completed.

Similar analysis is conducted for the LGO stockpile at the Leprechaun site:

- The one PAG sample in LGO from the Leprechaun pit has an average excess of AP in PAG, and the average NNP (NNP=NP-AP) of non-PAG LGO is 69.5 kg $CaCO_3$/t. In order to keep NPR of the PAG/Non-PAG mixture above 2, the excess NP (69.5 kg $CaCO_3$/t) from non-PAG LGO should be twice the excess of AP (17 kg $CaCO_3$/t). This condition results in 2 tonnes of PAG LGO per tonne of non-PAG LGO based on static testing.
- No acidity was generated in any kinetic tests of samples from the Leprechaun deposit. Therefore, the estimates are based on static tests only and minimum ARD onset time for the PAG LGO from Leprechaun is assumed to be similar to that calculated for PAG LGO from the Marathon pit.
- The ratio obtained from the static test results (2:1) indicates that the mixture/blend of LGO can contain up to 66.7% PAG material within the Leprechaun LGO stockpile within a rolling 2.8-year (similar to Marathon LGO) period to maintain neutral drainage.

Estimated limits for PAG LGO management for all deposits will be refined as more data is accumulated. The calculated limits will be considered with the mine plans and ARD block model for the Marathon pit to determine if additional mitigation is required to manage PAG LGO rock within the stockpiles. Water quality modeling from the EIS and later sensitivity analyses indicate that the effluents from LGO stockpiles will comply with MDMER limits and water treatment is not expected to be required. In the case that additional pre-construction modeling indicates need for the water treatment, the current mine plan segregates these effluents from other mine component flow streams in the overall mine design to facilitate collection and further water treatment, if required. Also, if excess PAG LGO (above 60% for Marathon and 66.7% for Leprechaun within a rolling 2.8 year period) is generated, the material will be moved to the HGO stockpile or an adjacent area where contingency mitigation for ARD/ML from HGO will be applied (see Section 5.1.5). In the event of early closure or other circumstances that result in unprocessed LGO, material remaining in the stockpiles will be moved back to the pit or covered (engineered cover) to reduce the risk of ARD/ML generation.

5.1.5 High Grade Ore

Water quality modeling from the EIS indicates that the effluents from the HGO stockpile will comply with the MDMER under neutral conditions and specific water treatment is not required. In case there is development of ARD/ML from the HGO stockpile, drainage will be directed to the TMF pond and for management as part of process plant / TMF water cycle as described in section 5.1.6 during 5–6-year lifespan of the stockpile. In the event of circumstances that result in unprocessed HGO, material remaining in the stockpile will be submerged (in the pit or TMF pond) or will be covered (engineered cover) to minimize the risk of ARD/ML generation.

5.1.6 Tailings

Risk of ARD generation from tailings is low because of short exposure times due to continued tailings deposition in the TMF during Year 1 to Year 9/10 and rapid submergence of tailings deposited in the Berry pit after Year 9/10. The treatment of discharge from the TMF is included in the project design

because pond water and seepage are conservatively predicted to exceed the MDMER limits for CN(T), un-ionized ammonia, and Cu (see Section 4.1.4.6). In the unlikely event ARD develops in the TMF during operation, the effluent will be treated prior to discharge until Year 9/10 or discharged to Berry pit afterwards until rehabilitation is complete.

If PAG samples are identified during confirmatory sampling of tailings beaches, additional measures will be assessed to reduce the risk of ARD/ML generation at closure. These measures may include, adding NP to areas with PAG tailings (e.g., liming), excavation and relocation of unsaturated PAG tailings to the Leprechaun, Berry or Marathon pit and/or (semi-) passive water treatment until TMF effluent(s) are below the MDMER limits (for further details refer to response to DIET-05 in Appendix A, Marathon 2022).

5.1.7 Open Pits

If testing of contact water quality from the pits exceeds trigger levels identified in Section 4.2, additional sampling, testing and assessment of the source will be completed. Further mitigation and management measures may be required, such as changes in blasting (in case of nitrogen leaching from undetonated explosives), pit water treatment (e.g., liming), and other options will be evaluated.

Figure 2-1 shows the Marathon ARD block model and pit geometry above the estimated pit flood level of 330 m. Based on the most recent ARD block model, PAG gabbro constitutes only 0.2% of total gabbro tonnage within the pit. Maps and cross sections (Figures A-8 to A-11 in the Phase III ARD/ML Assessment Report [Appendix C], Stantec 2022) indicate gabbro primarily intersects the pit wall along the north side, below 330 m elevation except for one small area of intersection on the northwest corner which is the lowest elevation in the pit and where there are also samples of gabbro that tested non-PAG. Most of the gabbro is expected to be below the pit lake elevation. The beige material along the south and southeast boundaries of the pit where the highwall will extend above the flooded water level is primarily conglomerate.

While predictions show that the risk of ARD/ML effects on the pit lake water quality from the exposed PAG materials in the highwall is low, if monitoring determines that sufficient PAG materials are above the flooded elevation of the pit (through geological mapping of the pit walls and updated water quality modelling) adaptive management will be triggered. There are a number of potential management measures that can be applied to address pit lake and discharge water quality if ARD/ML from the highwalls is assessed to be the source. Providing a cover to the exposed PAG in the highwalls, if required, could be achieved, for example, through retreat blasting and benching to lower slope angles to allow placement of the appropriate cover. During closure, natural development of permanently stratified pit lakes is expected with more concentrated contact water entering the pit at the beginning of pit flooding and cleaner water entering the pit near the end of rehabilitation. If natural stratification does not occur and discharges from pit lakes are predicted to exceed screening criteria because of ARD/ML, such mitigation measures as directing contaminant flows at depth, induced stratification, and/or in-pit treatment will be evaluated. Successful examples of full scale in-pit treatments of acidity, metals, and cyanide species with or without stratification are shown in Chapman et al. (2008), Fisher and Lawrence (2006), Flite and Duckett (2012), Kalin et al. (2000), Pieters et al. (2014), Poling et al. (2003).

6.0 REPORTING

Reporting procedures and documents associated with the ARD/ML Management Plan will be developed to comply with the conditions of release from the provincial and federal environmental assessment processes and permitting requirements (e.g., annual reports required to be submitted to the NLDIET, Mineral Development Division).

7.0 PLAN REVISION

This ARD/ML Management Plan is a living document and will be reviewed and updated by a Qualified Professional as follows:

- Annually at a minimum
- Following changes in the mine plan that may influence ARD/ML prediction
- As required, based on additional laboratory and/or field data that could potentially change the ARD/ML predictions or management protocols provided in this Plan.
- Results of monitoring programs that require a change or adaptation of the management approach(es) described in this document.

Updates or proposed changes to the ARD/ML Management Plan will be submitted to the applicable regulatory authorities for approval as outlined in Appendix A.

All ARD/ML Management Plan holders may initiate revisions by forwarding proposed revisions to the Environment Manager, Environmental Superintendent and/or Environmental Coordinator. The following information will be provided on the Revision Request Form for all revision requests:

- section to be revised
- nature of the revision
- rationale for the revision (e.g., environment/worker safety)
- name of the revision requestor

Approval for revisions will be required from Marathon. When the Environment Manager approves a revision request, details of the revision will be distributed to all ARD/ML Management Plan holders and will be documented in the Revision History Log as outlined in Appendix B. Each revision will be accompanied by:

- revision instructions
- list of sections being superseded
- an updated Table of Contents indicating the status of each section in the ARD/ML Management Plan
- When ARD/ML Management Plan holders receive a revision, they will, in a timely manner:
- read the text of the revision
- check the control sheet to confirm that all the listed pages have been received
- remove and destroy the superseded pages from their copy of the ARD/ML Management Plan
- insert the revised pages in the proper place in their copy of the ARD/ML Management Plan
- page check the ARD/ML Management Plan, using the updated table of contents to confirm the ARD/ML Management Plan is complete and current
- enter the revision number and date entered on the Revision History Log
- incorporate the revision into the area of responsibility, as applicable
- confirm that personnel in their purview are informed of and familiar with the revisions

8.0 REFERENCES

CCME (Canadian Council of Ministers of the Environment). 2020. Canadian water quality guidelines for the protection of aquatic life: Summary Table. In: Canadian environmental quality guidelines, 1999, Canadian Council of Ministers of the Environment, Winnipeg, MB. Accessed from http://st-ts.ccme.ca/en/index.html in January 2020.

CCME. 1991. Appendix IX—A protocol for the derivation of water quality guidelines for the protection of aquatic life (April 1991). In: Canadian water quality guidelines, Canadian Council of Resource and Environment Ministers. 1987. Prepared by the Task Force on Water Quality Guidelines.

Chapman, J.T., Coedy, W., Schultz, S., Rykaart, M. 2008. Water Treatment and Management during the Closure of the Colomac Mine.

Day S.J. et al., 2021. Small-scale field evaluation of geochemical blending of waste rock to mitigate acid rock drainage potential. Geochemistry: Exploration, Environment, Analysis. 22 (1): 1-15.

Environment Canada. 2009. Environmental code of practice for metal mines. Electronic monograph in PDF and HTML formats. ISBN 978-1-100-11901-4. https://www.ec.gc.ca/lcpecepa/documents/codes/mm/mm-eng.pdf.

Fisher, T.S.R., and Lawrence, G.A. 2006. Treatment of Acid Rock Drainage in a Meromictic Mine Pit Lake. Journal of Environmental Engineering-asce - J ENVIRON ENG-ASCE. 132. 10.1061/(ASCE)0733-9372(2006)132:4(515).

Flite, O., and Duckett, R. 2012. Performance of the Pit Lake at Ridgeway Gold Mine, South Carolina, USA. BC MEND ML/ARD Annual Workshop 2012.

Kalin, M., Cao, Y., Smith, M., and Olavenson, M. 2000. Development of the Phytoplankton Community in a Pit-Lake in Relation to Water Quality Changes. *Wat. Res*. Vol. 35, No. 13. pp. 3215-3225, 2001.

Marathon Gold Corporation. 2020. Valentine Gold Project Environmental Impact Statement. Final report prepared by Marathon Gold Corp. on 29 September 2020.

Marathon Gold Corporation. 2022. ARD/ML Management Plan (preliminary). January 2022

Mineral Development Division, 2020. *Development Plan Guidelines.* DOC-42913

Pieters, R., Coedy, W., Ashley, K.I., and Lawrence G.A. 2014. Artificial circulation of a mine pit lake. Can. J. Civ. Eng. 42: 33–43 (2015). dx.doi.org/10.1139/cjce-2014-0222

Poling, G. W., Pelletier, C. A., Muggli, D., Wen, W., Gerits, J., Hanks, C., and Black, K. 2003. Field studies of semi-passive biogeochemical treatment of acid rock drainage at the Island Copper Mine pit lake. Proc., 6th Int. Conf. on Acid Rock Drainage, Cairns, Australia, 549–558.

Price, W.A. 2009. Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials, Report prepared for MEND. Report 1.20.1, p. 1-579.

SOR/2002-222. 2020. Metal and Diamond Mining Effluent Regulations (MDMER). Published by the Minister of Justice.

Stantec Consulting Ltd. (Stantec). 2018. Preliminary Results of Phase I ARD/ML Assessment. Final report prepared for Marathon Gold Corp. on 23 March 2018. (Also submitted as Baseline Study Appendix 5, Attachment 5-A of the EIS).

Stantec Consulting Ltd. (Stantec). 2020a. Acid Rock Drainage/Metal Leaching (ARD/ML) Assessment. Final report prepared for Marathon Gold Corp. on 22 September 2020. (Also submitted as Baseline Study Appendix 5, Attachment 5-B of the EIS).

Stantec Consulting Ltd. (Stantec). 2020b. Valentine Gold Project –Water Quantity and Quality Modelling Report: Leprechaun Site. September 2020.

Stantec Consulting Ltd. (Stantec). 2020c. Valentine Gold Project –Water Quantity and Quality Modelling Report: Marathon Site. September 2020.

Stantec Consulting Ltd. (Stantec). 2020d. Valentine Gold Project – Assimilative Capacity Assessment. September 2020.

Stantec Consulting Ltd. (Stantec) 2022. Phase III ARD/ML Acid Rock Drainage/Metal Leaching (ARD/ML) Assessment. September 2022

Stantec Consulting Ltd. (Stantec) 2023. Berry Pit Expansion Environmental Registration / Environmental Assessment Update. August 2023

APPENDIX A

REVISION REQUEST FORM

Appendix A REVISION REQUEST FORM

SECTION TO BE REVISED:

NATURE OF REVISION:

RATIONALE FOR REVISION:
(i.e., environment/worker safety, etc.)

SUBMITTED BY:

APPENDIX B

REVISION HISTORY LOG

Appendix B REVISION HISTORY LOG

Version	Date Issued	Revision Notes
1	September 15, 2022	Application Plan
1	March 2023	Final Plan
3	August 4, 2023	Addition of Berry Expansion Project

APPENDIX 2G

Environment and Social Policies

Marathon Gold's Policies

Marathon Gold Corporation ("Marathon" or the "Company") has developed operating policies related to health and safety, environment, communities, Indigenous groups, and business governance which flow from our values and our commitment to the responsible development of a modern mining business. These policies are as follows:

Health and Safety Policy

Environmental Management Policy

Community Relations Policy

Indigenous Relations Policy

Code of Business Conduct and Ethics

Diversity Policy

Procurement Policy

Whistleblower Policy

Marathon's policies are based on fundamental principles which are derived from the Company's core operating values. These principles are:

- Compliance with all relevant laws, legislation and applicable industry rules, codes and ethical standards;
- Avoidance, mitigation and remediation of adverse risk towards employee well-being, the environment, and communities, and the proactive identification and management of such risks;
- Constant consideration for the dignity, well-being, and safety of our employees;
- Constant consideration for the well-being of the local communities that existed before our business commenced and will exist after our business has ended;

Marathon Gold's Policies

- Constant commitment to gender equality, diversity and inclusivity;
- Respect for the rights, values, culture and practices of Indigenous peoples;
- Ongoing, meaningful engagement with Indigenous groups, communities and civil society groups to build mutually beneficial relationships and contribute to the creation of lasting socio-economic benefits and sustainable development;
- The adoption of the highest professional standards in science and engineering and their application to our business;
- The willingness to adapt our operating procedures to the best practices learned from our peers and partners;
- The development and maintenance of comprehensive rules-based management systems;
- Continuous measurement and improvement of operating performance in our business practices;
- The adoption of the best standards in business governance through effective Board, management and third party oversight of our operations; and
- The maintenance of ongoing, open, honest and transparent communications with internal and external stakeholders.

Marathon's policies are living documents, subject to review and modification as our business evolves. They are to be clearly communicated to employees, contractors, consultants and visitors to the Valentine project site, and will be available on our website for external stakeholders. Elements of these corporate policy statements will be integrated as appropriate into tender documents for 3rd party suppliers of goods and services, and compliance with these standards will be made a condition of contract awards. On-site contractors may be required to demonstrate their compliance with policy, in particular with respect to health and safety and environmental and compliance, through regular reporting.

Health and Safety Policy

Marathon Gold Corporation ("Marathon" or the "Corporation") is committed to the successful development and operation of the Valentine Gold Project (the "Project"). Our vision is an enterprise balancing commercial success with a safe working environment, effective environmental management, and the creation of lasting social benefit.

The health and safety of people is an utmost priority for Marathon. We are committed to providing a safe working environment for all employees, contractors and visitors. Marathon's Health and Safety Policy has been developed with a view to identifying, assessing and managing risks to our people, and fostering a culture of safety in our workplaces.

Scope of the Policy

Marathon's objective is to identify, assess and manage risks to the health and safety of its people expressed in five primary commitments:

- Commitment to a workplace culture of zero harm;
- Commitment to the avoidance of injury and occupational illness;
- Commitment to the promotion of employee wellness and healthy lifestyles;
- Commitment to active safety leadership; and,
- Commitment to continuous improvement.

Marathon's Health and Safety Policy is a living document, subject to review and modification as our business evolves and based on evolving best-practice standards for health and safety performance in the Canadian mining industry. Marathon's Health and Safety Policy should be read in conjunction with individual operating standards for specific site-activities established for the Project.

The "Courage to Care"

Marathon understands that health and safety in the workplace is a shared responsibility, and that all parties, whether employees, contractors or stakeholders, have roles in hazard identification, risk assessment, and risk management. Ultimately, the establishment of effective controls and practices for a zero-harm workplace is achieved through collaboration, transparency, and the "Courage to

Care" for others. Marathon acknowledges this shared responsibility through the following measures:

- Communication of our safety values, programs and policies to all employees, contractors, visitors and the public;
- Establishing clear accountability for heath and safety management and performance;
- Open engagement with employees in the development and implementation of standards and encouraging an open dialog with internal and external stakeholders at all times;
- The willingness to adapt our health and safety procedures to the best practices learned from our peers and partners;
- Integration of health and safety considerations into operational decision-making, planning and activities;
- The establishment of relevant and measurable Key Performance Indicators ("KPIs") of health and safety outcomes, with both leading and lagging indicators, to evaluate organizational performance;
- The measurement of health and safety indicators in an objective and transparent fashion, and the assessment of outcomes against comparable Canadian mining industry data;
- A focus on continuous improvement in the assessment of leading indicators and accident prevention initiatives, and incentivising near-miss reporting;
- The disclosure of the Company's health and safety outcomes publicly, and in a timely manner;
- Promotion of healthy lifestyles through employee awareness and training, fitness for work standards, and occupational health programs;
- The equal application of safety standards to board directors, company executives, employees, contractors and visitors;
- Ensuring that supplies of personal protective equipment (PPE) appropriate to the task are readily available;
- Incorporation of health and safety outcomes into annual executive compensation reviews; and
- Compliance with all applicable laws, regulations, standards, and relevant industry best practices.

Communication and Compliance

This Health and Safety Policy shall be clearly communicated to both internal and external stakeholders, including employees, 3rd party suppliers of goods and services, Indigenous groups, local communities, regulators and civil society groups, and published on Marathon's website.

Training and orientation on this Policy, as well as individual operating standards for specific site-activities, will be provided for all employees and on-site contractors. Completing such training and orientation will be a condition for on-site access. All employees and 3rd party suppliers of goods and services at the Project will be required to adhere to Marathon's Health and Safety Policy. Notices of expected compliance will be made at the time of employment and in tender documents for supply and service contracts. On-site contractors may be required to demonstrate their compliance with this policy through regular reporting and adherence to Marathon's Occupational Health and Safety Management System. Non-compliance with this policy, and any associated operating standards for specific site-activities, may result in employee termination, or the termination of supply and service contracts.

Marathon welcomes and encourages dialogue to enhance our understanding of health and safety concerns or risks throughout all phases of the Project.

Occupational Health and Safety Management System

Marathon will develop an integrated and comprehensive Occupational Health and Safety Management System, with associated safe work policies, procedures and practices, which will be implemented prior to the start of construction. The management system will also include industry standard elements such as maintaining and supporting a site-based 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; ensuring appropriate use of PPE; and requiring daily toolbox talks and mandatory pre-job safety checklists. The Occupational Health and Safety Management System will be regularly reviewed and revised as necessary to incorporate evolving standards and best practices.

Continuous Improvement

Marathon is committed to continuous improvement of its health and safety performance, measures and practices, through employing the continuous improvement cycle (plan, do, check, act). To achieve this, Marathon will continually strive to improve health and safety performance based on defined targets, performance indicators and objectives for monitoring, measuring and reporting.

Marathon will monitor activities through each phase of the Project with timely and effective follow-up, and will report openly, honestly and in a timely manner on our progress to achieving responsible development.

Environment Policy

Marathon Gold Corporation ("Marathon" or the "Corporation") is committed to the successful development and operation of the Valentine Gold Project (the "Project"). Our vision is an enterprise balancing commercial success with a safe working environment, effective environmental management, and the creation of lasting social benefit.

Marathon shall implement high standards of environmental performance in all aspects of our work as part of our commitment to safe and responsible environmental, social and economic development. Marathon's Environment Policy has been developed with a view to preventing and reducing the adverse effects of our activities and maximizing the positive benefits and impacts upon people, communities and the biophysical environment.

Scope of the Policy

As part of our ongoing exploration activities and throughout all phases of the development, construction, operation and rehabilitation of the Valentine Gold Project, Marathon will implement a responsible approach to social, economic and environmental performance that is aligned with the evolving priorities of Indigenous groups, stakeholders and regulators, and which complies with standards established by law, regulation, and the Company's operating permits for the Project.

Our actions will be consistent with Marathon's Values that will inform and guide the development of measures to protect the natural environment and enhance socio-economic benefits. Marathon will proactively engage with Indigenous groups, communities, stakeholders and regulators to identify and manage environmental risks and opportunities as part of Project planning and execution.

Marathon's Environment Policy is a living document, subject to review and modification as our business evolves and based on evolving best-practice standard for environmental performance in the Canadian mining industry.

Marathon's Environment Policy should be read in conjunction with individual operating standards for specific site-activities established for the Project.

Compliance with Laws, Rules and Regulations

Marathon will comply with all applicable environmental laws, regulations and standards and ensure that effective systems, practices and plans, based on industry best practices, are in place to prevent, mitigate and manage environmental risks. This policy should be read in conjunction with Marathon's Code of Business Conduct and Ethics.

Communication and Compliance

This Environment Policy shall be clearly communicated to both internal and external stakeholders, including employees, 3rd party suppliers of goods and services, Indigenous groups, local communities, regulators and civil society groups, and published on Marathon's website.

Training and orientation on this Policy, as well as individual operating standards for specific site-activities, will be provided for all employees and on-site contractors. Completing such training and orientation will be a condition for on-site access.

All employees and 3rd party suppliers of goods and services at the Project will be required to adhere to Marathon's Environment Policy. Notices of expected compliance will be made at the time of employment and in tender documents for supply and service contracts. On-site contractors may be required to demonstrate their compliance with this policy through regular reporting and adherence to Marathon's Environmental Management System. Non-compliance with this policy, and any associated operating standards operating standards for specific site-activities, may result in employee termination, or the termination of supply and service contracts.

Marathon welcomes and encourages dialogue to enhance our understanding of environmental concerns or risks throughout all phases of the Project.

Environmental Management System

Marathon will develop, implement, document and maintain a comprehensive environmental management system which will be integrated into all aspects of our activities. We will employ a graduated approach to the management of environmental risks, which emphasizes avoidance of adverse effects as the first priority, followed by reduction / mitigation measures, with remediation as the last option.

Consistent with this focus, we will develop, design and operate our facilities in a manner that promotes the best and most efficient use of energy, technology, resources and materials. Our environmental management plans will include processes to avoid unnecessary uses of energy and water, control emissions including those linked with climate change, reduce waste, and structure activities to reduce our environmental footprint to the extent possible.

Marathon places a high priority on the avoidance or reduction of lasting adverse effects on the environment, including to fish and fish habitat, wildlife and land use. We will employ a progressive approach to rehabilitation and reclamation to avoid or reduce adverse legacy environmental consequences and will integrate rehabilitation and reclamation requirements into Project planning.

Continuous Improvement

Marathon is committed to continuous improvement of its environmental performance, measures and practices, through employing the continuous improvement cycle (plan, do, check, act). To achieve this, Marathon will continually strive to improve environmental performance based on defined targets, performance indicators and objectives for monitoring, measuring and reporting. Marathon will monitor activities through each phase of the Project with timely and effective follow-up, and will report openly, honestly and in a timely manner on our progress to achieving responsible development.

Community Relations Policy

Marathon Gold Corporation ("Marathon" or the "Corporation") is committed to the successful development and operation of the Valentine Gold Project (the "Project"). Our vision is an enterprise balancing commercial success with a safe working environment, effective environmental management, and the creation of lasting social benefit.

Scope of the Policy

Marathon Gold understands that exploration and mining activity can bring positive social and economic benefits to communities and regions when potential environmental and socio-economic impacts are understood and well-managed.

We believe that effective management of potential environmental and socio-economic impacts is best achieved through listening, collaboration and cooperation with communities and stakeholders. We are committed to meaningful and ongoing community engagement. Early development of constructive relationships with local communities based on respectful dialogue with community leaders and residents is critical to responsible development and will help to ensure our projects are sustainable and successful in all aspects.

Marathon's Commitments

Marathon acknowledges that it is responsible, together with government and other partners, to mitigate the adverse impacts of our operations and to maximize local benefits. Marathon's Values inform and guide an approach to engagement that acknowledges, considers, and responds to the concerns of people and their communities. Through engagement we will:

- Acknowledge that our business fundamentally impacts people and communities;
- Acknowledge that people and communities existed on the land before our business commenced, and will exist after our business has ceased;
- Work proactively with communities to identify and manage risks and opportunities and achieve long-term, mutual success;
- Deal with communities in an inclusive, transparent, culturally appropriate manner;

- Maintain open and honest lines of two-way communication so that communities are provided with the necessary information, including information relating to our environmental performance and employment and business opportunities, on an ongoing basis;
- Collaborate with communities to prevent or mitigate adverse effects and promote responsible social and economic development;
- Take the values, needs and priorities of communities into account in our planning and decision-making processes;
- Seek to maximise employment and contracting opportunities within local communities;
- Recognize local community business capacities when formulating procurement packages;
- Work with communities to foster community health and well-being through a program of investment and sponsorship that leaves a lasting, positive legacy;
- Continually assess and seek improvement of our community relations; and,
- Formalize our commitments with local communities through cooperation or partnership agreements.

Effective community communication and engagement is critical to obtaining and preserving our social licence to operate. Building community trust and support is a normal part of the way we do business. We are committed to working with local communities to develop projects which create value for our stakeholders and shareholders.

Marathon's Community Relations Policy is a living document, subject to review and modification as our business evolves and based on evolving best-practice standards for community and stakeholder engagement in the Canadian mining industry.

Indigenous Relations Policy

Marathon Gold Corporation ("Marathon" or the "Corporation") is committed to the successful development and operation of the Valentine Gold Project (the "Project"). Our vision is an enterprise balancing commercial success with a safe working environment, effective environmental management, and the creation of lasting social benefit.

Scope of the Policy

Marathon acknowledges the unique culture and history of Indigenous Peoples in the Central Region of Newfoundland and Labrador and understands that they may have interests and concerns that differ from, or are in addition to, those of stakeholder groups. We are committed to working constructively and in a spirit of good faith with these Indigenous Peoples to achieve mutually beneficial outcomes.

Marathon's approach to engagement with Indigenous Peoples will apply over the life of the Project, including development, construction, operation, and rehabilitation.

Marathon's Indigenous Relations Policy is a living document, subject to review and modification as our business evolves and based on evolving best-practice standards for the engagement with, and participation of, Indigenous Peoples in the Canadian mining industry.

Marathon's Commitments

Marathon's Values inform and guide the development of measures to (1) protect the natural environment; (2) minimize cultural and social impacts on communities and Indigenous Peoples; and, (3) enhance socio-economic benefits for all stakeholders. We recognize that the success of our enterprise includes the successful participation of Indigenous people in employment and contracting opportunities at all stages of the Project's life.

Marathon acknowledges these responsibilities through the following measures:

- Acknowledgement of potential or established Indigenous or treaty rights and compliance with the requirements of any applicable treaties, laws, and regulations;
- Protection of cultural and heritage sites;

- Provision of opportunities for Indigenous Peoples to share traditional knowledge and information on land and resource use in the Project area;
- Consideration of traditional knowledge and land and resource use information in the identification and assessment of Project effects;
- Working cooperatively with Indigenous Peoples to identify Project effects and develop and implement appropriate mitigation measures;
- Working cooperatively with Indigenous Peoples to identify and manage environmental risks and opportunities as part of Project planning and execution;
- Integration of traditional knowledge and land and resource use information into the Project decision-making process as appropriate;
- Provision of opportunities for Indigenous Peoples to participate in the Project through employment and/or the supply of goods and services;
- Working cooperatively with Indigenous Peoples to identify and remove barriers to the participation of Indigenous people in the Project; and,
- Implementation of an effective, respectful and meaningful engagement which:
  - Provides accurate and relevant Project information in a timely and culturally appropriate manner;
  - Provides sufficient opportunities to identify issues and concerns; and,
  - Enables consideration of, and response to, Indigenous issues and concerns.

Marathon will maintain constructive dialogue with Indigenous Peoples to ensure that their views are taken into consideration as the Project progresses. We recognize that Indigenous interests and activities in relation to the Project may evolve with time, and we acknowledge the need to conduct ongoing assessment of the impact of the Project on Indigenous people.

Code of Business Conduct and Ethics

The Code of Business Conduct and Ethics (the "Code") has been adopted by the Board of Directors of the Corporation. This Code embodies the commitment of the Corporation and its subsidiaries to conduct our business in accordance with all applicable laws, rules and regulations and high ethical standards.

The actions of all the Corporation's employees, consultants, officers and directors shall reflect honesty, integrity and impartiality that is beyond doubt and all business should be done in a manner that:
(i) complies with laws, rules and regulations;
(ii) avoids conflicts of interest;
(iii) protects confidential information; and
(iv) adheres to good disclosure practices, in accordance with applicable legal and regulatory requirements.

The Corporation encourages all employees, consultants, officers and directors to submit good faith complaints or concerns regarding accounting or auditing matters to the Corporation without fear of reprisal.

Those who violate the standards in this Code will be subject to disciplinary action, up to and including termination. If a situation exists or arises where an individual is in doubt, the individual should seek the advice from the Chief Financial Officer ("CFO").

Compliance with Laws, Rules and Regulations

The Corporation is committed to compliance with all applicable laws, rules, and regulations in each jurisdiction in which it does business. All employees, consultants, officers and directors must respect and obey the laws, rules and regulations of the cities, states and countries in which we operate.

Employees, consultants, officers and directors should educate themselves on the laws, rules and regulations that govern their work, and seek advice from supervisors, managers or other appropriate individuals at the Corporation. Employees, consultants, officers and directors who have access to confidential information are not permitted to use or share that information for stock trading

purposes or for any other purpose except the conduct of our business. All non-public information about the Corporation (or about any other company) should be considered confidential information. To use non-public information for personal financial benefit or to "tip" others, including family members, who might make an investment decision on the basis of this information, is not only unethical but also illegal. The Corporation has adopted an Insider Trading Policy in order to prevent improper trading of securities of the Corporation and the improper communication of undisclosed material information regarding the Corporation. All employees, consultants, officers and directors are expected to thoroughly understand and comply with such policy.

Conflicts of Interest

All employees, consultants, officers and directors have an obligation to act in the best interests of the Corporation. Employees, consultants, officers and directors should not be involved in any activity that creates or gives the appearance of a conflict of interest between the interests of the Corporation and their personal interest or the interests of a third party they are involved with. A conflict of interest occurs when an individual's private interest (or the interest of a member of his or her family) interferes, or even appears to interfere, with the interests of the Corporation. Employees and consultants must notify the CFO and officers and directors must notify the Chair of the Audit Committee and the Chair of the Board of the existence of any actual or potential conflict of interest.

If a conflict of interest exists, and there is no failure of good faith on the part of the employee, consultant, officer or director, the Corporation's policy generally will be to allow a reasonable amount of time for the employee, consultant, officer or director to correct the situation in order to prevent undue hardship or loss. However, all decisions in this regard will be at the discretion of the Chief Executive Officer ("CEO") (and in the case of the CEO, the Board of Directors), whose primary concern in exercising such discretion will be what is in the best interests of the Corporation.

Examples of a potential conflict of interest include:
(i) Employment/Outside Employment. In consideration of your employment with the Corporation, you are expected to devote your full attention to the business interests of the Corporation. You are prohibited from engaging in any activity

that interferes with your performance or responsibilities to the Corporation or is otherwise in conflict with or prejudicial to the Corporation. Our policies prohibit any employee, consultant, officer or director from accepting simultaneous employment with a corporation, supplier, customer, developer or competitor, or from taking part in any activity that enhances or supports a competitor's position. Additionally, you must immediately disclose to the Corporation any interest that you have that may conflict with the business of the Corporation. If you have any questions on this requirement, you should contact the CFO.

(ii) Outside Directorships. It is a conflict of interest to serve as a director of any company that competes with the Corporation. Although you may serve as a director of a company, supplier, customer, developer or other business partner, our policy requires that such position not conflict or otherwise interfere with your duties to the Corporation and that you first obtain written approval from the Corporation's CEO in the case of an employee or consultant of the Corporation or the Chair of the Board in the case of an officer or director of the Corporation, before accepting a directorship. Any compensation you receive should be commensurate with your responsibilities in your capacity as a director. Such approval may be conditioned upon the completion of specified actions.

(iii) Business Interests. If you are considering investing in a customer, supplier, developer or competitor of the Corporation, you must first take great care to ensure that these investments do not compromise your responsibilities to the Corporation. Many factors should be considered in determining whether a conflict exists, including the size and nature of the investment; your ability to influence the Corporation's decisions; your access to confidential information of the Corporation or of the other company; and the nature of the relationship between the Corporation and the other company. You should generally try to avoid even the appearance of impropriety or conflict.

(iv) Property Interests. The direct or indirect ownership of mineral properties or claims by an employee, consultant, officer or director of the Corporation creates a potential conflict of interest and any such interest must be disclosed to the CFO immediately upon commencement of employment with the Corporation and thereafter prior to the acquisition of such interest.

(v) Related Party Transactions. As an absolute rule, you should avoid conducting Corporation business with a relative or significant other, or with a business in which a relative or significant other is associated in any significant role. Relatives include spouse, sister, brother, daughter, son, mother, father, grandparents, aunts, uncles, nieces, nephews, cousins, step relationships, and in laws. Significant others include persons living in a spousal or familial fashion with an employee, consultant, officer or director.

If a related party transaction is unavoidable, you must fully disclose the nature of the related party transaction to the Corporation's CFO. If determined to be material to the Corporation by the CFO, the Corporation's Audit Committee must review and approve in writing in advance such related party transactions. The most significant related party transactions, particularly those involving the Corporation's directors or executive officers, must be reviewed and approved in writing in advance by the Corporation's Board of Directors. The Corporation must report all such material related party transactions under applicable accounting rules, Federal securities laws, SEC rules and regulations, and securities market rules. Any dealings with a related party must be conducted in such a way that no preferential treatment is given to this business.

Willful withholding of information regarding a prohibited relationship/reporting arrangement may be subject to corrective action, up to and including termination. If a prohibited relationship exists or develops between two employees, the employee in the senior position must bring this to the attention of his/her supervisor. The Corporation retains the prerogative to separate the individuals at the earliest possible time, either by reassignment or by termination, if necessary.

(vi) Related Party Employment. The employment of related parties (as defined above), whether as full-time employees, seasonal or student employees, or independent contractors, is permitted only with the prior consent of the CEO.

(vii) Other Situations. Since other conflicts of interest may arise, it would be impractical to attempt to list all possible situations. If a proposed transaction or situation raises any questions or doubts in your mind you should consult the CFO. If you are aware of a conflict or potential conflict of interest, as an employee or consultant you should bring the matter to the attention of a supervisor or manager

or report the matter in accordance with the Corporation's whistleblower policy. If you are aware of a conflict or potential conflict as an officer or director, you should promptly bring the matter to the attention of the Chair of the Audit Committee or report the matter in accordance with the Corporation's whistleblower policy.

Confidentiality

To avoid a breach of confidentiality, all employees, consultants, officers and directors should maintain all confidential information in strict confidence, except when disclosure is authorized by the Corporation or legally mandated. Confidential information includes, among other things, any non-public information concerning the Corporation, including its business, financial performance, results or prospects, and any non-public information provided by a third party with the expectation that the information will be kept confidential and used solely for the business purpose for which it was conveyed. The obligation to keep information confidential also extends beyond your employment or directorship with the Corporation.

Corporate Opportunities

Employees, consultants, officers and directors are prohibited from taking for themselves, personally or for the benefit of others, opportunities that are discovered through the use of corporate property, information or position, except to the extent that a waiver has been granted under this Code. No employee, consultant, officer or director may use corporate property, information, or position for improper personal gain or for the improper personal gain of others, and no employee, consultant, officer or director may compete with the Corporation directly or indirectly. Employees, consultants, officers and directors owe a duty to the Corporation to advance the Corporation's interests when the opportunity to do so arises.

Protection and Proper Use of Company Assets

All employees, consultants, officers and directors should protect the Corporation's assets and ensure their efficient use. The Corporation's assets should be protected from loss, damage, theft, misuse, and waste. Corporate assets include your time at work and work product, as well as the Corporation's equipment and vehicles, computers and software, trading and bank accounts, company information and the Corporation's reputation, trademarks and name. The Corporation's telephone, email, voicemail and other electronic systems are primarily for business purposes.

Personal communications should be kept to a minimum. Unauthorized use or distribution of this information would violate corporate policy. It is also illegal and could result in civil or even criminal penalties.

Competition and Fair Dealing

Each employee, consultant, officer and director should endeavor to deal fairly with the Corporation's counterparties, suppliers, competitors and employees. The Corporation seeks to outperform its competition in a fair and honest manner. No employee, consultant, officer or director should take unfair advantage of anyone through unlawful manipulation or concealment, abuse of privileged information, misrepresentation of material facts or any other intentional unfair-dealing practice. Each employee, consultant, officer or director is required to maintain impartial relationships with corporate suppliers and customers.

Gifts, Favours, Entertainment and Payments Received by Employees

Employees are expected to act and make decisions based on an impartial and objective assessment of each situation, free from the influence of gifts and similar favours that might compromise judgment. The Corporation avoids both the fact and the appearance of improperly influencing relationships with the organizations or individuals with whom it deals.

Employees shall not seek or accept gifts, payments, fees or services, valuable privileges, vacations, trips without a business purpose, loans (other than conventional loans from lending institutions), or other favours, from any person or business organization that does business with or is a competitor of the Corporation, except as provided below.

No employee is permitted to accept anything of value in exchange for referral of third parties to any such person or business organization. The following guidelines should be followed:

(i) Employees may accept gifts and entertainment usually associated with accepted business practices for themselves and members of their families if:

1. they are infrequent;
2. they legitimately serve a definite business purpose;
3. they are appropriate to the business responsibilities of the individuals involved; and
4. they are within the limits of reciprocation as a normal business expense.

(ii) Employees should neither give nor receive gifts with more than a nominal value. Employees must inform their immediate superior of gifts and entertainment received within a reasonable period not exceeding one month from receipt.

(ii) A strict standard is expected with respect to gifts, services or considerations of any kind from suppliers. Entertainment at the expense of suppliers, which exceeds the limits set out in the guidelines presented above, should not be accepted in any circumstances.

(iii) It is never permissible to accept a gift in cash or cash equivalents (i.e. stocks or other form of marketable securities) of any amount.

(iv) The propriety of employees keeping valuable gifts with a value substantially in excess of Canadian accepted business practices, versus turning them over to the Corporation should be discussed with the CFO.

Gifts, Favours, Entertainment and Payments Given by the Corporation

Gifts, favours, and entertainment may be given to others at the Corporation's expense only if they meet all the following criteria:

(i) They are consistent with accepted business practices;

(ii) They are of sufficiently limited value, and in a form that could not be construed as a bribe or payoff;

(iii) They are not in violation of applicable laws and generally accepted ethical standards; and

(iv) Public disclosure of the facts will not embarrass the Corporation.

Anti-Bribery and Corruption

Corruption is the misuse of public power for private profit, or the misuse of entrusted power for private gain. Bribery is the offer, promise, or payment of cash, gifts, or even excessive entertainment, or an inducement of any kind offered or given to a person in a position of trust to influence that person's views or conduct or to obtain an improper advantage. Bribery and corruption can take many forms, including the provision or acceptance of:

(i) Cash payments;

(ii) Phony jobs or "consulting" relationships;

(iii) Kickbacks;

(iv) Political contributions;

(v) Charitable contributions;

(vi) Social benefits; or

(vii) Gifts, travel, hospitality, and reimbursement of expenses.

The Corporation's personnel and agents are strictly prohibited from offering, paying, promising, or authorizing any payment or other thing of value to any person directly, or indirectly through a third party for the purpose of:

(i) causing the person to act or fail to act in violation of a legal duty;

(ii) causing the person to abuse or misuse their position; or

(iii) securing an improper advantage, contract or concession for the Corporation or any other party.

Monitoring of payments that could enable such transactions, including through the use of lawyers, agents and consultants, will be specifically identified and monitored on a regular basis to ensure compliance with anti-bribery legislation and the Criminal Code of Canada.

Employee Harassment and Discrimination

The Corporation is committed to fair employment practices in which all individuals are treated with dignity and respect. To that end, the Corporation will adopt the Respectful Workplace Policy & Harassment Prevention Plan which each employee, officer and director will be required to comply with.

Environmental, Safety, and Occupational Health Practices

The Corporation believes that sound environmental, safety and occupational health management practices are in the best interests of the Corporation, its employees, consultants, officer, directors and its shareholders and the communities in which it operates. The Corporation is committed to conducting its business in accordance with recognized industry standards and to meeting or exceeding all applicable environmental and occupational health and safety laws and regulations. Achieving this goal is the responsibility of all employees, consultants, officers and directors.

Whistleblower Policy

The Corporation is committed to maintaining the highest standards of business conduct and ethics, as well as full compliance with all applicable government laws, rules and regulations, corporate reporting and disclosure, accounting practices, accounting controls, auditing practices and other matters relating to fraud against shareholders (collectively "Governance Concerns").

Pursuant to its charter, the Audit Committee of the Board of Directors of the Corporation is responsible for ensuring that a confidential and anonymous process exists whereby persons can report any Governance Concerns relating to the Corporation and its subsidiaries. In order to carry out its responsibilities under its charter, the Audit Committee has adopted this Whistleblower Policy (the "Whistleblower Policy").

For the purposes of the Whistleblower Policy, "Governance Concerns" is intended to be broad and comprehensive and to include any matter, which in the view of the complainant, is illegal, unethical, contrary to the policies of the Corporation or in some other manner not right or proper.

Examples would include, but are not limited to:

(i) Violation of any law or regulation that relates to corporate reporting and disclosure;

(ii) Fraud or intentional acts of misstatement in the preparation, evaluation and review of the Corporation's financial statements and other continuous disclosure documents;

(iii) Fraud or deliberate error in the recording and maintenance of the Corporation's financial records;

(iv) Violations of the Corporation's internal policies; and

(v) False statements by or to a director, officer or employee of the Corporation with respect to matters reflected in the Corporation's financial records and financial reporting, or other elements of the Corporation's continuous disclosure.

Any person with an accounting concern, or any other concern, relating to the Corporation of any of its subsidiaries may submit his/her concern on a confidential and anonymous basis directly to the Chair of the Audit Committee in accordance with the Whistleblower Policy.

Waivers of the Code

From time to time, the Corporation may waive certain provisions of this Code. Waivers generally may only be granted by the CEO. However, any waiver of the provisions of this Code for officers, directors, including the CEO and CFO may only be made by the Board of Directors or its designee and will be disclosed to shareholders as required by applicable rules and regulations.

Diversity and Inclusivity Policy

Marathon Gold Corporation ("Marathon" or the "Corporation") is committed to the successful development and operation of the Valentine Gold Project (the "Project"). Our vision is an enterprise balancing commercial success with a safe working environment, effective environmental management, and the creation of lasting social benefit.

Marathon seeks to foster a diverse and inclusive corporate culture that acknowledges and values difference. Our workplaces shall reflect the business environment and geographic locations in which we operate, where all employees, regardless of age, gender, beliefs, language, race, ethnicity, Indigenous identity or physical abilities, are appreciated and respected for the talent and knowledge they bring to the Corporation.

Marathon understands that the inclusion of diverse ideas, talents, skills and perspectives at all levels within the workforce promotes creativity and thought-provoking discussions and solutions. Maintaining a corporate culture where all voices and points of views are heard and considered builds a stronger, more representative, engaged and competitive workforce.

Marathon recognizes that barriers to creating a diverse and inclusive workplace are common, and can be promulgated through indifference in leadership or systemic bias. We are committed to identifying and removing barriers wherever they exist. Our commitment to diversity and inclusion is reflected in all levels of the company, beginning with our Board of Directors and executive team.

We aim for a workforce which is comprised of talented and dedicated individuals who bring a wide mix of knowledge, expertise, experience, skills and backgrounds to their positions and to the team. Our employee selection and advancement processes will be founded on Marathon's Values. They will be equitable, non-discriminatory and free from bias, conscious or unconscious.

We consider all individuals based on merit, having due regard to the benefits of diversity and corporate needs and priorities.

DIVERSITY AND INCLUSIVITY POLICY

Marathon's commitment to diversity and inclusion aligns with our core corporate Values and is explicitly reflected in our Indigenous Relations Policy and Community Relations Policy. It informs our strategic planning and is incorporated into all aspects of our corporate structure.

Marathon's Diversity and Inclusivity Policy is a living document, subject to review and modification as our business evolves and based on evolving best-practice standards for human resource development in the Canadian workplace.

Whistleblower Policy

Marathon Gold Corporation ("Marathon" or the "Corporation") is committed to maintaining high standards of business conduct and ethical behavior, as well as complying fully with applicable laws, rules and standards applying to corporate reporting and continuous disclosure, accounting practices and controls, and processes for the prevention and detection of fraud, bribery or other improper activities.

MI 52-110 Requirement

Pursuant to Multilateral Instrument 52-110, the Corporation's Audit Committee is required to establish procedures for:
a) the receipt, retention, and treatment of complaints received by the Corporation regarding accounting, internal accounting controls, or auditing matters; and
b) the confidential, anonymous submission by employees of the Corporation of concerns regarding questionable accounting or auditing matters.

This procedures policy is designed to achieve this purpose and to address more generally any Governance Concerns, as described below, raised by directors, officers, employees and service providers working at any level within the Corporation (each a "Relevant Individual").

Governance Concerns Explained

For the purposes of this Policy, "Governance Concerns" are intended to be applied broadly and to encompass any matter or behavior which, in the reasonable and genuinely held belief of a complainant, represents professional malpractice; is illegal, unethical, or criminal in nature; is in violation of any promulgated policy of the Corporation; or is in some other manner improper. It is not intended to deal with personal grievances or employment-related disputes.

Examples of a Governance Concern addressable by this policy include, but are not limited to, allegations of the following:

- Violation of any law or regulation including those related to corporate reporting and disclosure.
- Fraud or intentional acts of misstatement including in the preparation, evaluation

and review of the Corporation's financial statements and other continuous disclosure documents.

- Fraud or deliberate error related to the Corporation's operations or finances including in the recording and maintenance of the Corporation's financial records.
- Violation of the Corporation's internal policies including the Corporation's Code of Business Conduct and Ethics.
- False statements by or to a director, officer or employee of the Corporation with respect to matters reflected in the Corporation's financial records and financial reporting, or other elements of the Corporation's continuous disclosure.

This policy should not be used to report any personal grievance. Any complaints about a Relevant Individual's own personal circumstances (for example an employment dispute) should be pursued with the appropriate line manager through the ordinary grievance channels.

Reporting Governance Concerns

Relevant Individuals should report a Governance Concern as soon as they have a reasonable suspicion, unease or disquiet regarding a situation or matter. A Relevant Individual is not expected to investigate the matter personally before reporting it.

Relevant Individuals are encouraged to submit a Governance Concern (the "Governance Complaint") in writing to the Chair of the Corporation's Audit Committee using the contact details set out below. Submissions may be made anonymously and in confidence. Relevant Individuals may also contact the Chair of the Audit Committee to discuss the applicability of this policy or concerns regarding a business practice. If a Relevant Individual is uncomfortable reporting a Governance Concern to the Chair of the Audit Committee, the Relevant Individual may report a matter to the Corporation's external legal counsel using the contact details set out below.

Responding to Governance Complaints

Upon receiving a Governance Complaint, the Chair of the Audit Committee will, depending upon the apparent urgency of the matter, call a meeting of the Audit Committee or add the Governance Complaint to the agenda for consideration at the next regularly scheduled meeting of the Audit Committee.

The Audit Committee shall review and discuss, on a preliminary basis, the nature of the Governance Complaint and the accounting, auditing, control or other matters that are called into question. In conducting this review, the Audit Committee will hold an in camera session, and then may request the attendance, at its discretion, of the Chief Executive Officer, the Chief Financial Officer, the Corporation's auditor, the Corporation's external legal counsel, the person making the Governance Complaint (if known and if such person is amenable) or such other persons as it deems necessary. The purpose of the meeting and the nature of the Governance Complaint shall have been communicated to all such attendees by notice prior to the meeting.

If the Audit Committee is satisfied upon a preliminary review that the Governance Complaint has merit, the Audit Committee shall investigate such Governance Complaint with the assistance of such internal and external resources and advisors as it deems appropriate. Following the conclusion of its review, the Audit Committee shall meet to determine the merit of the Governance Complaint and to formulate recommendations on any action to be taken in respect of the Governance Complaint. Minutes of such meeting shall be kept in the normal course in order to ensure a record of the nature and treatment of the Governance Complaint.

Upon reaching such determination, the Audit Committee will communicate its findings and recommendations to the Board. The Board shall consider and implement such recommendations, as it deems advisable, to rectify any deficiencies identified in the Governance Complaint and shall communicate same to management.

The Audit Committee shall ensure that confidentiality will be maintained throughout the investigatory process to the extent practicable and appropriate under the circumstances; and the person who makes the Governance Complaint (if known) shall receive a written summary of the final determination.

The Audit Committee shall retain all documentation regarding the Governance Complaint, its preliminary review, any investigation, determination and implementation of recommendations for a period of no less than ten (10) years.

Administration

The Corporation, through the Chief Executive Officer shall be responsible for the dissemination of this Policy to all Relevant Individuals.

No Retaliation

The Corporation will not allow or pursue retaliation of any kind in respect of a Governance Complaint, or for assistance or information provided to applicable authorities in connection with an investigation of breaches of applicable securities law, where such are made or provided in good faith. In addition, no employee may be adversely affected because the employee refused to carry out a directive which, in fact, constitutes corporate fraud, is a violation of this Policy, a violation of the law, or presents a substantial and specific danger to the public's health and safety. Any retaliatory action should immediately be reported to the Chair of the Board or any other member of the Corporation's Board of Directors.

Contact

Chair of the Audit Committee

In writing:
Julian Kemp
75-11 Pirie Drive
Dundas, Ontario
L9H 6Z6
By phone: 647-554-5367
By email: Jkemp.director@bell.net

External Legal Counsel

In writing:
Alison Babbitt
45 O'Connor Street, Suite 1500,
Ottawa, ON K1P 1A4, Canada
By phone: 613-780-8665
By email: alison.babbitt@nortonrosefulbright.com