

**Valentine Gold Project: Second
Amendment to the EIS**

Second Amendment to the
Environmental Impact Statement



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PART 1 SUMMARY OF THE SECOND AMENDMENT TO THE EIS

1.0 INTRODUCTION

On October 29, 2021, Marathon Gold Corporation (Marathon) received notification from the Minister of Environment and Climate Change that additional information is required in the form of a Second Amendment to the Environmental Impact Statement (EIS) for the proposed Valentine Gold Project. Following submission of the first amendment to the EIS, submitted on August 6, 2021, the amendment was reviewed by the Environmental Assessment Committee (EAC), with opportunity to comment provided to the public as required by the *Environmental Protection Act* (EPA). This document comprises a Second Amendment to the EIS to address the comments received on October 29. Table 1 is a table of concordance identifying where the responses to EAC comments can be found.

Table 1 Table of Concordance

Agency / Organization	Response #	Part 2 Page #
Department of Health and Community Services (DHCS)	DHCS(2)-01 - DHCS(2)-06	12 to 20
Department of Industry, Innovation and Technology (NLDIET)	DIET(2)-01 – DIET(2)-03	21 to 25
Department of Tourism, Culture, Arts and Innovation (DTCAI)	DTCAI(2)-01 – DTCAI(2)-02	26 to 30
Department of Environment and Climate Change (NLDECC)	ECC(2)-01 – ECC(2)-05	31 to 39
Office for the Status of Women (OSW)	OSW(2)-01	40
Department of Fisheries, Forestry and Agriculture (NLDFFA)	FFA(2)-01 – FFA(2)-03	41 to 49
Department of Fisheries and Oceans Canada (DFO)	DFO(2)-01	50
Health Canada (HC)	HC(2)-01 – HC(2)-11	51 to 95
Transport Canada (TC)	TC(2)-01	96
Environment and Climate Change Canada (ECCC)	Comments from the Canadian Wildlife Service (CWS) directly related to the on-going federal technical review and information requirements process for the EIS, specifically with respect to the potential effects of the Project on migratory birds, had been included in the EAC comments provided to Marathon on October 29, 2021. Marathon acknowledges these comments and continues to address CWS comments through the federal information requirements process.	



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2.0 REGULATORY COMMENTS

Responses to regulatory comments are provided in Part 2 of this document, with associated appendices in Part 3. To clearly document the comments received, each comment was converted into a tabled information request format, as was done for the first amendment, which includes the following:

- Applicable section of the Provincial EIS Guidelines and EIS section number, if provided
- Context and rationale for the comment, if provided
- Specific comments or requests for information
- Marathon's response

These comments pertain to various issues and associated requests for clarification and information that were submitted by government departments and agencies that are members of the EAC. The primary comments provided by regulators during review of the EIS amendment include the following:

- **Caribou:** Comments and questions related to cumulative effects and detailed plans for caribou protection and monitoring arose during review of the first EIS amendment. Additional information on caribou is provided in Part 2 (FFA(2)-01 and FFA(2)-02), including a preliminary Caribou Protection and Environmental Effects Monitoring Plan (CPEEMP; Appendix A), developed in consultation with NLDFFA-Wildlife Division. Note that in the first amendment to the EIS, the CPEEMP was referred to as the Caribou Management Plan.
- **Human Health:** DHCS and Health Canada provided comments related to potential effects to human health including, noise, air quality, water quality, country foods, and human health risk assessment, noting that a Human Health Risk Assessment was prepared to support the first EIS amendment
- **Dam Breach Assessment (DBA):** ECC requested that Marathon update its DBA to incorporate outflows from the Victoria Lake Reservoir, based on information provided by NL Hydro. As requested, Marathon has updated assessment results and accompanying dam breach inundation maps and issued these in the form of an addendum (Appendix B) to the most recent DBA (Appendix C).
- **Acid Rock Drainage / Metal Leaching (ARD/ML) Management:** DIET had provided comment that Marathon is required to submit a satisfactory ARD/ML Management Plan prior to the submission of the development plan and the rehabilitation and closure plan (as required under section 4 of the *Mining Act*). In subsequent consultations, Marathon informed DIET that a preliminary ARD/ML Management Plan has been developed in response to information requirements received from Natural Resources Canada through the federal technical review of the EIS. At the request of DIET, this preliminary plan has been also appended to this second amendment to the EIS (Appendix D).



3.0 PUBLIC AND STAKEHOLDER COMMENTS

Comments were also received from the public and stakeholders. Key comments raised by the public and stakeholders, and Marathon’s responses are provided in Table 2.

Table 1 Key Public and Stakeholder Comments and Marathon’s Responses

Group	Key Comments and Requests	Marathon’s Response
NL Hydro	<ul style="list-style-type: none"> • Request for a copy of the updated DBA report to review the assumptions made in the report and the potential for water from the Victoria Dam spillway to affect the results of the dam breach assessment. • Further information from Marathon during the detailed design phase and the right to request further analysis or action to be taken to limit the impact a potential breach could have on Victoria Dam. • Monitoring of ground acceleration at Victoria main dam is to be reviewed by a geotechnical engineer (provided by Marathon) prior to and during blasting operations. The expectation is that Marathon will determine the maximum limits for blasting operation near Victoria Dam using provided information by NL Hydro. This information in relation to Victoria dam should be submitted to Hydro for review prior to the undertaking of any blasting operations that have the potential to impact the dam. • Remain cognizant of potential impacts to Millertown Dam, located at the outlet of Red Indian Lake. • Notification from Marathon when there is a change to the design, including access, when activities start in the area (increased vehicle traffic on the access road, blasting, etc.), progress and results of studies/designs on the tailings dam and its effect on existing assets operated by NL Hydro (Victoria Dam, Millertown Dam, etc.). 	<p>Marathon has consulted NL Hydro with respect to these comments and provides the following updates:</p> <ul style="list-style-type: none"> • A copy of the identified DBA report, and the more recent technical memo addressing the addition of potential flows from the Victoria Dam Spillway (requested by NLDECC – Water Resources Division) have been provided to NL Hydro for review and is appended to this second amendment to the EIS (Appendix C). • Marathon has had recent discussion with NL Hydro regarding the comments provided and notes the following: <ul style="list-style-type: none"> – Marathon will provide updates to NL Hydro through the detailed design and permitting phase, and respond to any requests from NL Hydro for information or analysis. This will include consideration of potential effects to downstream infrastructure (e.g., Millertown Dam). – Marathon has provided a report to NL Hydro regarding predicted vibrations from Project blasting operations with respect to the Victoria Dam. Marathon will consult with NL Hydro regarding blasting operations (construction and for mining) including a review of blast designs/plans/thresholds as part of Marathon’s detailed engineering, vibration monitoring station location selection (including the Victoria Dam), and providing results of the vibration monitoring to NL Hydro over the life of the Project. – Marathon will continue to consult with NL Hydro on common/shared issues such as inundation mapping, access road use and bridge work, public access to Victoria Lake Reservoir, emergency response and communications plans for the Victoria Dam and Marathon’s project, and engineering studies. <p>Marathon and NL Hydro’s dam safety personnel are planning a meeting in January 2022 to discuss the issues above, and it is expected that regular meetings will occur to address these and other matters related to dam safety.</p>



Table 1 Key Public and Stakeholder Comments and Marathon’s Responses

Group	Key Comments and Requests	Marathon’s Response
<p>Atlantic Salmon Federation (ASF)</p>	<ul style="list-style-type: none"> • Downstream fish and fish habitat threats from chemical pollution due to the volume of effluent (even when treated) that will be deposited into the watershed on a daily basis, plus the cumulative impact of these deposits for 365 days a year, over the 13 plus year life span of the mine. • Tailings management dam threats and the potential impacts on fish and fish habitat downstream if there was a breach. • Water extraction threats from the Exploits Watershed for construction and operation of the mine during its life span, and the potential impact that this would have on fish and fish habitat throughout the watershed. • Risks remaining to woodland caribou populations. 	<p>Marathon has continued to consult with stakeholders, including ASF, to address questions and concerns and provide additional information when requested. Upon release from federal and provincial environmental assessment (EA) processes, the Valentine Gold Project will proceed in compliance with the mitigation measures identified throughout the EA process and other measures set out by the provincial and federal governments as conditions of EA release and Project permitting, and in compliance with regulatory requirements. Monitoring will be conducted to verify the EA effects predictions, including with respect to ground and surface water resources and fish and fish habitat. Monitoring will also be conducted to demonstrate Marathon’s compliance with regulatory and permitting conditions and requirements.</p> <p>Marathon is committed to following recent guidelines and regulatory requirements to reduce the risk of tailings management facility (TMF) dam failure – see Section 5 below for more information on compliance with tailings management protocols. With respect to a potential dam breach, an updated DBA has been appended to this Second Amendment (Appendix C).</p> <p>Water for use for the Project will be extracted from the Victoria Lake Reservoir, which is also where the primary effluent release from the milling process will occur. There is no planned extraction of water from the Exploits watershed during construction or operations, however there is a plan to extract some water from Valentine Lake during the rehabilitation and closure phase of the Project to expedite flooding of the open pit, as described and assessed in the EIS. During construction and operations, the Project will have a small influence on local sub-watersheds, however the changes to flows will not have a measurable effect on the Exploits watershed.</p> <p>With respect to caribou, Marathon has continued to consult with NLDDFA-Wildlife Division with respect to the protection of caribou and the mitigation and monitoring of potential Project effects. Appendix A presents the preliminary CPEEMP, which has been developed in consideration of feedback Marathon has received from through consultation with NLDDFA-Wildlife Division, Indigenous groups and the Newfoundland and Labrador Outfitters Association (NLOA). The CPEEMP will be reviewed and updated as required to reflect conditions of EA release, ongoing baseline studies, relevant permitting, and future follow-up monitoring.</p>



Table 1 Key Public and Stakeholder Comments and Marathon’s Responses

Group	Key Comments and Requests	Marathon’s Response
<p>Newfoundland and Labrador Outfitters Association (NLOA)</p>	<p>NLOA raised various concerns including Project-related effects to woodland caribou, other wildlife including moose and Atlantic salmon, acoustic disturbance, potential for devaluing of outfitting businesses, effects of increased traffic on wildlife and outfitting businesses, and the lack of an Outfitters Environmental Effects Monitoring Plan to protect the outfitting industry in the area.</p>	<p>Marathon has been engaging with NLOA since early 2020 to provide Project-related information, to understand the nature and scope of outfitting activities in the vicinity of, or potentially affected by, the Project, and to discuss and respond to outfitters’ questions and concerns. On October 4, 2021, Marathon and NLOA entered into a Memorandum of Understanding (MOU) in which the parties agree to develop an Outfitters Environmental Effects Monitoring Plan (OEEMP). Additional details on the MOU and the OEEMP are provided in response to DTCAI(2)-02. Marathon will continue to engage with outfitters over the life of the Project regarding hunting, trapping and fishing activities in and around the Project Area and associated economic conditions.</p> <p>Additionally, monitoring will be conducted to verify the effects predictions provided in the EIS with respect to caribou, other wildlife, and fish and fish habitat.</p>
<p>Qalipu First Nation (Qalipu)</p>	<p>Key concerns raised by the Qalipu relate to whether there will be a rehabilitation target set by Marathon, as well as if there are any consequences to Marathon if the rehabilitation targets are not met once mine operations have stopped. Additionally, there is concern that the EA process has continued to conclude that there will be adverse effects on caribou.</p>	<p>Marathon has, and will continue to, engage with the Qalipu to understand and respond to questions and concerns.</p> <p>Rehabilitation ‘targets’ are established through a Rehabilitation and Closure Plan which is a requirement under the Newfoundland and Labrador (NL) <i>Mining Act</i>, administered by the NLDIET, Mines Branch. Conceptual closure planning targets have been described in the EIS and subsequent information requirements responses, and a formal Rehabilitation and Closure Plan is required to be submitted to regulators for review and approval as part of the permitting process. Also a requirement under the <i>Mining Act</i>, Financial Assurance is required to be in place prior to the commencement of construction of a mining project. The Financial Assurance amount is based on the closure cost estimate included in the Rehabilitation and Closure Plan. The Financial Assurance is held by the province in the event of a default by the proponent, whereby the province would step in and complete the rehabilitation and closure of the site using those funds.</p> <p>With respect to caribou, Marathon continues to consult with NLDDFA-Wildlife Division with respect to reducing the risk of Project-related effects to caribou, including through development of the CPEEMP (Appendix A), and anticipates continued consultation and potential implementation of adaptive mitigation measures based on results of monitoring throughout the life of the Project.</p>



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4.0 PROJECT REFINEMENTS

Throughout the EA process, Marathon has continued to assess the design of the Project and apply refinements where required or appropriate, in consideration of engineering attributes and to reduce environmental effects. Project refinement through on-going planning and engineering is part of the standard evolution of the development of a new mine or industrial project. The refinements made to the Valentine Gold Project design, which are further described below, have resulted from several factors, including ongoing planning and engineering; feedback from regulators and other information received through the EA process, which have been used to reduce potential environmental effects where possible; and fluctuating market conditions.

The following sections summarize the two types of Project refinements that have been or are being proposed during the EA process for the Valentine Gold Project: refinements related to the Feasibility Study (FS; Section 4.1) and refinements related to mitigation proposed to avoid or reduce effects to migrating caribou (Section 4.2). Section 4.3 describes how these refinements do not result in changes to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS.

4.1 PROJECT REFINEMENTS RELATED TO THE FEASIBILITY STUDY

The Project description presented in the EIS (Chapter 2) is based on the Prefeasibility Study (PFS) completed by Marathon in April 2020, noting that, as outlined in Section 2.1 of the EIS, the PFS Project design incorporated early feedback from regulators and stakeholders regarding the potential environmental effects of the Project. Marathon has subsequently completed the next required phase of Project engineering, with results described in the FS (Ausenco 2021). As anticipated, the FS confirmed the basis of design used in the PFS; therefore, only minor changes or refinements to the Project design were identified as compared to the Project description provided in the EIS, and there are no substantive changes to the scope of the Project or planned Project components and activities.

Project design refinements resulting from the FS and potential implications for the EIS were submitted to provincial regulators in a letter dated September 8, 2021, and are summarized below. Appendix E (also submitted to provincial regulators on September 8, 2021) provides additional details on these proposed refinements, the rationale for these refinements, and implications for the environmental effects predicted for the Valued Components (VCs) assessed in the EIS. Note that these proposed Project refinements (as shown in Figure 1.1 of Appendix E) occur entirely within the Project Area assessed in the EIS and will result in a slight decrease (0.8 ha) in the overall Project footprint (decrease of 0.1% of the total Project footprint).



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The following are the main FS-related Project refinements proposed, with additional details provided in Table 1.1 of Appendix E:

- Modification of the TMF dam alignment to fully avoid and provide a buffer from the stream running west to east along the southern boundary of the TMF.
- Relocation of the polishing pond closer to the plant site.
- Refinements to stockpile and waste rock pile siting and footprints, as a result of engineering optimization and avoidance of fish habitat identified during ground-truthing.
- Optimization of water management infrastructure, including the consolidation of several ponds and reduced overall footprint.
- Modifications to the number and type of haul trucks and heavy equipment, as a result of engineering optimization.
- An extension of the Project's operating period from 12 years to 13 years, as a result of positive changes in the gold market since the PFS was completed.
- Transportation to site of a pre-mixed ammonium nitrate emulsion product, rather than shipping of individual components and manufacturing the emulsion on site.

Given the conservative assumptions adopted in the EIS and the relatively minor nature of the refinements, for most VCs, the predicted residual adverse effects, mitigation and monitoring as described in the EIS are not affected by the proposed refinements:

- For groundwater, given the minor nature of the refinements and the conservative estimate of the mass loading to surface water receivers from groundwater, the Project refinements do not alter the groundwater assessment provided in the EIS.
- For surface water, effluent discharge quality will continue to meet the *Metal and Diamond Mining Effluent Regulations* criteria and the effluent mixing zones described in the EIS remain valid.
- For fish and fish habitat, refinements in the TMF design and stockpile footprints will result in a small reduction in the area of direct habitat loss.
- There are no changes to the EIS assessment of habitat loss and/or alteration for terrestrial VCs, given that the Project refinements will occur within the Project Area and that the EIS conservatively assumed that all habitat would be lost within the Project Area.
- There are no changes to the EIS assessment of residual adverse effects for Indigenous groups, the socio-economic environment, and historic resources. The mine life extension will result in an extension to the positive economic effects predicted for the Project.
- While Project refinements to the numbers and types of mobile equipment will result in a small increase in the predicted sound levels during Project operation, the increase would not exceed the Health Canada criteria of 6.5% for 'highly annoyed' conditions.



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For some Project refinements, additional analyses were required to determine whether the assessment provided in the EIS remained valid. The results of these additional analyses are provided in Appendix E and summarized below:

- Refinements related to increased mine life and changes to mobile equipment are anticipated to increase the Project's greenhouse gas emissions (direct + indirect) by 6.3% during the peak operational year, and 13% over the life of the mine. However, based on these estimates and as described further in Appendix E, this increase does not change the overall conclusions of the assessment related to greenhouse gas emissions.
- As described in Appendix E, the air quality model was updated based on the Project refinements. The results of the updated modelling are consistent with, or slightly lower than, the predicted concentrations presented in the EIS. The EIS predicted maximum 24-hour PM10 concentration above the Newfoundland and Labrador Ambient Air Quality Standard, and this remains the case for the updated model results. There were no other exceedances predicted and there were no exceedances predicted at the cabin locations, exploration camp, or the accommodations camp. Based on the results of the updated dispersion modelling, the Project refinements do not result in changes to the predicted residual adverse effects or proposed mitigation described in the EIS.
- The DBA has been updated based on Project refinements associated with the TMF. As described in further detail in Appendix E, the updated analysis has resulted in reduced potential effects to the downstream environment compared to those presented in the EIS due to changes in the tailings deposition plan, and relocation of the polishing pond away from the toe of the tailings dam.
- Fate and effects modelling has been conducted for a potential spill of pre-mixed ammonium nitrate emulsion during transportation to site. The predicted residual environmental effects from a spill of ammonium nitrate emulsion are consistent with those predicted in the EIS for a hazardous materials spill.

4.2 PROJECT REFINEMENTS AS CARIBOU MITIGATION

When Marathon submitted the letter to provincial regulators on September 8, 2021 outlining the Project design refinements resulting from the FS and potential implications for the EIS, no further refinements were anticipated by Marathon during the EA process. Subsequently, Marathon has continued to consult with NLDFFA-Wildlife Division and review mitigations in the context of the CPEEMP to further reduce the risk of potential effects of the Project on caribou. Specifically, alternatives to the current layout of Project infrastructure in the vicinity of the Marathon pit have recently been identified and discussed with NLDFFA-Wildlife Division to improve the permeability of the site for Buchans herd caribou migrating through the Project Area. Based on these discussions, Marathon has determined it to be technically and environmentally feasible to refine the layout/location of the low-grade ore and overburden stockpiles and the waste rock pile (dividing the waste rock pile into two piles to be located to the northwest and southeast of the open pit). These refinements will provide wider and more direct travel paths within the primary migratory corridor both during operation of the mine, but also through rehabilitation, closure and post-closure. Additional details on these Project refinements, rationale for these refinements, and implications for the environmental effects predicted for the VCs assessed in the EIS, are provided in Appendix F.



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Given the conservative assumptions adopted in the EIS and the relatively minor nature of the refinements, for all VCs the predicted residual adverse effects, mitigation and monitoring as described in the EIS are not affected by the proposed refinements:

- For the atmospheric environment, refinements to the site layout do not alter the assessment findings regarding a change in greenhouse gas emissions or light levels within the Local Assessment Area. Slight changes in air and sound quality along the boundary of the mine site and potentially further downwind are expected, however do not alter the overall conclusions of the assessment.
- The implications of the proposed refinements on groundwater and surface water resources and fish and fish habitat required additional analysis, including review of the water resources models and results of the assimilative capacity study with respect to Victoria River. The analysis demonstrated that no substantive changes to infiltration, groundwater and seepage, surface runoff, water balance and geochemistry, effluent quality and ultimately to the assimilative capacity assessment of the VALP3 tributary and Valentine Lake receiver are anticipated as a result of the proposed changes to the overburden and low-grade ore stockpiles. With respect to the relocated portion of the waste rock pile, the infiltration and seepage characteristics would be similar to that assessed for the single waste rock pile. Additionally, given Marathon is proposing to manage the expected minor volume of potentially acid generating (PAG) waste rock by blending and encapsulation by non-PAG waste rock with excess of neutralization potential, it is expected that the relocated waste rock pile will perform similarly geochemically to the results modelled for the original waste rock pile and thus runoff and seepage quality will remain the same as modeled in the EIS. Finally, the results of the assimilative capacity study review are consistent with those presented in the EIS with respect to the extent of the ultimate mixing zones. Therefore, the proposed Project refinements do not result in changes to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS for Groundwater Resources and Surface Water Resources.
- For fish and fish habitat, refinements to the footprint and location of the waste rock pile are not expected to change predictions of mass loadings to surface water receivers, and these do not alter the overall conclusions of the assessment of Fish and Fish Habitat.
- There are no changes to the EIS assessment of habitat loss and/or alteration for terrestrial VCs, given that the Project refinements will occur within the Project Area and that the EIS conservatively assumed that all habitat would be lost within the Project Area.
- There are no changes to the EIS assessment of residual adverse effects for Indigenous groups, the socio-economic environment, or historic resources, as the refinements occur within the mine site and will not result in a change in planned Project activities. As noted above, there are also no substantive changes to the assessment of Project effects on atmospheric resources, groundwater resources, surface water resources, or fish and fish habitat. Therefore, the characterization of residual adverse effects on Indigenous and non-Indigenous land and resource users would remain unchanged.



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4.3 PROJECT REFINEMENTS SUMMARY

The proposed Project refinements related to both the FS and proposed caribou mitigation do not constitute a substantive change to the scope of the Project, either individually or in combination. Given the conservative approach to the effects assessment employed in the EIS, the information presented in Appendix E and F demonstrates that no further environmental assessment is required related to these proposed Project refinements. The Project refinements do not result in changes to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS.

5.0 CLOSURE

This Second Amendment to the EIS has been prepared to respond to the regulatory and public comments submitted through the provincial EIS review process. The responses have been prepared in accordance with the provincial *Environmental Protection Act* and Provincial EIS Guidelines and provide supplemental information to and/or clarify information contained in the EIS and the first EIS amendment. The information provided in the responses does not change the conclusions of the EIS; routine Project activities are not predicted to cause significant adverse environmental effects on any Valued Component, with the exception of caribou.

Since the submission of the EIS, Marathon has continued to work to reduce potential Project-related adverse effects, including through several of the proposed Project refinements described above. Additionally, since submission of the EIS, Marathon has progressed several corporate commitments related to environmental and social stewardship, including the following:

- Marathon has become a member of the Mining Association of Canada (MAC). As a MAC member, Marathon is committed to implementing the 'Towards Sustainability Mining' (TSM) initiative, including adopting the TSM guiding principles and conforming with the requirements set forth in the TSM protocols.
- Through TSM, Marathon is required to adhere to the TSM Tailings Management Protocol and Tailings Guide, which has been updated in 2021 to conform with the 2020 release of the International Council on Mining and Minerals' Global Industry Standard on Tailings Management.
- Marathon has become a signatory to the International Cyanide Management Code and is designing the process facility and process water management system in this context.
- In early 2021, Marathon retained an external consultant to conduct a gap analysis of the Valentine Gold Project against the Equator Principles 4 (EP4) standards and International Finance Corporation (IFC) Performance Standards, used by Equator Principle Financial Institutions (EPFIs) to guide decisions regarding ESG risks for project financing. Marathon is currently implementing the EP4 Action Plan, developed following the gap analysis, including conducting additional biodiversity studies and assessments (Human Rights Risk Assessment and Climate Change Risk Assessment), and developing a formal stakeholder engagement strategy and grievance mechanisms for workers and stakeholders.



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- Marathon has initiated work to develop and implement an ISO 14001-conformant Environmental and Social Management System (ESMS). As per ISO 14001, ESMS scoping has been completed and the functional and workflow processes are currently being developed. The ESMS will be functional prior to construction.
- Marathon continues to actively engage with communities, Indigenous groups, and stakeholders through in-person and virtual meetings, conference calls, correspondence, quarterly newsletters, notices, press releases, and social media and website updates.
- As part of Indigenous engagement, Marathon has entered into agreements with both Qalipu First Nation (Qalipu) and Miawpukek First Nation (MFN). In April 2021, Marathon and Qalipu concluded a Socio-Economic Agreement (SEA). The SEA provides the framework for a long-term, positive working relationship with Qalipu, and addresses matters such as ongoing engagement processes, training, employment and business opportunities for Qalipu members and Qalipu businesses, environmental stewardship and monitoring, and community investment. Marathon and MFN entered into a MOU in May 2021. The MOU provides for the undertaking of a Traditional Knowledge and Land and Resource Use study. Based upon the terms of the MOU, Marathon and MFN commenced negotiations in October, 2021, with a view to concluding an SEA, similar to that which has been entered into with Qalipu.
- On October 4, 2021, Marathon and NLOA entered into a MOU in which the parties agree to develop an OEEMP. Additional details on the MOU and the OEEMP are provided in the response to DTCAI(2)-02. Marathon will continue to engage with outfitters over the life of the Project regarding hunting, trapping and fishing activities in and around the Project Area and associated economic conditions.

Marathon will continue to engage with regulators with respect to ongoing and upcoming monitoring programs, and it is anticipated that these monitoring programs will be adapted as required over the life of the Project (including closure and post-closure monitoring). Marathon is actively planning for and will implement high standards of environmental performance as part of its commitment to safe and responsible environmental, social and economic development.

6.0 REFERENCES

Ausenco. 2021. N.I. 43-101 Technical Report & Feasibility Study on The Valentine Gold Project. Newfoundland and Labrador, Canada. Prepared for Marathon Gold Corporation. Effective date: April



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PART 2 RESPONSES TO REGULATORY COMMENTS

RESPONSE TO DHCS(2)-01

IR 2 Reference #	DHCS(2)-01
IR 1 Reference #	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	<p>Please see HCS full comments in Attachment 1. In summary, HCS states:</p> <ol style="list-style-type: none"> a. The Human Health Risk Assessment (HHRA) should be expanded to include the following: <ol style="list-style-type: none"> i. the need for additional rationale for the selection of ‘sensitive receptor’ locations ii. the need for baseline assessment of chemicals in environmental media, in relation to applicable established standards (e.g. Soil Quality Guidelines) iii. the need for further assessment of anticipated chemical concentrations released during project activities and potentially released during accidents or malfunctions iv. the use of health-based standards for comparison, where applicable (e.g. air quality values) b. Any environmental protection plans/environmental management plans that describe mitigation measures to address potential impact to human health should be provided for technical review as part of the EIS review process. The Traffic Management Plan should also consider the concerns presented by the NL Outfitters Association. c. The proponent should provide detailed information on how the noise-related complaints from Indigenous groups and communities, including Millertown and Buchans, will be addressed. Industry groups and business owners should also be considered in any plans for responding to noise-related complaints. d. HCS supports Health Canada’s comments that the proponent should “provide the distribution of baseline noise events at night with a comparison to predicted individual noise events at night at each receptor location, including resident receptors for Millertown and Buchans. Noise mitigation measures should be considered where noise events at night are predicted to exceed 60 dBA Lmax outdoors 15 times per night at any noise receptor location.”



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IR 2 Reference #	DHCS(2)-01
Response:	<p>a. The bulleted component of this request for additional information has been addressed in responses to Health Canada’s technical comments and information requests as outlined below.</p> <ul style="list-style-type: none"> i. Additional rationale to support the selection of sensitive receptor locations is provided in the response to HC(2)-02. ii. The need for a baseline assessment of chemicals environmental media, in relation to applicable established standards (e.g., Canadian Council of Ministers of the Environment Soil Quality Guidelines) is addressed in the response to HC(2)-04. iii. The need for further assessment of anticipated chemical concentrations released during Project activities and potentially released during accidents or malfunctions is addressed in the response to HC(2)-03. iv. The need to use health-based standards for comparison, where applicable (e.g., air quality values) is addressed in the responses to HC(2)-02 and HC(2)-06a. <p>b. Further information on the environmental protection plans/environmental management plans that describe mitigation measures to address potential impacts to human health is provided in the response to DHCS(2)-03. Details on the Traffic Management Plan is provided in DHCS(2)-03 and DHCS(2)-04. Mitigation measures to be included in the Traffic Management Plan are provided in Appendix G and include consideration of the concerns raised by the Newfoundland and Labrador Outfitters Association (i.e., the potential effects of increased traffic on wildlife and outfitting businesses). Furthermore, as discussed in DTCAI(2)-02, Marathon and the Newfoundland and Labrador Outfitters Association entered into a Memorandum of Understanding according to which the parties agree to develop an Outfitters Environmental Effects Monitoring Plan which will include a process for ongoing engagement to respond to outfitters’ concerns respecting traffic management and the potential effects of vehicular traffic noise upon their activities.</p> <p>c. Please refer to the response provided for HC(2)-10. The Grievance Process discussed in HC(2)-10 would also be applicable to Indigenous groups and all stakeholders, including communities and individual community members, business owners, industry groups, fish and wildlife associations, civil society groups, and the general public.</p> <p>d. Please refer to the response provided for HC(2)-11 for details on the distribution of baseline noise events at night with a comparison to predicted individual noise events at night at receptor location. As</p>



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IR 2 Reference #	DHCS(2)-01
	described in HC(2)-11, there is no potential for the Project to affect resident receptors in Millertown and Buchans at night due to their distance from the mine site (60 km and 49 km, respectively) and as there will be no routine Project-related traffic along the access road at night during construction or operation.
Appendix:	Appendix G: Human Health-related Mitigation Measures and Monitoring Table



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RESPONSE TO DHCS(2)-02

IR 2 Reference #	DHCS(2)-02
IR 1 Reference #	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	<p>HCS acknowledges that a HHRA was completed, but supports Health Canada’s comments regarding certain aspects of the HHRA including:</p> <ol style="list-style-type: none"> the need for additional rationale for the selection of ‘sensitive receptor’ locations the need for baseline assessment of chemicals in environmental media, in relation to applicable established standards (e.g. Soil Quality Guidelines) the need for further assessment of anticipated chemical concentrations released during project activities and potentially released during accidents or malfunctions the use of health-based standards for comparison, where applicable (e.g. air quality values)
Response:	<ol style="list-style-type: none"> Please refer to HC(2)-02 for additional rationale for the selection of ‘sensitive receptor’ locations. Please refer to HC(2)-04 for a discussion of chemicals that could be elevated in environmental media as a result of Project activities as contaminants of potential concern, including the corresponding Canadian Council of Ministers of the Environment soil quality guidelines for agricultural and residential/parkland soils and the percentage of the guideline value that each predicted concentration represents (Table HC(2)-04.1). Note that predicted Future Case concentrations do not represent exceedance or near-exceedance concentrations. Please refer to HC(2)-03 for a discussion of anticipated chemical concentrations released during Project activities and potentially released during accidents or malfunctions. Please refer to HC(2)-06(a) for details related to health-based standards.
Appendix:	None



RESPONSE TO DHCS(2)-03

IR 2 Reference #	DHCS(2)-03
IR 1 Reference #	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	Given the issues that Health Canada identified with the Human Health Risk Assessment, additional information regarding mitigation measures may be required. Any environmental protection plans/environmental management plans that describe mitigation measures to address potential impact to human health should be provided for technical review as part of the EIS review process.
Response:	<p>Draft environmental management plans are currently being prepared to support the overall environmental management system described in Section 2.7.3 of the EIS. These plans will include the mitigation measures presented in the EIS or committed to by Marathon during the technical review of the EIS, and the formal conditions of the environmental assessment (EA) approval, as well as subsequent requirements of federal and provincial Project permitting processes.</p> <p>The purpose of the environmental protection/management plans is to operationalize the mitigation and monitoring commitments and requirements described above, by outlining roles, responsibilities and reporting mechanisms to be followed by Marathon staff and contractors. It is not the intent of the plans to develop new mitigation measures that have not been previously identified through one of the sources described above. As Marathon is currently in the pre-planning phase of the Project, internal management procedures and structures are still being developed. Additionally, conditions associated with EA release and permitting are not yet known. Therefore, these plans cannot be further developed and finalized until the receipt of the Ministers' Decision and further consultation with applicable regulators, including Department of Health and Community Services, as applicable.</p> <p>As indicated above, environmental management plans outline protection and response measures to reduce potential environmental effects related to Project activities and describe practical procedures required of all personnel (Marathon employees, contractors and suppliers) to reduce or avoid potential adverse environmental effects. To assist the Department of Health and Community Services in understanding the environmental protection measures that would be included in the environmental management plans (including the Traffic Management Plan) and that may assist in the protection of human health and public safety, a summary table of all</p>



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	applicable mitigation and monitoring commitments made by Marathon through the EIS and technical review of the EIS has been compiled and is attached as Appendix G. Within the table, measures which relate to human health and/or public safety considerations are identified with a checkmark. The Human Health Risk Assessment (in consideration of the discipline-specific mitigation) did not identify an unacceptable risk to human health as a result of the Project. However, monitoring programs related to air and water quality, undertaken throughout the Project to meet regulatory requirements and conditions of authorization, will also confirm the effectiveness of the discipline-specific mitigation considered in the Human Health Risk Assessment.
Appendix:	Appendix G: Human Health-related Mitigation Measures and Monitoring Table



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RESPONSE TO DHCS(2)-04

IR 2 Reference #	DHCS(2)-04
IR 1 Reference #	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	The Traffic Management Plan should also consider the concerns presented by the NL Outfitters Association.
Response:	As noted in DHCS(2)-03, Marathon is currently developing environmental management plans which will operationalize the mitigation measures committed to through the EIS and regulatory and public review process. This includes the development of a Traffic Management Plan which will describe the key aspects of traffic management and controls to be implemented by Marathon associated with site access, traffic routing and management with respect to vehicle and employee transportation. Mitigation measures to be included in the Traffic Management Plan are provided in Appendix G and include consideration of the concerns raised by the Newfoundland and Labrador Outfitters Association (i.e., the potential effects of increased traffic in wildlife and outfitting businesses).
Appendix:	Appendix G: Human Health-related Mitigation Measures and Monitoring Table



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RESPONSE TO DHCS(2)-05

IR 2 Reference #	DHCS(2)-05
IR 1 Reference #	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	<p>HCS supports Health Canada’s comments that the proponent should provide detailed information on how the noise- related complaints from Indigenous groups and communities, including Millertown and Buchans, will be addressed.</p> <p>Given the comments from the NL Outfitters Association, industry groups and business owners should also be considered in any plans for responding to noise-related complaints.</p>
Response:	<p>Please refer to the response provided for HC(2)-10. The Grievance Process discussed in HC(2)-10 would also be applicable to the Newfoundland and Labrador Outfitters Association, and any other business owner, industry group, Indigenous group, community member, or member of the general public. Furthermore, as discussed in DTCAI(2)-02, Marathon and Newfoundland and Labrador Outfitters Association entered into a Memorandum of Understanding according to which the parties agree to develop an Outfitters Environmental Effects Monitoring Plan, which is currently under development.</p>
Appendix:	None



RESPONSE TO DHCS(2)-06

IR 2 Reference #	DHCS(2)-06
IR 1 Reference #	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	<p>HCS supports Health Canada’s comments that the proponent should “provide the distribution of baseline noise events at night with a comparison to predicted individual noise events at night at each receptor location, including resident receptors for Millertown and Buchans. Noise mitigation measures should be considered where noise events at night are predicted to exceed 60 dBA Lmax outdoors 15 times per night at any noise receptor location.”</p> <p>Based on the comments from the NL Outfitters Association, there receptor locations should include any nearby businesses, such as outfitters.</p>
Response:	<p>Please refer to the response provided for HC(2)-11.</p> <p>As described in Section 5.2.1 of the EIS, sensitive receptors included outfitter locations within the Local Assessment Area / Regional Assessment Area (i.e., within 5 km of the access road and 10 km of the mine site). Therefore, the potential effects of noise generated by Project activities on outfitters were assessed within the EIS. There are no other businesses, communities (and no schools, hospitals or places of worship), year around residential receptors, or major roadways located within the Local Assessment Area / Regional Assessment Area.</p> <p>Note that as described in HC(2)-11, there is no potential for the Project to affect resident receptors in Millertown and Buchans at night due to their distance from the mine site (60 km and 49 km, respectively) and as there will be no routine Project-related traffic along the access road at night during construction or operation.</p>
Appendix:	None



RESPONSE TO DIET(2)-01

IR 2 Reference #	DIET(2)-01
IR 1 Reference #	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	IET requires the development of a Benefits Agreement that meets the approval of the Minister of Industry, Energy and Technology. The Benefits Agreement must also include a Gender Equity and Diversity Plan that meets the requirements of the Ministers responsible for the Office of Women and Gender Equality, and Industry, Energy and Technology. The proponent is required to finalize the Benefits Agreement and Gender Equity and Diversity Plan and obtain Ministerial approval prior to the commencement of site activities.
Response:	<p>A Benefits Agreement between the Province and Marathon that meets the approval of the Minister of Industry, Energy and Technology will be prepared prior to the commencement of site activities. Marathon and representatives of the Newfoundland and Labrador Department of Industry, Energy and Technology (NLDIET) have been engaged in discussions respecting the Benefits Agreement since late 2020, and in October 2021 the parties reached consensus on its terms. The Benefits Agreement sets out Marathon’s commitments to ensure priority access to employment and contracting opportunities by provincial residents and suppliers.</p> <p>The Benefits Agreement will include, as an appendix, a Gender Equity, Diversity and Inclusion (GEDI) Plan that meets the requirements of the Ministers responsible for the Office of Women and Gender Equality, and NLDIET. The GEDI Plan will contain measures to facilitate access to the economic opportunities associated with the Project by members of under-represented groups – women, Indigenous persons, persons with disabilities and members of visible minority groups. The GEDI Plan is intended to promote gender equity, diversity and inclusion in the following areas: corporate culture, education and training, employment (recruitment, retention and promotion), workplace culture and conditions, and business access.</p> <p>Marathon has engaged with a wide range of diversity groups in preparing the GEDI plan and has worked with representatives of NLDIET in the development of the Plan’s terms. The GEDI Plan will be supported by a Human Resources Plan, which will also be an appendix to the Benefits Agreement. Drafts of the GEDI Plan have been exchanged with NLDIET over the past year and reviewed by relevant government departments, including the Office of Women and Gender Equality. Marathon will finalize</p>



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	the Benefits Agreement and associated GEDI Plan and obtain Ministerial approval prior to the commencement of site activities.
Appendix:	None



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RESPONSE TO DIET(2)-02

IR 2 Reference #	DIET(2)-02
IR 1 Reference #	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	No further comments from the Electricity and Alternative Energy Division on the EIS or EIS amendment.
Response:	Acknowledged.
Appendix:	None



RESPONSE TO DIET(2)-03

IR 2 Reference #	DIET(2)-03
IR 1 Reference #	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	<ol style="list-style-type: none"> 1 Prior to the submission of the development plan and the rehabilitation and closure plan as required under Section 4 of the <i>Mining Act</i>, the proponent must submit a satisfactory ARD/ML Management Plan. 2 Prior to the submission of the development plan and the rehabilitation and closure plan as required under Section 4 of the <i>Mining Act</i>, the proponent must also submit a satisfactory ARD/ML Report. The ARD/ML Report must: <ol style="list-style-type: none"> i. Characterize and evaluate the potential for and mitigation of ARD/ML at the project using all sampling data collected to date; ii. Conform to the “Prediction Manual for Drainage Chemistry from Sulphidic Geological Materials, MEND Report 1.20.0, December 2009” .; iii. Include an interpretation of results by an ARD/ML Qualified Professional (ARD/ML QP); iv. The report must include: <ol style="list-style-type: none"> a. Discussion of the adequacy of the number of samples collected on each geologic material and types of tests conducted on the samples; b. Interpretation of the analytical and test results and justification for further sampling, testing and investigation recommendations; c. Review the ARD/ML Management Plan, the ARD Block Model and the design and operation of all aspects of the project, including the waste rock piles, tailings management facility, low grade ore stockpile and high grade ore stockpile; d. Recommendations for ARD/ML prevention, mitigation, and management including practical considerations for the project regarding storage, handling, and long-term disposal of ore, waste rock and tailings; e. A statement of qualifications by the ARD/ML QP; f. All analytical results must be appended.
Response:	<ol style="list-style-type: none"> 1 As required under Section 4 of the <i>Mining Act</i>, Marathon will submit a satisfactory Acid Rock Drainage / Metal Leaching (ARD/ML) Management Plan prior to the submission of the development plan and the rehabilitation and closure plan. In response to information



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	<p>requirements received from Natural Resources Canada (NRCan) through the federal technical review of the EIS, Marathon has developed a preliminary ARD/ML Management Plan that delineates the steps, decisions and actions that will be taken on an ongoing basis by Marathon to identify and manage potentially acid-generating (PAG) materials. This ARD/ML Management Plan is included herein as Appendix D and is considered preliminary; it will be updated in consideration of the ongoing ARD/ML testing and analysis, conditions of release received through the provincial and federal environmental assessment processes, and requirements identified through the permitting process.</p> <p>2 Marathon will submit a satisfactory ARD/ML Report prior to the submission of the development plan and the rehabilitation and closure plan as required under Section 4 of the <i>Mining Act</i>. This report will address the requirements noted in the request above. Note that, since the submission of the EIS, Marathon has been conducting additional ARD/ML testing and analysis to address outstanding data gaps and requests for additional information that have been identified through the federal and provincial technical review of the EIS. The results (available to date) of this additional testing are provided in the preliminary ARD/ML Management Plan included in Appendix D.</p>
Appendix:	Appendix D: ARD/ML Management Plan (Preliminary)



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RESPONSE TO DTCAI(2)-01

IR 2 Reference #	DTCAI(2)-01
IR 1 Reference #	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	No further comments from the Provincial Archaeology Office on the EIS or EIS amendment.
Response:	Acknowledged.
Appendix:	None



RESPONSE TO DTCAI(2)-02

IR 2 Reference #	DTCAI(2)-02
IR 1 Reference #	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	<p>Tourism product development in Newfoundland and Labrador is guided by a Provincial Tourism Product Development Plan and Regional Destination Development plans to ensure development and investment decisions are strategically aligned with the brand and unique selling proposition of the province. With these guiding plans the over-arching goals are to increase the number of visitors, encourage them to stay longer and experience more in order to double tourism revenues.</p> <p>To achieve these goals, investment and development decisions must strengthen the ability to grow the tourism industry in ways that:</p> <ol style="list-style-type: none"> 1 Resonate with travellers and reinforce the brand of the province; 2 Continue to improve the quality of visitor experiences and increase the experience offerings; and 3 Be visible leaders of responsible, sustainable tourism. <p>Outfitting</p> <p>Outfitting is an iconic, high yield tourism demand generator and one of Newfoundland and Labrador’s most developed tourism products. Outfitters annually attract high end hunting and angling enthusiasts that benefit local communities, other private operators, transportation providers and guides. These adventure activities along with the backdrop of the central region’s natural environment provide on- going content for the media, blogs, photos and videos of enthusiastic travelers. TCAR has worked closely with these businesses in efforts to diversify and increase the product offerings throughout the province.</p> <p>The Covid-19 pandemic has had a devastating impact on the outfitting sector which relies on almost 100% non-resident visitation. These clients seek out Newfoundland and Labrador for our high quality outfitting camps, remote wilderness experience and high success rates.</p> <p>The Valentine Lake Gold project may disrupt the big game carry capacity of the area in particular with regards to woodland caribou. This will devalue the visitor appeal and experience of our destination. It is imperative that Marathon Gold Corporation, Newfoundland and Labrador Outfitters Association (NLOA) and impacted outfitters work together in efforts to sustain the sector. The EIS as presented does not include an Outfitter Environmental Effects Monitoring Plan.</p>



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	<p>Recommendation</p> <p>The Department of Tourism, Culture, Arts and Recreation recommends that Marathon Gold Corporation amend the EIS submission to include an Outfitter Environmental Effects Monitoring Plan (OEEMP)</p> <p>The OEEMP should:</p> <ol style="list-style-type: none"> a. Identify a program for monitoring the effectiveness of measures implemented to mitigate adverse environmental and negative economic effects to outfitters; b. Build on existing information, consultations and commitments made in the EIS, and conditions of the relevant permits and licenses for the project including mitigation objectives, metrics and targets, following and monitoring mitigation efforts; and c. Include a contingency plan should mitigation efforts not be successful. d. Also included in the OEEMP, the proponent shall work with affected outfitters and the NLOA to develop compensation provisions and in areas of new access and implement an access decommissioning plan to mitigate decreased big game success rates in the region. <p>Updated EIS October 5, 2021</p> <ul style="list-style-type: none"> • The NLOA and the proponent have come to an agreement that the lack of an Outfitters Environmental Effects Monitoring Plan (OEEMP) as specified in the EIS should not delay the project release by the Minister. • NLOA and the proponent signed an MOU on October 4, 2021, committing Marathon Gold Corporation to completing the OEEMP in partnership with the NLOA by Dec 31, 2021. • Based on this agreement, the NLOA does not want the lack of an OEEMP to be a factor in determining the release of the project by the Minister. • The EIS and amendment with MOU with NLOA to develop the OEEMP sufficiently answers the requirements outlined by TCAR.
Response:	<p>Marathon has engaged with the Newfoundland and Labrador Outfitters Association (NLOA) since early 2020. The purpose of Marathon’s engagement has been to provide Project-related information to NLOA in order to understand the nature and scope of outfitting activities in the vicinity of, or potentially affected by, the Project, and to discuss and respond to outfitters’ questions and concerns. As detailed in the EIS, engagement activities have included virtual meetings with the Board of NLOA / Executive Director to provide Project updates and discuss issues of concern, an outfitter survey, and regular transmission of other Project-related materials. Engagement has continued since submission of the EIS</p>



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	<p>and it is Marathon’s objective to maintain a constructive relationship with NLOA and its membership over the life of the Project.</p> <p>As a result of these engagement activities, it is Marathon’s understanding that outfitters’ concerns respecting the Project relate primarily to potential effects on land and resource use (e.g., access, availability of wildlife and fish) and associated economic effects (e.g., loss of revenue, increased operating costs and diminished client experience). On October 4, 2021, Marathon and NLOA entered into a Memorandum of Understanding (MOU) according to which the parties agree to develop an Outfitters Environmental Effects Monitoring Plan (OEEMP). According to the MOU, the OEEMP will include a description of environmental effects management measures, and an identification of proposed environmental effects monitoring programs with associated Key Performance Indicators (KPIs). The OEEMP will address monitoring programs specific to outfitters – it is intended to complement and be read in conjunction with other Management Plans relating to matters of interest to outfitters (e.g., Caribou Protection and Environmental Effects Monitoring Plan [CPEEMP]).</p> <p>While the terms of the OEEMP are currently under negotiation, the Parties have agreed that, consistent with the MOU, the OEEMP will include specific monitoring measures (both qualitative and quantitative) to determine the effectiveness of proposed mitigations upon the quality of outfitter experience (from the perspective of both the outfitter and the client), hunting success and access. KPIs will be based on data collected from regulators, outfitters and their clients. In addition, the OEEMP will also contain provisions respecting a compensation mechanism for any outfitter who can establish ongoing economic losses directly attributable to the Project.</p> <p>Marathon will continue to engage with outfitters over the life of the Project regarding the overlap of the Project with hunting, trapping and fishing areas in the Project Area and associated economic conditions. 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. With respect to the OEEMP, Marathon will also provide NLOA timely information respecting the progress of the Project, including any notices of Project-related activity, such as road closures, snow clearing or other access-related matters, which potentially could affect outfitter activities in the area. In addition to periodic meetings to discuss the implementation of the OEEMP and effectiveness of monitoring measures, Marathon will produce an annual report detailing OEEMP monitoring results</p>



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	and will work with NLOA to resolve any issues associated with monitoring metrics or methodology. The OEEMP Monitoring Report may also contain a summary of monitoring results associated with other environmental components of importance to NLOA.
Appendix:	None



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RESPONSE TO ECC(2)-01

IR 2 Reference #	ECC(2)-01
IR 1 Reference #	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	<p>Due to the submission of the Project Refinements Letter of September 8, 2021 by Marathon Gold Corporation and information contained therein, CCB requires additional information/data to inform/update the recommendation regarding the BACT analysis previously submitted to EA Division on September 9, 2021. While the refinements do not change the obligations or requirements under the MGGGA; the estimates of annual greenhouse gas (GHG) emissions has changed. In their letter, Marathon indicated that the refinements to the project will result in an increase in GHG emissions; Table 2.4 provides the original estimate and revision of GHG emissions (direct and indirect) and Appendix A gives yearly GHG estimates. However, new estimates of GHGs by specific activity were not included as they were in the original BACT report. Table 1.1 in Appendix F of the Amended EIS (entitled Best Available Control Technology Report) provides estimates of annual GHG emissions by specific activity during project operation. This table needs to be updated and resubmitted. Once received, CCB will update, and resubmit the recommendation re BACT analysis.</p>
Response:	<p>The Best Available Control Technology (BACT) Study (Appendix A in the EIS Amendment submitted on August 3, 2021) was submitted prior to the letter outlining Project refinements (submitted to the Environmental Assessment Division of the Newfoundland and Labrador Department of Environment and Climate Change on September 8, 2021). However, the estimates of GHG emissions in the BACT Study had already been updated from those presented in the EIS to match those in the letter dated September 8, 2021. The BACT Study therefore represents the latest estimates.</p>
Appendix:	None



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RESPONSE TO ECC(2)-02

IR 2 Reference #	ECC(2)-02
IR 1 Reference #	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	No further comments from the Pollution Prevention Division on the EIS or EIS amendment.
Response:	Acknowledged.
Appendix:	None



RESPONSE TO ECC(2)-03

IR 2 Reference #	ECC(2)-03
IR 1 Reference #	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	<p>With respect to the mandate of the WRMD, the EIS and amendment did not fulfill information requirements for the following:</p> <ul style="list-style-type: none"> Marathon Gold Inc. undertook updated tailings dam breach analysis which indicates that the flood area extend upstream on Victoria River, but does not reach the toe of the Victoria Dam. However, the assumption was made that there is no flow coming from the Victoria Reservoir. According to NL Hydro, water spills from the Victoria Dam spillway approximately once every two years. The impact of water spilling from the Victoria Reservoir into the Victoria River during a breach of the tailings dam was not examined. This scenario should be modelled to determine if there is backup of water to the toe of the Victoria Dam during a tailings dam breach when water is spilling from the reservoir, which could pose a safety issue to the Victoria Dam. <p>This outstanding item represents a major gap in information that could have implications for public safety or potentially result in major changes to project elements that WRMD considers it best to be dealt with during the EA process.</p>
Response:	<p>The Dam Breach Assessment (DBA) (Golder 2021) (Appendix C) has been updated to incorporate outflows from the Victoria Lake Reservoir, based on information provided by NL Hydro. The updated assessment results and accompanying dam breach inundation maps have been issued as an addendum (Appendix B) to the DBA. Under a flood-induced scenario, the additional flows from the Victoria Lake Reservoir will result in a larger inundated area under the probable maximum flood (PMF) scenario previously modelled, with or without a tailings management facility (TMF) dam breach. With the addition of the Victoria Dam spillway overflow under the PMF event, the model predicts temporary ponding at the downstream toe of the Victoria Dam, irrespective of a TMF breach (i.e., under both the TMF breach and no breach scenarios). The incremental increase in the maximum water depth at the toe of the dam from a TMF breach is less than 0.01 m. The Hazard Potential Classification of the TMF dam remains unchanged, as the updated analyses indicate no additional increase in risk to human life, the environment or infrastructure.</p>



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IR 2 Reference #	ECC(2)-03
	References: Golder Associates Ltd. 2021. Dam Breach Assessment and Inundation Study – Valentine Gold Project. Rev B. Report prepared for Marathon Gold Corporation, Mississauga, Ontario. December 2021.
Appendix:	Appendix B: Updated Assessment Results and Accompanying Dam Breach Inundation Maps Technical Memo Appendix C: Dam Breach Assessment and Inundation Study



RESPONSE TO ECC(2)-04

IR 2 Reference #	ECC(2)-04
IR 1 Reference #	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	<p>The following will be required by WRMD:</p> <ol style="list-style-type: none"> a. Marathon Gold Inc., as per provisions of Section 31 of the <i>Water Resources Act</i> and in consultation and partnership with the Water Resources Management Division of the Department of Environment and Climate Change, is required to establish a real-time water resources monitoring network that shall be comprised of water quantity, quality, climate and groundwater monitoring stations. The proponent is to bear all costs associated with the monitoring network and must install the required stations to collect baseline data prior to project commencement, and throughout the life of the project. b. Marathon Gold Inc. shall employ or retain an Engineer of Record who shall be responsible for providing technical direction regarding the safety of any project site dams, including any tailings dams. c. Marathon Gold Inc. shall employ or retain a Tailings Storage Facility qualified person for the safe management of all Tailings Storage Facilities, and shall develop a Tailings Management Plan and Water Management Plan which shall be submitted to the Water Resources Management Division for review. Marathon Gold Inc. shall follow the Global Industry Standard on Tailings Management and the Mining Association of Canada Tailings Management Protocol (most recent versions). d. Marathon Gold Inc. shall establish an Independent Tailings Review Board (ITRB) to review all aspects of the Tailings Storage Facilities from site selection and design to closure. e. Marathon Gold Inc. shall undertake and cover the cost associated with the following work, in consultation with NL Hydro: <ol style="list-style-type: none"> i. Modelling of the tailings dam breach that incorporates outflows from the Victoria Reservoir and development of dam breach inundation maps. ii. Monitoring and review of blasting impacts on the Victoria Dam by a qualified geotechnical engineer to ensure impacts are maintained within acceptable limits.



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IR 2 Reference #	ECC(2)-04
	<p>iii. Notification of NL Hydro of changes to the project design, site access, the commencement of major works that may result in increased vehicle traffic on the access road, blasting operations, and any other activities which may affect the operations of NL Hydro or the safety of the Victoria Dam.</p> <p>f. Marathon Gold Inc. shall undertake further investigation to confirm the hydraulic conductivity of the Valentine Lake Thrust fault to fully characterize the fault. Information shall be submitted to WRMD prior to construction and WRMD must determine the submission to be sufficient prior to the start of construction.</p> <p>g. Marathon Gold Inc. shall undertake further characterization of the Victoria Lake Group (VLG) rocks, located under the Leprechaun waste rock pile, tailings storage facility, process plant, and accommodations camp. Full characterization of these units, especially in areas that may impact the environment (e.g. The Leprechaun waste rock pile, tailings storage facility and process plant) must be undertaken prior to the start of construction and will require installation and testing of additional observation wells. These data shall be used to update the groundwater model and the new data and modelling results shall be submitted to WRMD for approval prior to construction and WRMD must determine the submission to be sufficient prior to the start of construction.</p> <p>h. Marathon Gold Inc. shall complete a more detailed assessment of the viability of the Leprechaun open pit as a tailings disposal site. This shall include confirmation of the predicted rock mass quality and hydraulic conductivities, and determination if a pit liner is required or not. This information shall be submitted to WRMD for approval and WRMD must determine the submission to be sufficient prior to the use of the Leprechaun pit as a tailings disposal site.</p>
Response:	<p>a. Marathon, in consultation and partnership with the Water Resources Management Division (WRMD) of the Department of Environment and Climate Change, will establish a real-time water resources monitoring network that will be comprised of water quantity, quality, climate and groundwater monitoring stations as outlined in the request above. It is understood that the costs associated with the monitoring network are to be borne by Marathon, and that these must be installed to collect baseline data prior to Project commencement and throughout the life of the Project.</p> <p>b. Marathon has engaged Engineers of Record who have and will continue to be responsible for providing technical direction regarding the safety of any Project site dams, including any tailings dams.</p>



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	<p>c. Marathon will employ or retain a Tailings Storage Facility qualified person for the safe management of all Tailings Storage Facilities. Marathon will develop a Tailings Management Plan and Water Management Plan which will be submitted to the Water Resources Management Division for review. Marathon will follow the Global Industry Standard on Tailings Management and the Mining Association of Canada Tailings Management Protocol (most recent versions). Marathon has become a member of the Mining Association of Canada (MAC). As a MAC member, Marathon is committed to implementing the 'Towards Sustainability Mining' (TSM) initiative, including adopting the TSM guiding principles and conforming with the requirements set forth in the TSM protocols. Through TSM, Marathon is required to adhere to the TSM Tailings Management Protocol and Tailings Guide, which has been updated in 2021 to conform with the 2020 release of the International Council on Mining and Minerals' Global Industry Standard on Tailings Management.</p> <p>d. Marathon has established an Independent Tailings Review Board (ITRB) to review all aspects of the Tailings Storage Facilities from site selection and design to closure.</p> <p>e. Marathon will undertake and cover the cost associated with the following work, in consultation with NL Hydro:</p> <ul style="list-style-type: none"> i. Modelling of the tailings dam breach that incorporates outflows from the Victoria Reservoir and development of dam breach inundation maps (completed – please see response to ECC(2)-03 and Appendix C). ii. Monitoring and review of blasting impacts on the Victoria Dam by a qualified geotechnical engineer to ensure impacts are maintained within acceptable limits. As described in EIS Chapter 19 Dam Infrastructure (Section 19.9 Follow-up and Monitoring), monitoring related to routine blasting will include seismic (blast) monitoring at the Victoria Dam and Project dams, and possibly nearer to the blasting activity to measure vibrations directly at the structures. Additionally, Marathon will consult with NL Hydro regarding blasting plans, schedule, safety and monitoring prior to commencing such work. iii. Notification will notify and consult with NL Hydro regarding changes to the project design, site access, the commencement of major works that may result in increased vehicle traffic on the access road, blasting operations, and any other activities which may affect the operations of NL Hydro or the safety of the Victoria Dam.



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	<p>f. Marathon will undertake further investigation and assessment to confirm the hydraulic conductivity of the Valentine Lake Thrust and information will be submitted to WRMD prior to construction to permit WRMD to determine the submission to be sufficient prior to the start of construction.</p> <p>g. Marathon will undertake further characterization of the Victoria Lake Group rocks, located under the Leprechaun waste rock pile, tailings storage facility, process plant, and accommodations camp. Full characterization of these units, especially in areas that may impact the environment (e.g., the Leprechaun waste rock pile, tailings storage facility and process plant) will be undertaken prior to the start of construction and will include the installation and testing of additional observation wells. These data will be used to update the groundwater model and the new data and modelling results submitted to WRMD for approval prior to construction and to permit WRMD to determine the submission to be sufficient prior to the start of construction.</p> <p>h. Marathon will complete a more detailed assessment of the viability of the Leprechaun open pit as a tailings disposal site, including confirmation of the predicted rock mass quality and hydraulic conductivities, and determination whether a pit liner is required. This information will be submitted to WRMD for approval and to allow WRMD to determine the submission to be sufficient prior to the use of the Leprechaun pit as a tailings disposal site.</p>
Appendix:	Appendix C: Dam Breach Assessment and Inundation Study



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RESPONSE TO ECC(2)-05

IR 2 Reference #	ECC(2)-05
IR 1 Reference #	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	WRMD would like to be provided with a copy of the updated Tailings Dam Breach Analysis Report.
Responsibility:	Marathon / Golder
Response:	<p>The Dam Breach Assessment (DBA) (Golder 2021) is provided as Appendix C. A further update to the DBA, issued as a technical memo summarizing the updated modelling incorporating outflows from the Victoria Lake Reservoir as described in ECC(2)-03, is provided as Appendix B.</p> <p>Reference:</p> <p>Golder Associates Ltd. 2021. Dam Breach Assessment and Inundation Study – Valentine Gold Project. Rev B. Report prepared for Marathon Gold Corporation, Mississauga, Ontario. December 2021.</p>
Appendix:	<p>Appendix B: Updated Assessment Results and Accompanying Dam Breach Inundation Maps Technical Memo</p> <p>Appendix C: Dam Breach Assessment and Inundation Study</p>



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RESPONSE TO OSW(2)-01

IR 2 Reference #	OSW(2)-01
IR 1 Reference #	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	Require that a Gender Equity and Diversity Plan (GEDP) be completed and submitted to Industry, Energy and Technology, Economics and Benefits Division and Office of Women and Gender Equality for approval.
Response:	<p>As noted in the response to DIET (2)-01, a Benefits Agreement that meets the approval of the Minister of Industry, Energy and Technology will be prepared prior to the commencement of site activities. The Benefits Agreement will include, as an appendix, a Gender Equity, Diversity and Inclusion (GEDI) Plan that meets the requirements of the Ministers responsible for the Office of Women and Gender Equality, and Newfoundland and Labrador Department of Industry, Energy and Technology (NLDIET). The GEDI Plan sets out measures to facilitate access to the economic opportunities associated with the Project by members of under-represented groups – women, Indigenous persons, persons with disabilities and members of visible minority groups. The GEDI Plan is intended to promote gender equity, diversity and inclusion in the following areas: corporate culture, education and training, employment (recruitment, retention and promotion), workplace culture and conditions, and business access.</p> <p>Marathon has engaged with a wide range of diversity groups in preparing the GEDI plan and has worked with representatives of NLDIET in the development of the Plan’s terms. Drafts of the GEDI Plan have been exchanged with NLDIET over the past year and these drafts have been reviewed by relevant government departments, including the Office of Women and Gender Equality. The GEDI Plan is close to finalization and upon completion will be submitted to NLDIET (Economic and Benefits Division) and the Office of Women and Gender Equality for approval.</p>
Appendix:	None



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RESPONSE TO FFA(2)-01

IR 2 Reference #	FFA(2)-01
IR 1 Reference #	-
EIS Reference:	-
Context and Rationale:	The Valentine Gold Environmental Impact Statement (EIS) (EA2015) and subsequent amendment does not fulfill the EIS Guidelines information requirements from the Department of Fisheries, Forestry and Agriculture (FFA) – Wildlife Division. Based on the current submission and amendment, further information is required to meet the criteria outlined in the EIS Guidelines. As outlined in the specific comments on the EIS amendment (below), the proponent has not provided a thorough discussion of the cumulative effects/impacts of the project on caribou in the context of other development in the area.
Information Request:	FFA recommends the proponent further amend the EIS submission to include an expanded discussion of cumulative effects (e.g., hydro development, forest management, mineral exploration), including the construction of the transmission line related to the project, on caribou in this region. This information will inform the development of a Caribou Protection and Environmental Effects Monitoring Plan.
Response:	An expanded discussion of cumulative effects (e.g., hydro development, forest management, mineral exploration), including the construction of the transmission line related to the Project, on caribou in the region is provided in Appendix H. This information was used to inform the development of the Caribou Protection and Environmental Effects Monitoring Plan discussed further in FFA(2)-02.
Appendix:	Appendix H: Cumulative Effects Discussion



RESPONSE TO FFA(2)-02

IR 2 Reference #	FFA(2)-02
IR 1 Reference #	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	<p>However, the more critical gap is a lack of a specific Caribou Protection and Environmental Effects Monitoring Plan for caribou that details possible impact mitigations and effects monitoring commitments. It remains unclear how the proponent will respond to probable significant negative environmental effects of the project on caribou. Specifically, disruption of the caribou migratory corridor that will be bisected by the mine site.</p> <p>FFA also recommends that the proponent develop a Caribou Protection and Environmental Effects Monitoring Plan as part of the EIS amendment, which will include specific mitigations for likely caribou response scenarios and detail how project effects will be monitored, including mitigation modifications based on monitoring results. The Wildlife Division is available to collaborate with the proponent on the development of possible mitigations and a monitoring program.</p> <p>The Caribou Protection and Environmental Effects Monitoring Plan shall include, but is not limited to:</p> <ul style="list-style-type: none"> • Identification of risks to caribou as a consequence of all phases of the project. • Identification of possible caribou responses to all phases of the project. • Identification of possible mitigation options for the range of possible caribou responses. <ul style="list-style-type: none"> – Options must be specific (e.g., possible shut down periods during migration, infrastructure proposals to redirect or support safe caribou migration, predator control programs near migratory choke points, etc.) • A decision framework/matrix that clearly identifies the planned mitigation or contingency response for each of the identified caribou response scenarios, including mixed response models. • A plan for the monitoring of the Buchan’s caribou herd including: <ul style="list-style-type: none"> – Continuous monitoring of the migratory behaviour of the herd and caribou response to the project through a GPS collaring program through all phases of the project. – A real-time monitoring system to detect the movement of caribou through the site (e.g. real-time camera system, or observers). • Reporting of any interactions between caribou and the site (e.g. caribou vehicle collisions, observed behavioral responses to blasting).



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	<ul style="list-style-type: none"> • Monitoring of noise, dust, traffic levels etc, and any other parameters identified in the EIS as potential risks for caribou. • A commitment to provide financial support to offset additional activities required by FFA for survey activity (i.e. winter surveys and fall classifications), and additional surveys specific to monitoring caribou response to the project. • A commitment to provide financial support for the hiring of environmental effects monitor positions at FFA for all phases of the project. • A commitment to provide annual financial support for graduate students, over all phases of the project, to study specific project effects caused by activities in relation to EA2015 and related cumulative effects. • A commitment to review and update the Caribou Protection and Environmental Effects Monitoring Plan in collaboration with FFA based on the data collected via monitoring.
Response:	<p>Marathon has developed a Caribou Protection and Environmental Effect Monitoring Plan (CPEEMP) in consultation with the Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture (NLDDFA) - Wildlife Division, and the plan is provided in Appendix A. Marathon also requested comments regarding mitigations and monitoring from Qalipu First Nation, Miawpukek First Nation, and the Newfoundland and Labrador Outfitters Association, and comments provided were considered in the development of the CPEEMP.</p> <p>The CPEEMP defines the mitigation measures aimed at reducing the risk of adverse effects on caribou and describes the follow-up and monitoring activities that will be undertaken to verify the environmental effects predictions and mitigation effectiveness.</p> <p>The purpose of the CPEEMP is to provide specific mitigation measures and monitoring protocols that will reduce the risk of Project-related adverse effects on caribou. The goal of avoiding or reducing Project effects on caribou and their habitat will be achieved by linking the risk of the predicted effects directly to mitigation measures, monitoring mitigation effectiveness through performance indicators, reviewing monitoring results relative to performance targets with specific thresholds, and potentially refining mitigation or monitoring approaches through an adaptive management process.</p> <p>The CPEEMP is considered a “live” document that will be updated regularly over the life of the Project. The current, initial version of the Plan is identified as “preliminary” in respect of anticipated comments through continued regulatory review, conditions of authorization (EA release and</p>



IR 2 Reference #	FFA(2)-02
	<p>permitting), and collection and analysis of additional baseline data prior to construction. The CPEEMP will continue to be reviewed and refined as the Project progresses, incorporating information from ongoing follow-up and monitoring activities and review with regulators, scientific experts, Indigenous groups, and stakeholders.</p> <p>Marathon is proposing two specific CPEEMP reviews with NLDFFA-Wildlife Division in 2022. The first review would be conducted in March, the primary purpose of which will be to review the fall 2021 migration data, determine how that data may help to inform the CPEEMP and specifically the monitoring components of the Plan, and review the plans for the spring 2022 migration monitoring. The second review would be held in September to review the spring 2022 migration data, determine how that data may help inform the CPEEMP, and review the plans for the fall 2022 migration monitoring. Additional consultation will be undertaken with regards to the CPEEMP, field surveys and monitoring requirements, financial commitments, and other related matters.</p> <p>The information below is in response to specific comments from the NLDFFA-Wildlife Division in the information request and identifies where in the CPEEMP the comment is addressed or provides a direct response to the comment.</p> <ul style="list-style-type: none"> • Identification of risks to caribou as a consequence of all phases of the project. <p>Section 4 of the CPEEMP outlines the risks the Project poses to caribou and how risks change through the Project phases (construction, operation, closure and post-closure).</p> <ul style="list-style-type: none"> • Identification of possible caribou responses to all phases of the project. <p>Section 4 of the CPEEMP discusses potential caribou responses to all phases of the Project. These responses provide the basis for the risk assessment presented in Tables 4.1-4.4 for each Project phase.</p> <ul style="list-style-type: none"> • Identification of possible mitigation options for the range of possible caribou responses. <p>Section 5 of the CPEEMP details Marathon's proposed mitigation measures, including a defined hierarchy of protection levels to address the variation of risk to caribou seasonally and based on proximity to the Project.</p> <ul style="list-style-type: none"> • A decision framework/matrix that clearly identifies the planned mitigation or contingency response for each of the identified caribou response scenarios, including mixed response models.



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	<p>Marathon has employed a systematic approach to the development of potential mitigation measures that consider all Project phases, potential effects pathways, and a range of caribou responses (including mixed response) and levels of response to Project features and activities.</p> <p>Section 5 of the CPEEMP details Marathon’s proposed mitigation measures, including a defined hierarchy of protection levels to address the variation of risk to caribou seasonally and based on proximity to the Project.</p> <ul style="list-style-type: none"> • A plan for the monitoring of the Buchan’s caribou herd. <p>Section 6 of the CPEEMP presents a detailed monitoring program. The monitoring program is founded in key questions that address potential changes in caribou behaviour for the Buchans and Grey River herds. These questions are linked to measurable performance indicators with defined thresholds. The monitoring techniques (e.g., collars, remote cameras, on-site monitoring, drones) and analytical approaches are presented in the CPEEMP.</p> <ul style="list-style-type: none"> • Reporting of any interactions between caribou and the site (e.g., caribou vehicle collisions, observed behavioral responses to blasting). <p>Sections 5, 6 and 8 of the CPEEMP include responsibilities, monitoring and reporting protocols to address interactions with caribou and their behavioural responses in proximity to the Project.</p> <ul style="list-style-type: none"> • Monitoring of noise, dust, traffic levels etc., and any other parameters identified in the EIS as potential risks for caribou. <p>Sections 5, 6 and 8 of the CPEEMP include mitigation measures, monitoring and reporting requirements pertaining to air emissions (noise, dust) and traffic levels, aimed at reducing the risk of potential effects on caribou.</p> <ul style="list-style-type: none"> • A commitment to provide financial support to offset additional activities required by NLDFFA for survey activity (i.e., winter surveys and fall classifications), and additional surveys specific to monitoring caribou response to the project. <p>Marathon has consulted with the NLDFFA-Wildlife Division over the past two years with respect to baselines studies, increasingly working together on survey activities, including the collaring program and the 2021 post-calving survey. Marathon recognizes NLDFFA-Wildlife Division’s continued and future need for resources to complete survey and monitoring activities (including monitoring caribou response), assess results, and consult with Marathon on the proposed Project. Marathon is committed to providing</p>



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	<p>financial support for these activities and will work with NLDDFA-Wildlife Division to fulfill these requirements.</p> <ul style="list-style-type: none"> • A commitment to provide financial support for the hiring of environmental effects monitor positions at NLDDFA for all phases of the project. <p>Marathon has had preliminary discussions with NLDDFA-Wildlife Division regarding their need for additional resources related to the Project. Marathon is committed to providing financial support for the hiring of environmental effects monitor positions at FFA and will work with NLDDFA-Wildlife Division to fulfill this requirement. It is understood that an agreement will be established for the terms of this arrangement.</p> <ul style="list-style-type: none"> • A commitment to provide annual financial support for graduate students, over all phases of the project, to study specific project effects caused by activities in relation to EA2015 and related cumulative effects. <p>Marathon is committed to providing financial support for graduate students to study specific Project-related effects, including potential cumulative effects, with details and process to be defined in consultation with NLDDFA-Wildlife Division.</p> <ul style="list-style-type: none"> • A commitment to review and update the Caribou Protection and Environmental Effects Monitoring Plan in collaboration with NLDDFA based on the data collected via monitoring <p>Marathon is committed to reviewing and updating the CPEEMP in collaboration with NLDDFA-Wildlife Division based on data collected via monitoring and other information that is pertinent to the Plan. As described above and in the CPEEMP, the need to continually update the Plan based on new information through results of baseline and/or monitoring data, studies and consultation is well understood and is inherent in adaptive management and a requirement of the Environmental and Social Management System under which Marathon will operate.</p>
Appendix:	Appendix A: Caribou Protection and Environmental Effects Monitoring Plan



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RESPONSE TO FFA(2)-03

IR 2 Reference #	FFA(2)-03
IR 1 Reference #	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	<p>Additionally, the amendment is to include a commitment to complete a baseline survey of fish populations in Victoria Lake and Valentine Lake, in collaboration with FFA. The baseline survey is to include testing for contaminants in the flesh of sampled fish. These lakes must be resurveyed every three years or as soon as possible after any environmental incidents that may result in waste water or effluent entering the lakes.</p>
Response:	<p>Marathon is committed to working with Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture (NLDDFA) to satisfy its requirements for baseline fish surveys and recurring monitoring of fish populations in Victoria Lake and Valentine Lake. Through consultation with the NLDDFA, Marathon understands that the Division anticipates that not all the information will be acquired through the <i>Metals and Diamond Mining Effluent Regulations</i> (MDMER) Environmental Effects Monitoring (EEM) program, particularly related to fish abundance and biodiversity, and that additional surveys will be needed.</p> <p>In September 2021, Marathon completed a baseline data collection program at Victoria Lake Reservoir, Valentine Lake and Red Indian Lake, designed and implemented to provide baseline data (additional to baseline data collected for the EIS) to inform future EEM programs required under MDMER. The Valentine Gold Project will trigger the MDMER, and this will occur once effluent discharge exceeds an effluent flow rate of 50 m³ per day, based on the effluent deposited from all the final discharge points of the mine.</p> <p>The work completed and planned under the MDMER EEM may at least partially satisfy NLDDFA's requirements. A technical data report summarizing the methods and results of the 2021 baseline program is under development. Marathon commits to providing this report to NLDDFA in Q1 2022 upon completion, and to a follow-up review and planning session with the Division, whereby a plan will be developed to collect sufficient information to NLDDFA's satisfaction. A brief description of the baseline survey that was conducted in September 2021 and of the planned work under the MDMER EEM is provided below for information.</p>



IR 2 Reference #	FFA(2)-03
	<p>MDMER Baseline Survey and EEM Description</p> <p>As per the Metal Mining Technical Guidance for Environmental Effects Monitoring (Environment Canada 2012), MDMER EEM programs are not basic end-of-pipe measurement of chemicals in effluent, rather involve comprehensive, cyclical monitoring and interpretation to assess the effectiveness of mitigation measures in the aquatic ecosystems. EEM studies consist of:</p> <ul style="list-style-type: none"> • effluent and water quality monitoring studies comprising effluent characterization, sublethal toxicity testing and water quality monitoring (MDMER, Schedule 5, Part 1); and • biological monitoring studies in the aquatic receiving environment to determine if mine effluent is having an effect on fish, fish habitat or the use of fisheries resources (MDMER, Schedule 5, Part 2). <p>Marathon’s 2021 baseline program consisted of a fish population study, a benthic invertebrate community study, and a metals in fish tissue study. The program was designed and implemented in accordance with guidance provided in Environment and Climate Change Canada’s (ECCC’s) EEM Technical Guidance Document (Environment Canada 2012). Although a baseline EEM program is not required under MDMER, Marathon conducted this robust program in order to describe existing conditions in Victoria Lake Reservoir and Valentine Lake for fish (species caught [diversity], lengths and weights of individual fish, relative abundance and catch per unit effort and, for two selected sentinel species, indicators of growth, reproduction, condition and survival), fish habitat (benthic invertebrate density [abundance per unit area], species richness and evenness, community similarity, Simpson’s diversity), and fish tissue (trace metals, lipids, moisture content). The baseline data will allow for comparison with results of future EEM studies to determine, in accordance with the MDMER, if there are effects of mine effluent in the aquatic receiving environment. A technical data report summarizing the methods and results of the 2021 baseline program is under development and will be provided to NLDFFA in Q1 2022 upon completion.</p> <p>The 2021 baseline program, along with earlier baseline programs conducted to support the environmental assessment (EA), provide a strong basis for understanding existing conditions for fish populations, fish habitat (i.e., benthic invertebrates), and metals in fish tissue in Victoria Lake Reservoir and Valentine Like. Fisheries and Oceans Canada has reviewed the baseline data collected in support of the EA and is satisfied with respect to their regulatory role under the <i>Fisheries Act</i>. Future EEM programs will collect similar information to that collected in the 2021 baseline EEM</p>



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	<p>program. The results of the baseline program will be compared with findings of future studies to determine if there are statistically significant changes that are indicative of higher risk to the environment and if such changes are associated with mining activities or related to other factors.</p> <p>The MDMER requires that a Study Design be submitted to Environment and Climate Change Canada within a year of MDMER being triggered. EEM is typically completed in three-year cycles, with the first EEM referred to as the Cycle 1 Study Design. Study Designs are reviewed by a Technical Advisory Panel (TAP) comprised of federal and provincial representatives. The TAP reviews the Study Design for compliance with the information requirements in the MDMER, information contained in the EEM Technical Guidance Document (Environment Canada 2012), and generally accepted standards of good scientific practice. Fieldwork can commence no earlier than six months after the Study Design is submitted, and only upon TAP approval. The 2021 data collection will inform the Cycle 1 Study Design and a summary of the results from 2021 is required to be included in the Cycle 1 Study Design. The summary will appear in the main body of the Cycle 1 Design and the 2021 Report will be appended to the Cycle 1 Report. The MDMER also sets out the elements that must be included in an emergency response plan and associated reporting requirements. In the event of an accidental release (unauthorized deposit of a deleterious substance) MDMER requires that acute toxicity testing be conducted without delay and that the emergency response plan be followed.</p> <p>Reference:</p> <p>Environment Canada. 2012. Metal Mining Technical Guidance for Environmental Effects Monitoring. Available Online: https://www.ec.gc.ca/esee-eem/default.asp?lang=En&n=aec7c481-1</p>
Appendix:	None



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RESPONSE TO DFO(2)-01

IR 2 Reference #	DFO(2)-01
IR 1 Reference #	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	No further comments from Fisheries and Oceans Canada on the EIS or EIS amendment.
Response:	Acknowledged.
Appendix:	None



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RESPONSE TO HC(2)-01

IR 2 Reference #	HC(2)-01
IR 1 Reference #	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	<p>Health Canada’s comments are included in Attachment 1 for consideration. In general, they pertain to the technical assessment of the Proponent’s responses to EAC comments provided by Health Canada (HC-01 HC-25) and the project-related impacts to human health including noise, air quality, water quality, country foods, and human health risk assessment. Please see the attached HC comment. The following is the main points:</p> <ol style="list-style-type: none"> a. Provide detailed rationale about how the 32 ‘sensitive receptor’ locations used in the HHRA represent the worst-case exposure scenario for assessments of air quality and human health risks. Alternatively, use the predicted contaminant levels at the maximum point of impingement in assessments of air quality and health risks. b. Include additional chemical sources in the assessment by considering: <ol style="list-style-type: none"> i. The concentrations of various chemicals that are present in environmental media prior to project commencement (i.e., baseline conditions); ii. The concentrations of chemicals that are expected to be emitted by project activities during the construction, operation, decommissioning, and post closure project phases (where applicable); iii. The concentrations that models indicate will be present in various media in areas where there are human receptors; iv. The concentrations of chemicals that may be released as a result of an accident or malfunction and the modelled concentrations of those chemicals into various environmental media that may be impacted in areas where there are human receptors. c. Re-evaluate soil COPC levels using health risk-based criteria, such as the Soil Quality Guidelines for the Protection of Environmental and Human Health (CCME, 2014). Provide additional mitigation measures and monitoring programs, as appropriate. Reference: Canadian Council of Ministers of the Environment (CCME), 2014. Soil Quality Guidelines for the Protection of Environmental and Human Health. Available at : http://stts.ccme.ca/en/index.html?chems=all&chapters=4&pdf=1 d. Provide detailed rationale about how assessments of air quality and associated health risks based on surrogate estimates of PAHs, VOCs



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	<p>and DPM from other mining projects are directly applicable to the Valentine Project. Additionally, develop and implement ambient air quality monitoring plans for PAHs and VOCs during all project phases.</p> <p>e. Discuss uncertainties associated with the proposed use of NAPS surrogate data as baseline levels, including how the use of overestimated baseline levels may affect assessments of incremental health risks due to project activities.</p> <p>f. Clarify how screening of NO₂, SO₂, and PM_{2.5} levels against the CAAQS or NL-APCR values can adequately protect human health from potential exposures to these contaminants. Additionally, develop and implement additional mitigation measures and ambient air quality monitoring plans for NO₂, SO₂, and PM_{2.5} during all project phases.</p> <p>g. Clarify the discrepancy between the original EIS and EIS Amendment with respect to the maximum predicted concentrations of air contaminants that are used to assess project-related air quality changes and health risks.</p> <p>h. Provide the maximum predicted annual average concentrations of PM_{2.5} and 1 hr/annual average concentrations of NO₂ and SO₂ due to project-related road traffic on the access. Given that health effects can occur even at concentrations below applicable CAAQS guidelines, develop and implement additional mitigation measures and follow-up monitoring program at human receptor locations, including Millertown and Buchans, if necessary.</p> <p>i. For clarity, compare the on-site measured concentrations of PM_{2.5}, NO₂, and SO₂ with the NAPS data. Alternatively, discuss uncertainties associated with the proposed use of NAPS surrogate data as baseline levels.</p> <p>j. Provide annual average concentrations of NO₂ and SO₂ in relation to the sensitive receptor locations.</p> <p>k. Provide detailed information on how the noise-related complaints from Indigenous groups and communities, including Millertown and Buchans, will be addressed.</p> <p>l. Provide the distribution of baseline noise events at night with a comparison to predicted individual noise events at night at each receptor location, including resident receptors for Millertown and Buchans. Noise mitigation measures should be considered where noise events at night are predicted to exceed 60 dBA L_{max} outdoors 15 times per night at any noise receptor location.</p>



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IR 2 Reference #	HC(2)-01
	<p>m. Consider all applicable adjustments/assessments for sound sources and characteristics as per Health Canada’s noise guidance document (2017) and ISO 1996-1:2016.</p>
<p>Response:</p>	<p>Responses to these information requests have been addressed in the responses to technical information requests from Health Canada as outlined below.</p> <ul style="list-style-type: none"> a. Additional rationale to support the selection of sensitive receptor locations is provided in the response to HC(2)-02. b. Requests related to additional chemical sources have been addressed in the response to HC(2)-03 as outlined below: <ul style="list-style-type: none"> i. The concentrations of various chemicals that are present in environmental media prior to project commencement (i.e., baseline conditions) are addressed in the response to HC(2)-03a. ii. The concentrations of chemicals that are expected to be emitted by Project activities during the construction, operation, decommissioning, and post closure Project phases (where applicable) are addressed in the response to HC(2)-03b. iii. The concentrations that models indicate will be present in various media in areas where there are human receptors, are addressed in the response to HC(2)-03c. iv. The concentrations of chemicals that may be released as a result of an accident or malfunction and the modelled concentrations of those chemicals into various environmental media that may be impacted in areas where there are human receptors, is addressed in the response to HC(2)-03d. c. Information regarding a re-evaluation of soil contaminants of potential concern using Canadian Council of Ministers of the Environment Soil Quality Guidelines for the Protection of Environmental and Human Health is provided in the response to HC(2)-04. d. Additional rationale to support the exclusion of volatile organic compounds and polycyclic aromatic hydrocarbons from the list of contaminants of potential concern is provided in the response to HC(2)-05a. e. A discussion of uncertainties associated with the use of National Air Pollution Surveillance surrogate data as baseline levels, including how the use of overestimated baseline levels may affect assessments of health risks, is provided in the response to HC(2)-05b. f. Additional clarification related to the adequacy of screening nitrogen dioxide (NO₂), sulphur dioxide (SO₂) and fine particulate matter with an



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IR 2 Reference #	HC(2)-01
	<p>aerodynamic diameter less than 2.5 µm (PM_{2.5}) against the Canadian Ambient Air Quality Standards is provided in the response to HC(2)-06a.</p> <p>g. Information with respect to the maximum predicted concentrations of air contaminants that are used to assess Project-related air quality changes and health risks is provided in response to HC(2)-06b.</p> <p>h. Information regarding the maximum predicted annual average concentrations of PM_{2.5} and 1 hr/annual average concentrations of NO₂ and SO₂ due to Project-related road traffic on the access is provided in HC(2)-07.</p> <p>i. Please refer to HC(2)-08 for details on the use of National Air Pollution Surveillance data.</p> <p>j. Please refer to HC(2)-09 for a discussion of annual average concentrations of NO₂ and SO₂ in relation to the sensitive receptor locations.</p> <p>k. Information on how noise-related complaints from Indigenous groups and communities, including Millertown and Buchans, would be addressed is provided in response to HC(2)-10.</p> <p>l. Please refer to HC(2)-11a for details on the noise assessment.</p> <p>m. Please refer to HC(2)-11b for information on applicable adjustments/assessments for sound sources and characteristics.</p>
Appendix:	None



RESPONSE TO HC(2)-02

IR 2 Reference #	HC(2)-02
IR 1 Reference #	HC-01
EIS Reference:	
Context and Rationale:	<p>The proposed receptor locations may not represent the worst-case exposure scenario for assessments of air quality and human health risks.</p> <p>To conservatively assess project impacts on Traditional Land and Resource Users (TLRUsers), the study assumes that “there was potential for the Qalipu to use the LAA, even if land and resource use activity was not identified in that area” (EIS Amendment Response to IR HC-01). However, it is unclear how the 32 ‘sensitive receptor’ locations used in the HHRA represent the worst-case exposure scenario for TLRUsers near the project site. The 32 sensitive receptors represent seasonal residences, such as cabins and outfitter camps (Section 3.3 of Appendix A, pdf p.23), rather than TLRU activities. In the absence of sufficient TLRU information, the use of contaminant levels at the maximum point of impingement (e.g., Table 5.16 of the original EIS, pdf p.74), or at the project site boundary, should be used in the air quality assessment to adequately protect the health of TLRUsers from short-term exposures to the elevated contaminant concentrations near the project site (e.g., 1-hr NO₂ levels).</p>
Information Request:	<p>Health Canada recommends that the Department request the following comments be addressed in an updated Environmental Impact Statement (EIS):</p> <p>Provide detailed rationale about how the 32 ‘sensitive receptor’ locations used in the HHRA represent the worst-case exposure scenario for assessments of air quality and human health risks.</p> <p>Alternatively, use the predicted contaminant levels at the maximum point of impingement in assessments of air quality and health risks.</p>
Response:	<p>The selection of the 32 special receptor locations was based on consultation and community engagement, as described in Section 3.3 of the Human Health Risk Assessment (Appendix A of the Amendment to the EIS submitted August 3, 2021). These locations represent the places within the Local Assessment Area (LAA) that Indigenous and non-Indigenous land users identified as locations where it is reasonable to expect that people could be present on a 24-hour per day basis. As such, use of the maximum 24-hour and annual average contaminant concentrations predicted for these residential locations would represent the reasonable worst-case 24-hour and annual average exposures that could be expected for Indigenous and non-Indigenous people present in the LAA.</p>



IR 2 Reference #	HC(2)-02
	<p>Indigenous and non-Indigenous people could be at other locations within the LAA for shorter periods of time while harvesting terrestrial and aquatic country foods. Thus, they could be exposed to higher concentrations of contaminants for shorter periods of time (e.g., 1-hour). Air contaminants with short-term (1-hour, 2-hour) health-based exposure limits at environmentally relevant concentrations are limited to nitrogen dioxide (NO₂), sulphur dioxide (SO₂), carbon monoxide (CO), and diesel particulate matter (DPM). The following provides additional discussion of potential for short-term exposures to these air contaminants within the LAA.</p> <p>Contour plots of predicted 1-hour NO₂ and 1-hour SO₂ concentrations were provided as response for a previous Information Request from Health Canada (response to HC-14 submitted on August 3, 2021 as part of the Amendment to the EIS). As illustrated in the contour plot for 1-hour NO₂ (Figure HC-14.10, replicated below as Figure HC(2)-02.1), the maximum point of impingement (MPOI) concentration in the LAA is predicted to occur at the southwestern edge of the Project Area and concentrations higher than the 2025 Canadian Ambient Air Quality Standards (CAAQS) for 1-hour NO₂ (79 µg/m³) are restricted to the Project Area and a limited area on the southwestern boundary of the Project Area. As illustrated in the contour plot of predicted 1-hour SO₂ concentrations (Figure HC-14.12, replicated below as Figure HC(2)-02.2), the MPOI concentration is predicted to occur near the southwestern edge of the Project Area and concentrations greater than the 2025 CAAQS (170 µg/m³) do not extend beyond the boundary of the Project Area. At all other locations within the LAA, 1-hour NO₂ and SO₂ concentrations are predicted to meet their respective 2025 CAAQS.</p> <p>The MPOI for 2-hour DPM also occurs on southwestern edge of the Project Area. At all other locations within the LAA, 2-hour DPM concentrations are predicted to be less than the Health Canada 2-hour DPM toxicity reference value of 10 µg/m³.</p> <p>The maximum concentrations of CO (1,634 µg/m³ for 1-hour exposures and 923 µg/m³ for 8-hour exposures) are less than the Newfoundland and Labrador Ambient Air Quality Standards for Carbon Monoxide (35,000 µg/m³ for 1-hour exposures and 15,000 µg/m³ for 8-hour exposures). The guidelines reflect maximum acceptable levels as recommended by Health Canada (1994).</p> <p>Any locations where the maximum concentrations of air contaminants are predicted to exceed the relevant health-based guidelines occur on the southwest boundary of the Project Area, more than several kilometers away from the areas identified as those used for fishing, hunting, trapping, or known recreational areas (as described in Chapter 17 [Indigenous Groups]</p>



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IR 2 Reference #	HC(2)-02
	<p>and illustrated on Figure 17-5 of the EIS). Furthermore, during construction and operation, people would be less likely to frequent this boundary of the Project Area. In addition, these maximum concentrations do not represent continuous concentrations at a given location; they represent the maximum concentration predicted to occur at that location for the averaging period (e.g., 1-hour, 2-hour) across the full modelling timeframe (26,280 hours in three years). Thus, it is unlikely that an Indigenous or non-Indigenous receptor would be at a location at the point in time when these limited exceedances are predicted to occur. Based on the above, it is reasonable to conclude that exposure to NO₂, SO₂ and DPM represents a negligible human health risk for Indigenous and non-Indigenous receptors in the LAA and does not alter the conclusions of the Human Health Risk Assessment.</p> <p>Reference:</p> <p>Health Canada. 1994. National Ambient Air Quality Objectives for Carbon Monoxide: Executive Summary. Desirable, Acceptable and Tolerable Levels. Prepared by the CEPA /FPAC Working Group on Air Quality Objectives and Guidelines.</p>
Appendix:	None



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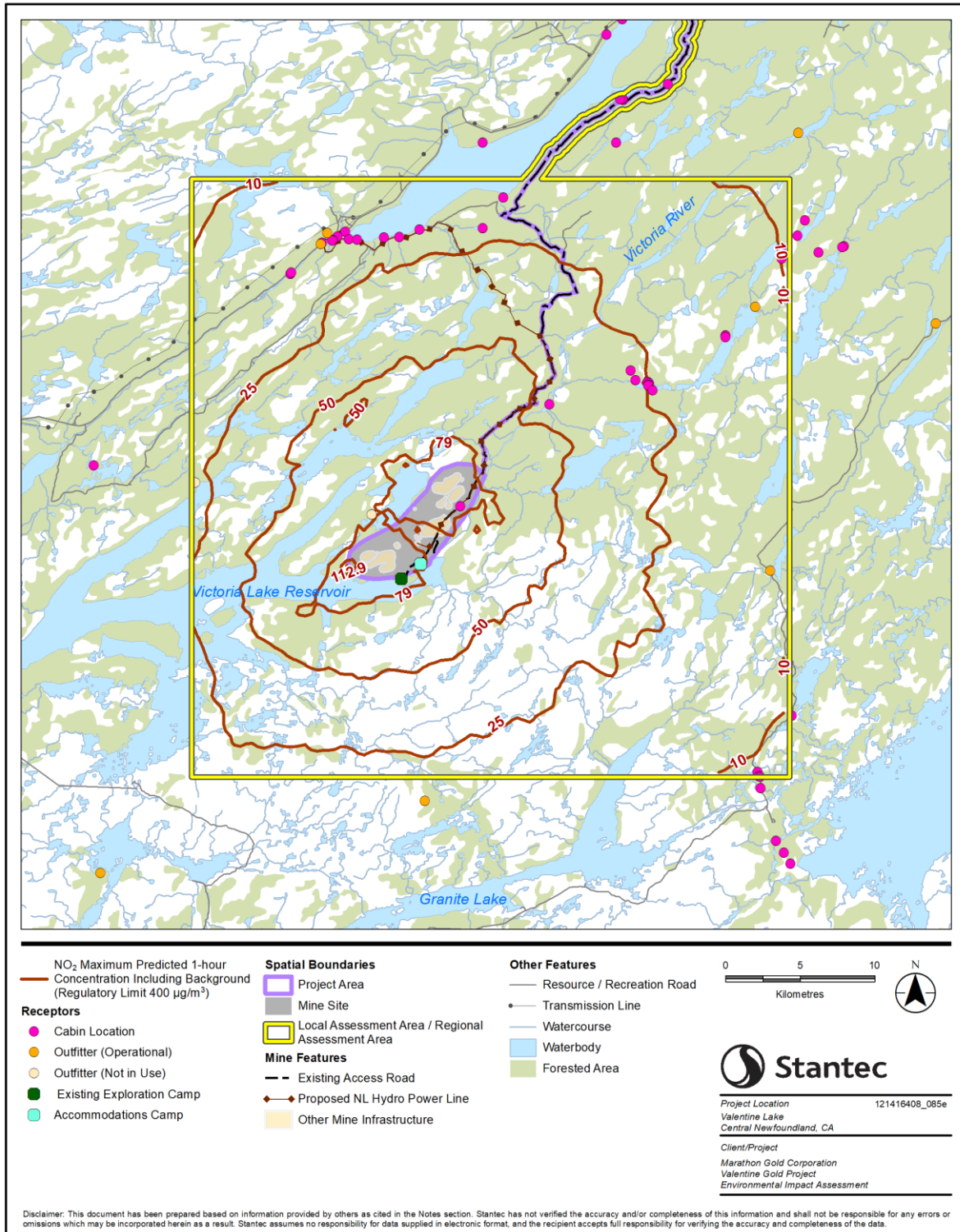


Figure HC(2)-02.1 NO₂ Maximum Predicted 1-hour Concentration including Background (Regulatory Limit 400 µg/m³)



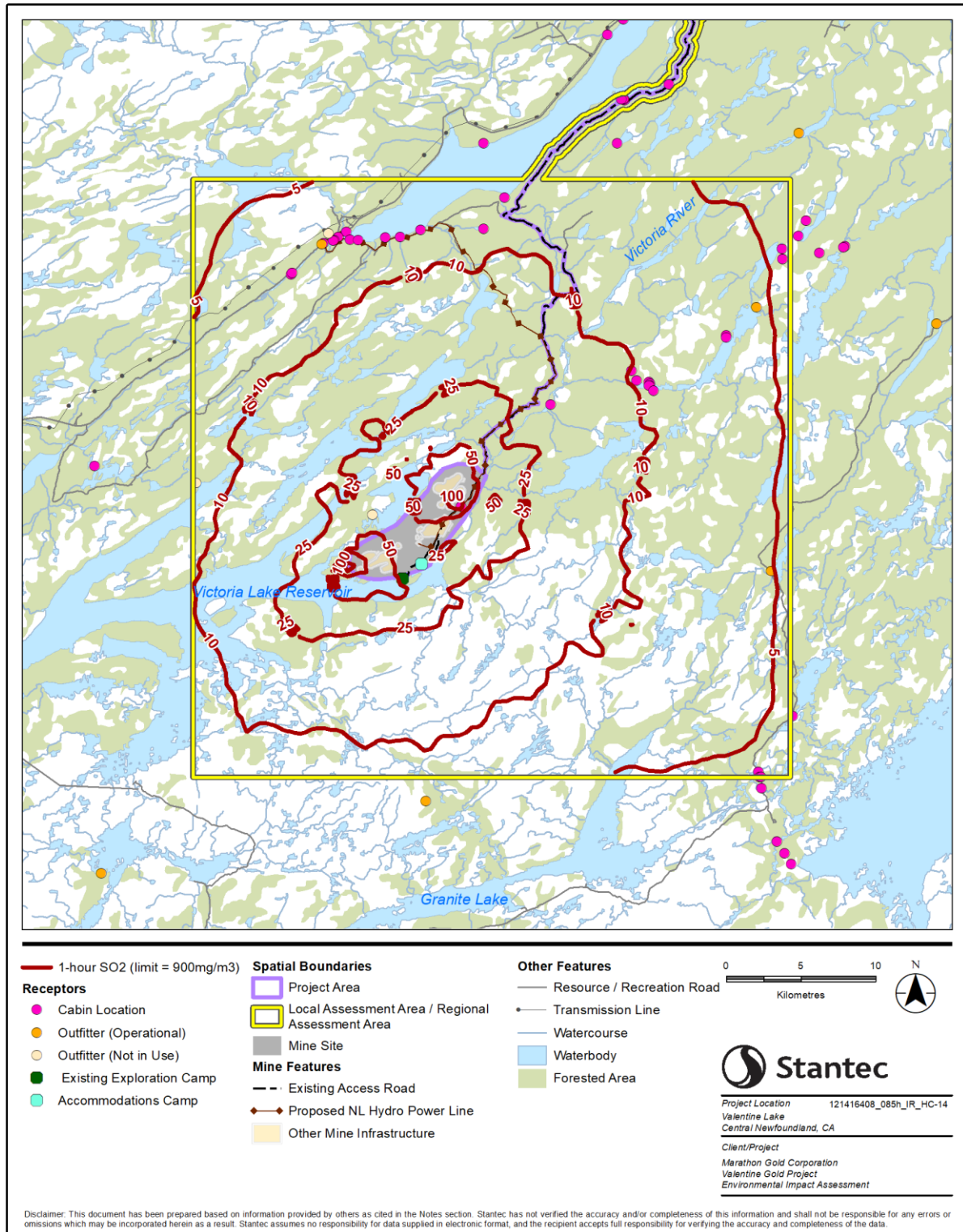


Figure HC(2)-02.2 SO₂ Maximum Predicted 1-hour Concentration Including Background (Regulatory Limit 900 mg/m³)



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RESPONSE TO HC(2)-03

IR 2 Reference #	HC(2)-03
IR 1 Reference #	HC-05
EIS Reference:	-
Context and Rationale:	<p>Sufficient detail is not provided about possible sources of chemicals. The study lists metals that are identified as contaminants of potential concern (COPCs) from “Trace metals within the dust released during ore handling and processing, wind erosion, and blasting” (Section 3.4 of Appendix A, pdf p.24 to 27).</p> <p>However, it remains unclear whether the proponent has sufficiently considered all possible sources of chemicals to develop the list of COPCs. Possible chemical sources can be identified by considering all potential project activities, emission sources and environmental transport pathways.</p>
Information Request:	<p>Health Canada recommends that the Department request the following comments be addressed in an updated EIS:</p> <ol style="list-style-type: none"> a. Include additional chemical sources in the assessment by considering: <ol style="list-style-type: none"> I. The concentrations of various chemicals that are present in environmental media prior to project commencement (i.e., baseline conditions); II. The concentrations of chemicals that are expected to be emitted by project activities during the construction, operation, decommissioning, and post- closure project phases (where applicable); III. The concentrations that models indicate will be present in various media in areas where there are human receptors; IV. The concentrations of chemicals that may be released as a result of an accident or malfunction and the modelled concentrations of those chemicals into various environmental media that may be impacted in areas where there are human receptors.
Response:	<ol style="list-style-type: none"> a. Baseline concentrations of the various chemicals that are present in air, soil, surface water, and country foods were considered and summarized in Section 4.3 of the Human Health Risk Assessment (HHRA; Appendix A of the Amendment to the EIS submitted August 3, 2021). Additional details are documented as follows: <ul style="list-style-type: none"> • Existing conditions for ambient air quality, including criteria air contaminants (fine particulate matter with an aerodynamic diameter less than 2.5 µm [PM_{2.5}], nitrogen dioxide [NO₂], sulphur dioxide [SO₂], carbon monoxide [CO]), un-ionised ammonia (NH₃), hydrogen cyanide (HCN), and metals, as well as a description of



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IR 2 Reference #	HC(2)-03
	<p>the methods used to characterize baseline air quality, are provided in Section 5.2 of the EIS (Atmospheric Environment Valued Component [VC]).</p> <ul style="list-style-type: none"> • Existing conditions for surface water quality, including general chemistry, nutrients, and metals, are provided in Section 7.2 of the EIS (Surface Water Resources VC). • Existing conditions for metal concentrations in soil and country foods (snowshoe hare, blueberries, Labrador tea, and brook trout) are presented in Appendix C of the HHRA (Country Foods Sampling Program). <p>Baseline groundwater quality was not summarized in the HHRA as groundwater is not used as a potable water supply (i.e., no direct exposure); however, existing groundwater quality is characterized in Section 6.2 of the EIS (Groundwater Resources VC).</p> <p>No additional chemical sources for the HHRA are identified based on the existing (baseline) conditions.</p> <p>b. The contaminants of potential concern identified in the HHRA incorporated the findings of detailed assessments of potential Project releases completed as part of the Atmospheric Environment, Surface Water Resources, and Groundwater Resources VCs. Specifically, the concentrations of chemicals that are expected to be released by Project activities and were considered in the HHRA reflect the following:</p> <ul style="list-style-type: none"> • Air contaminant emissions for activities during construction were estimated for blasting activities, fugitives from wind erosion of stockpile surfaces and material transfer (loading and unloading) at stockpiles, and fugitives from travel on haul roads and from fuel combustion in mobile heavy equipment. The releases were estimated using activity data provided by Marathon and published emission factors, such as those from Environment and Climate Change Canada and the United States Environmental Protection Agency. The detailed emissions inventory for construction is provided in Appendix 5C of the EIS. • Air contaminant emissions for operation were estimated using design information, including stack gas properties, exhaust gas concentrations in stacks for the processing plant, ore specifications and activity data for the mining operation, and emission factors published by regulatory agencies, such as the United States Environmental Protection Agency and Environment and Climate Change Canada. Sample calculations of emission estimates are



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	<p>provided in Appendix 5D of the EIS and the detailed emissions inventory for operations is provided in Appendix 5E of the EIS.</p> <ul style="list-style-type: none"> • An assessment of the potential for acid rock drainage and metals leaching was completed for the waste rock, ore, and tailings at the site for the Leprechaun complex, Marathon complex, and the processing and tailings management facility (TMF) complex. The findings of the assessment are summarized in Section 6.3.5 of the EIS and were used to derive water quality source terms for the water quality model reports (Appendix 7A and Appendix 7B of the EIS). The predicted water quality, together with the groundwater discharge rates (determined by the groundwater flow model; Appendix 6A of the EIS) were used to estimate potential effects of Project activities on groundwater quality and loading to surface water receivers. • An assessment of the potential chemical releases to surface water used multiple analytical methods and tools, including a site-wide water quantity and quality GoldSim™ model, site-wide groundwater flow model, and a 3-dimensional steady state near-field Cornell Mixing Zone Expert System (CORMIX) model. Development of the models, inputs and results are described in detail in the Water Quantity and Water Quality Modelling Reports (Appendix 7A and 7B of the EIS), and the Assimilative Capacity Assessment (Appendix 7C of the EIS). An overview of the methods used is provided in Section 7.3.5 of the EIS, a summary of the sources of potential contaminants to surface water is provided in Section 7.5.2 of the EIS, and a summary of the predicted surface water concentrations is provided in Section 7.5.2 of the EIS. <p>Based on the detailed assessment of source concentrations to air, surface water, and groundwater, no additional chemical sources to the HHRA have been identified.</p> <p>c. The Local Assessment Area (LAA) for the HHRA represents the area where future conditions can be predicted or measured with a level of confidence that allows assessment of potential Project-related changes in human health risk. Areas of land and resource use that fall beyond the LAA will not be affected by Project activities and therefore will not contribute to potential exposures to Project-related emissions. The concentrations that models indicate will be present in various media in areas where human receptors could be exposed within the LAA are summarized in Section 4.3 of the HHRA, which includes rationale for</p>



IR 2 Reference #	HC(2)-03
	<p>why the media concentrations are considered representative of potential exposures. Additional details are provided as follows:</p> <ul style="list-style-type: none"> • Baseline and predicted future concentrations of potential contaminants in air are provided in Section 5.5.1 of the EIS. Assessment of potential exposures of Indigenous and non-Indigenous receptors to concentrations at the maximum points of impingement is provided in response to HC(2)-02, while assessment of exposures at sensitive receptor locations is provided in the HHRA. • Predicted future concentrations of potential contaminants in surface water are provided in Section 7.5.1 of the EIS. • The findings of the air deposition modeling were used to predict future soil concentrations, which are provided in Section 4.3 of the HHRA, with a sample calculation provided in Appendix B of the HHRA. <p>Based on the modelling completed, no additional chemical sources to the HHRA have been identified.</p> <p>d. The potential for chemical releases as a result of accidents or malfunctions at the Project (including TMF failure, stockpile slope failure, fuel and hazardous material spill, unplanned release of contact water, fire / explosion, and vehicle accident) are discussed in Chapter 21 of the EIS (Accidental Events). This includes spill modelling for fuel and hazardous materials as presented in Appendix 21 A of the EIS and further discussed in Appendix A of this Second Amendment to the EIS.</p> <p>In the event of a major spill (as described in Section 21.5.3.4 of the EIS), following implementation of spill response and containment procedures, a monitoring plan specific to the incident would be developed, tailored to factors such as the type of material spilled, quantity spilled, and location of the spill. In the event of a TMF dam failure (refer to Section 21.5.1.3 of the EIS), a remedial action and monitoring plan would also be developed, in addition to immediately engaging the <i>Metals and Diamond Mining Effluent Regulations</i> tailings/effluent emergency response plan. Where required following an accidental event, public notices would be issued and access to the area would be restricted if there was any risk associated with public exposure. Emergency response, containment and remediation measures would be implemented, in consultation with the federal and provincial regulators as applicable, to reduce or eliminate the effects of the accidental release. Thus, increases in chemical concentrations in environmental media are anticipated to be short-term (i.e., acute).</p>



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	Human health risks associated with such events would be assessed as part of the emergency response to the event and would be expected to inform remediation and risk management activities (e.g., fish advisories). As a result, no additional chemical sources to the HHRA have been identified.
Appendix:	None



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RESPONSE TO HC(2)-04

IR 2 Reference #	HC(2)-04
IR 1 Reference #	HC-06
EIS Reference:	-
Context and Rationale:	<p>The HHRA does not evaluate soil COPC levels using health- based criteria.</p> <p>In Section 4.3.2 of Appendix A, the study concludes that there is a negligible risk for human health based on percentage increase of COPCs in soil from the baseline to the future case scenario. Health Canada disagrees with this interpretation of the data, as COPCs should be evaluated based on their potential human health risks, irrespective of the percentage change above Baseline Case conditions.</p>
Information Request:	<p>Health Canada recommends evaluating soil COPCs in the HHRA, taking into account the potential of risk for human health at baseline conditions as well as the future scenario condition. If exceedances and/or near-exceedances are predicted in a quantitative HHRA for concentrations of the COPCs to which human receptors will be exposed, include monitoring, mitigation strategies and/or follow-up programs as a part of an environmental management plan (EMP) and/or risk management plan. The purpose of the plan is to identify methods to reduce the potential risks to acceptable levels.</p> <p>For additional information refer to: Health Canada’s Guidance for Evaluating Human Health Impacts in Environmental Assessment: Human Health Risk Assessment (Health Canada, 2019). Refer to Section 7.1.2 Identification Of Contaminants of Potential Concern and Appendix C: Additional Information About Screening Chemicals of Potential Concern https://publications.gc.ca/site/eng/9.870475/publication.html</p> <p>Health Canada recommends that the Department request the following comments be addressed in an updated EIS: Re-evaluate soil COPC levels using health risk- based criteria, such as the Soil Quality Guidelines for the Protection of Environmental and Human Health (CCME. 2014). Provide additional mitigation measures and monitoring programs, as appropriate.</p> <p>Reference: Canadian Council of Ministers of the Environment (CCME), 2014. Soil Quality Guidelines for the Protection of Environmental and Human Health. Available at : http://sts.ccme.ca/en/index.html?chems=all&chapters=4&pdf=1</p>



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IR 2 Reference #	HC(2)-04
Response:	<p>The Human Health Risk Assessment (HHRA; Appendix A of the Amendment to the EIS submitted August 3, 2021) followed Health Canada (2019) guidance (Section 7.1.2: Identification of Contaminants of Potential Concern) and considered each of the chemicals that could, as a result of the Project, be elevated in environmental media as contaminants of potential concern (COPC).</p> <p>Health Canada (2019) guidance further notes that if the modelled concentrations (including baseline) are calculated to be below guidelines/standards/criteria for the impacted media, the problem formulation phase of the risk assessment may conclude that the chemicals do not need to be carried forward as COPCs in a quantitative risk assessment. Table HC(2)-04.1 lists the maximum predicted future concentration of each chemical in the soil, the corresponding Canadian Council of Ministers of the Environment (CCME) soil quality guidelines for agricultural and residential/parkland soils, and the % of the guideline value that each predicted concentration represents.</p> <p>CCME does not list a soil quality guideline for strontium. Therefore, the United States Environmental Protection Agency (US EPA) Risk Screening Level (RSL) for residential land use/child exposure was used for strontium. The US EPA RSL for strontium (47,000 mg/kg) is based on a Hazard Quotient of 1.0. Therefore, the US EPA RSL was adjusted to reflect a Hazard Quotient of 0.2 (9400 mg/kg).</p> <p>For each of the chemicals, the maximum predicted Future Case concentration in soil is below the corresponding CCME soil quality guidelines for agricultural and residential/parkland use. Following Health Canada guidance, each of the chemicals could have been excluded as a COPC in the problem formulation stage of the HHRA. However, to provide a conservative assessment of potential human health risks, each chemical was carried through the HHRA.</p> <p>Predicted Future Case concentrations of chemicals ranged from 60% of the guideline (arsenic) to 0.3% of the guideline (strontium). Based on this, predicted Future Case concentrations do not represent exceedance or near-exceedance concentrations. As such, predicted human health risks would be considered to be at acceptable levels. Thus, the inclusion of monitoring and/or mitigation strategies in an environmental management plan to reduce potential human health risks to acceptable levels is not warranted.</p>



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IR 2 Reference #	HC(2)-04
	Reference: Health Canada. 2019. Guidance for Evaluating Human Health Impacts in Environmental Assessment: Human Health Risk Assessment. Available online at: https://www.canada.ca/en/health-canada/services/publications/healthy-living/guidance-evaluating-human-health-impacts-risk-assessment.html (Accessed February 2021)
Appendix:	None



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Table HC(2)-04.1 Maximum Predicted Future Concentration of Each Chemical in the Soil Compared to Guidelines

COPC	Predicted Future Soil Concentration	Agricultural Land Use		Residential/Parkland Land Use	
		Soil Quality Guideline	% of Guideline Concentration	Soil Quality Guideline	% of Guideline Concentration
	(mg/kg)	(mg/kg)		(mg/kg)	
Arsenic	7.2	12	60%	12	60%
Barium	118	750	16%	500	24%
Beryllium	2	4	50%	4	50%
Cadmium	0.5	1.4	36%	10	5%
Chromium	5.8	64	9%	64	9%
Cobalt	3.7	40	9%	50	7%
Copper	10	63	16%	63	16%
Lead	25.8	70	37%	140	18%
Mercury	0.3	6.6	5%	6.6	5%
Nickel	3.6	45	8%	45	8%
Strontium	26.9	9400	0.3%	9400	0.3%
Zinc	60.9	250	24%	250	24%



RESPONSE TO HC(2)-05

IR 2 Reference #	HC(2)-05
IR 1 Reference #	HC-10
EIS Reference:	-
Context and Rationale:	<p>Detailed rationale is not provided about how assessments of air quality and associated health risks from other mining projects are directly applicable to the Valentine Project</p> <p>a. As surrogate estimates are provided for VOCs, PAH and DPM, a thorough discussion about how assessments of air quality and associated health risks for Greenstone Gold Project (ON), Lynn Lake Gold Project (MB), Ajax Copper-Gold Project (BC), and its applicability to Valentine Gold Project, should be provided. The Proponent’s discussion should outline why similarities and differences between these projects are considered appropriate for the assessment of the Valentine Gold Project. Some of these differences may include:</p> <ul style="list-style-type: none"> • The project phases considered; • The receptors considered; • The estimated life of mine and decommissioning and post-closure phases; • Contextual considerations such as prominent wind directions relative to receptors and distance to the nearest receptors. Notably, regardless of the method chosen to estimate future ambient air concentrations, the Valentine Gold Project EIS should read as a stand-alone report. Readers (e.g., public) should not be expected to have an understanding of other gold mining projects in distant provinces, and should not be required to reference other projects to fully understand the assumptions and conclusions of the Valentine Gold Project. <p>b. Baseline concentrations of PM_{2.5}, NO₂, and SO₂ are established based on ambient air quality data from the NAPS station at the Grand Falls-Windsor, NL. The use of elevated baseline levels may lead to an underestimation of the project- associated changes to ambient air quality, and consequently the incremental health risks, particularly regarding non- threshold substances (i.e., pollutants for which health effects may occur at any level of exposure).</p>
Information Request:	<p>Health Canada recommends that the Department request the following comments be addressed in an updated EIS:</p> <p>a. Provide detailed rationale about how assessments of air quality and associated health risks based on surrogate estimates of PAHs, VOCs</p>



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IR 2 Reference #	HC(2)-05
	<p>and DPM from other mining projects are directly applicable to the Valentine Project. Additionally, develop and implement ambient air quality monitoring plans for PAHs and VOCs during all project phases.</p> <p>b. Discuss uncertainties associated with the proposed use of NAPS surrogate data as baseline levels, including how the use of overestimated baseline levels may affect assessments of incremental health risks due to project activities.</p>
Response:	<p>a. A summary of the production rates, expected mine life and distance to the nearest downwind residential receptor location for the Valentine, Greenstone, Lynn Lake and Ajax gold mine projects is provided in Table HC(2)-05.1.</p> <p>For each of the Greenstone Gold, Lynn Lake Gold and Ajax Copper-Gold projects, the nearest residential receptor is located less than 2 km downwind from the project. The predicted human health risks associated with volatile organic compound (VOC) exposures are below 0.1 for the two mining projects where VOCs were evaluated. The predicted non-cancer risks associated with inhalation exposures to diesel particulate matter (DPM) are below 0.01. The estimated incremental increases in lifetime cancer risk associated with inhalation exposures to carcinogenic polycyclic aromatic hydrocarbons (PAH) are 5 to 8 orders of magnitude lower than the 10⁻⁵ cancer risk acceptability benchmark for the Greenstone Gold, Lynn Lake Gold and Ajax Copper-Gold projects.</p> <p>Production rates at each of these projects is higher (2.7 to 6.8 times) than the maximum production rate planned for the Valentine Gold Project, and the anticipated mine life of each is also longer than that of the Valentine Gold Project. In addition, the distance to the closest residential receptor location is similar for all four projects. Note that while the closest residential receptors to the Valentine Gold Project are seasonal cabins, they were conservatively assumed to be occupied 100% of the time, on a year-round basis. Therefore, it is reasonable to conclude that the potential human health risks associated with inhalation exposures to VOC, DPM and PAH for the Valentine Gold Project would be similar to or lower than those predicted for the projects noted above. Thus, inhalation exposures to VOC, DPM and PAH would be expected to represent a negligible human health risk for human receptors in the Local Assessment Area. This further suggests that inclusion of these contaminants in the assessment would not alter the conclusions of the human health risk assessment or the determination of the significance of Project residual effects on human health.</p>



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IR 2 Reference #	HC(2)-05
	<p>It should be noted that DPM was specifically modelled for this Project and the assessment of potential human health risks associated with inhalation exposure to DPM is based on Project-specific modelling results (see Section 4.3 of the HHRA). However, DPM has been included here as requested in the IR.</p> <p>Plans for ambient air quality monitoring through all Project phases are being developed in conformance with provincial guidance and will be finalized in consultation with the Government of Newfoundland and Labrador (NL) during Project permitting. Monitoring for VOCs and PAHs has not been required for past and on-going mining projects in NL, and the need for monitoring of these contaminants has not been identified through the results of the Atmospheric Environment assessment or the HHRA; however, Marathon will comply with conditions of release from the environmental assessment process and requirements identified through permitting with respect to the scope and details of ambient air quality monitoring.</p> <p>b. The HHRA did not rely on the incremental changes to air quality; rather, the HHRA assessed air quality based on comparison of the future concentrations to health-based guidelines; notably, these future concentrations are also likely overstated, given the use of the National Air Pollution Surveillance station data as the baseline to which the Project emissions were added. As a result, the use of the data from the National Air Pollution Surveillance station does not affect the conclusions of the HHRA.</p>
Appendix:	None



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Table HC(2)-05.0.1 A Summary of the Production Rates, Expected Mine Life, and Distance to the Nearest Downwind Residential Receptor Location for the Valentine Gold, Greenstone Gold, Lynn Lake Gold and Ajax Gold Mine Projects

Project Description	Greenstone Gold Project	Lynn Lake Gold Project	Ajax Copper-Gold Project	Valentine Gold Project
Modelled Production Rate (tonnes/day)	30,000	75,000	65,000	10,960
Expected Mine Life	15 years	21 years	23 years	14 years
Phases Modelled	Operations	Operations	Operations	Operations
Closest Residence	< 2km	<1km	<1 km	<1 km*
Maximum Predicted Non Cancer Risk Estimates				
VOCs	<0.1	<0.001	-	
DPM Annual Average	-	0.0043	-	
Maximum Predicted Incremental Lifetime Cancer Risk Estimate				
B[a]PTPE	1.7E-11	4.9E-13	6.3E-10	
Notes: "-" not assessed. *: closest receptor is a vacant outfitters cabin; however, it was evaluated as a residential building with full time occupancy in the HHRA				



RESPONSE TO HC(2)-06

IR 2 Reference #	HC(2)-06																
IR 1 Reference #	HC-11																
EIS Reference:	-																
Context and Rationale:	<p>The levels of NO₂, SO₂, and PM_{2.5} are screened against air quality criteria values that do not represent the thresholds for health risks. There is an unexplained discrepancy between the original EIS and EIS Amendment with respect to the maximum predicted concentrations of air contaminants.</p> <p>a. Concentrations of NO₂, SO₂ and PM_{2.5} in air were screened against the Canadian Ambient Air Quality Standards (CAAQS) or Newfoundland and Labrador’s Air Pollution Control Regulation (NL-APCR) values, which are not health-based thresholds. The proponent assumes that in the absence of acceptable risk benchmarks for NO₂, SO₂, and PM_{2.5}, “predicted concentrations that are below the respective CAAQS for these compounds are considered to represent a negligible human health risk” (Section 4.3.1 of Appendix A, pdf p.31). However, the Canadian Air Quality Management System (AQMS) explicitly recognizes that health effects occur below the maximum thresholds (i.e., the CAAQS), and proposes additional management levels in recognition of the health and environmental benefits that can be realized by taking actions to decrease or maintain background levels of air pollution.</p> <p>Furthermore, although the predicted air contaminant concentrations are below the CAAQS values, the EIS Amendment predicts that project-related air emissions will substantially increase these contaminant levels on a short- term basis (Table 4.1 of Appendix A, pdf p.32) at cabins/camps locations, which is summarized below:</p> <table border="1" data-bbox="625 1402 1099 1619"> <thead> <tr> <th>Contaminants / Averaging periods</th> <th>Background levels (µg/m³)</th> <th>Maximum predicted concentrations plus background levels (µg/m³)</th> <th>Project contribution to contaminant increases (%)</th> </tr> </thead> <tbody> <tr> <td>PM_{2.5} / 24hr</td> <td>10.3</td> <td>14.0</td> <td>36</td> </tr> <tr> <td>NO₂ / 1hr</td> <td>3.8</td> <td>75.3</td> <td>1,882</td> </tr> <tr> <td>SO₂ / 1hr</td> <td>2.6</td> <td>36.2</td> <td>1,292</td> </tr> </tbody> </table> <p>b. The maximum predicted concentrations at human receptor locations used in the EIS Amendments appear to be different from those used in the original EIS. For example, the maximum predicted concentration for 1-hr NO₂ at camp/cabin locations (Table 5-17 of the 2020 EIS, pdf p.76) during operations is 101 µg/m³, which is substantially higher than the related CAAQS threshold of 79 µg/m³ for year 2025. However, the EIS</p>	Contaminants / Averaging periods	Background levels (µg/m ³)	Maximum predicted concentrations plus background levels (µg/m ³)	Project contribution to contaminant increases (%)	PM _{2.5} / 24hr	10.3	14.0	36	NO ₂ / 1hr	3.8	75.3	1,882	SO ₂ / 1hr	2.6	36.2	1,292
Contaminants / Averaging periods	Background levels (µg/m ³)	Maximum predicted concentrations plus background levels (µg/m ³)	Project contribution to contaminant increases (%)														
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NO ₂ / 1hr	3.8	75.3	1,882														
SO ₂ / 1hr	2.6	36.2	1,292														



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IR 2 Reference #	HC(2)-06
	Amendment (Table 4.1 of Appendix A, pdf p.32) uses an NO ₂ concentration of 75.3 µg/m ³ , which is just below the CAAQS threshold, for the same locations.
Information Request:	<p>Health Canada recommends that the Department request the following comments be addressed in an updated EIS:</p> <ul style="list-style-type: none"> a. Clarify how screening of NO₂, SO₂, and PM_{2.5} levels against the CAAQS or NL-APCR values can adequately protect human health from potential exposures to these contaminants. Additionally, develop and implement additional mitigation measures and ambient air quality monitoring plans for NO₂, SO₂, and PM_{2.5} during all project phases. b. Clarify the discrepancy between the original EIS and EIS Amendment with respect to the maximum predicted concentrations of air contaminants that are used to assess project-related air quality changes and health risks.
Response:	<ul style="list-style-type: none"> a. Health Canada (2016) notes that the Canadian Ambient Air Quality Standards (CAAQS) are health-based guidelines intended to be benchmarks against which the Government of Canada and provincial and territorial governments can inform risk management decisions (e.g., regulation or other actions to reduce air pollution), as well as report on progress on reducing the health and environmental burden of air pollution. The CAAQS represent targets agreed upon by federal and provincial/territorial governments and a multi-stakeholder group. Therefore, although the CAAQS are not threshold health-based limits, they are levels that are intended to protect human health and are appropriate for screening concentrations of nitrogen dioxide (NO₂), sulphur dioxide (SO₂), and fine particulate matter with an aerodynamic diameter less than 2.5 µm (PM_{2.5}) in human health risk assessments. <p>As concentrations of NO₂, SO₂, and PM_{2.5} meet the appropriate CAAQS at the locations where receptors are most likely to be exposed, additional mitigation and air quality monitoring plans are not necessary to protect human health; however, Marathon will be implementing mitigation and monitoring to reduce and manage Project effects on air quality. As these measures to mitigate changes in air quality will also reduce the potential changes in air contaminant exposure to human receptors within the Local Assessment Area, they will also reduce the risk to human health from exposure to these non-threshold contaminants. Please refer to the response to DHCS(2)-03 and Appendix G of this Second Amendment to the EIS for a full listing of these mitigation and monitoring commitments.</p>



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IR 2 Reference #	HC(2)-06
	<p>Reference:</p> <p>Health Canada. 2016. Guidance for Evaluating Human Health Impacts in Environmental Assessment: Air Quality. Available online at: https://www.acee.gc.ca/050/documents/p80054/119376E.pdf</p> <p>b. The maximum predicted concentration for 1-hour NO₂ at camp/cabin locations as presented in the EIS (refer to Table 5.17 of the EIS) during operations of 101 µg/m³ occurs at the cabin location (Receptor Location 33 on Figure HC(2)-11.1) within the mine site. At the time of completion of the HHRA (i.e., post submission of the EIS), it was confirmed that this cabin would be acquired by Marathon prior to construction of the Project and will therefore not constitute the nearest receptor. The maximum predicted 1-hour NO₂ concentration presented in Table 4.1 of Appendix A of the EIS Amendment therefore occurs at a different camp/cabin location (Receptor Location 32 on Figure HC(2)-11.1).</p>
Appendix:	Appendix G: Human Health-related Mitigation Measures and Monitoring Table



January 2022

RESPONSE TO HC(2)-07

IR 2 Reference #	HC(2)-07
IR 1 Reference #	HC-12
EIS Reference:	-
Context and Rationale:	<p>Sufficient rationale is not provided about how the proposed spatial boundaries surrounding the site access road are relevant to the protection of human health.</p> <p>The proponent concludes that air emissions from project- related road traffic are not expected to have adverse effects beyond the 500-m buffer area, or LAA/RAA, surrounding the site access road. The conclusion is based on a modelling result where the maximum predicted 24-hour concentration for PM_{2.5} due to vehicle traffic on the access road (i.e., 13 µg/m³ in the project plus background scenario) is predicted to be below the respective 24-hour CAAQS (i.e., 27 µg/m³) (EIS Amendment Response to IR HC-12 and 15). However, the modelling result does not provide information on an annual average concentration of PM_{2.5} or 1 hr/annual average concentrations of other common contaminants (e.g., NO₂ and SO₂). Information on these contaminant levels can help gauge the project impacts on changes to gaseous compound levels and associated human health risks due to both short- and long-term exposures.</p> <p>Additionally, the proponent precluded further quantitative assessments of health risks associated with Inhalation of air contaminants by Indigenous and non-Indigenous receptors as “(p)redicted Future Case contaminant concentrations in air are below the corresponding human health-based ambient air quality standards and therefore represent a negligible human health risk for Indigenous and non-Indigenous people in the LAA” (Table 4-7 of Appendix A, pdf p.45). However, the CAAQS or NL-APCR for common air contaminants, such as PM_{2.5}, NO₂, and SO₂, do not represent the thresholds for human health protection and therefore the predicted contaminant levels below the criteria values do not necessarily indicate negligible health risks.</p>
Information Request:	<p>Health Canada recommends that the Department request the following comments be addressed in an updated EIS:</p> <p>Provide the maximum predicted annual average concentrations of PM_{2.5} and 1 hr/annual average concentrations of NO₂ and SO₂ due to project-related road traffic on the access. Given that health effects can occur even at concentrations below applicable CAAQS guidelines, develop and implement additional mitigation measures and follow-up monitoring program at human receptor locations, including Millertown and Buchans, if necessary.</p>



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IR 2 Reference #	HC(2)-07
Response:	<p>In support of this response, the hourly nitrogen dioxide (NO₂) and sulfur dioxide (SO₂) concentrations, as well as annual average PM_{2.5} (particulate matter with an aerodynamic diameter less than 2.5 µm) concentrations, due to Project-related road traffic along the access road have been predicted. The hourly emissions were estimated for a 20-tonne truck pass along the access road, assuming a diesel consumption rate of 30 L/hr. The hourly NO₂ emissions were estimated using Tier 4 United States Environmental Protection Agency/ <i>Canadian Environmental Protection Act</i> Emission Factors and the SO₂ emissions were estimated by mass balance using the assumed diesel consumption rate and fuel properties (USLD assumed – 15 ppmw S content). The annual emissions were estimated using the hourly emission rates and total truck trips per year (16 trips per day or 8 round trips). The estimated emission rates are as follows:</p> <ul style="list-style-type: none"> • PM_{2.5}: 1.74E-07 g/s (annual) • NO_x: 0.014 g/s (hourly), 2.64E-06 g/s (annual) • SO₂: 2.13E-04 g/s (hourly), 3.94E-08 g/s (annual) <p>The estimated emissions were modelled along the access road using AERSCREEN, using the same approach presented in the information response to HC-15 (submitted on August 3, 2021 as part of the Amendment to the EIS). The Ozone Limiting Method in AERSCREEN was used to predict conversion of nitrogen oxides (NO_x) to NO₂.</p> <p>The maximum predicted concentrations of PM_{2.5}, NO₂, and SO₂ along the access road are shown in Table HC(2)-07.1.</p> <p>As per the results described in the information response to HC-15 (for daily total suspended particulate matter [TSP] and PM_{2.5} concentrations), the maximum predicted concentrations (hourly and annual) along the access road (due to heavy traffic associated with the Project) are well below the Canadian Ambient Air Quality Standards and the maximum concentrations occur within the immediate vicinity, decreasing rapidly with distance from the access road. The predicted concentrations reach background concentrations well within the 500 m buffer around the access road. Based on the results of the additional modelling, releases of PM_{2.5}, SO₂ and NO₂ from truck traffic along the access road are not likely to result in a substantive change in air quality near the access road.</p> <p>As per the response to HC(2)-06, although the Canadian Ambient Air Quality Standards are not threshold health-based limits, they are levels that are intended to protect human health and are appropriate for screening concentrations of NO₂, SO₂, PM_{2.5}. As maximum predicted concentrations (hourly and annual) are well below the Canadian Ambient Air Quality Standards, additional mitigation, and air quality monitoring plans are not</p>



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IR 2 Reference #	HC(2)-07
	necessary to protect human health. However, Marathon will be implementing mitigation and monitoring to reduce and manage Project effects on air quality, which will also reduce potential changes in air contaminant exposure to human receptors within the Local Assessment Area, thereby also reducing the risk to human health from exposure to these non-threshold contaminants. Please refer to the response to DHCS(2)-03 and Appendix G of this Second Amendment to the EIS for a full listing of these mitigation and monitoring commitments.
Appendix:	Appendix G: Human Health-related Mitigation Measures and Monitoring Table



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Table HC(2)-07.1 Maximum Predicted Concentrations along the Access Road

Air Contaminant	Average Period	Maximum Predicted Concentrations (incl Background) ($\mu\text{g}/\text{m}^3$)	2025 CAAQS ($\mu\text{g}/\text{m}^3$)
PM _{2.5}	Annual	4.2	8.8
NO ₂	1-hour	46.3	79
	Annual	5.7	28.2
SO ₂	1-hour	3.5	170
	Annual	0.1	10.5



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RESPONSE TO HC(2)-08

IR 2 Reference #	HC(2)-08
IR 1 Reference #	HC-13
EIS Reference:	-
Context and Rationale:	<p>The study does not sufficiently characterize the uncertainty associated with the use of NAPS surrogate data as baseline levels of air contaminants</p> <p>The proponent justified the use of NAPS surrogate data as baseline levels based on an observation that the NAPS PM_{2.5} level is roughly comparable to the on-site measured concentrations of other particulate matters (i.e., TSP and PM₁₀) (EIS Amendment Response to IR HC-13 a). However, these 3 parameters refer to different particle size designations of “particulate matter” and their concentrations cannot be directly compared.</p>
Information Request:	<p>Health Canada recommends that the Department request the following comments be addressed in an updated EIS:</p> <p>For clarity, compare the on-site measured concentrations of PM_{2.5}, NO₂, and SO₂ with the NAPS data. Alternatively, discuss uncertainties associated with the proposed use of NAPS surrogate data as baseline levels.</p>
Response:	<p>A comparison of the on-site measured concentrations of fine particulate matter (with an aerodynamic diameter less than 2.5 µm or PM_{2.5}), nitrogen dioxide (NO₂) and sulphur dioxide (SO₂) with the Grand Falls-Windsor National Air Pollution Surveillance (NAPS) station data cannot be made, for the reasons described below. Therefore, uncertainties associated with using NAPS surrogate data as baseline levels are also described, as requested.</p> <p>While PM_{2.5} was not measured at the mine site, total suspended particulate matter (with an aerodynamic diameter less than 30 µm or TSP) and respirable particulate matter (with an aerodynamic diameter less than 10 µm or PM₁₀) were measured. It is understood that PM_{2.5} is a subset of TSP and PM₁₀; however, the measured concentrations of these particulate size fraction ranges (at the mine site) are likely representative of the PM_{2.5} concentrations in the Project Area. As is generally the case in most rural locations where no large sources of particulate matter exist (e.g., in the Project Area and near the NAPS station in Grand Falls-Windsor), the background particulate concentrations at the site are likely to consist primarily of PM_{2.5} (i.e., TSP, PM₁₀ and PM_{2.5} are generally equivalent). Typically, background concentrations in areas where there are few large sources of particulate matter consist primarily of secondary particulate matter (fines formed and transported in the atmosphere from photochemical reactions as a result of releases from large industrial sources concentrated</p>



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IR 2 Reference #	HC(2)-08
	<p>on the United States eastern seaboard and southern Ontario and Quebec). Therefore, it is reasonable to compare TSP/PM₁₀ measured at the site with PM_{2.5} measured at the NAPS station.</p> <p>With respect to NO₂ and SO₂ concentrations, given that the sampling at the mine site was conducted using passive samplers collected over several days, a direct comparison with short-term hourly data is not a relevant exercise. However, the hourly concentrations of NO₂ and SO₂ measured at the NAPS station at Grand Falls-Windsor are low, and therefore likely conservative yet representative of the concentrations at the site. The measured concentrations at the NAPS station are likely conservative since there would be some contributions from small local sources in Grand Falls-Windsor (e.g., vehicle traffic). While there would be some local traffic near the mine site, it would be less than within the town of Grand Falls-Windsor near the NAPS station.</p> <p>In summary, the background concentrations used in the assessment for PM_{2.5}, NO₂ and SO₂ (estimated using the measured concentrations from the NAPS station at Grand Falls Windsor) are considered representative yet conservative. This is because the concentrations measured near the mine site are similar in magnitude to the concentrations measured at the NAPS station, as discussed above. Further, the background concentrations are considered conservative because there are typically more sources of air contaminant emissions in a small urban area, such as local vehicle traffic (e.g., in Grand Falls-Windsor, where the NAPS station is located), meaning ambient concentrations of PM_{2.5}, NO₂ and SO₂ would likely be slightly higher at the NAPS station (which the data are indicating). However, this may be less likely for PM_{2.5} since ambient concentrations are primarily due to long range transport of secondary particulate matter (as discussed above), meaning the concentrations at the site are likely consistent with those measured at the NAPS station most of the time.</p> <p>In consideration of the conservative background concentrations applied in the air quality assessment (combined with the worst case or maximum model predicted concentrations to assess a change in air quality), the predicted change in air quality due to the Project is considered conservative. Therefore, any uncertainties associated with use of the NAPS data would result in an overestimation of Project effects on the atmospheric environment. It is also noted that ambient air quality monitoring will be conducted during construction and operation of the Project to measure air contaminant concentrations around the Project Area.</p>
Appendix:	None



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RESPONSE TO HC(2)-09

IR 2 Reference #	HC(2)-09
IR 1 Reference #	HC-14
EIS Reference:	-
Context and Rationale:	<p>The contour maps do not provide predicted levels of certain air contaminants.</p> <p>The contour maps in Figures HC 14.10 to 14 (EIS Amendment Response to IR HC-14, pdf p.264 to 268) do not provide annual average concentrations of NO₂ and SO₂.</p>
Information Request:	<p>Health Canada recommends that the Department request the following comments be addressed in an updated EIS:</p> <p>Provide annual average concentrations of NO₂ and SO₂ in relation to the sensitive receptor locations.</p>
Response:	<p>Contour plots (or isopleths) for annual nitrogen dioxide (NO₂) and sulphur dioxide (SO₂) were not prepared because the maximum annual concentrations are less than 10% of the Newfoundland and Labrador annual air quality standards for both NO₂ and SO₂ (and less than 30% of the 2025 annual Canadian Ambient Air Quality Standards). Given the annual concentrations are low, it was originally determined that contour plots are not necessary. However, contour plots of annual NO₂ and SO₂ predicted concentrations were prepared for this response and are provided below (Figures HC(2)-09.1 and HC(2)-09.2). Additionally, the overall highest maximum annual concentrations at the sensitive receptor locations are provided below (Table HC(2)-09.1). Note that the sensitive receptor locations in this table includes receptor location 33 (the cabin that will be acquired by Marathon prior to construction of the Project) and therefore is considered conservative with respect to the highest maximum annual concentrations at sensitive receptor locations.</p>
Appendix:	None



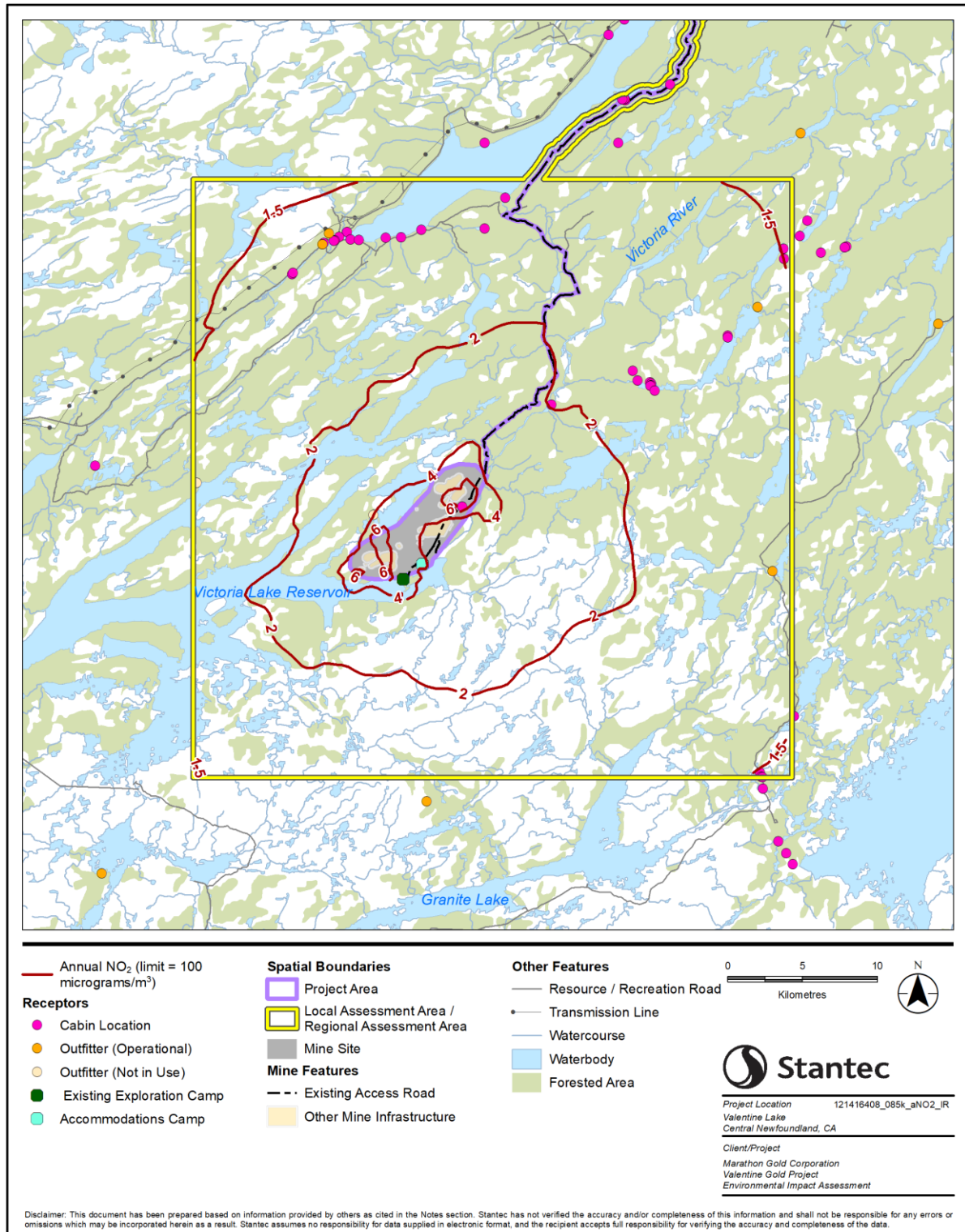


Figure HC(2)-09.1 NO₂ Maximum Predicted Annual Concentration including Background (Regulatory Limit 100 µg/m³)



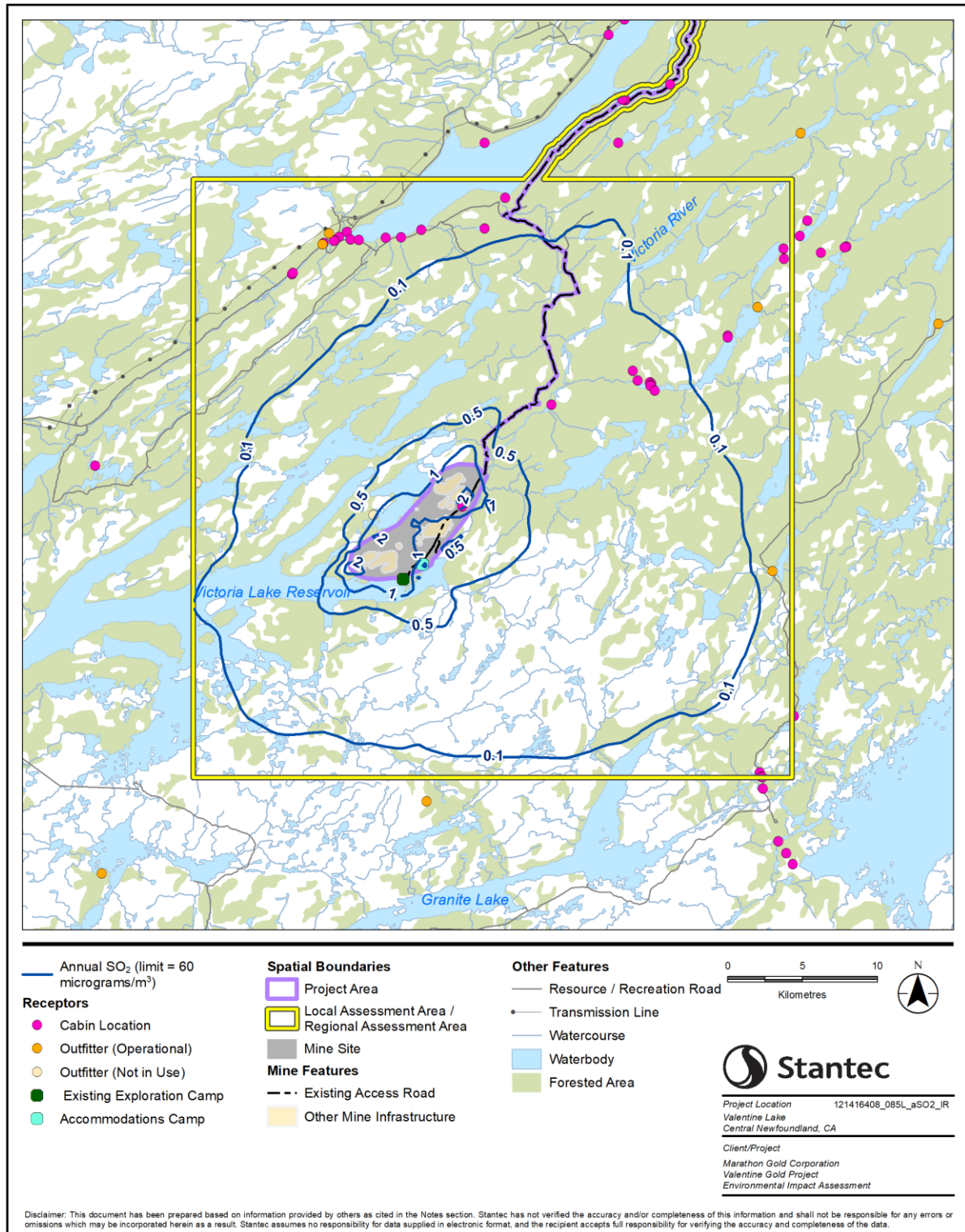


Figure HC(2)-09.2 SO₂ Maximum Predicted Annual Concentration including Background (Regulatory Limit 60 µg/m³)



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Table HC(2)-09.1 Maximum Predicted Concentrations at Cabin Locations – Model Updates

Contaminant	CAS#	Average Period	Background Concentrations (µg/m³)	Predicted Concentrations Incl. Background (µg/m³)		NL AAQS (µg/m³)	2020 CAAQS (µg/m³)	2025 CAAQS (µg/m³)	Ontario ACB (µg/m³)	Percent of NL/Adopted Standard	
				Prediction from EIS	Revised Prediction					Prediction from EIS	Revised Prediction
TSP	N/A-1	24-hour	13.8	70.7	61.9	120	-	-	-	59%	52%
	N/A-1	Annual	2.6	4.58	4.57	60	-	-	-	8%	8%
PM ₁₀	N/A-2	24-hour	13.0	34.2	31.6	50	-	-	-	68%	63%
PM _{2.5}	N/A-3	24-hour	10.3	19.3	21.3	25	27.0	NA	-	77%	85%
	N/A-3	Annual	3.8	4.48	4.67	8.8	8.8	NA	-	51%	53%
DPM	N/A-4	2-hour	-	6.93	6.23	-	-	-	-	-	-
	N/A-4	Annual	-	0.0937	0.0827	-	-	-	-	-	-
NO ₂	10102-44-0	1-hour	3.8	101	97.5	400	112.9	79	-	25%	24%
	10102-44-0	24-hour	1.9	45.7	42.9	200	-	-	-	23%	21%
	10102-44-0	Annual	1.4	8.53	7.93	100	32.0	28.2	-	9%	8%
SO ₂	7446-09-5	1-hour	2.6	125	125	900	183.4	170	-	14%	14%
	7446-09-5	3-hour	2.6	62.9	61.5	600	-	-	-	10%	10%
	7446-09-5	24-hour	neg.	26.8	25.5	300	-	-	-	9%	8%
	7446-09-5	Annual	neg.	2.55	2.41	60	13.1	10.5	-	4%	4%
CO	630-08-0	1-hour	206	935	934	35,000	-	-	-	3%	3%
	630-08-0	8-hour	200	480	474	15,000	-	-	-	3%	3%
NH ₃	7664-41-7	24-hour	neg.	2.65	3.42	100	-	-	-	3%	3%
HCN	74-90-8	24-hour	neg.	2.65	3.99	-	-	-	8	33%	50%
As	7440-38-2	24-hour	2.1E-03	3.68E-03	3.68E-03	0.3	-	-	-	1%	1%
Cd	7440-43-9	24-hour	4.2E-04	5.39E-04	5.38E-04	2	-	-	-	<1%	<1%
Cu	7440-50-8	24-hour	1.3E-03	0.0108	0.0124	50	-	-	-	<1%	<1%
Pb	7439-92-1	24-hour	1.3E-03	3.91E-03	3.96E-03	2	-	-	-	<1%	<1%
	7439-92-1	30-day	5.0E-04	1.51E-03	1.53E-03	0.7	-	-	-	<1%	<1%
Hg	7439-97-6	24-hour	neg.	2.17E-04	3.26E-04	2	-	-	-	<1%	<1%
Ni	7440-02-0	24-hour	2.1E-03	2.80E-03	2.94E-03	2	-	-	-	<1%	<1%
Zn	7440-66-6	24-hour	2.1E-02	2.61E-02	2.61E-02	120	-	-	-	<1%	<1%
Ba	7440-39-3	24-hour	2.1E-03	7.55E-03	7.55E-03	-	-	-	10	<1%	<1%
Sr	7440-24-6	24-hour	2.1E-03	6.18E-03	6.18E-03	-	-	-	120	<1%	<1%
Be	7440-41-7	24-hour	1.3E-03	1.31E-03	1.31E-03	-	-	-	0.01	13%	13%
Cobalt	7440-48-4	24-hour	1.3E-03	1.83E-03	1.96E-03	-	-	-	0.1	2%	2%
Li	7439-93-2	24-hour	neg.	1.91E-03	2.22E-03	-	-	-	20	<1%	<1%
Sb	7440-36-0	24-hour	2.1E-03	4.44E-03	5.04E-03	-	-	-	25	<1%	<1%
Sn	7440-31-5	24-hour	1.3E-03	4.70E-03	5.54E-03	-	-	-	10	<1%	<1%
Se	7782-49-2	24-hour	4.2E-03	8.30E-03	8.30E-03	-	-	-	10	<1%	<1%
Cr	7440-47-3	24-hour	2.1E-03	7.52E-03	8.35E-03	-	-	-	0.5	2%	2%
Bi	7440-69-9	24-hour	2.1E-03	3.36E-03	3.36E-03	-	-	-	2.5	<1%	<1%



RESPONSE TO HC(2)-10

IR 2 Reference #	HC(2)-10
IR 1 Reference #	HC-17
EIS Reference:	-
Context and Rationale:	<p>The study does not provide communication and resolution protocols for potential noise complaints</p> <p>In the context of noise exposure, two of the most common community reactions indicative of potential adverse health are complaints and annoyance. Health Canada recommends developing a complaint resolution protocol as part of the Environmental Management Plan (Health Canada, 2017).</p> <p>Reference:</p> <p>Health Canada. 2017. Guidance for Evaluating Human Health Impacts in Environmental Assessment: NOISE. Available at: https://publications.gc.ca/site/eng/9.832514/publication.html</p>
Information Request:	<p>Health Canada recommends that the Department request the following comments be addressed in an updated EIS:</p> <p>Provide detailed information on how the noise- related complaints from Indigenous groups and communities, including Millertown and Buchans, will be addressed.</p>
Response:	<p>The mine site is in a remote area with limited human activity, and no substantive anthropogenic noise sources within 50 km. The mine site is located approximately 49 km southwest of the Town of Buchans and 60 km southwest of the Town of Millertown. Within the Local Assessment Area/Regional Assessment Area for the Atmospheric Environment Valued Component, there are approximately 35 seasonal dwellings (3 active outfitters, 2 inactive outfitters, and 30 cabins), which represent the nearest sensitive receptors to the Project. The assessment of noise emissions contained in the EIS concluded that the predicted sound pressure levels (existing sound levels plus Project sound levels) at the nearby receptors are expected to be well below Health Canada targets for annoyance (change in %HA < 6.5) and sleep disturbance (45 dBA partially open windows and 57 dBA for fully closed windows) during both construction and operation. The mitigation and management measures that will be employed to reduce adverse effects of noise are outlined in EIS Chapter 5 and in the response to DHCS(2)-03 and Appendix G of this Second Amendment to the EIS.</p> <p>Although the EIS has predicted that Project related noise will not exceed applicable regulatory guidelines, Marathon will continue to engage with</p>



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IR 2 Reference #	HC(2)-10
	<p>stakeholders to address issues and concerns, including those associated with Project-related noise. If stakeholder issues and concerns related to noise are identified and cannot be resolved informally through the engagement process, these can be referred to the formal Grievance Process. The Grievance Process has been designed to enable Indigenous groups or any stakeholder or stakeholder group, including communities, cabin owners, outfitters, and recreational land users, to bring concerns and complaints to the attention of Marathon and forward 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 <i>Operational Level Grievance Mechanisms</i> (IPIECA 2012), <i>Addressing Grievances from Project-Affected Communities</i> (IFC Practice Note 2009), <i>Handling and Resolving Local Grievances</i> (ICMM 2019), and the <i>IRMA Standard for Responsible Mining IRMA-STD-001</i> (2018). It has been designed to comply with the six overarching principles for non-judicial processes recommended by the United Nations:</p> <ul style="list-style-type: none"> • Legitimate • Accessible • Predictable • Equitable • Rights compatible • Transparent <p>The Grievance Process will provide an accessible, timely, efficient and transparent procedure to communicate, document and 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 communities, Indigenous groups, fish and wildlife organizations (e.g., Newfoundland and Labrador Outfitters Association) and, on request, to any other stakeholder or stakeholder group. In addition, Marathon will meet with communities, Indigenous groups, stakeholder organizations, and with individually affected 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.</p> <p>The Grievance Process is intended to address stakeholder or Indigenous concerns or complaints which have been raised and have failed to be</p>



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	<p>resolved through other means. It is Marathon’s intention to act proactively to avoid the occurrence of grievances through a robust approach to engagement.</p> <p>References:</p> <p>ICMM (International Council on Mining and Metals). 2019. Handling and Resolving Local-Level Concerns and Grievances. Available at: https://www.icmm.com/website/publications/pdfs/social-performance/2019/guidance_grievance-mechanism.pdf</p> <p>IPIECA. 2012. Operational Level Grievance Mechanisms. IPIECA Good Practice Survey. Available at: https://www.securityhumanrightshub.org/sites/default/files/2020-04/grievance_mechanisms.pdf</p> <p>IFC (International Finance Corporation). 2009. Addressing Grievances from Project-Affected Communities. Available at: https://www.ifc.org/wps/wcm/connect/f9019c05-0651-4ff5-9496-c46b66dbee4b/IFC%2BGrievance%2BMechanisms.pdf?MOD=AJPERES&CACHEID=ROOTWORKSPACE-f9019c05-0651-4ff5-9496-c46b66dbee4b-jkD0-.g</p> <p>IRMA (Initiative for Responsible Mining Assurance). 2018. IRMA Standard for Responsible Mining IRMA-STD-001. Available at: https://responsiblemining.net/wp-content/uploads/2018/07/IRMA_STANDARD_v.1.0_FINAL_2018-1.pdf</p>
Appendix:	Appendix G: Human Health-related Mitigation Measures and Monitoring Table



RESPONSE TO HC(2)-11

IR 2 Reference #	HC(2)-11
IR 1 Reference #	HC-20
EIS Reference:	-
Context and Rationale:	<p>The study does not use appropriate assessment criteria for sleep disturbance or consider all applicable adjustments/assessments for project-associated sound sources and characteristics</p> <p>The study appears to use a continuous outdoor sound level target of 45 dBA, or 30 dBA indoors, as the sole assessment criteria for sleep disturbance caused by project-related noise. In addition to the criteria, noise events that exceed 60 dBA Lmax outdoors (or 45 dBA indoor) during the nighttime should be limited to no more than 15 per night (WHO, 1999) to avoid sleep disturbance (Health Canada, 2017).</p> <p>Health Canada also recommends the study consider all applicable adjustments/assessments for sound sources and characteristics that may be associated with project noise as per Health Canada’s noise guidance document (Health Canada, 2017) and ISO 1996-1:2016, which includes:</p> <ul style="list-style-type: none"> • High-energy impulsive sounds (e.g., blasting) require an adjustment where C-weighting be applied to assess the %HA from exposure to frequent blasting that lasts more than one year or US EPA (1974)’s sonic boom criterion (i.e., 125-10 log N dBZ, or Z-weighted decibels) be used as a mitigation noise level for blasting that lasts less than one year. • Low-frequency sounds (e.g., diesel powered transport trucks and heavy equipment) require a separate assessment to prevent rattles from low-frequency noise and the associated annoyance from this effect. American National Standards Institute (ANSI, 2005) indicates that the energy sum of the sound levels in the 16-, 31.5- and 63-hertz (Hz) octave bands be less than 70 dBZ (Z-weighted decibels). If the predicted levels are greater than this 70-dBZ “rattle criterion”, Health Canada recommends implementation of feasible mitigation measures (Health Canada, 2017). <p>References:</p> <p>World Health Organization (WHO). 1999. Guidelines for Community Noise. Berglund, B., Lindvall, T. and Schwela, D.H (Eds.). Available online at: www.who.int/docstore/peh/noise/guidelines2.html</p> <p>World Health Organization (WHO). 2009. Night Noise Guidelines for Europe. Hurtley, C. (Ed).</p>



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IR 2 Reference #	HC(2)-11
	<p>Available online at: www.euro.who.int/en/health-topics/environmentandhealth/noise/publications/2009/night-noise-guidelines-for-europe</p> <p>International Organization for Standardization (ISO). 2016. ISO 1996-1:2016 Acoustics – Description, measurement and assessment of environmental noise – Part 1: Basic quantities and assessment procedures.</p> <p>US Environmental Protection Agency (USEPA).1974. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.</p> <p>American National Standards Institute (ANSI). 2005. Quantities and Procedures for Description and Measurement of Environmental Sound Part 4: Noise Assessment and Prediction of Long-Term Community Response (ANSI S12.9- 2005/Part 4). Standards Secretariat Acoustical Society of America.</p>
Information Request:	<p>Health Canada recommends that the Department request the following comments be addressed in an updated EIS:</p> <ol style="list-style-type: none"> a. Provide the distribution of baseline noise events at night with a comparison to predicted individual noise events at night at each receptor location, including resident receptors for Millertown and Buchans. Noise mitigation measures should be considered where noise events at night are predicted to exceed 60 dBA Lmax outdoors 15 times per night at any noise receptor location. b. Consider all applicable adjustments/assessments for sound sources and characteristics as per Health Canada’s noise guidance document (2017) and ISO 1996-1:2016.
Response:	<ol style="list-style-type: none"> a. Baseline sound pressure levels were measured at one location within the Project Area representing the nearest receptor location. The results (daytime sound level (L_d), nighttime sound level (L_n), day night average sound level (L_{dn}) and % highly annoyed (%HA)) of the baseline monitoring event are presented in Table 5.7 in Section 5.2.2.4 of the EIS. <p>The noise assessment considered the potential impact from Project construction and operation on the nearest receptor locations during both the daytime and nighttime, as well as the change from the existing environment. The assessment relied upon metrics including L_d, L_n, L_{dn} and %HA. The results of the noise assessment are presented in Tables 5.26, 5.27, 5.28 and 5.29, and Figures 5-9 and 5-11 in Section 5.5.3.2 of the EIS, and in responses provided to information requests HC-17,</p>



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IR 2 Reference #	HC(2)-11
	<p>HC-18 and HC-20 (submitted on August 3, 2021, as part of the Amendment to the EIS).</p> <p>As construction activities are not anticipated to occur during the nighttime period (i.e., not to occur from 10 pm to 7 am), no noise events related to Project construction are expected to occur at night, and therefore a comparison of the baseline monitoring event to the maximum predicted sound levels (L_{Amax}) from individual noise events at night was not conducted.</p> <p>During construction and operation, routine Project-related vehicle traffic is not expected at night along the access road since the shift changes and scheduled deliveries of supplies and materials to site will occur during daytime hours to protect wildlife (e.g., avoid collisions) and for safety reasons (i.e., vehicle pass-by events will not occur during the nighttime). No blasting will occur at night (i.e., impulsive noise events will not occur at night). During operation, the other noise generating activities located at the mine site were assumed to occur continuously and simultaneously 24 hours a day.</p> <p>Receptors located within 10 km of the mine site and 5 km of the access road (including active and inactive outfitter locations) were included in the noise assessment and illustrated on Figure 5-2 in Chapter 5 of the EIS (included below as Figure HC(2)-11.1). The nearest receptor to the mine site is receptor 32. Note that receptor 34 represents an inactive outfitter, there is no longer a season cabin at the location of receptor 33, and receptors 35 and 36 represent Project infrastructure (i.e., accommodations camps within the mine site).</p> <p>The predicted L_d and L_n, based on the steady state operation of the Project, at receptor 32 were 27 dBA and 25 dBA, respectively. As no noise events (e.g., blasting or vehicle passby) are expected to occur during the nighttime, an L_{Amax} at this location was not predicted. Similarly, the L_{Amax} was also not predicted at receptors 1 through 31, as these receptors are all located along the access road and no Project-related traffic (i.e., no noise event) is expected to occur during the night. Given the following factors, there is no potential for the Project to affect residential receptors in Millertown and Buchans at night: there is no routine Project-related traffic along the access road at night during construction and operation; Buchans and Millertown are 49 km and 60 km from the mine site, respectively; and the results of the noise assessment for the closest receptor to the mine site predicted L_d and L_n of 27 dBA and 25 dBA, respectively, at the nearest receptor.</p>



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	<p>As the construction and operation of the Project is not expected to exceed the $L_{A_{Max}}$ criteria of 60 dBA during the nighttime, additional mitigation has not been proposed.</p> <p>b. The following information supplements the responses to IRs HC-17 and HC-18, submitted on August 3, 2021, as part of the Amendment to the EIS.</p> <p>The Project activities, including material handling, hauling, vehicle activities, and ore processing, are not considered impulsive noise (i.e., sounds characterized by brief bursts of sound pressure (ISO1996:1)). Therefore, impulsive noise adjustments were not applied to these sources.</p> <p>Blasting, which is considered impulsive noise, will occur during Project construction and operation. Blasting provides a low frequency air blast and ground vibration. Air blast is low frequency sound generated by energy waves transferred through the air and is measured in decibels or dB(lin). Vibration is energy waves transferred through the ground and measured by particle velocity. Blasting-related noise was assessed qualitatively considering blasting industry standards and separately from the steady state activities and traffic noise, as the potential effects from blasting on the acoustic environment are measured differently (i.e., dB(lin)) than those from steady state and traffic-related activity (i.e., A-weighted Decibels [dBA] or dBC).</p> <p>Therefore, noise adjustments were not applicable. During Project operation, blasting will alternate pits (Marathon and Leprechaun) such that a blast is expected to occur at a given pit every second day, overall averaging one blast per day (for both pits combined) or approximately 350 total blasts per year. As mentioned above, no blasting will occur at night.</p> <p>Blasting will be conducted in accordance with best management practices, namely the Blasters Handbook (ISEE 2011) and the Environmental Code of Practice for Metal Mines (ECCC 2009). These include recommended threshold values for blasting, and mitigation options to reduce air blast related noise and vibration during blasting events. Relative to blasting for other types of mining (e.g., iron ore), blasting during gold mining requires substantively fewer explosives and is much more localized, thereby resulting in less air blast -related noise and vibration. Therefore, it is expected that noise and vibration emissions from blasting during Project construction and operation will conform to the recommended thresholds outlined in these best-practice guides.</p>



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	<p>The nighttime adjustment of 10 dBA was included in the EIS for all noise sources operating at night, as per Health Canada’s noise guidance document (referenced in the IR). The baseline day night average sound level (L_{dn}) (i.e., range of 46.9 to 47.4 dBA) (refer to Table 5-7 of the EIS) indicated that the region was above the threshold definition for a quiet rural area (of 45 dBA); therefore, the adjustment for a quiet rural area was not applied in the EIS. However, given the remoteness of the Project location from major urban centres or major roadways, it is reasonable to consider the receptors near the Project location as quiet rural areas that should be subject to the 10-dBA quiet rural area adjustment. This adjustment was therefore applied, and the assessment results were updated and presented in the response to information request HC-18. As noted in HC-18, the updated assessment results were still predicted to be below Health Canada’s guideline level of 6.5%.</p> <p>As previously noted in the response to HC-18, Low Frequency Noise (LFN) is generally assessed from measurements rather than from model output. LFN assessments should be based on cumulative noise levels (the summation of background noise and project noise) since LFN can be present in background noise and the Project LFN may not therefore be audible. An LFN assessment also requires noise information in octave bands as low as 16 hertz (Hz). However, octave band data below 63 Hz are generally not readily available from equipment vendors. Only some specific equipment, such as the main crusher, have data available at 31 Hz. The LFN from crusher operations is predicted to be less than 55 dBA at the nearest receptors. The crusher is expected to be the dominant sound level for LFN, and so it is expected that the LFN will be less than the 70 dB American National Standards Institute threshold at the receptor locations.</p> <p>The potential for LFN from sources such as diesel powered transport trucks and heavy equipment was further evaluated to support this information request response. The closest receptor to the mine site (noise from heavy equipment) is receptor 32 and the closest receptor to the access road (noise from diesel powered trucks) is receptor 3 (Figure HC(2)-11.1). The energy sum of the predicted sound levels in the 16-, 31.5- and 63-hertz (Hz) octave bands at both of these receptor locations during Project operations are below the 70 decibel z-weighting (dBZ) threshold (43.8 dBZ at receptor 32 and 52.5 dBZ at receptor 3). As these receptors are located the closest to the Project activities, the 70 dBZ threshold (in consideration of Project related-</p>



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	noise) is also expected to be met at locations further from Project activities, including those in Buchans and Millertown.
Appendix:	None



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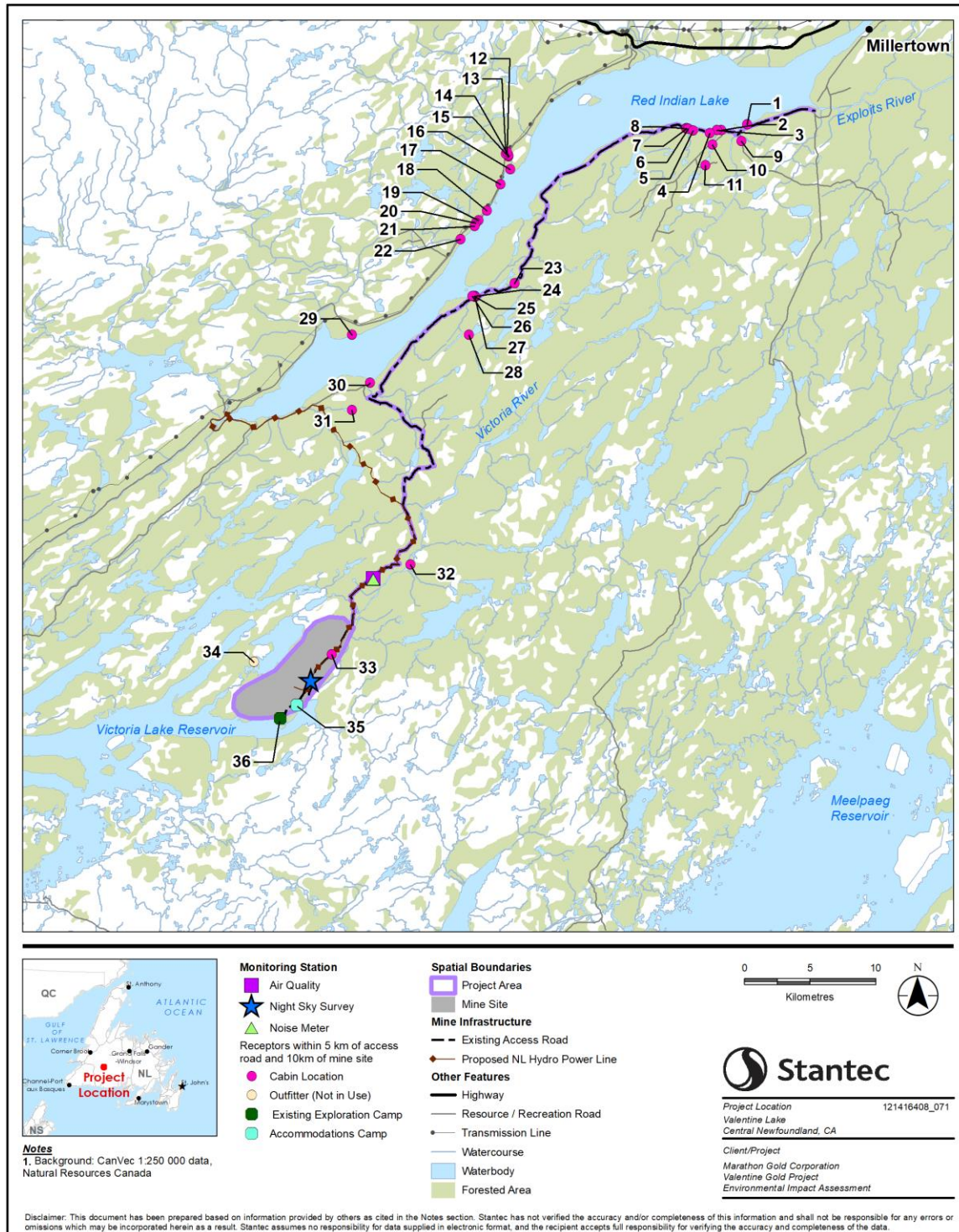


Figure HC(2)-11.1 Locations of Seasonal Dwellings within 10 km of the Mine Site and 5 km of the Access Road



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RESPONSE TO TC(2)-01

IR 2 Reference #	TC(2)-01
IR 1 Reference #	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	The Proponent should confirm their approach going forward as it relates to any future applications for CNWA approval and clarify if they have made any self-determinations with respect to navigation / navigable waters
Response:	Marathon has self-determined that the Project will not result in alteration of a non-scheduled or scheduled navigable water, as there is no reasonable likelihood of navigation on any body of water to be altered by the Project, and repairs and upgrades to existing bridges will not interfere with navigation.
Appendix:	None



APPENDIX A

Caribou Protection and Environmental Effects Monitoring Plan (Preliminary)

Supplied as a Separate Document

APPENDIX B

**Updated Assessment Results and Accompanying Dam
Breach Inundation Maps Technical Memo**

Supplied as a Separate Document

APPENDIX C

Dam Breach Final Assessment

Supplied as a Separate Document

APPENDIX D

Acid Rock Drainage / Metal Leaching Management Plan (Preliminary)

Supplied as a Separate Document

APPENDIX E

Project Refinements Related to the Feasibility Study

**Valentine Gold Project:
Project Refinements,
Supplemental Information**



Marathon Gold Corporation
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Toronto, ON M5C 2X3

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1.0 PROJECT REFINEMENTS AND RATIONALE

Project refinements are a necessary and expected aspect in the evolution of a mining project throughout the progression of the Environment Assessment (EA), planning and permitting stages of a project. Key factors influencing refinements to the Valentine Gold Project since submission of the Environmental Impact Statement (EIS) (as described in Table 1.1) include:

- Ongoing feedback from regulators and other information received from the EA process, public consultation and engagement with Indigenous groups – where possible, the Project layout and design, and specific activities have been refined to reduce potential environmental effects.
- Engineering optimization –incorporating new and updated environmental and engineering data into the engineering design of the Project components and activities (e.g., further environmental baseline information, geotechnical data).
- Fluctuating market conditions – engineering studies are completed under Canadian Securities Regulatory Standards for Mineral Projects (National Instrument 43-101) requirements and must be updated based on changes in the market conditions (positive or negative). Further, the Newfoundland and Labrador (NL) *Mines Act* requires that all economically feasible minerals must be mined (and not sterilized or made uneconomical). As a result of positive changes in the gold market since the Pre-Feasibility Study (PFS) was completed, the Feasibility Study (FS) includes an extension of the Project operating period of approximately 1 year, or 8% of the original operating mine life (i.e., extension from 12 years to 13 years). Note that market conditions will continue to fluctuate (up and down) prior to and over the life of mine and may continue to affect the operating period, increasing or decreasing based on gold prices.

Due to the above-noted factors, refinements to the Project description have been made since it was presented in Chapter 2 of the EIS. These refinements are described below in Table 1.1, which is referenced to Figure 1.1. Note that all of the proposed Project refinements occur within the Project Area assessed in the EIS and combined will result in a slight decrease (0.8 ha) in the overall Project footprint (decrease of 0.1% of the total Project footprint).

The proposed Project refinements do not constitute a substantive change to the scope of the Project, either individually or in combination. Given the conservative approach to the effects assessment employed in the EIS, the information presented in Section 2 of this document demonstrates that no further environmental assessment is required related to these proposed Project refinements. Note that Marathon Gold Corporation (Marathon) does not anticipate further Project refinements during the EA process.



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Table 1.1 Refinements to the Project Description

Corresponding # on Figure 1.1	Project Refinement	Rationale for Refinement
Tailings Management Facility (TMF)		
1	The tailings impoundment dam alignment has been altered and the footprint of the tailings impoundment has been reduced by approximately 5 hectares (ha) (approximately 3%).	The dam alignment has been shifted slightly, primarily along the south and east dam areas, in order to optimize the design (improve tailings storage efficiency without changing the dam height), improve dam safety, and entirely avoid the small stream running along the southern end of the impoundment. The footprint of the TMF has been reduced slightly, and the overall dam safety has been improved due to the new dam alignment following flatter topography.
2	The polishing pond has been relocated closer to the process plant area.	Relocation of the polishing pond results in several improvements: <ul style="list-style-type: none"> • Reduces the potential effects of a tailings impoundment dam breach in the former pond location (toe of dam to the east of the TMF) • Reduces piping lengths between the process plant and polishing pond, and eliminates pipelines along the crest and downstream slope of the tailings impoundment dam • Proximity to process plant improves accessibility for monitoring and surveillance
Mine Infrastructure		
3	Low-grade ore stockpile footprints have increased (by approximately 1 ha or 10% for Leprechaun and approximately 3 ha or 21% for Marathon).	Increase in footprint of 10 to 20% due to an increase in overall ore extraction and life of mine based on the increased gold price. Stockpile remains in same location with a perimeter expansion to account for additional ore rock and to provide stream/waterbody buffers/setbacks. Water Management through perimeter drains to collection ponds remains the same.
4	Minor changes to the waste rock pile footprints (Marathon has increased by approximately 2 ha or 2% and Leprechaun has decreased by approximately 8 ha or 5%).	Minor changes have been made to the Marathon waste rock pile footprint to provide additional distance (buffer) between the toe of the pile and fish habitat along the southeast side of the pile, and to address topography and geotechnical data collected in 2020. There is an overall increase in footprint of approximately 2 ha. The Leprechaun waste rock pile footprint (perimeter) has been modified slightly to provide consistent buffers to fish habitat. Overall, the footprint has been reduced by approximately 8 ha.



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Table 1.1 Refinements to the Project Description

Corresponding # on Figure 1.1	Project Refinement	Rationale for Refinement
5	Minor relocation of topsoil stockpiles (approximately 440 m northeast for Leprechaun and 315 m north for Marathon) and footprints increased (approximately by 0.06 ha for Leprechaun and approximately 0.55 ha for Marathon).	The Leprechaun topsoil stockpile has been relocated a short distance east due to a change in the ramp/access for Leprechaun pit and to improve water/seepage management for this pile. The increased footprints are related to increased volume of topsoil based on improved delineation from advanced geotechnical studies. The Marathon topsoil stockpile has been relocated a short distance north to provide more buffer between the pond and the adjacent stream, and to improve ditching and water management in this area.
6	The Leprechaun overburden stockpiles were combined and the overall footprint decreased (approximately 3 ha or 19%). No changes to the Marathon overburden stockpile.	The Leprechaun overburden stockpiles (originally two stockpiles) have been combined into one and the overall footprint has been reduced by nearly 20%. This change was made due to the discovery (through ground-truthing) that the stream located between the piles was further west than presented on provincial mapping. As a result, a single stockpile design was possible to the east of the stream, which also reduces the overall footprint of the pile and reduces water management infrastructure.
7	The Leprechaun pit slope and perimeter has been adjusted slightly along the southwest and northeast crests, resulting in an increased footprint (approximately 6 ha or 11%). No changes to the Marathon open pit.	Further pit slope assessments have determined that a minor flattening of the pit slope is required along the southwest portion of the pit, and the pit ramp has been adjusted to exit in the northeast/east portion of the pit.
Water Management Infrastructure		
8 (not numbered on Figure 1.1)	Change to the shape and a reduction in the size of the water management pond adjacent to the Marathon topsoil stockpile, and two ponds northwest of the overburden stockpile combined into one.	The number of water management ponds at the Marathon and Leprechaun complexes has been reduced from 16 to 12 ponds. The FS design allowed for the low head pond embankments to be combined, with relatively minor increases in height and volume, thereby reducing the combined pond footprints. In addition, some ponds were relocated to low lying areas, following confirmation that the ponds / watercourse in these areas are not fish habitat.
9 (not numbered on Figure 1.1)	Given the changes to the overburden stockpile and engineering optimization, the Leprechaun water management infrastructure has been refined to consolidate several ponds and reduce overall footprint.	
Other Refinements		
10	The accommodations camp (pad) has been relocated approximately 245 m northeast.	The accommodations camp has been rotated and shifted approximately 245 m northeast to reduce earthworks requirements and potential effects to an adjacent, small wetland. There is no change in the size of the camp.



VALENTINE GOLD PROJECT: PROJECT REFINEMENTS SUPPLEMENTAL INFORMATION

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Table 1.1 Refinements to the Project Description

Corresponding # on Figure 1.1	Project Refinement	Rationale for Refinement
11	The process plant / mine services layout has been changed.	The layout / arrangement of the process plant and mine services area has been altered to address water management and health and safety related issues, as well as engineering optimization. The overall footprints are approximately the same as presented in the EIS. The design of selected point sources (dimensions and orientations of release stacks / vents) at the processing plant was updated to reduce effects to the atmospheric environment.
12 (not shown on Figure 1.1)	Transporting a pre-mixed ammonium nitrate emulsion product to site is being considered rather than shipping of the individual components to the mine site and manufacturing the emulsion on site.	Use of the pre-mixed product eliminates the need for onsite explosives manufacturing and the requisite mixing plant (including the associated operational challenges and risks) and decreases the estimated overall power consumption at site by approximately 5%. The supplier of the pre-mixed product is a locally based (Corner Brook, NL) company, which employs local personnel.
13 (not shown on Figure 1.1)	Changes to the number and types of haul trucks and heavy equipment to be used.	Continued assessment of rock quality, mine design, and equipment options and matching have resulted in the identification of efficiencies in equipment size and numbers. These efficiencies ultimately reduce fuel usage and associated greenhouse gas (GHG) emissions, as the proper equipment selection includes the optimization of fuel usage relative to tonnes moved (as an operating cost).



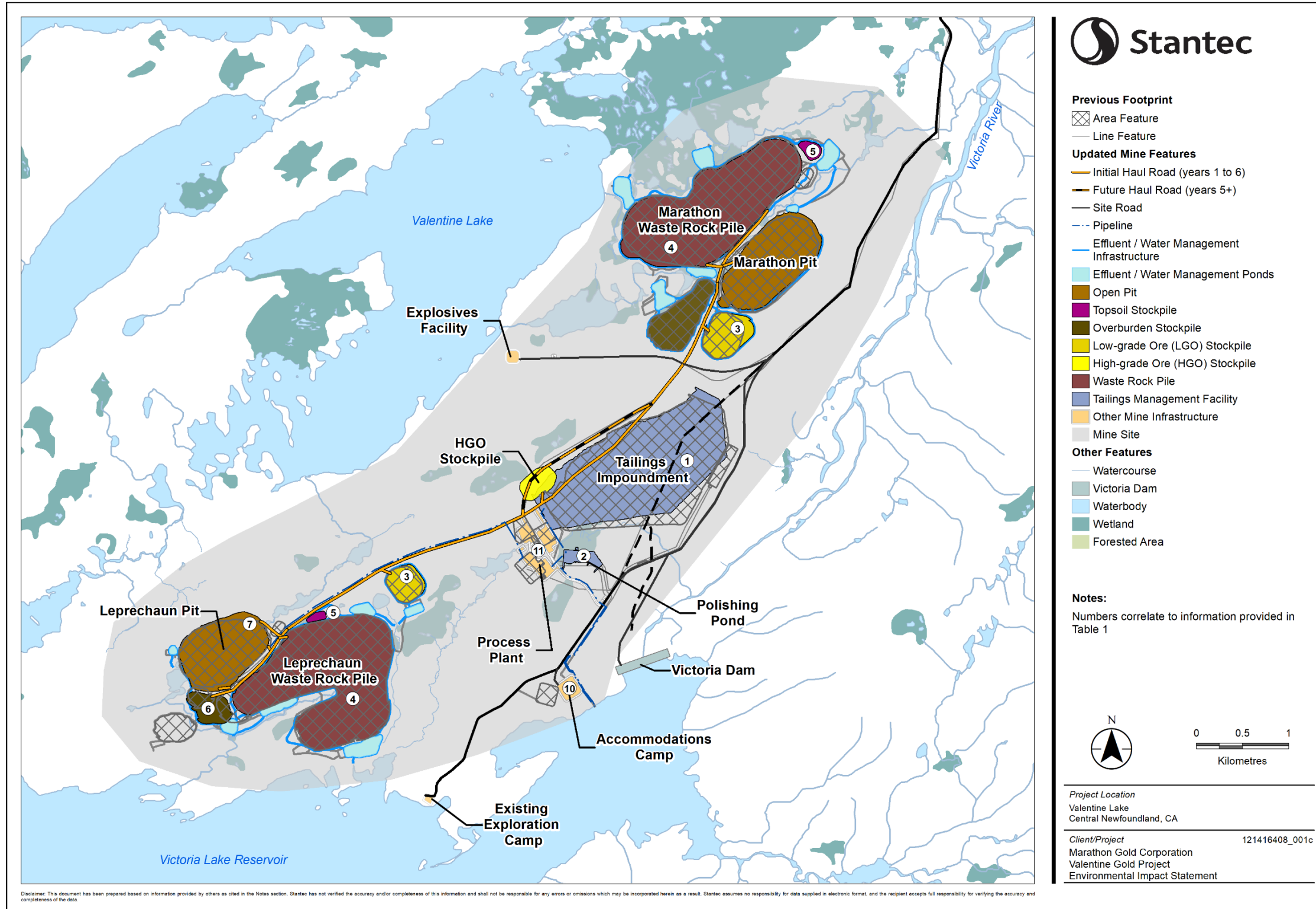


Figure 1.1 Updated Project Layout and Comparison to EIS Site Layout



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2.0 IMPLICATIONS FOR THE ENVIRONMENTAL ASSESSMENT

In consideration of the Project refinements described above, a review of the potential impacts to the assessment of valued components (VCs) described in the EIS has been conducted and is provided below.

Note that the geographic boundaries (i.e., Project Area, Local Assessment Areas (LAA) and Regional Assessment Areas (RAA)) described in the EIS for each VC have not changed as a result of the Project refinements. Based on the extension of the mine life by one year, the temporal EA boundary for the operation phase of the Project would extend by one year, therefore the duration of effects associated with Project operation would also extend by one year. The mitigation and monitoring proposed in the EIS to reduce residual effects associated with operation would continue to be effective and applicable throughout the mine life extension.

2.1 ATMOSPHERIC ENVIRONMENT

An assessment for Atmospheric Environment (Chapter 5) was provided in the EIS. The following effects were assessed for this VC:

- Changes in air quality
- Change in greenhouse gas (GHG) emissions
- Change in sound quality
- Change in light levels

The refinements to the design of the TMF and the topsoil, overburden, low and high-grade ore stockpiles and waste rock piles do not alter the findings of the EIS with respect to a change in air quality, GHG emissions, sound quality, or light levels within the LAA. With respect to air quality, the change in location/elevation of the TMF may result in some minor changes related to fugitive dust generated from wind erosion of the tailing beaches; however, these changes are not expected to substantively influence the resulting ambient concentrations of dust or trace metals within the LAA. Minor changes to the releases of fugitive dust from the storage piles are also not likely to result in a substantive change in the resulting downwind ambient concentrations. The assessment of air quality, GHG emissions, sound quality, or lighting levels in the LAA will not change as a result of refinements to water management infrastructure, emulsion mixing approach and other minor refinements. The effects associated with the mine life extension (i.e., additional year of operation) will result in an overall increase in release of GHG emissions (see Table 2.4). An updated GHG emissions inventory is included, and discussed further, below.

The refinements to the numbers and types of mobile equipment result in some larger equipment types being used (e.g., haul trucks, excavators and drills) which will result in some increases in noise levels, and in the quantities of air contaminants and GHGs released to the atmosphere as described further below.



VALENTINE GOLD PROJECT: PROJECT REFINEMENTS SUPPLEMENTAL INFORMATION

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In terms of air quality, since overall emissions and emissions from individual sources (specific pieces of equipment) are expected to increase, additional dispersion modelling has been conducted to assess the potential effects on a change in air quality as a result of the updated number and types of mobile equipment expected to be onsite. In addition to the refinements to the mobile equipment, the following Project refinements were also incorporated into the updated modelling:

- The location and layout of the processing plant (as shown in Figure 1.1).
- The design of selected point sources (dimensions and orientations of release stacks / vents) at the processing plant was updated.
- Particle size fraction information for updated estimates of PM₁₀ and PM_{2.5} releases from the processing plant sources (based on average particle size fraction information for the crushed ore) were incorporated in the model.
- The semi-autogenous grinding (SAG) mill conveyor drop point and intensive leaching feed hopper (ore processing / handling sources) were removed from the model. These operations are enclosed and/or under negative pressure and are therefore not expected to result in measurable air contaminant releases to the atmosphere.

Table 2.1 provides a summary of the revised annual releases of air contaminants from the Project based on the refinements described above compared with those presented in the EIS.

Table 2.1 Revised Air Contaminant Emissions – Annual Totals

Air Contaminant	CAS #	Emission Rate (tonnes/year)		Percent Change (%)
		Estimates Presented in EIS	Revised Estimate	
TSP	N/A-1	1,581	1,466	-7%
PM ₁₀	N/A-2	611	575	-6%
PM _{2.5}	N/A-3	119	109	-8%
NO _x	10102-44-0	782	820	5%
SO ₂	7446-09-5	234	251	7%
CO	630-08-0	1,306	1,319	1%
HCN	74-90-8	3.63	3.63	0%
NH ₃	7664-41-7	3.70	3.70	0%
As	7440-38-2	2.13E-03	2.10E-03	-2%
Cd	7440-43-9	1.92E-04	1.89E-04	-2%
Cu	7440-50-8	2.13E-02	2.10E-02	-2%
Pb	7439-92-1	5.17E-03	5.08E-03	-2%
Hg	7439-97-6	1.05E-04	1.03E-04	-1%
Ni	7440-02-0	1.63E-03	1.60E-03	-2%
Zn	7440-66-6	3.91E-03	3.84E-03	-2%
Ba	7440-39-3	3.78E-03	3.72E-03	-2%
Sr	7440-24-6	4.58E-03	4.49E-03	-2%
Be	7440-41-7	2.10E-05	2.07E-05	-2%



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Table 2.1 Revised Air Contaminant Emissions – Annual Totals

Air Contaminant	CAS #	Emission Rate (tonnes/year)		Percent Change (%)
		Estimates Presented in EIS	Revised Estimate	
Cobalt	7440-48-4	1.29E-03	1.27E-03	-2%
Li	7439-93-2	4.26E-03	4.19E-03	-2%
Sb	7440-36-0	5.49E-03	5.40E-03	-2%
Sn	7440-31-5	8.07E-03	7.94E-03	-2%
Se	7782-49-2	6.40E-03	6.29E-03	-2%
Cr	7440-47-3	1.18E-02	1.16E-02	-2%
Bi	7440-69-9	2.13E-03	2.10E-03	-2%

The updated modelling uses the same methodology and other inputs as those used in the EIS (described in Section 5.5.1 of the EIS).

A summary of the results of the model update is provided in Table 2.2 and Table 2.3. The overall maximum predicted concentrations (outside the Project Area) are provided in Table 2.2. The maximum predicted concentrations at the discrete receptor locations evaluated (cabins and the new locations of accommodations and exploration camps) are provided in Table 2.3. For comparison, the model results presented in the EIS are also provided in each table. In each table, the predicted concentrations combined with the measured background concentrations are compared with the relevant Newfoundland and Labrador Ambient Air Quality Standard (NL AAQS) or adopted standard for the assessment (Ontario Air Contaminant Benchmarks [ACB] or Canadian Ambient Air Quality Standard [CAAQS]).



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Table 2.2 Maximum Predicted Concentrations – Model Updates

Contaminant	CAS#	Average Period	Background Concentrations (µg/m³)	Predicted Concentrations Incl. Background (µg/m³)		NL AAQS (µg/m³)	2020 CAAQS (µg/m³)	2025 CAAQS (µg/m³)	Ontario ACB (µg/m³)	Percent of NL/Adopted Standard	
				Prediction from EIS	Revised Prediction					Prediction from EIS	Revised Prediction
TSP	N/A-1	24-hour	13.8	119	118	120	-	-	-	99%	99%
	N/A-1	Annual	2.6	4.95	5.2	60	-	-	-	8%	9%
PM ₁₀	N/A-2	24-hour	13.0	65.7	65.2	50	-	-	-	131%	130%
PM _{2.5}	N/A-3	24-hour	10.3	21.3	20.0	25	27.0	NA	-	85%	80%
	N/A-3	Annual	3.8	5.08	4.57	8.8	8.8	NA	-	58%	52%
DPM	N/A-4	2-hour	-	19.2	23.4	-	-	-	-	-	-
	N/A-4	Annual	-	0.099	0.114	-	-	-	-	-	-
NO ₂	10102-44-0	1-hour	3.8	169	194	400	112.9	79	-	42%	48%
	10102-44-0	24-hour	1.9	72.6	77.2	200	-	-	-	36%	39%
	10102-44-0	Annual	1.4	8.53	7.9	100	32.0	28.2	-	9%	8%
SO ₂	7446-09-5	1-hour	2.6	341	461	900	183.4	170	-	38%	51%
	7446-09-5	3-hour	2.6	206	274	600	-	-	-	34%	46%
	7446-09-5	24-hour	neg.	75.3	97.0	300	-	-	-	25%	32%
	7446-09-5	Annual	neg.	2.69	3.42	60	13.1	10.5	-	4%	6%
CO	630-08-0	1-hour	206	1,634	1,863	35,000	-	-	-	5%	5%
	630-08-0	8-hour	200	923	1055	15,000	-	-	-	6%	7%
NH ₃	7664-41-7	24-hour	neg.	3.42	5.10	100	-	-	-	3%	5%
HCN	74-90-8	24-hour	neg.	3.87	4.93	-	-	-	8	48%	62%
As	7440-38-2	24-hour	2.1E-03	4.95E-03	4.95E-03	0.3	-	-	-	2%	2%
Cd	7440-43-9	24-hour	4.2E-04	6.34E-04	6.34E-04	2	-	-	-	<1%	<1%
Cu	7440-50-8	24-hour	1.3E-03	1.85E-02	0.0185	50	-	-	-	<1%	<1%
Pb	7439-92-1	24-hour	1.3E-03	6.00E-03	6.00E-03	2	-	-	-	<1%	<1%
	7439-92-1	30-day	5.0E-04	2.32E-03	2.32E-03	0.7	-	-	-	<1%	<1%
Hg	7439-97-6	24-hour	neg.	3.07E-04	4.48E-04	2	-	-	-	<1%	<1%
Ni	7440-02-0	24-hour	2.1E-03	3.37E-03	3.37E-03	2	-	-	-	<1%	<1%
Zn	7440-66-6	24-hour	2.1E-02	3.01E-02	3.01E-02	120	-	-	-	<1%	<1%
Ba	7440-39-3	24-hour	2.1E-03	1.20E-02	1.20E-02	-	-	-	10	<1%	<1%
Sr	7440-24-6	24-hour	2.1E-03	9.47E-03	9.47E-03	-	-	-	120	<1%	<1%
Be	7440-41-7	24-hour	1.3E-03	1.32E-03	1.32E-03	-	-	-	0.01	13%	13%
Cobalt	7440-48-4	24-hour	1.3E-03	2.25E-03	2.25E-03	-	-	-	0.1	2%	2%
Li	7439-93-2	24-hour	neg.	3.44E-03	3.44E-03	-	-	-	20	<1%	<1%
Sb	7440-36-0	24-hour	2.1E-03	5.87E-03	5.87E-03	-	-	-	25	<1%	<1%
Sn	7440-31-5	24-hour	1.3E-03	7.41E-03	7.41E-03	-	-	-	10	<1%	<1%
Se	7782-49-2	24-hour	4.2E-03	1.16E-02	1.16E-02	-	-	-	10	<1%	<1%
Cr	7440-47-3	24-hour	2.1E-03	1.19E-02	1.19E-02	-	-	-	0.5	2%	2%
Bi	7440-69-9	24-hour	2.1E-03	4.37E-03	4.37E-03	-	-	-	2.5	<1%	<1%



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Table 2.3 Maximum Predicted Concentrations at Cabin Locations – Model Updates

Contaminant	CAS#	Average Period	Background Concentrations (µg/m³)	Predicted Concentrations Incl. Background (µg/m³)		NL AAQS (µg/m³)	2020 CAAQS (µg/m³)	2025 CAAQS (µg/m³)	Ontario ACB (µg/m³)	Percent of NL/Adopted Standard	
				Prediction from EIS	Revised Prediction					Prediction from EIS	Revised Prediction
TSP	N/A-1	24-hour	13.8	44.8	43.6	120	-	-	-	37%	36%
	N/A-1	Annual	2.6	3.39	3.34	60	-	-	-	6%	6%
PM ₁₀	N/A-2	24-hour	13.0	27.2	27.2	50	-	-	-	54%	54%
PM _{2.5}	N/A-3	24-hour	10.3	15.5	13.4	25	27.0	NA	-	53%	53%
	N/A-3	Annual	3.8	4.20	4.02	8.8	8.8	NA	-	46%	46%
DPM	N/A-4	2-hour	-	3.46	4.21	-	-	-	-	-	-
	N/A-4	Annual	-	0.034	0.039	-	-	-	-	-	-
NO ₂	10102-44-0	1-hour	3.8	87.7	91.7	400	112.9	79	-	23%	23%
	10102-44-0	24-hour	1.9	48.5	54.7	200	-	-	-	27%	27%
	10102-44-0	Annual	1.4	4.25	4.58	100	32.0	28.2	-	5%	5%
SO ₂	7446-09-5	1-hour	2.6	65.0	83.1	900	183.4	170	-	9%	9%
	7446-09-5	3-hour	2.6	37.6	48.7	600	-	-	-	8%	8%
	7446-09-5	24-hour	neg.	17.4	22.3	300	-	-	-	7%	7%
	7446-09-5	Annual	neg.	0.92	1.16	60	13.1	10.5	-	2%	2%
CO	630-08-0	1-hour	206	507	545	35,000	-	-	-	2%	2%
	630-08-0	8-hour	200	363	385	15,000	-	-	-	3%	3%
NH ₃	7664-41-7	24-hour	neg.	1.55	1.68	100	-	-	-	2%	2%
HCN	74-90-8	24-hour	neg.	1.52	1.62	-	-	-	8	20%	20%
As	7440-38-2	24-hour	2.1E-03	3.50E-03	3.50E-03	0.3	-	-	-	1%	1%
Cd	7440-43-9	24-hour	4.2E-04	5.25E-04	5.25E-04	2	-	-	-	<1%	<1%
Cu	7440-50-8	24-hour	1.3E-03	9.73E-03	0.0097	50	-	-	-	<1%	<1%
Pb	7439-92-1	24-hour	1.3E-03	3.60E-03	3.60E-03	2	-	-	-	<1%	<1%
	7439-92-1	30-day	5.0E-04	1.39E-03	1.39E-03	0.7	-	-	-	<1%	<1%
Hg	7439-97-6	24-hour	neg.	1.43E-04	1.47E-04	2	-	-	-	<1%	<1%
Ni	7440-02-0	24-hour	2.1E-03	2.72E-03	2.72E-03	2	-	-	-	<1%	<1%
Zn	7440-66-6	24-hour	2.1E-02	2.55E-02	2.55E-02	120	-	-	-	<1%	<1%
Ba	7440-39-3	24-hour	2.1E-03	6.91E-03	6.91E-03	-	-	-	10	<1%	<1%
Sr	7440-24-6	24-hour	2.1E-03	5.70E-03	5.70E-03	-	-	-	120	<1%	<1%
Be	7440-41-7	24-hour	1.3E-03	1.31E-03	1.31E-03	-	-	-	0.01	13%	13%
Cobalt	7440-48-4	24-hour	1.3E-03	1.77E-03	1.77E-03	-	-	-	0.1	2%	2%
Li	7439-93-2	24-hour	neg.	1.69E-03	1.69E-03	-	-	-	20	<1%	<1%
Sb	7440-36-0	24-hour	2.1E-03	3.95E-03	3.95E-03	-	-	-	25	<1%	<1%
Sn	7440-31-5	24-hour	1.3E-03	4.30E-03	4.30E-03	-	-	-	10	<1%	<1%
Se	7782-49-2	24-hour	4.2E-03	7.82E-03	7.83E-03	-	-	-	10	<1%	<1%
Cr	7440-47-3	24-hour	2.1E-03	6.89E-03	6.89E-03	-	-	-	0.5	1%	1%
Bi	7440-69-9	24-hour	2.1E-03	3.21E-03	3.21E-03	-	-	-	2.5	<1%	<1%



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The results of the updated modelling are generally consistent with, or slightly lower than, the predicted concentrations presented in the EIS. The maximum predicted 24-hour PM₁₀ concentration (including background) was above the NL AAQS (similar to the results of the EIS). There were no other exceedances predicted. There were no exceedances predicted at the cabin locations or exploration camp, or at the revised location of the accommodations camp (maximum predictions at camp / cabin locations are shown in Table 2.3).

Based on the results of the updated dispersion modelling, the Project refinements do not result in changes to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS.

For GHG emissions, based on the increased mine life and changes to mobile equipment, it is anticipated the GHG emissions (direct + indirect) will increase by 6.3% during the peak operational year, and 13% over the life of the mine over the GHG release estimates presented in the EIS. A summary of changes to the GHG emissions is provided in Table 2.4. The GHG emissions are compared to the annual provincial and national GHG totals. The annual GHG emissions for each year of operation of the mine, both for releases as presented in the EIS and based on the proposed Project refinements, are provided in Appendix A.

Table 2.4 Estimated Contribution of Operation GHG Emissions to Federal and Provincial Totals

Parameter	Units	Total (expressed as CO _{2e})	
		Estimate Presented in EIS	Revised Estimate
Operation GHG Emissions (direct and indirect) ^A	t/y	92,118	97,283
NL GHG Emissions ^{B, C}	t/y	11,000,000	11,000,000
National GHG Emissions ^{B, C}	t/y	729,000,000	729,000,000
Project Operation Contribution to NL GHG Emissions	%	0.8%	0.88%
Project Operation Contribution to National GHG Emissions	%	0.01%	0.01%

Notes:
^A Indirect emissions include electricity and fuel associated with shipping product and delivery of consumables
^B Provincial and national GHG emission totals from ECCC NIR (ECCC 2020b)
^C Provincial and national GHG emission totals include other fluorinated GHGs

Based on these estimates and given that the increases in GHG emissions due to the Project refinements are relatively minor, the Project refinements do not result in changes to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS for GHG emissions.

With respect to a change in sound quality, the Project refinements to the numbers and types (i.e., larger) of mobile equipment will likely result in a small increase in the predicted sound levels during Project operation, however, the increase is not expected to result in a change in highly annoyed conditions that exceeds the Health Canada criteria of 6.5%. Therefore, the Project refinements do not result in changes to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS for sound quality.



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2.2 WATER RESOURCES

An assessment for Groundwater Resources (Chapter 6) and Surface Water Resources (Chapter 7) was provided in the EIS. The following effects were assessed for these VCs:

- Groundwater Resources
 - Change in groundwater quantity
 - Change in groundwater quality
- Surface Water Resources
 - Change in surface water quantity
 - Change in surface water quality

Minor changes to the footprint and location of the TMF are anticipated to result in negligible changes to the seepage from the TMF. This is because the associated water level in the refined TMF design is anticipated to operate at approximately the same elevation as the TMF design presented in the EIS. Therefore, the Project refinements do not result in an appreciable change in the predicted effects to the environment from those provided in the EIS. Because the EIS provides a conservative estimate of the mass loading to surface water receivers from groundwater, the relatively minor changes proposed to the TMF do not change the characterization of residual effects, proposed mitigation, or overall conclusions described in the EIS.

Minor changes to the sizes of the waste rock piles, water management ponds, and other features are anticipated to result in minor alterations to the groundwater flow balance. Due to the minor nature of the changes and the conservative nature of the predictions of mass loading from ore stockpiles to surface water receivers from groundwater (i.e., no attenuation of mass along the flow path through groundwater), the proposed minor refinements do not change the characterization of residual effects, proposed mitigation, or overall conclusions described in the EIS.

Surface water management infrastructure refinements include:

- Adjustment of perimeter drains to account for changes to stockpile footprint and the presence of shallow and outcropping bedrock. Perimeter drains continue to collect all stockpile runoff and intercept seepage and continue to gravity drain to sedimentation collection ponds.
- Sedimentation ponds have the same flood control, climate change, water quality and baseflow augmentation as previously designed. Several ponds have been consolidated to improve operational efficiency and reduce monitoring complexity, including a reduction in the number of Final Discharge Points (FDPs). Due to further geotechnical ground-truthing, pond impoundment dam design has been adjusted from low permeability till cores to use of liners and moderate dam height increases. This has facilitated a general reduction in pond footprint, an increase in maximum pond depth, and the opportunity to consolidate ponds. Increasing pond depth will further reduce the potential for thermal charging and resuspension of deposited sediments and extend inactive storage volumes resulting in improved pond performance.
- Ponds and drains will continue to manage runoff and seepage to the same criteria and effluent limits as those identified in the EIS. The consolidation of ponds and FDPs will not extend effluent mixing zones beyond those described in the assimilative capacity modeling provided with the EIS.



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Water management infrastructure design modifications represent refinements to the size and location of ditches and ponds to address stockpile and component footprint refinements, updated geotechnical information and engineering design optimizations to reduce footprint and improve performance. Effluent quality in consideration of Project refinements is predicted to meet the *Metal and Diamond Mining Effluent Regulations* (MDMER) criteria as described in the EIS, and effluent mixing and assimilative capacity are predicted to remain within the mixing zone boundary extents, also as described in the EIS.

Per the descriptions above, the proposed Project refinements do not result in changes to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS for Groundwater Resources and Surface Water Resources.

2.3 FISH AND FISH HABITAT

An assessment for Fish and Fish Habitat (Chapter 8) was provided in the EIS. The following effects were assessed for this VC:

- Change in fish habitat quantity
- Change in fish habitat quality
- Change in fish health and survival

Per the Project design presented in the EIS, the proposed refinement in the TMF design will result in no mine waste being placed in fish-bearing waters. However, the tailings dam alignment has now been refined to completely avoid stream 14, and the footprint of the process plant facilities has been altered slightly in the headwaters of stream 14, resulting in a small reduction in direct fish habitat loss. Other Project refinements may result in minor changes in the predicted quantity of indirect loss of fish habitat due to changes in drainage area or flow patterns. As described in Section 8.5.1 of the EIS, the loss of habitat (direct and indirect) will be quantified and offset as part of the *Fisheries Act* Authorization process following consultation with Fisheries and Oceans Canada.

The Project refinements are not anticipated to result in substantial changes in stream flows, runoff, sedimentation, and the introduction of contaminants than those previously described in the EIS. Similarly, Project refinements are not anticipated to result in changes to the concentration of sediment and contaminants from surface water runoff due to overburden and rock management, and water management. Therefore, the proposed Project refinements do not result in changes to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS for Fish and Fish Habitat.



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2.4 TERRESTRIAL ENVIRONMENT

The EIS assessed potential Project-related effects on Vegetation, Wetlands, Terrain and Soils (Chapter 9), Avifauna (Chapter 10), Caribou (Chapter 11), and Other Wildlife (Chapter 12). The following effects were assessed for these VCs:

- Vegetation, Wetlands, Terrain and Soils:
 - Change in Species Diversity
 - Change in Community Diversity
 - Change in Wetland Function
 - Change in Terrain and Terrain Stability
 - Change in Soils Quality and Quantity
- Avifauna and Other Wildlife
 - Change in Habitat
 - Change in Mortality Risk
- Caribou
 - Change in Habitat
 - Change in Movement
 - Change in Mortality Risk

As described in the EIS, a conservative approach was used to address uncertainty in the environmental effects assessment for habitat loss and/or alteration. This conservative approach also allows for refinements to the site layout, as these typically occur through detailed Project design and planning. Specifically, the assessment assumed the following:

- That all habitat within the Project Area would be disturbed, altered or lost, resulting in a direct loss or change of vegetation and habitat; in practice, not all vegetation will be cleared within the Project Area.
- That all wetlands within the Project Area would be disturbed, altered or lost, resulting in a direct loss of wetland function; in practice, not all wetlands within the Project Area will be altered or disturbed.

Given the conservative assumptions described above and that Project refinements will occur entirely within the Project Area, there is no change in the assessment of habitat loss and/or alteration presented in the EIS for the terrestrial VCs.

In addition, the Project refinements do not result in a change in the assessments of sensory disturbance on avifauna, other wildlife, and caribou. The refinements do not result in substantive changes to noise, dust or light emissions relative to those presented in the EIS (refer to Section 2.1 of this Attachment). The assessment in the EIS also conservatively assumed that indirect habitat alteration/loss would occur within a buffer around the mine site. As the proposed Project refinements are located within the mine site, the assessed buffers as described in the EIS remain valid.

The primary pathways for change in mortality risk are through vegetation clearing and earthworks, vehicular collisions, human-wildlife conflicts, and predation. Project refinements are not anticipated to result in measurable changes to these pathways.



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With regards to the assessment of a change in caribou movement, the primary effect pathway is from the alteration or loss of existing caribou paths along a preferred migration corridor within the Project Area. As described in the EIS, a primary spring / fall migration corridor used by Buchans herd caribou directly overlaps with Project infrastructure, and residual effects on a change in movement are predicted to be significant, as the mine site has been determined to present a potential obstacle to caribou migration. Project refinements represent minor changes to the footprints (as presented in the EIS) of mine infrastructure within the preferred caribou migration paths (e.g., the footprint of the Marathon waste rock pile has increased by 2 ha, or 2% of the original footprint) and do not change the EIS prediction of a significant residual environmental effect on caribou.

The proposed Project refinements do not result in changes to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS for Vegetation, Wetlands, Terrain and Soils, Avifauna, Caribou, and Other Wildlife.

2.5 SOCIO-ECONOMIC ENVIRONMENT

The EIS assessed potential Project-related effects on Infrastructure and Services (Chapter 13), Community Health (Chapter 14), Economy and Employment (Chapter 15), and Land and Resource Use (Chapter 16). The following effects were assessed for these VCs:

- Infrastructure and Services:
 - Change in local housing and temporary accommodations
 - Change in local services and infrastructure
- Community Health
 - Change in community well-being
 - Change in physical health conditions
- Employment and Economy
 - Change in regional labour force
 - Change in economic activities of outfitters
 - Change in economy
- Land and Resource Use
 - Change in land use
 - Change in resource use
 - Change in recreational use

Predicted effects on infrastructure and services are associated primarily with Project-related population growth. Given that the proposed Project refinements will not result in a change to Project-related population growth described in the EIS (other than the increase in duration of predicted Project effects by one year during Project operation), the refinements do not result in changes to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS for Infrastructure and Services.

With respect to community health, effects pathways as described in the EIS may result in a change to community well-being (availability of health services and infrastructure) and physical health conditions (potential effects to air and water quality and country foods due to Project-related emissions). Since filing



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the EIS, a human health risk assessment (HHRA) was completed for the Project and was submitted to both the Impact Assessment Agency of Canada (as part of Marathon's responses to Information Requirements) and to the Newfoundland and Labrador Department of Environment and Climate Change (as part of the EIS Amendment).

The HHRA evaluated potential human health risks associated with exposures to Project-related contaminants of potential concern under Background and Predicted Future Case conditions for Indigenous and non-Indigenous receptors. The results demonstrated that the predicted changes in inhalation exposures, direct contact exposures to soil and surface water, and ingestion exposures from the consumption of country foods represent a negligible change in human health risk for Indigenous and non-Indigenous receptors. The results of the HHRA do not change the conclusions of the assessment presented in the EIS.

As described in Section 2.1 of this Attachment, air quality modelling results have been updated due to refinements to the numbers and types of mobile equipment. While there are minor changes in the results, these changes do not alter the conclusions of the HHRA. The updated maximum 98th percentile 1-hour NO₂ concentrations at the accommodations camp and exploration camps do not exceed the 2025 CAAQS, which represents a lower human health risk than was presented in the HHRA. On an hour-by-hour basis, the exceedance frequency at the accommodations camp increased from 42 to 51 exceedances of the 1-hour NO₂ limit (i.e., an increase from 0.15% to 0.19% of the total 26,280 hours modelled). However, exceedance patterns (number of consecutive hours with predicted exceedances) at the accommodations and exploration camps are unchanged, with a maximum of 4 consecutive hours with predicted 1-hour NO₂ concentrations above 2025 CAAQS of 79 µg/m³. These changes in predicted 1-hour NO₂ do not alter the conclusions of the HHRA or the conclusions of the EIS related to Community Health.

As described in Section 2.2 of this Attachment, refinements to surface water management, TMF design and a decrease in the number of final discharge points, do not alter the surface water quality predictions presented in the EIS. Therefore, the Project refinements related to surface water quality would similarly not alter the conclusions of the HHRA. The Project refinements therefore do not result in changes to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS for Community Health.

Project demand for, and expenditures on, services, labour, materials and equipment are the primary pathways for changes in regional labour force, regional business and economy. The Project refinements do not result in measurable changes to these pathways (other than extension of the mine life by one year, which would result in a temporal extension of economic benefits associated with Project operation) and therefore do not result in changes to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS for Employment and Economy.

With respect to land and resource use, the primary effects pathways are through the Project activities and components, as these may restrict access to, or cause loss of, areas used for resource activities and/or recreation. As the Project refinements will occur within the assessed Project Area, they will not result in measurable changes to these pathways, except for the extension of the mine life by one year, which would result in any land and resource use restrictions in place during Project operation to extend for one



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additional year. Therefore, the Project refinements do not result in changes to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS for Land and Resource Use.

2.6 INDIGENOUS GROUPS

An assessment of potential Project-related effects for Indigenous Groups (Chapter 17) was provided in the EIS. The following effects were assessed for this VC:

- Change in current use
- Change in Indigenous health conditions
- Change in Indigenous socio-economic conditions
- Change in physical and cultural heritage

Given that the Project refinements will occur within the existing Project Area, the Project refinements do not result in measurable changes to effects on Indigenous groups related to current use, socio-economic conditions or physical and cultural heritage. Predicted effects associated with Project operation would extend for one additional year due to the proposed mine life extension. With respect to Indigenous health conditions, the discussion provided in Section 2.5 of this Attachment for Community Health is also applicable to Indigenous Groups. As indicated in Section 2.5, the Project refinements do not alter the conclusions of the HHRA, which evaluated potential human health risks for Indigenous and non-Indigenous receptors. Therefore, the Project refinements do not result in changes to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS for Indigenous Groups. Marathon will continue to engage with Indigenous groups, including Indigenous resource users, throughout the life of the Project.

2.7 HISTORIC RESOURCES

The EIS assessed potential Project-related effects on Historic Resources (Chapter 18). As noted in the EIS, there are no known registered archaeological sites within the Project Area. As discussed in Section 18.2.3.4 of the EIS, there is one area of archaeological potential within the Project Area, however this area does not overlap with the footprints of the refined Project infrastructure. Therefore, the Project refinements do not result in changes to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS for Historic Resources.

2.8 DAM INFRASTRUCTURE

The EIS assessed potential Project-related effects on Dam Infrastructure (Chapter 19). The following effects were assessed for the VC:

- A change in water quality in Victoria Lake Reservoir
- A change in water balance in Victoria Lake Reservoir
- A change in dam stability for the Victoria Dam



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The proposed Project refinements do not result in changes in water quality or water balance with respect to Victoria Lake Reservoir, as described in Section 2.2, above. In terms of a potential change in dam stability for the Victoria Dam, the effects pathways include vibrations due to blasting and potential inundation from a failure of the TMF. The proposed Project refinements do not result in changes to the expected vibration frequency or intensity presented in the EIS generally, or specific to the Victoria Dam.

Due to the proposed refinement of the TMF dam alignment and relocation of the polishing pond towards the process plant (and away from the toe of the TMF dam), the inundation resulting from a potential TMF failure (unplanned/accidental event) no longer encroaches on the downstream toe of the Victoria Dam as presented in the EIS. As described in further detail in Section 2.9.2 of this Attachment, the results of the updated dam breach assessment predict that the inundation (water/tailings) zone from a TMF breach would stop approximately 550 m downstream of the Victoria Dam and therefore would not have any impact on the stability of the dam.

Based on these factors, the proposed Project refinements do not result in a change to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS for Dam Infrastructure.

2.9 ACCIDENTAL EVENTS

2.9.1 Fuel and Hazardous Material Spill

As indicated in Table 1.1, Marathon is considering transporting a pre-mixed ammonium nitrate emulsion product to site instead of shipping the individual components and manufacturing the emulsion on site as described in the EIS. Stantec was retained to evaluate the fate and behavior of potential spills of an ammonium nitrate emulsion product into the Victoria River, which flows into Red Indian Lake (see Appendix B).

Based on the modelling results, the maximum concentrations of total ammonia, unionized ammonia and nitrate at the Exploits River dam would be below the Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life (CWQG-FAL) limit. The modelling results indicate that, in the event of a spill, the total ammonia, unionized ammonia and nitrate are not expected to persist in the environment, nor result in potential bioaccumulation. A comparison of the results presented in Chapter 21 of the EIS for an accidental spill of ammonium nitrate in solid prill form, and in Appendix B for an accidental spill of TITAN 1000 G emulsion, indicates the following:

- Hydrodynamic conditions including inflows, water levels and current velocities were identical.
- The main difference in the results is due to the nature of the materials spilled into the water: in Chapter 21 and the technical memo in Appendix 21A of the EIS, it was assumed that the spilled ammonium nitrate becomes soluble in the water immediately after the spill and breaks down to ammonia and nitrate; therefore, the travel time of the material was shorter and resulting concentrations were higher at the Exploits River dam. However, the TITAN 1000 G emulsion behaves differently in the water than does ammonium nitrate. This material does not immediately become soluble in the water and the breakdown process takes longer, which results in a longer total travel time to the dam and lower resulting concentrations.



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Based on the results described above, the proposed Project refinements do not result in a change to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS for a hazardous materials spill.

2.9.2 TMF Malfunction

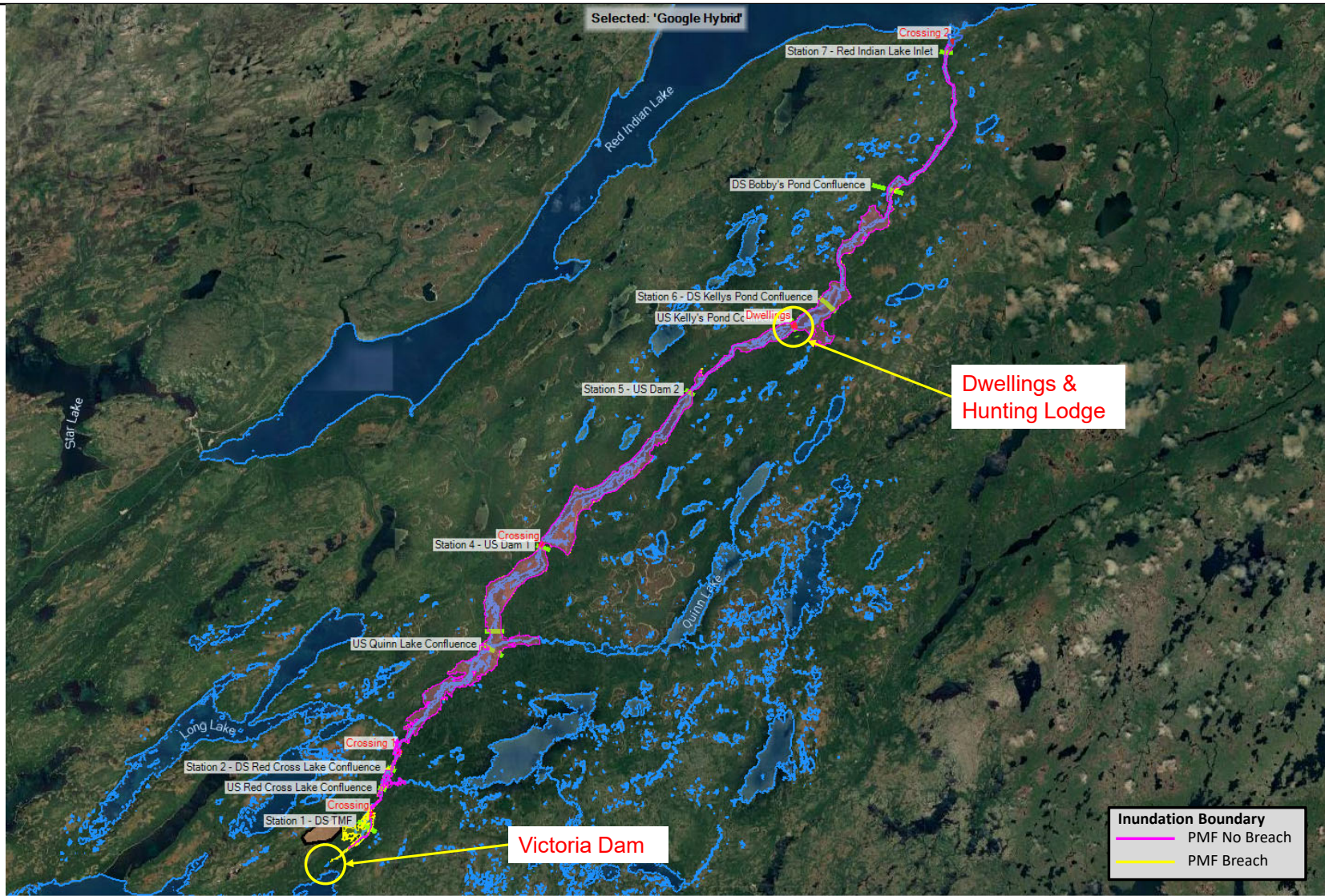
The Dam Breach Assessment (DBA) modeling has been updated, incorporating several design refinements to the TMF. The key refinements (described in Table 1.1) are as follows:

- Modification to the dam alignment to completely avoid and provide buffer to the stream running west to east along the southern boundary of the TMF. The new alignment also improves tailings storage efficiency without changing the dam height, and the overall TMF footprint is reduced slightly (approximately 3%).
- The polishing pond has been relocated closer to the plant site, which improves tailings water management components and eliminates the potential for a cascade failure in the event of a tailings dam breach.

Based on the available meteorological data, in consideration of the advancement of the engineering design for the TMF, and to provide a more conservative assessment of potential effects from the Project, the most conservative values for the long-term design precipitation events have been used in the ongoing update of the DBA. For final engineering design, alternate probable maximum precipitation (PMP) values may be considered, if further collection and assessment of meteorological data indicate these are warranted. These would be included in the final design information submitted for regulatory review and approval via the permitting process. The PMP value only affects the sizing of the emergency spillway for very high consequence category dams and is used in the DBA. In selection of the PMP value, the Buchans meteorological station (ID 8400698) provides the most conservative data, with a PMP of 450 mm. An updated DBA utilizing the Buchans station PMP value is ongoing, and an updated DBA report will be issued separately. It is important to note that the DBA will continue to be updated as the detailed engineering for the TMF and associated infrastructure is advanced.

At this time, the flood-induced dam breach model runs have been completed. Figures 2.1 to 2.3 show the inundation extent under the 450 mm probable maximum flood (PMF) in the Victoria River, with (pink) and without (yellow) a dam breach. In the event of a dam breach under a PMP induced flood, up to a peak discharge of 1,735 m³/s may be released from the TMF. This is approximately 8% to 16% lower than the peak discharge estimated in the DBA presented in the EIS, as a result of ongoing design refinements including relocation of the polishing pond. The incremental impact upstream and downstream of the TMF was assessed relative to the impact of the PMF.





Selected: 'Google Hybrid'

Dwellings & Hunting Lodge

Victoria Dam

Inundation Boundary
 — PMF No Breach
 — PMF Breach

CLIENT
 MARATHON GOLD CORPORATION

PROJECT
 DAM BREACH ASSESSMENT AND INUNDATION STUDY
 RESPONSE TO IR63

CONSULTANT	YYYY-MM-DD	2021-04-23
PREPARED	MAR	
DESIGNED	MAR	
REVIEWED	AC	
APPROVED	PM	



TITLE
 INUNDATION AREA OF SIMULATED PMF BREACH AND NO
 BREACH SCENARIOS

PROJECT NO.
 20141194

REV
 B

FIGURE
 2.1



CLIENT
 MARATHON GOLD CORPORATION

PROJECT
 DAM BREACH ASSESSMENT AND INUNDATION STUDY
 RESPONSE TO IR63

CONSULTANT



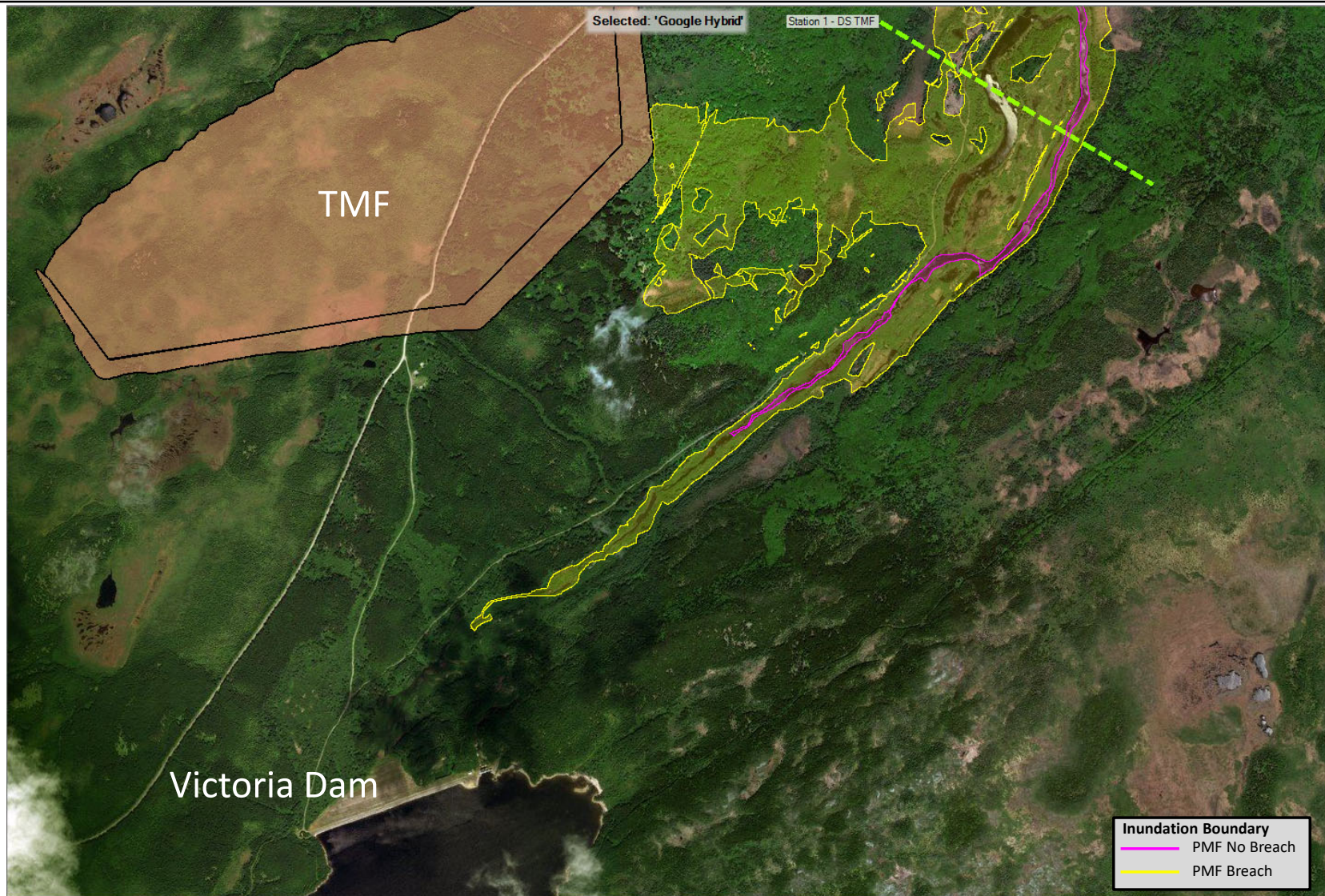
YYYY-MM-DD 2021-04-23
 PREPARED MAR
 DESIGNED MAR
 REVIEWED AC
 APPROVED PM

TITLE
 INUNDATION AREA OF SIMULATED PMF BREACH AND NO
 BREACH SCENARIOS - AREA OF DWELLINGS AND HUNTING
 LODGE

PROJECT NO.
 20141194

REV
 B

FIGURE
 2.2



CLIENT
MARATHON GOLD CORPORATION

PROJECT
DAM BREACH ASSESSMENT AND INUNDATION STUDY
RESPONSE TO IR63

CONSULTANT



YYYY-MM-DD 2021-04-23
PREPARED MAR
DESIGNED MAR
REVIEWED AC
APPROVED PM

TITLE
INUNDATION AREA OF SIMULATED PMF BREACH AND NO
BREACH SCENARIOS - AREA OF VICTORIA DAM

PROJECT NO.
20141194

REV
B

FIGURE
2.3

VALENTINE GOLD PROJECT: PROJECT REFINEMENTS SUPPLEMENTAL INFORMATION

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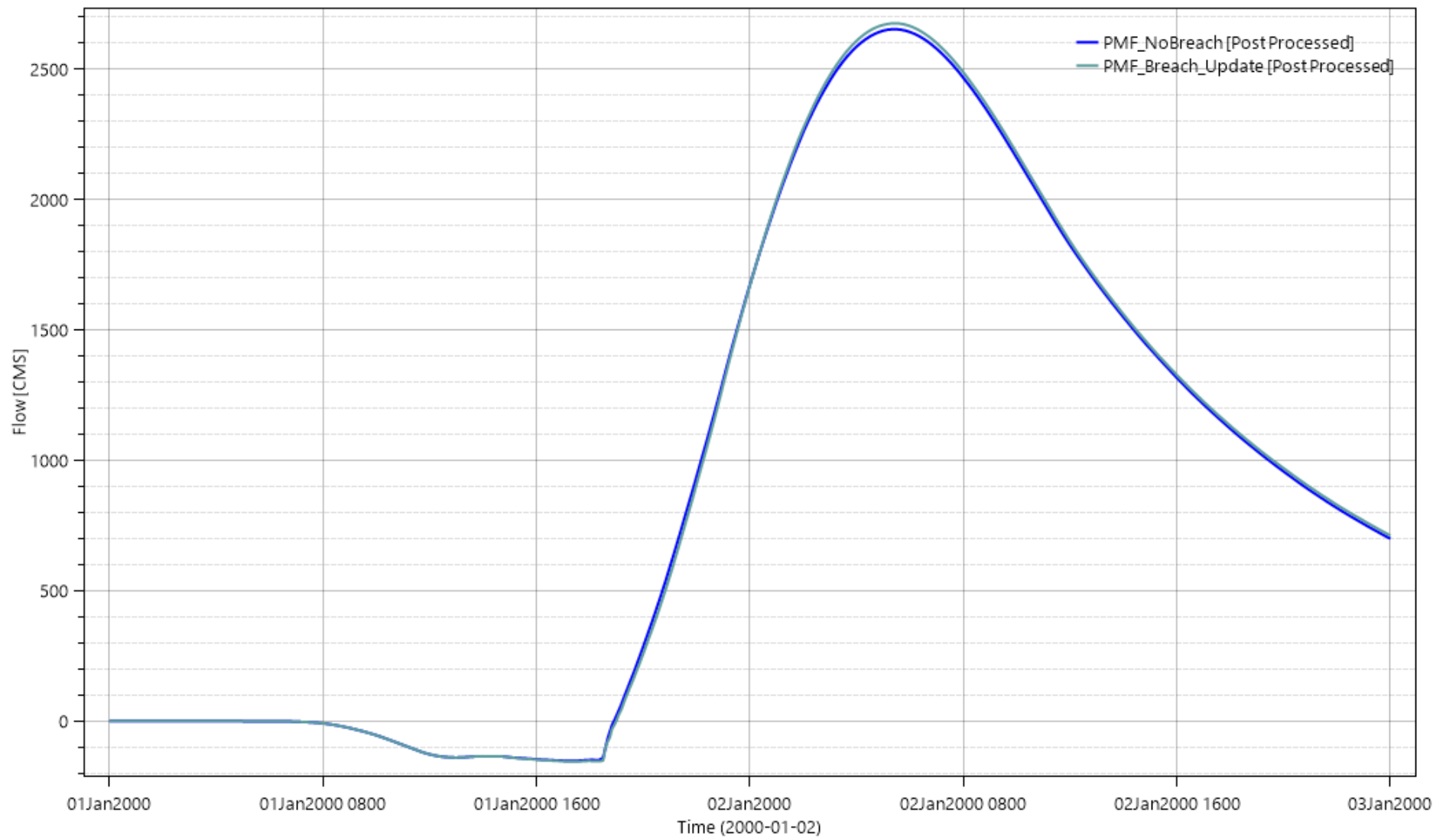
Upstream of the TMF, the mild slope of the Victoria River channel is expected to result in backwater flows towards the Victoria Dam. Based on a breach under PMP conditions, the TMF inundation could extend upstream to within 550 m (downstream) of the Victoria Dam, however would not reach the dam toe as was predicted in the DBA presented in the EIS.

Downstream of the TMF, and consistent with the DBA presented in the EIS, a dam breach would result in negligible incremental impact (<0.5%) on the extent of the flood boundary resulting from the natural effects of the PMF. For example, the peak flow under the updated PMP volume (450 mm) at the dwellings and hunting lodge upstream of Kelly's Pond confluence is 2,677 m³/s under a breach, compared to 2,654 m³/s with no breach (Figure 2.4). As shown in the figure, the incremental effect (water level) due to the dam breach is almost indiscernible (<0.5%) from the natural flood level. This is consistent with the results of the DBA presented in the EIS.

The updated DBA results described above result in less impact to the downstream environment than what was presented in the EIS, despite using a more conservative design flood (PMP at 450 mm versus 309 mm). This is a result of design modifications that have been made to the TMF to reduce potential environmental effects and improve engineering efficiency. Based on the results of the DBA, the Project refinements do not result in a change to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS for a TMF malfunction. As noted in Section 21.5.1.2 of the EIS, the dams required for the tailings impoundment will be designed, constructed, operated and closed in accordance with the Canadian Dam Association (CDA) and Mining Association of Canada (MAC) guidelines, Global Industry Standards on Tailings Management, as well as applicable provincial requirements. The dams will be inspected, maintained and repaired in accordance with the NL *Water Resources Act*.

The Dam Breach Assimilative Capacity Study is being revised to incorporate the TMF design refinements as described in Table 1.1. Based on preliminary results, the findings are similar to those provided in the EIS (Baseline Study Appendix 1, Attachment 1-B), in that a hypothetical failure of the TMF dam would release impounded water and suspended tailings into Victoria River, ultimately reaching Red Indian Lake. Such a failure has the potential to result in adverse environmental effects to aquatic life as a result of increased concentrations of dissolved constituents as described in the EIS.





CLIENT
MARATHON GOLD CORPORATION

PROJECT
DAM BREACH ASSESSMENT AND INUNDATION STUDY
RESPONSE TO IR63

CONSULTANT



YYYY-MM-DD 2021-04-23
PREPARED MAR
DESIGNED MAR
REVIEWED AC
APPROVED PM

TITLE
PMP FLOW HYDROGRAPHS DOWNSTREAM OF THE
DWELLINGS AND HUNTING LODGE

PROJECT NO.
20141194

REV
B

FIGURE
2.4

25mm IF THIS REQUIREMENT GOVERNOR/STATION RESPONSE, THE SHEET DATE HAS BEEN MODIFIED FROM 2021-04-23

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The preliminary results indicate that short-duration concentrations of the modelled constituents are anticipated to exceed the CWQG-FAL chronic water quality guidelines at one or more locations in Victoria River. The magnitude of concentrations is typically greater closer to the breach and in the fair-weather scenario, while duration of concentrations greater than applicable criteria is typically greater further from the breach on account of attenuation of peak flow rates over distance. The modelled conditions are considered to be fully reversible over a relatively short period of time once all inundated areas have drained to ambient water levels. As with the previous study presented in the EIS, concentrations of constituents have been compared to the CWQG-FAL. However, relatively few constituents are assigned a CWQG-FAL acute guideline as compared to those assigned a chronic guideline value. Therefore, results were compared to CWQG-FAL chronic guidelines. This is considered a highly conservative approach, as the nature of a dam breach event into a river system is a temporary event of short duration (i.e., less than a day), and elevated concentrations in the Victoria River resulting from a dam breach are not expected to persist over the long exposure period for which chronic toxicity guidelines are intended to be applied. If elevated concentrations were to occur in Red Indian Lake during low flow conditions, effects of the dam breach could persist for a longer period of time (e.g., more than 30 days) due to the longer retention time of the lake during low flow conditions. However, during high flow events (e.g., spring freshet), the increased flow rates would likely reduce the retention time.

In consideration of the above preliminary results, the Project refinements do not result in changes to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS for a TMF malfunction.

2.9.3 Unplanned Release of Contact Water

Project refinements have resulted in an increase in the dam height of some of the sedimentation ponds to above 2.5 m. In keeping with NL and CDA requirements, a DBA was conducted for dams impounding the sedimentation ponds to determine the Hazard Classification and Inflow Design Flood for each dam using an incremental assessment of loss of life potential, and potential environmental, economic and social/cultural losses. The DBA examined breaches under both dry weather (sunny day) and wet weather (flood-induced) conditions. All sedimentation ponds were assigned the hazard classification of Low, with associated inflow design flood of the 1:100-year return period flood event. Based on the results described above, the Project refinements do not result in a change to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS for an unplanned release of contact water.



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2.10 CUMULATIVE EFFECTS

Cumulative effects were assessed for the following VCs:

- Atmospheric Environment
- Groundwater Resources
- Surface Water Resources
- Fish and Fish Habitat
- Vegetation, Wetlands, Terrain and Soils
- Avifauna
- Caribou
- Other Wildlife
- Community Services and Infrastructure
- Community Health
- Employment and Economy
- Land and Resource Use
- Indigenous Groups
- Historic Resources

The cumulative effects assessment includes consideration of other physical activities that have been (past), are being (present and ongoing), and will be carried out (future) in the cumulative effects RAA. The pathways for cumulative effects are the same as those described for the assessment of Project residual effects on each VC. As described above, the Project refinements do not result in changes to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS and would therefore also not result in a change to the cumulative effects assessment.

3.0 CONCLUSIONS

Based on the above, the proposed Project refinements do not constitute a substantive change to the scope of the Project, either individually or in combination. Given the conservative effects assessment approach used within the EIS, no further assessment, beyond the information provided herein, is considered necessary. The Project refinements do not result in changes to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS; the conclusion that routine Project activities will not cause significant adverse environmental effects on any of the VCs, with the exception of caribou, remains unchanged.



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APPENDIX A

Projected Operation GHG Emissions over the Lifetime of the Project

Projected Operation GHG Emissions over the Life Time of the Project

GHG Emissions - EIS

	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	LOM
Total Material Mined	40,383.77	44,458.35	59,962.06	52,951.24	49,283.69	41,157.90	33,171.49	14,862.63	5,749.32	0.00	0.00	0.00	-
Total Resource Milled	1,875.40	2,500.40	2,500.07	3,250.01	4,000.10	4,000.39	4,000.10	4,000.10	3,999.54	4,000.00	4,000.00	2,922.82	-
Direct GHG Emissions tCO₂e/year	59,139.06	65,277.42	87,698.08	77,854.39	72,845.63	61,094.58	49,544.87	23,067.40	9,887.90	1,573.67	1,573.67	1,149.89	510,707
Indirect GHG Emissions tCO₂e/year	3,793.96	4,420.41	4,420.09	5,171.79	5,923.63	5,923.92	5,923.63	5,923.63	5,923.07	5,923.53	5,923.53	4,843.83	64,115
Total (direct & indirect) GHG Emissions tCO₂e/year	62,933.02	69,697.84	92,118.17	83,026.17	78,769.26	67,018.51	55,468.50	28,991.03	15,810.97	7,497.20	7,497.20	5,993.72	574,822

GHG Emissions - Project Refinements

	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	LOM
	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	
Total Material Mined	46,644.44	46,846.89	58,858.23	55,315.79	51,630.11	42,815.84	36,076.30	17,028.65	9,006.52	3,764.07	0	0	0	-
Total Resource Milled	2,460.60	2,500.40	2,500.37	3,625.40	3,999.95	4,000.16	4,000.10	4,000.10	4,000.10	3,999.72	4,000.00	4,000.00	3,502.94	-
Direct GHG Emissions tCO₂e/year	74,557.12	74,892.18	93,842.00	88,695.78	83,028.36	69,122.50	58,489.76	28,438.98	15,782.78	7,511.81	1,573.48	1,573.48	1,377.96	598,886
Indirect GHG Emissions tCO₂e/year	3,401.36	3,441.24	3,441.21	4,568.74	4,944.13	4,944.33	4,944.28	4,944.28	4,944.27	4,943.89	4,944.18	4,944.18	4,446.01	58,852
Total (direct & indirect) GHG Emissions tCO₂e/year	77,958.48	78,333.42	97,283.21	93,264.52	87,972.49	74,066.83	63,434.03	33,383.26	20,727.05	12,455.71	6,517.66	6,517.66	5,823.97	657,738

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APPENDIX B

Fate and Behavior Modelling of Hazardous Materials Spill

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B.1 VALENTINE GOLD PROJECT – FATE AND BEHAVIOR MODELLING OF HAZARDOUS MATERIALS SPILL

Marathon Gold Corporation (Marathon) retained Stantec Consulting Ltd. (Stantec) to evaluate the fate and behavior of potential spills of an ammonium nitrate emulsion product into the Victoria River flowing into Red Indian Lake in accordance with the provincial and federal guidelines for the Valentine Gold Project. The study area focused on the 100 m extent of the Victoria River, approximately 14 kilometers of Red Indian Lake, and the Exploits River Dam. The accidental spill release was modelled to occur at the bridge crossing of the Victoria River where the river drains into Red Indian Lake. In this memorandum, the Regional Assessment Area (RAA), ambient characteristics, ambient water quality, meteorological data, regulatory frameworks, two-dimensional (2D) hydrodynamic modelling approach, and modelling scenarios are based on the Valentine Gold project – fate and behavior modelling of hazardous materials spill report (Stantec, 2020).

Hazardous Material Information and Spill Assumption

The ammonium nitrate emulsion material proposed is the Dyno Nobel TITAN 1000 G (ungassed) product. TITAN 1000 G is an unsensitized gassable bulk emulsion matrix designed for quarry and open pit mining operation. Chemical gassing can vary the density from 1.10 g/cc to 1.30 g/cc. TITAN 1000 G is a mixture of 45% to 80% ammonium nitrate and 0.1% to 10% diesel. Ammonium nitrate is a chemical compound with the chemical formula NH_4NO_3 (molar mass: 80.043 g/mol). Nitrate (molar mass: 62.004 g/mol) accounts for 77% of ammonium nitrate based on the molar mass (PubChem 2020; Ammonium Nitrate, 2020). Petroleum-derived diesel is composed of about 75% saturated hydrocarbons (primarily paraffin including n, iso, and cycloparaffins), and 25% aromatic hydrocarbons (including naphthalenes and alkylbenzenes) (Bacha et al., 2007). The average chemical formula for common diesel fuel is $\text{C}_{12}\text{H}_{24}$, ranging approximately from $\text{C}_{10}\text{H}_{20}$ to $\text{C}_{15}\text{H}_{28}$ (Petro Canada 2020). Three critical characteristics of the emulsion are its viscosity, density, and solubility. The emulsion product has very high viscosity, described by DYNO representative R. Walsh (personal communication, January 26, 2021), as similar to that of mayonnaise. The product is not free-draining and must be pumped to transport. The emulsion is denser than water at a density of approximately 1,25 kg/L, settling in water and is anhydrous and quite insoluble in water. The emulsion will break down in time into its daughter ammonia, nitrate, and diesel products over a period of several weeks. More information about the physical properties and loading methods for TITAN 1000 G emulsion/ Ammonium Nitrate/Fuel Oil (ammonium nitrate emulsion) explosive blends can be found in the material safety data sheet (Bulk Explosives 2020).

TITAN 1000 G is proposed to be transported to the mine site with tanker trucks. Each tanker truck of emulsion will carry up to 20 T of TITAN 1000 G. Due to very high viscosity of the emulsion and the fact that it must be pumped to be transported, it was assumed that 200 kg of TITAN 1000 G will be released to the Victoria River over the course of an hour after the accident. The emulsion material release was conservatively modeled by particle tracking using a particle count of 10,000. The settling velocities for each particle was estimated as 1 mm/s based on Stokes Law.



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To consider a worst-case scenario, it was assumed that TITAN 1000 G was composed of 10% diesel and 80% ammonium nitrate. The total mass of 200 kg was considered at the deposited location. Therefore, the total mass of diesel and ammonium nitrate were considered as 20 kg and 160 kg, respectively. The Canadian Council of Ministers of the Environment (CCME) CWQG-FAL¹ concentration limits for nitrate, total ammonia, and unionized ammonia are summarized in Table B.1. The concentration limit of total ammonia is reported at pH 7.5, temperature 15°C.

Table B.1 CCME CWQG-FAL Allowable Concentration Limits

Parameter	CCME CWQG-FAL (mg/l)
Un-ionized ammonia (expressed as nitrogen) ¹	0.019
Total ammonia ²	1.83
Nitrate	550 ³
Diesel	-
Notes:	
¹ Source: http://st-ts.ccme.ca/en/index.html?chems=6&chapters=all	
² Total ammonia concentration limit varies with pH and temperature, See table at: http://st-ts.ccme.ca/en/index.html?lang=en&factsheet=5	
³ 550 mg/l for short term exposure and 13 mg/l for long term exposure	

Modelling Scenarios and Results

The annual minimum 7-day average (7Q1), the mean annual flow, and the 1:30 year high flow (Q30) were considered as three potential flow scenarios to estimate the inflow from each watercourse into the lake. More details about the modelling scenarios can be found in Stantec (2020). The following two-step simulation process was performed:

Step 1: 84 hours (3.5 days) of simulation was performed for each spill modelling scenario to estimate the location that the spilled materials will transport as emulsion material and due to negative buoyancy become sedimented.

Step2: 2 stage spill modelling considers 7 days for the ammonium nitrate emulsion without breakdown and 7 subsequent days for the ammonium nitrate emulsion breakdown to diesel fuel oil and ammonium nitrate and solubilization. As indicated, the solubilization time is expected to take longer than one week, however, to be conservative, it was estimated in this model to occur over a one week period. In the subsequent week, the simulation results for ammonium nitrate and diesel fuel oil concentrations are discussed.

Spill of Titan 1000 G Results

84 hours (3.5 days) of simulation was performed for the 7Q1, mean annual flow, and Q30 scenarios to estimate the location where the spilled TITAN 1000 G will become sedimented. Figure B.1, Figure B.2,

¹ Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life (CWQG-FAL)



VALENTINE GOLD PROJECT: PROJECT REFINEMENTS SUPPLEMENTAL INFORMATION

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and Figure B.3 present the simulation results for initial fluvial transport and settling location for the emulsion product.

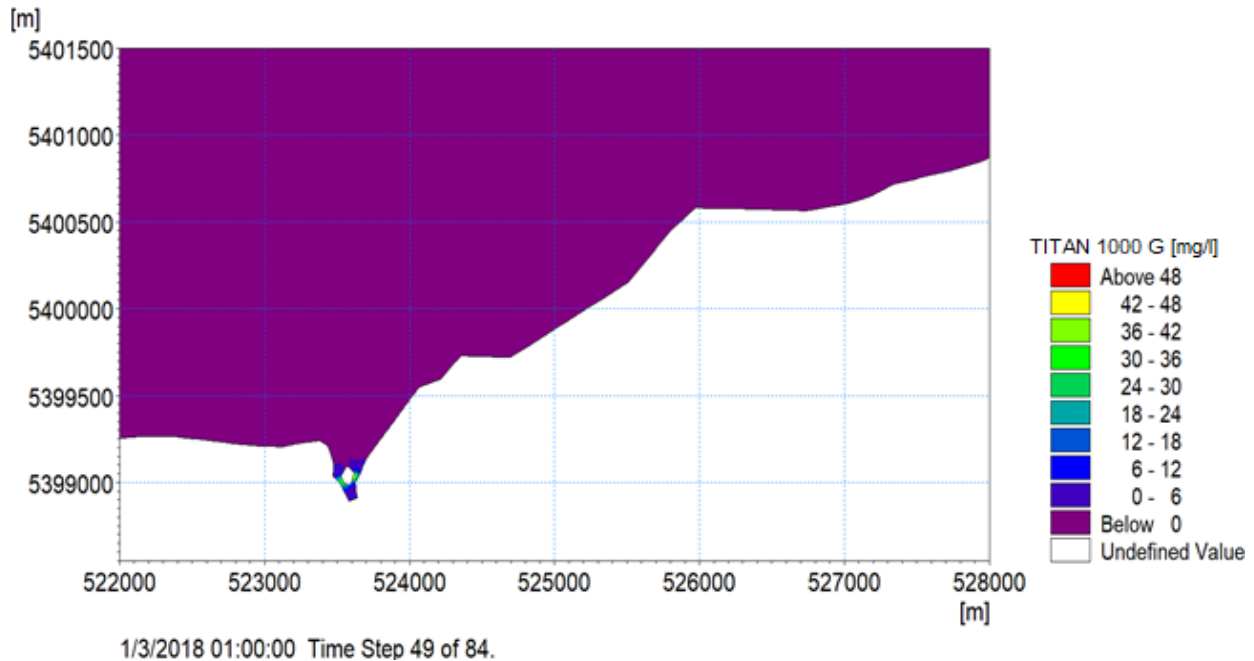


Figure B.1 Q1 Scenario Simulation Results of TITAN 1000 G (Emulsion)

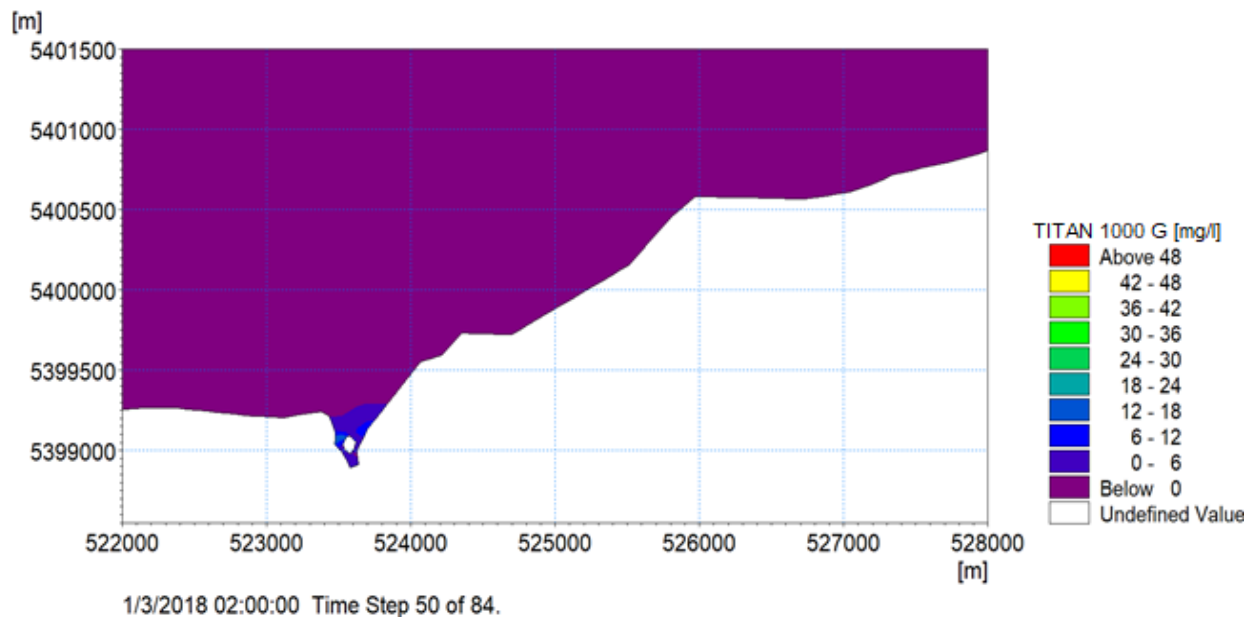


Figure B.2 Mean Annual Flow Scenario Simulation Results TITAN 1000 G (Emulsion)



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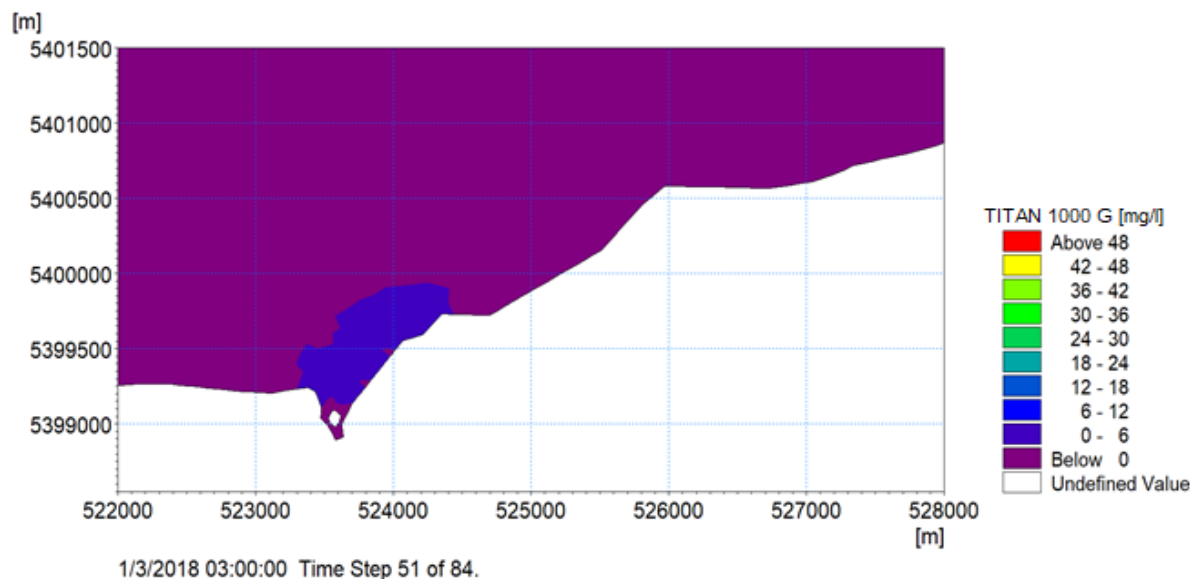


Figure B.3 Q30 Scenario Simulation Results TITAN 1000 G (Emulsion)

Shown in Figure B.1 and Figure B.2, spilled materials settle out in the Victoria River mouth and did not enter Red Indian Lake.

The simulation results for the Q30 scenario (Figure A.3) indicated that TITAN 1000 G deposited in Red Indian Lake and had the highest dispersion area in the Lake. Therefore, step 2 of the simulation process was performed for the Q30 scenario only. The Q30 flow scenario is a 1:30 years high flow. The 1:30 year high flow scenario would not be expected to extend over a two-week period; however, was extended over the two-week modeling period to provide further model conservatism.

The simulation results for ammonium nitrate and diesel for the breakup and dissociation process are shown in Figure B.4 and Figure B.5. In Figure B.4, the breakup process started 7 days after the spilled materials became sedimented. In the Q30 scenario, ammonium nitrate reached to the Exploits River dam after 205 hours of simulation (8 days and 13 hours). The CWQG-FAL limits for total ammonia, unionized ammonia, and nitrate are reported in Table B.1. The maximum ammonium nitrate concentration at the sedimentation location when breakup started was 12.5 µg/l, which included 9.62 µg/l of nitrate and 2.88 µg/l of ammonia. The initial ammonia and nitrate concentrations were below the CWQG-FAL limits. The maximum concentrations at the Exploits River dam were 1.15 µg/l of nitrate and 0.35 µg/l of ammonia, which was reduced by 88% due to material assimilation.



September 2021

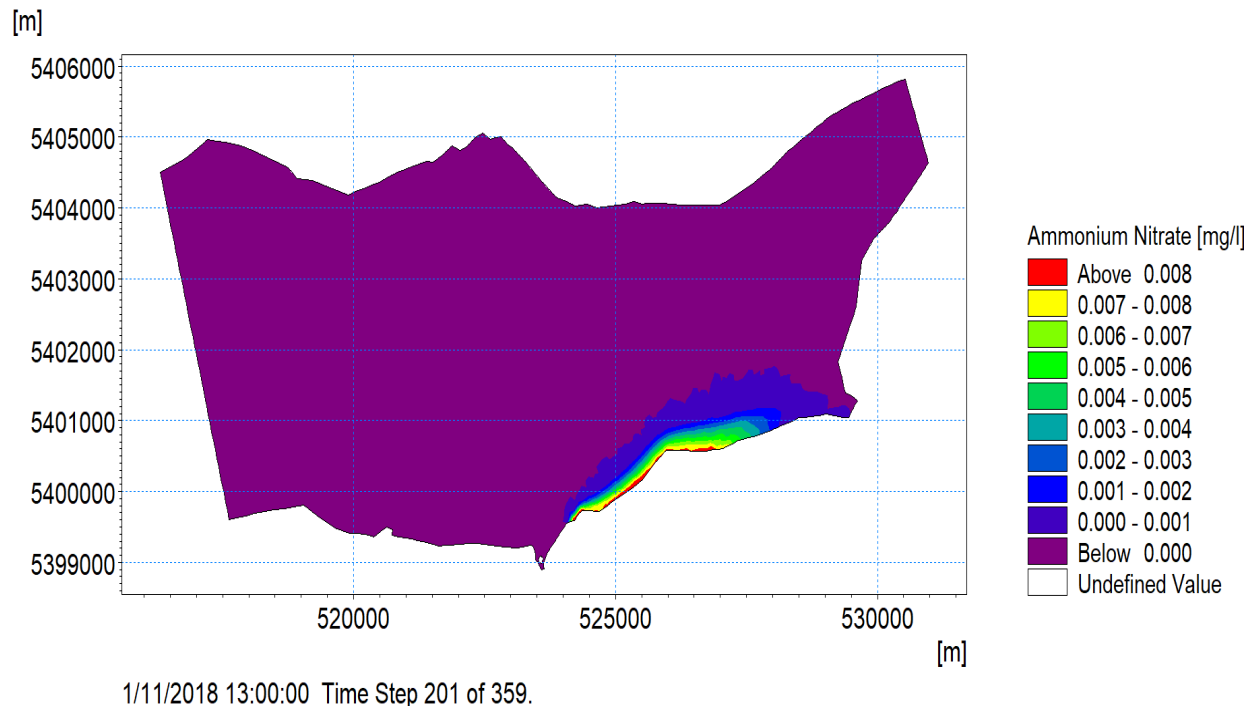


Figure B.4 Ammonium Nitrate Concentration (Q30 Scenario)

Figure B.5 shows the simulation results for diesel after the breakup and dissociation process started. In the Q30 scenario, diesel reached to the Exploits River dam after 205 hours of simulation (8 days and 13 hours). No CWQG-FAL limits are defined for diesel. The maximum concentration of diesel when the breakup process started was 1.5 µg/l at the sediment location. The maximum concentration of diesel at the Exploits River dam was 0.11 µg/l, which was reduced by 93%.



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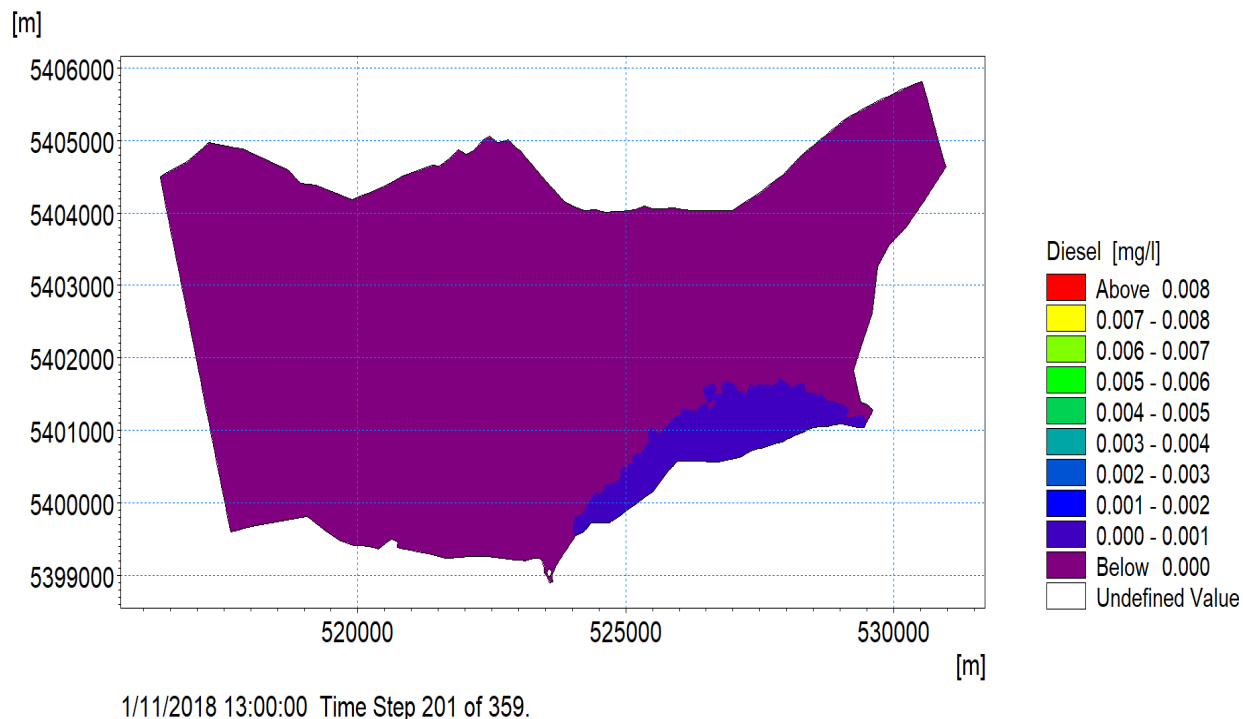


Figure B.5 Diesel Concentration (Q30 Scenario)

Summary of Findings

The potential impacts of an accidental spill of TITAN 1000 G emulsion on the water quality of Red Indian Lake and the Victoria River was evaluated under three spill modelling scenarios over a two-step modeling process. The simulation results showed that the spilled materials have the highest initial dispersion area under flow scenario 3 (high flow). The maximum concentrations of total ammonia, unionized ammonia, and nitrate at the Exploits River dam were below the CWQG-FAL limit. The total ammonia, unionized ammonia and nitrate are not expected to persist in the environment, nor result in potential bioaccumulation. Diesel may attach to nearshore and shoreline vegetation and shallow sediments and thus the potential exists for some further persistence of diesel in the environment. None of the fate and behavior modelling considered spill response, particularly for diesel where the deployment of spill diversion, collection and sorbent booms and product recovery would be reasonably implemented. Thus, the modelling is considered to be conservative and represent a worse-case condition.

The following compares the results presented in Chapter 21 for an accidental spill of ammonium nitrate in solid prill form and in this memo for an accidental spill of TITAN 1000 G emulsion:

- Hydrodynamic conditions including inflows, water levels, and current velocities were identical.



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- The main difference in the results is due to the nature of the materials spilled into the water: in Chapter 21 and the technical memo in Appendix 21A of the EIS, it was assumed that the spilled ammonium nitrate becomes soluble in the water immediately after the spill and breaks down to ammonia and nitrate; therefore, the travel time of the material was shorter and resulting concentrations were higher at the Exploits River dam. However, the TITAN 1000 G emulsion behaviour in the water is different than ammonium nitrate. This material does not immediately become soluble in the water and the breakdown process takes some time; therefore, the total travel time to the dam was longer and resulting concentrations were lower as a result of a longer breakdown process.
- The significance of residual environmental effects from a spill of ammonium nitrate emulsion are consistent with the effects predicted in Chapter 21 for a hazardous materials spill as outlined in Section 21.5.2.

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APPENDIX F

Project Refinements as Caribou Mitigation

**Valentine Gold Project: Project
Refinements related to Caribou
Mitigation, Supplemental
Information**



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1.0 PROJECT REFINEMENTS AND RATIONALE

Project refinements are a necessary and expected aspect in the evolution of a mining project throughout the progression of the Environment Assessment (EA), planning and permitting stages of a project. Refinements to the Valentine Gold Project description have been made since it was presented in Chapter 2 of the EIS. This refinement pertains to the layout of infrastructure within the Project Area, specifically near the Marathon pit area, which has been identified as an obstacle to migrating caribou. Through the review of mitigation measures in the context of the Caribou Protection and Environmental Effects Monitoring Plan (CPEEMP) and consultation with the Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture (NLDDFA)-Wildlife Division, alternatives to the current layout for the low-grade ore (LGO) stockpile, overburden stockpile and waste rock pile were discussed to improve the permeability of the site for caribou migrating through the Project Area.

Based on these discussions, Marathon Gold Corporation (Marathon) has determined it to be technically and environmentally feasible to refine the layout/location of the LGO and overburden stockpiles and the waste rock pile (dividing the waste rock pile into two piles to be located to the northwest and southeast of the open pit). These refinements will provide wider and more direct travel paths within the primary migratory corridor both during operation of the mine, and through rehabilitation, closure and post-closure. Combining specific temporal mitigation measures (e.g., reduction in on-site activity during the sensitive migratory period) to reduce sensory disturbances with the change in the physical layout of the infrastructure set within the primary migratory corridor, it is expected that the migratory path will be more functional than that originally anticipated based on the site layout presented in the EIS and EIS Amendment. The refined site layout has been reviewed and discussed with NLDDFA-Wildlife Division and deemed to be an improved approach for migrating caribou. The refined site layout has also been discussed with other members of the Environmental Assessment Committee, as applicable.

Dividing the Marathon waste rock pile will create a combined footprint that is approximately 13% larger than that of the original waste rock pile. Approximately 75% of the Marathon waste rock pile footprint (90% of the volume) would be located on the northwest side of the pit and nearly 25% of the footprint (10% of the volume) southeast of the pit (See Figure 1-1). The proposed shape of the two waste rock piles will also form a permanent diversion around the open pit, reducing the potential that migrating caribou would directly encounter the open pit. In addition, the LGO stockpile will be shifted 450 m to the southwest and will increase in footprint from 20 hectares to 25 hectares (a 25% increase). The overburden stockpile will also be shifted approximately 125 m to the southwest, with the footprint being reduced by approximately 10%. The refinements to the stockpiles and waste rock pile will also require adjustments to the water management infrastructure associated with these Project features as further discussed in Section 2.2. Note that all the proposed Project refinements occur within the Project Area assessed in the EIS.



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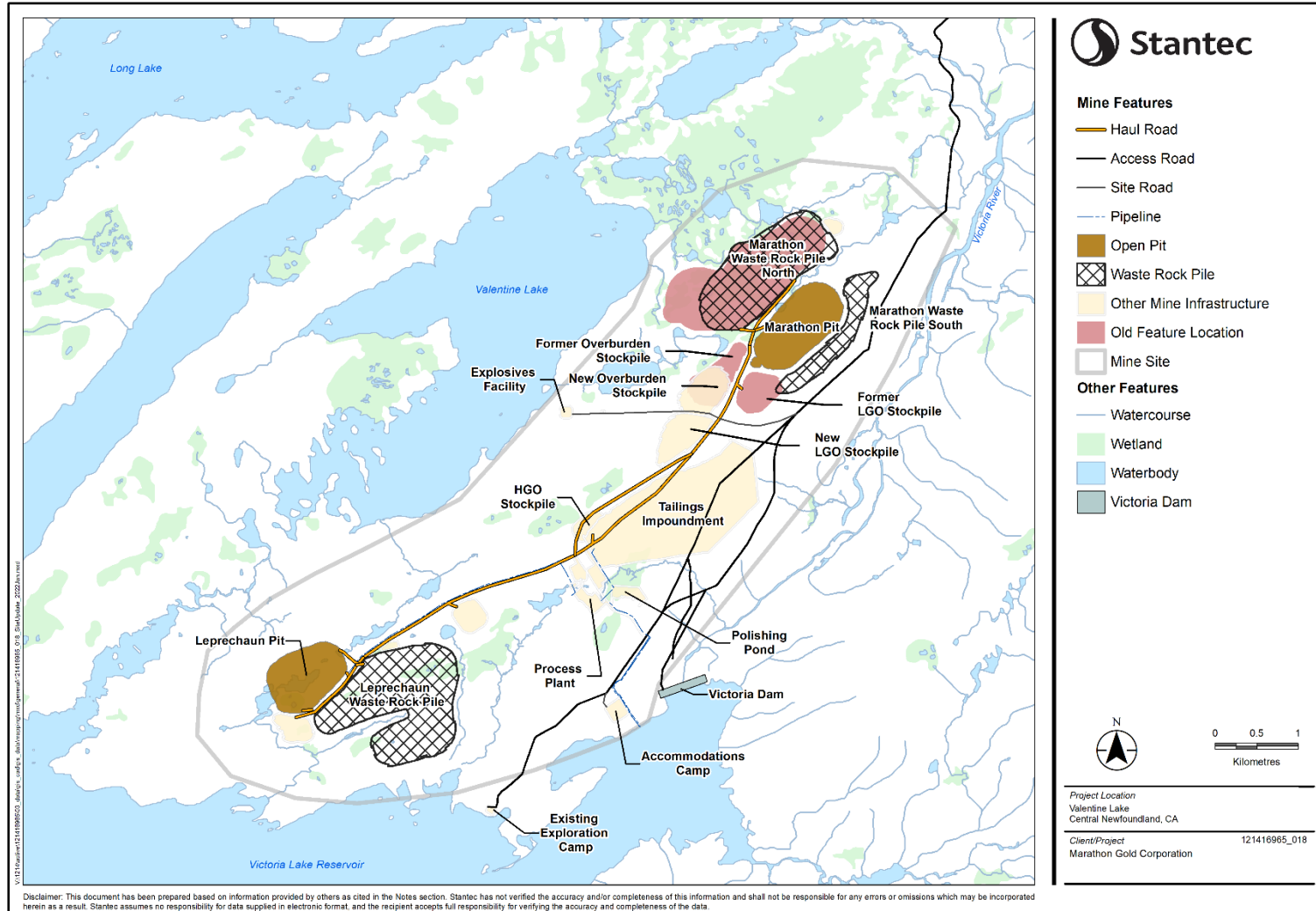


Figure 1-1 Updated Project Layout



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The proposed Project refinements do not constitute a substantive change to the scope of the Project, either individually or in combination. Given the conservative approach to the effects assessment employed in the EIS, the information presented in Section 2 of this document demonstrates that no further environmental assessment is required related to these proposed Project refinements. Note that Marathon does not anticipate further Project refinements during the EA process.

2.0 IMPLICATIONS FOR THE ENVIRONMENTAL ASSESSMENT

In consideration of the Project refinements described above, a review of the potential impacts to the assessment of valued components (VCs) described in the EIS has been conducted and is provided below.

Note that the geographic boundaries (i.e., Project Area, Local Assessment Areas (LAA) and Regional Assessment Areas [RAA]) described in the EIS for each VC have not changed as a result of the Project refinements, nor have the mitigation and monitoring proposed in the EIS to reduce potential adverse residual Project effects.

2.1 ATMOSPHERIC ENVIRONMENT

An assessment for Atmospheric Environment (Chapter 5) was provided in the EIS. The following effects were assessed for this VC:

- Changes in air quality
- Change in greenhouse gas (GHG) emissions
- Change in sound quality
- Change in light levels

The refinements to the site layout do not alter the findings of the EIS with respect to a change in GHG emissions or light levels within the LAA. With respect to a change in air and sound quality, the refinements to the site layout will result in slight changes to predicted concentrations and sound levels along the boundary of the mine site and potentially further downwind, however this does not change the overall conclusions of the assessment. Therefore, the Project refinements do not result in changes to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS with respect to the Atmospheric Environment.

2.2 WATER RESOURCES

An assessment for Groundwater Resources (Chapter 6) and Surface Water Resources (Chapter 7) was provided in the EIS. The following effects were assessed for these VCs:

- Groundwater Resources
 - Change in groundwater quantity
 - Change in groundwater quality



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- Surface Water Resources
 - Change in surface water quantity
 - Change in surface water quality

To determine whether the proposed refinements would result in changes to these effects as presented in the EIS, further analysis was conducted as described below.

2.2.1 Relocation of the Overburden and Low-Grade Ore Stockpiles

The overburden and LGO stockpiles both drain currently to Pond MA-SP-01AB, adjacent to the overburden stockpile. These stockpiles would continue to drain to MA-SP-01AB with the proposed refinements. As the total area draining the LGO and overburden stockpile areas will remain similar as previously assessed and presented, no change in pond MA-SP-01AB is required.

Groundwater in the area of the overburden and LGO stockpiles drains northwest from the ridge to the east forming the local topographic high towards Valentine Lake ValP3 pond and tributary. Perimeter drains would route surface runoff and intercept shallow groundwater as is proposed in the current design. As the stockpile materials, pile design, and placement methods are still the same, a slight adjustment in the shape and/or height does not result in a change in model assumptions of infiltration and seepage characteristics. Therefore, it is anticipated that no new or expanded groundwater effects would be experienced. Similarly, from a Water Balance/Water Quality (WB/WQ) modelling perspective a relocation of the LGO stockpile and readjustment of the overburden stockpile with the same areal footprint and tonnages is expected to yield similar WB/WQ model results meaning similar Monte Carlo simulation results with sedimentation pond inflow water quality meeting MDMER limits. Finally, as sedimentation ponds MA-SP-01A and 01B (refer to Water Management Plan, Appendix 2A of the EIS, Figure 4.1), both of which discharged to the same VALP3 tributary, were combined to form the MA-SP-01AB pond at the feasibility stage, it is expected that MA-SP-01AB water quality would be the same as with two separate ponds and the assimilative capacity study would also yield no increase in mixing zone extent. The ultimate mixing zone boundary would remain the same as currently proposed in Valentine Lake.

No substantive changes to infiltration, groundwater and seepage, surface runoff, water balance and geochemistry, effluent quality and ultimately to the assimilative capacity assessment of the VALP3 tributary and Valentine Lake receiver are anticipated as a result of the proposed changes to the overburden and LGO stockpiles. As a result, the proposed Project refinements do not result in changes to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS for Groundwater Resources and Surface Water Resources.

2.2.2 Relocated Portion of Marathon Waste Rock Pile

As shown in Figure 1.1, a portion (25% of the area) of the waste rock pile will be relocated to the southeast of the Marathon open pit. The portion of the waste rock pile to be relocated currently drains to MA-SP-02, which drains to Valentine Lake through a local tributary. Waste rock is not planned to be stored in the Marathon waste rock pile until later in 2023 and not in the pile located southeast of the open pit until early 2024. The proposed relocation of waste rock would eliminate the need for pond MA-SP-02 and the waste rock pile's southwest extent would be designed to follow the drainage divide between pond



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MA-SP-02 and the next pond to the northwest, which is MA-SP-03, to avoid stranding collected runoff and seepage and facilitating gravity drainage to MA-SP-03.

The relocated portion of the waste rock pile would be sited to the southeast of the Marathon open pit, between the pit and the ridge to the southeast forming the topographic high and local watershed divide. Drainage in the area of the proposed waste rock relocation is to the northwest down the local hill slope and towards the north and the Victoria Steadies, which drain to the Victoria River to the northeast.

As the relocated portion of waste rock is a new stockpile, an assessment of groundwater was conducted semi-quantitatively by assessing infiltration, stockpile seepage and shallow groundwater flow regimes determined for the LGO stockpile and waste rock pile, which represent the physical material characteristics of the relocated waste rock. Geotechnical test pitting conducted in support of Marathon open pit overburden stripping and dewatering indicate that overburden under the proposed waste rock stockpile is relatively shallow underlain by bedrock. In the southwest of the proposed relocated stockpile, depth to bedrock is expected to be < 0.85 m, and depth to groundwater is approximately 0.20 m. As the stockpile extends north, the depths to bedrock increase to approximately 2.0 m with depth to groundwater of approximately 0.80 m. The infiltration and seepage characteristics of the relocated stockpile would be similar to that assessed for the previous LGO stockpile and the single waste rock pile. The portion of the waste rock pile to be relocated was in an area of poorly drained ground with the groundwater surface at or near the ground surface. As a result, collection ditching was very shallow sloped and oversized to account for the poor drainage conditions. Moving the portion of the waste rock pile to the southeast of the Marathon open pit relocates this part of the pile to an area of much better drained ground, with improves gravity drainage. Thus, the relocated stockpile would infiltrate and seep similarly to the LGO stockpile and waste rock pile, but due to improved ground drainage intercepting the shallow groundwater surface with collection ditches is more technically feasible, efficient and effective.

The relocated waste rock pile can have collection ditches along the northwest, north and northeast perimeters as the site is on a slope draining naturally toward the northwest and north. Collected seepage and runoff would be directed to pond MA-SP-05, which is proposed as the Marathon open pit dewatering pond and would be expanded to accommodate the additional seepage and runoff from the relocated waste rock pile. Based on the relocated waste rock pile sizing, the pond MA-SP-05 volume capacity would have to be expanded to 80,000 m³ of active storage to accommodate the drainage from the relocated pile. Design event runoff and seepage is expected to peak at 10 m³/s. The Final Discharge Point for MA-SP-05 would remain the same.

The WB/WQ model accounts for the expected range and quantity of waste rock lithologies in a composite stockpile. Marathon is proposing to manage the expected minor volume of potentially acid generating (PAG) rock by blending and encapsulation by non-PAG rock with excess of neutralization potential. As such it is expected that the relocated waste rock pile will perform geochemically similar to the results modelled for the original waste rock pile and thus runoff and seepage quality will remain the same as modeled in the EIS.

Finally, the existing assimilative capacity model was updated to account for the new source draining to MA-SP-05 and ultimately to the Victoria Steadies and Victoria River from its previous drainage to MA-SP-02 and Valentine Lake. For normal operating conditions (average flows) water quality in the Victoria River



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meets the CWQG-FAL within 100 m of discharge into the river. For the regulatory scenario (7Q10 flow), similarly to previously presented results in the EIS, aluminum, copper, lead and zinc are predicted to be above CWQG-FAL in the ultimate mixing zone in the Victoria River. However, based on extension of dilution ratios for the regulatory scenario, it is expected that the ultimate mixing zone of 300 m (as predicted in the EIS) is still applicable, and that aluminum, copper, lead and zinc concentrations return to CWQG-FAL thresholds within 300 m of discharge into the Victoria River, as previously presented.

Based on the above, the proposed Project refinements do not result in changes to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS for Groundwater Resources and Surface Water Resources.

2.3 FISH AND FISH HABITAT

An assessment for Fish and Fish Habitat (Chapter 8) was provided in the EIS. The following effects were assessed for this VC:

- Change in fish habitat quantity
- Change in fish habitat quality
- Change in fish health and survival

As described above, refinements to the footprint and location of the waste rock pile, overburden stockpile, LGO stockpile and water management ponds/ditching are not anticipated to change predictions of mass loadings to surface water receivers. Effluent quality in consideration of Project refinements is predicted to meet the MDMER criteria as described in the EIS, and effluent mixing and assimilative capacity are predicted to remain within the mixing zone boundary extents, also as described in the EIS. Therefore, the proposed refinements do not change the characterization of residual effects, proposed mitigation, or overall conclusions described in the EIS as it related to fish habitat quality and fish health and survival.

The Project refinements avoid overprinting fish habitat. Water management infrastructure design modifications may result in changes in stream flows and indirect loss of fish habitat. As such, it will be necessary to recalculate the loss in the watershed area (or loss in flow contribution) for streams where indirect loss is anticipated based on the new Project layout and associated water management infrastructure. The corresponding potential changes in fish habitat quality (geomorphology, water velocity, habitat type [e.g., riffles, runs] and wetted channel perimeter) are consistent with the effects described in the EIS. The Project modifications are not anticipated to exceed the total anticipated loss of fish habitat quantity, which was predicted in the EIS (Section 8.5.1). As described in Section 8.5.1 of the EIS, the loss of habitat (direct and indirect) will be quantified and offset as part of the *Fisheries Act* Authorization process following consultation with Fisheries and Oceans Canada.

The proposed Project refinements do not result in changes to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS for Fish and Fish Habitat.



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2.4 TERRESTRIAL ENVIRONMENT

The EIS assessed potential Project-related effects on Vegetation, Wetlands, Terrain and Soils (Chapter 9), Avifauna (Chapter 10), Caribou (Chapter 11), and Other Wildlife (Chapter 12). The following effects were assessed for these VCs:

- Vegetation, Wetlands, Terrain and Soils:
 - Change in Species Diversity
 - Change in Community Diversity
 - Change in Wetland Function
 - Change in Terrain and Terrain Stability
 - Change in Soils Quality and Quantity
- Avifauna and Other Wildlife
 - Change in Habitat
 - Change in Mortality Risk
- Caribou
 - Change in Habitat
 - Change in Movement
 - Change in Mortality Risk

As described in the EIS, a conservative approach was used to address uncertainty in the environmental effects assessment for habitat loss and/or alteration. This conservative approach also allows for refinements to the site layout, as these typically occur through detailed Project design and planning. Specifically, the assessment assumed the following:

- That all habitat within the Project Area would be disturbed, altered or lost, resulting in a direct loss or change of vegetation and habitat; in practice, not all vegetation will be cleared within the Project Area.
- That all wetlands within the Project Area would be disturbed, altered or lost, resulting in a direct loss of wetland function; in practice, not all wetlands within the Project Area will be altered or disturbed.

Given the conservative assumptions described above and that the Project refinements will occur entirely within the Project Area, there is no change in the assessment of habitat loss and/or alteration presented in the EIS for the terrestrial VCs.

In addition, the Project refinements do not result in a change in the assessments of sensory disturbance on avifauna, other wildlife, or caribou. The refinements do not result in measurable changes to noise, dust, or light emissions relative to those presented in the EIS (refer to Section 2.1 of this Attachment). The assessment in the EIS also conservatively assumed that indirect habitat alteration/loss would occur within a buffer around the mine site. As the proposed Project refinements are located within the mine site, the assessed buffers as described in the EIS remain valid.

The primary pathways for change in mortality risk are through vegetation clearing and earthworks, vehicular collisions, human-wildlife conflicts, and predation. The Project refinements are not anticipated to result in measurable changes to these pathways.



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With regards to the assessment of a change in caribou movement, the primary effect pathway is from the alteration or loss of existing caribou paths along a preferred migration corridor within the Project Area. As described in the EIS, a primary spring / fall migration corridor used by Buchans herd caribou directly overlaps with Project infrastructure, and residual effects on a change in movement are predicted to be significant, as the mine site (the Marathon open pit and waste rock piles, specifically) has been determined to present a potential obstacle to caribou migration. The Project refinement to divide the Marathon waste rock pile will provide wider and more direct travel paths within the site and allow migrating caribou to more readily move through the Project Area. While the site layout has been refined to reduce adverse effects to migrating caribou and will result in a more functional migratory path than originally anticipated in the site layout presented in the EIS and amendment to the EIS, the Project refinements do not change the EIS prediction of a significant residual environmental effect on caribou.

In summary, the proposed Project refinements do not result in changes to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS for Vegetation, Wetlands, Terrain and Soils, Avifauna, Caribou, and Other Wildlife.

2.5 SOCIO-ECONOMIC ENVIRONMENT

The EIS assessed potential Project-related effects on Infrastructure and Services (Chapter 13), Community Health (Chapter 14), Economy and Employment (Chapter 15), and Land and Resource Use (Chapter 16). The following effects were assessed for these VCs:

- Infrastructure and Services:
 - Change in local housing and temporary accommodations
 - Change in local services and infrastructure
- Community Health
 - Change in community well-being
 - Change in physical health conditions
- Employment and Economy
 - Change in regional labour force
 - Change in economic activities of outfitters
 - Change in economy
- Land and Resource Use
 - Change in land use
 - Change in resource use
 - Change in recreational use

Given that the proposed Project refinements will not result in a change to Project-related population growth or Project demand for, and expenditures on, services, labour, materials, and equipment described in the EIS, the Project refinements do not result in changes to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS for Infrastructure and Services and Economy and Employment.



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With respect to community health, effects pathways as described in the EIS may result in a change to community well-being (availability of health services and infrastructure) and physical health conditions (potential effects to air and water quality and country foods due to Project-related emissions). Since filing the EIS, a human health risk assessment (HHRA) was completed for the Project and was submitted to both the Impact Assessment Agency of Canada (as part of Marathon's responses to Information Requirements) and to the Newfoundland and Labrador Department of Environment and Climate Change (as part of the EIS Amendment). As described in Section 2.2 of this Attachment, the proposed Project refinements do not alter the surface water quality predictions presented in the EIS and, therefore, do not alter the conclusions of the HHRA. As a result, the Project refinements do not result in changes to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS for Community Health.

With respect to land and resource use, the primary effects pathways are through the Project activities and components, as these may restrict access to, or cause loss of, areas used for resource activities and/or recreation. As the Project refinements will occur within the assessed Project Area, they will not result in measurable changes to these pathways. Therefore, the Project refinements do not result in changes to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS for Land and Resource Use.

2.6 INDIGENOUS GROUPS

An assessment of potential Project-related effects for Indigenous Groups (Chapter 17) was provided in the EIS. The following effects were assessed for this VC:

- Change in current use
- Change in Indigenous health conditions
- Change in Indigenous socio-economic conditions
- Change in physical and cultural heritage

Given that the Project refinements will occur within the existing Project Area, they will not result in measurable changes to effects on Indigenous groups related to current use, socio-economic conditions, or physical and cultural heritage. With respect to Indigenous health conditions, the discussion provided in Section 2.5 of this Attachment for Community Health is also applicable to Indigenous Groups. As indicated in Section 2.5, the Project refinements do not alter the conclusions of the HHRA, which evaluated potential human health risks for Indigenous and non-Indigenous receptors. Therefore, the Project refinements do not result in changes to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS for Indigenous Groups. Marathon will continue to engage with Indigenous groups, including Indigenous resource users, throughout the life of the Project.



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2.7 HISTORIC RESOURCES

The EIS assessed potential Project-related effects on Historic Resources (Chapter 18). As noted in the EIS, there are no known registered archaeological sites within the Project Area. As discussed in Section 18.2.3.4 of the EIS, there is one area of archaeological potential within the Project Area, however this area does not overlap with the footprints of the refined Project infrastructure. Therefore, the Project refinements do not result in changes to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS for Historic Resources.

2.8 DAM INFRASTRUCTURE

The EIS assessed potential Project-related effects on Dam Infrastructure (Chapter 19). The following effects were assessed for the VC:

- A change in water quality in Victoria Lake Reservoir
- A change in water balance in Victoria Lake Reservoir
- A change in dam stability for the Victoria Dam

The proposed Project refinements do not result in changes in water quality or water balance with respect to Victoria Lake Reservoir, as described in Section 2.2, above. In terms of a potential change in dam stability for the Victoria Dam, the effects pathways include vibrations due to blasting and potential inundation from a failure of the tailings management facility. The proposed Project refinements do not result in changes to the expected vibration frequency or intensity presented in the EIS generally, or specific to the Victoria Dam.

Based on these factors, the proposed Project refinements do not result in a change to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS for Dam Infrastructure.

2.9 CUMULATIVE EFFECTS

Cumulative effects were assessed for the following VCs:

- Atmospheric Environment
- Groundwater Resources
- Surface Water Resources
- Fish and Fish Habitat
- Vegetation, Wetlands, Terrain and Soils
- Avifauna
- Caribou
- Other Wildlife
- Community Services and Infrastructure
- Community Health



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- Employment and Economy
- Land and Resource Use
- Indigenous Groups
- Historic Resources

The cumulative effects assessment includes consideration of other physical activities that have been (past), are being (present and ongoing), and will be carried out (reasonably foreseeable future) in the cumulative effects RAA. The pathways for cumulative effects are the same as those described for the assessment of Project residual effects on each VC. As described above, the Project refinements do not result in changes to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS, and would therefore also not result in a change to the cumulative effects assessment.

3.0 CONCLUSIONS

Based on the above, the proposed Project refinements do not constitute a substantive change to the scope of the Project. Given the conservative effects assessment approach used within the EIS, no further assessment, beyond the information provided herein, is considered necessary. The Project refinements do not result in changes to the characterization of residual adverse effects, proposed mitigation, or overall conclusions described in the EIS. The conclusion that routine Project activities will not cause significant adverse environmental effects on any of the VCs, with the exception of caribou, remains unchanged.



APPENDIX G

Human Health-related Mitigation Measures and Monitoring Table

APPENDIX G - HUMAN HEALTH-RELATED MITIGATION MEASURES AND MONITORING TABLE

Table DHCS(2)-03.1 Mitigation and Monitoring Specific to Human Health

Category	Mitigation and Monitoring	C	O	D	Discipline-Specific Measures Related to Human Health	Public Safety Considerations
Site Clearing, Site Preparation and Erosion and Sediment Control	Vegetation will be maintained around high activity areas to the extent practicable, to act as a buffer to reduce sensory (light and noise) disturbance.	✓	-	-	✓	-
	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.	✓	-	-	-	✓
	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.	✓	-	-	✓	-
	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.	✓	-	-	✓	-
	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.	✓	-	-	✓	-
	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: <ul style="list-style-type: none"> • 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 	✓	-	-	-	✓
	Signage will be installed around the mine site to alert the public and land users of the presence of the Project and its facilities.	✓	✓	✓	-	✓
	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.	✓	✓	-	✓	-
Blasting	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.	✓	✓	-	-	✓



APPENDIX G - HUMAN HEALTH-RELATED MITIGATION MEASURES AND MONITORING TABLE

Category	Mitigation and Monitoring	C	O	D	Discipline-Specific Measures Related to Human Health	Public Safety Considerations
	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.	✓	✓	-	-	✓
	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.	✓	✓	-	-	✓
Air Emissions	During dry periods, water will be applied to the access road, site roads and haul roads as needed to mitigate dust emissions. The application of water will be limited to non-freezing temperatures to avoid icing that can present a safety hazard. Watering is most effective immediately after application, and repeated watering several times a day might be required, depending on surface and meteorological conditions. Water used for dust suppression will be sourced from site contact water, not natural waterbodies.	✓	✓	✓	✓	-
	The application of dust suppressants other than water to roads as an alternative option to watering will be considered in consultation with NLDECCM. Dust suppression would be applied on an as-needed basis during high wind conditions or if measured ambient particulate matter (PM) concentrations are in exceedance of the Newfoundland and Labrador Ambient Air Quality Standards, and if an increase of watering is determined ineffective or unfeasible at the time. The chosen dust suppressant will be approved by the NLDECCM prior to application. These suppressants, if required, will be applied, as per the manufacturer's recommendations.	✓	✓	✓	✓	-
	Conveyors will be covered to reduce fugitive dust emissions.	-	✓	-	✓	-
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.	✓	✓	✓	✓	-
	Vehicles and heavy equipment will be maintained in good working order and will be equipped with appropriate mufflers to reduce noise.	✓	✓	✓	✓	-
	Haul roads and infrastructure will be designed to reduce transportation and haul distances where possible.	✓	✓	-	✓	-
Vehicles / Equipment / Roads	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.	✓	✓	✓	-	✓



APPENDIX G - HUMAN HEALTH-RELATED MITIGATION MEASURES AND MONITORING TABLE

Category	Mitigation and Monitoring	C	O	D	Discipline-Specific Measures Related to Human Health	Public Safety Considerations
	Traffic control measures such as permanent entry/exit security gates, placement of barricades (e.g., large boulders and fencing) will be used to restrict public access to the mine site. This could also include lighting and signage including stop signs.	✓	✓	✓	-	✓
	Highway laws will be obeyed, including seasonal weight restrictions, speed limits, traffic signage and requirements for permit for oversized loads.	✓	✓	✓	-	✓
Light Emissions	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.	✓	✓	✓	✓	-
	Lights will be designed to avoid excessive use of mobile flood lighting units and will be turned off when they are not required.	✓	✓	✓	✓	-
	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.	✓	✓	✓	✓	-
	Full cut-off luminaires will be used wherever practicable to reduce glare, light trespass and sky glow from Project lighting.	✓	✓	✓	✓	-
Noise Emissions	Project facilities and infrastructure will be designed to limit noise emissions.	-	✓	-	✓	-
	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.	✓	✓	-	✓	-
	If stakeholder issues and concerns related to noise are identified and cannot be resolved informally through the engagement process, these can be referred to the formal Grievance Process. The Grievance Process has been designed to enable Indigenous groups or any stakeholder or stakeholder group, including communities, cabin owners, outfitters, and recreational land users, to bring concerns and complaints to the attention of Marathon and forward for appropriate resolution. The Grievance Process will provide an accessible, timely, efficient and transparent procedure to communicate, document and resolve stakeholder and Indigenous concerns which will not, however, supplant or replace judicial or administrative remedies which may otherwise be available.	✓	✓	✓	✓	-
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.	✓	✓	✓	✓	-



APPENDIX G - HUMAN HEALTH-RELATED MITIGATION MEASURES AND MONITORING TABLE

Category	Mitigation and Monitoring	C	O	D	Discipline-Specific Measures Related to Human Health	Public Safety Considerations
	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.	✓	✓	✓	✓	-
	Existing drainage patterns will be maintained to the extent feasible with the use of culverts and bridges.	✓	✓	-	✓	-
	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.	✓	-	-	✓	-
	Project water storage features (i.e., sedimentation ponds) will be used to attenuate peak discharges to the environment.	✓	✓	✓	✓	-
	Standard construction methods, such as seepage cutoff collars, will be used where trenches extend below the water table to mitigate preferential flow paths.	✓	-	-	✓	-
	Water management ditches will be designed to allow wildlife crossing opportunities, aligned with wildlife trails where practicable.	✓	✓	✓	✓	-
	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.	✓	✓	-	✓	-
	Site ditching will be designed to reduce erosion and sedimentation through use of rock check dams, silt fences, plunge pools, and grading as appropriate.	✓	✓	✓	✓	-
	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.	✓	✓	-	✓	-
	Culverts will be inspected periodically to remove accumulated material and debris upstream and downstream of the culverts.	✓	✓	✓	✓	-
	Perimeter grading and access roads will be used to divert runoff away from the open pit and reduce the amount of dewatering required.	✓	✓	-	✓	-
	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.	✓	✓	✓	✓	-
Site Water Management	Where possible, contact water will be recycled for use on-site (e.g., dust suppression).	✓	✓	✓	✓	-
	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.	✓	✓	✓	✓	-
	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.	-	-	✓	✓	-



APPENDIX G - HUMAN HEALTH-RELATED MITIGATION MEASURES AND MONITORING TABLE

Category	Mitigation and Monitoring	C	O	D	Discipline-Specific Measures Related to Human Health	Public Safety Considerations
	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.	-	✓	-	✓	-
	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.	✓	✓	✓	✓	-
	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 <i>Metal and Diamond Mining Effluent Regulation</i> (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.	✓	✓	✓	✓	-
	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.	✓	✓	✓	✓	-
	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.	✓	✓	✓	✓	-
	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).	✓	✓	✓	✓	-
	Effluent discharge rates will be maintained to below the highest rate used in the Assimilative Capacity Assessment (Appendix 7C).	✓	✓	✓	✓	-
	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.	✓	✓	-	✓	-
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	✓	✓	✓	-	✓
	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.	✓	✓	✓	-	✓
	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.	✓	✓	✓	-	✓



APPENDIX G - HUMAN HEALTH-RELATED MITIGATION MEASURES AND MONITORING TABLE

Category	Mitigation and Monitoring	C	O	D	Discipline-Specific Measures Related to Human Health	Public Safety Considerations
	Marathon has engaged Engineers of Record who have and will continue to be responsible for providing technical direction regarding the safety of any Project site dams, including any tailings dams.	✓	✓	✓	-	✓
	Marathon has established an Independent Tailings Review Board (ITRB) to review all aspects of the Tailings Storage Facilities from site selection and design to closure.	✓	✓	✓	-	✓
	Marathon will employ or retain a Tailings Storage Facility qualified person for the safe management of all Tailings Storage Facilities.	✓	✓	✓	-	✓
	Marathon will provide updates to NL Hydro through the detailed design and permitting phase, and respond to any requests from NL Hydro for information or analysis. This will include consideration of potential effects to downstream infrastructure (e.g., Millertown Dam). Marathon has provided a report to NL Hydro regarding predicted vibrations from Project blasting operations with respect to the Victoria Dam. Marathon will consult with NL Hydro regarding blasting operations (construction and for mining) including a review of blast designs/plans/thresholds as part of Marathon's detailed engineering, vibration monitoring station location selection (including the Victoria Dam), and providing results of the vibration monitoring to NL Hydro over the life of the Project. Marathon will continue to consult with NL Hydro on common/shared issues such as inundation mapping, access road use and bridge work, public access to Victoria Lake Reservoir, emergency response and communications plans for the Victoria Dam and Marathon's project, and engineering studies.	✓	✓	✓	-	✓
	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.	-	✓	-	✓	-
	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.	✓	✓	✓	✓	-
	Shallow groundwater seepage from the TMF will be intercepted by seepage collection ditches and pumped back to the TMF via sump pumps.	✓	✓	✓	✓	-
	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.	-	✓	-	✓	-
	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.	-	✓	-	✓	-
	A polishing pond will receive discharge from the water treatment plant to further advance the treatment of water prior to discharge to the environment.	-	✓	✓	✓	-
	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.	-	✓	-	✓	-



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Category	Mitigation and Monitoring	C	O	D	Discipline-Specific Measures Related to Human Health	Public Safety Considerations
Waste Management	<p>The following procedures shall be implemented with respect to the management of non-hazardous waste:</p> <ul style="list-style-type: none"> • Solid waste will be handled according to the provincial <i>Environmental Protection Act</i>. • Work areas will be kept clear of waste and litter to reduce the potential for attracting wildlife and reducing potential interactions with wildlife. • Waste accumulated on site prior to disposal will be confined, so that it does not pose an environmental or health hazard. • To aid in segregation at the source, several waste disposal containers (i.e., dumpsters) will be available at various locations and labelled with the appropriate waste stream (e.g., Food Waste, Wood Waste, Metal Waste, Recyclable Containers, etc.). • Waste that may attract animals (i.e., food) will be stored in covered, wildlife-proof containers. • Solid waste materials shall be considered, prior to disposal, for reuse, resale or recycling. • Waste will be transported from site to be recycled, reused or disposed of in licensed/approved facilities, in accordance with local statutory requirements. 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 approved management facility for each material type. Contractors are responsible for their waste and are required to adhere to these same requirements. • There will be no burning of materials at site, including of non-hazardous waste. 	✓	✓	✓	✓	-
	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.	✓	✓	✓	✓	-
	Sewage effluent will be treated and monitored in accordance with the NL <i>Environmental Control Water and Sewage Regulations</i> 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.	✓	✓	-	✓	-
	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.	-	✓	-	✓	-
	Sumps and sump pumps will be installed in reagent storage areas for spillage control.	-	✓	-	✓	-
Waste Management	Fuel will be obtained from a licensed contractor who will be required to comply with federal and provincial regulations including federal <i>Sulphur in Diesel Fuel Regulations</i> , and provincial <i>Storage and Handling of Gasoline and Associated Products Regulations</i> .	✓	✓	✓	✓	-



APPENDIX G - HUMAN HEALTH-RELATED MITIGATION MEASURES AND MONITORING TABLE

Category	Mitigation and Monitoring	C	O	D	Discipline-Specific Measures Related to Human Health	Public Safety Considerations
	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.	✓	✓	✓	✓	-
	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.	✓	✓	✓	✓	-
	Transportation of hazardous materials will be conducted in compliance with the federal <i>Transportation of Dangerous Goods Act</i> and the provincial <i>Dangerous Goods Transportation Act</i>	✓	✓	✓	✓	-
	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.	✓	✓	✓	✓	-
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.	✓	✓	✓	-	✓
Site Facilities and Services	Security services will be established on-site.	✓	✓	✓	-	✓
	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.	✓	✓	✓	-	✓
	Marathon will implement COVID-19 protocols as necessary.	✓	✓	✓	✓	-
Engagement with Stakeholders, Indigenous Groups and the Public	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.	✓	✓	✓	✓	✓
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.	✓	✓	✓	✓	✓



APPENDIX G - HUMAN HEALTH-RELATED MITIGATION MEASURES AND MONITORING TABLE

Category	Mitigation and Monitoring	C	O	D	Discipline-Specific Measures Related to Human Health	Public Safety Considerations
	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.	✓	✓	✓	✓	✓
	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.	✓	✓	✓	✓	✓
Rehabilitation and Closure	Wells on site will be decommissioned in compliance with the Guidelines for Sealing Groundwater Wells (Government of NL 1997).	-	-	✓	✓	-
	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.	-	-	✓	✓	-
Accidental Event Prevention and Response	Mandatory safety orientations will be provided for employees.	✓	✓	✓	✓	✓
	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.	✓	✓	✓	✓	✓
	Appropriate project personnel will be trained in fuel handling, equipment maintenance and fire prevention and response measures.	✓	✓	✓	✓	✓
	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.	✓	✓	✓	✓	✓
Accidental Event Prevention and Response	Facilities will have a fire suppression system in accordance with the structure's function and in accordance with regulatory requirements, including NL <i>Occupational Health and Safety Act</i> and <i>Occupational Health and Safety Regulations</i> . 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.	✓	✓	✓	✓	✓



APPENDIX G - HUMAN HEALTH-RELATED MITIGATION MEASURES AND MONITORING TABLE

Category	Mitigation and Monitoring	C	O	D	Discipline-Specific Measures Related to Human Health	Public Safety Considerations
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 <i>National Building Code of Canada</i> (NBCC), <i>the National Fire Code of Canada</i> , and <i>the Canadian Dam Association Guidelines</i> . 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.	✓	✓	✓	-	✓
	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.	✓	✓	✓	-	✓
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.	✓	✓	✓	✓	✓
	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.	✓	✓	✓	✓	✓
	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.	✓	✓	✓	✓	✓
Effects of the Environment on the Project – Forest Fires	Project-related activities will be adjusted in case of a severe fire and as needed to protect the health and safety of employees.	✓	✓	✓	✓	✓
Traffic Management	The Environmental Technicians and Monitors will keep informed of upcoming weather conditions and weather warnings and notify the Environmental Superintendent / Coordinator when it is highly probable that weather could affect safe movement of vehicles. The Environmental Superintendent / Coordinator will notify the people under their responsibility of the impacts of weather on the traffic conditions by radio, telephone or toolbox meetings; and advise appropriate action including delaying travelling to or from the site. The type of weather conditions could include severe rain, hail, fog and heavy snowfall or icy conditions (e.g., freezing rain).	✓	✓	✓	-	✓



APPENDIX G - HUMAN HEALTH-RELATED MITIGATION MEASURES AND MONITORING TABLE

Category	Mitigation and Monitoring	C	O	D	Discipline-Specific Measures Related to Human Health	Public Safety Considerations
	<p>Drivers of all vehicles that have been engaged by Marathon must adhere to the following Code of Conduct for Drivers:</p> <ul style="list-style-type: none"> • Abide by Newfoundland and Labrador Department of Transportation and Infrastructure (NLDTI) road rules and vehicle regulations • Operate in full compliance with this Traffic Management Plan • Respect the rights of others, including drivers and pedestrians, to use and share the road space • Maintain a high level of courtesy • Maintain a safe following distance between vehicles • Turn off flashing/rotating beacons when on public roads • Confirm that the vehicle is clean and in good mechanical condition to reduce environmental impacts • Avoid travelling in convoys where possible unless under approved escorts • Follow the designated access routes for the Project 	✓	✓	✓	-	✓
	<p>The travel time to the mine site from Millertown is approximately two hours. To reduce increases in traffic volumes and lengthy daily commutes to the site by staff, which could result in a health and safety risk, Marathon will provide a mandatory bus system. The bus system will transport staff from designated communities to the mine site with a return trip at the end of their work rotations.</p>	✓	✓	✓	-	✓
	<p>Drop off and pick up points established in nearby communities versus one large parking area will help to mitigate an increase in traffic volumes associated with staff transportation to and from the mine site.</p>	✓	✓	✓	-	✓
	<p>Rotation changes will be scheduled so that workers do not arrive to and leave the site at the same time, limiting Project-related demands on both road and air services and infrastructure. Arrivals and departures of buses will also 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 necessary.</p>	✓	✓	✓	-	✓
Traffic Management	<p>Driver education, such as driver safety training, and advisements of updates to the TMP will assist to improve both driver and general community safety. Driver education will be delivered via employee orientation program, toolbox meetings and safety briefings.</p>	✓	✓	✓	-	✓
	<p>Heavy vehicle movements will adhere to the posted load limits for each route used. Where over-dimensioned loads/vehicles are required, the loads will be broken down to bring them within the acceptable dimensions. If over-dimensioned loads are unavoidable, a review of the intended haul route will be completed. Potential impacts will be identified and either addressed via physical improvements to infrastructure, such as roads or bridge structures, or scheduling of trips during low volume traffic hours. Necessary permits will be obtained, and relevant communities and governing bodies will be notified prior to movement of oversized loads. A traffic control plan will be prepared to describe the method(s) of controlling traffic adjacent to or around the over-dimensioned vehicle. This would include details relating to pilot and trailing vehicles or police escort (if required), as well as vehicle mounted traffic control signs.</p>	✓	✓	✓	-	✓



APPENDIX G - HUMAN HEALTH-RELATED MITIGATION MEASURES AND MONITORING TABLE

Category	Mitigation and Monitoring	C	O	D	Discipline-Specific Measures Related to Human Health	Public Safety Considerations
	Drivers engaged by Marathon are required to act responsibly when travelling through built up areas such as towns and will yield to pedestrians and other sensitive road users (e.g., cyclists, ATV users, snowmobile drivers), reducing vehicle speed in their presence.	✓	✓	✓	-	✓
	To provide a high level of courtesy while driving through such built up areas, drivers will: <ul style="list-style-type: none"> • Reduce the use of fog lights and high beams • Reduce the use of compression brakes • Use designated drop off and pick up parking areas and keep the areas safe and clean • Be conscientious of the potential risks to vulnerable users, such as pedestrians and cyclists 	✓	✓	✓	-	✓
	Education, in the form of Marathon informing the community of the practices at the mine and associated traffic will help to raise community awareness. Marathon will communicate with local communities and service providers with respect to scheduling so they may prepare for potential increased demands related to transportation.	✓	✓	✓	-	✓
	Enforcement campaigns will be conducted by Marathon periodically and if complaints are reported relating to disregard for posted speed limits or public safety.	✓	✓	✓	-	✓
	Mine access road will be upgraded to Class A with 7.3 m wide top travel surface with proper ditching and appropriately sized culverts, in accordance with, and approval by NLDTI.	✓	-	-	-	✓
	New signage will be installed along the mine access road speed limit signs, road narrows, curve ahead in accordance and approval by NLDTI.	✓	-	-	-	✓
Traffic Management	Mileage markers will be installed along the mine access road as reference in the event of a breakdown or accident.	✓	-	-	-	✓
	Vehicle operators will hold the appropriate driver's license.	✓	✓	✓	-	✓
	Permitting will be in place (as applicable) for the transport of mobile and fixed plant equipment to and from the Project site.	✓	✓	✓	-	✓
	Movement of heavy vehicles will be scheduled to occur outside of spring weight restricted periods, as applicable.	✓	✓	✓	-	✓
	Traffic control personnel will be used to manage heavy oversized loads on access roads.	✓	✓	✓	-	✓
	Deliveries will be scheduled to reduce over-sized loads on access roads during peak traffic periods and at night.	✓	✓	✓	-	✓
	Marathon will liaise with local emergency providers so that roles and responsibilities are understood and that the necessary resources required to respond to vehicle accidents are in place.	✓	✓	✓	-	✓
	Temporary construction signage will be installed during mine access road maintenance.	✓	✓	✓	-	✓



APPENDIX G - HUMAN HEALTH-RELATED MITIGATION MEASURES AND MONITORING TABLE

Category	Mitigation and Monitoring	C	O	D	Discipline-Specific Measures Related to Human Health	Public Safety Considerations
Monitoring	Ambient air quality monitoring programs will be implemented throughout the life of the Project, as required and in accordance with Project permitting and conditions of approval. Monitoring will consist of continuous, real-time, monitoring which will include meteorological monitoring (wind speed and wind direction) and monitoring of ambient TSP, PM10 and PM2.5 concentrations during the operation of the Project. The observed ambient air quality values would be compared with federal and provincial air quality standards and objectives and used to verify predicted (modelled) residual effects on air quality associated with fugitive dust. Ambient PM concentrations will be monitored in areas with predicted high concentrations and in proximity to sensitive receptors, including the accommodations camp.	✓	✓	✓	✓	-
	Surface water monitoring to confirm compliance with regulatory requirements, support predictions of effects of the Project on water quality, identify changes in drainage patterns and surface water flow, and determine if additional mitigation or response measures are required. The proposed monitoring program includes surface quality monitoring at effluent discharges (FDPs), downstream receivers (water quality points [WQPs]), WWTP inlets (inlet points [INPs]), WWTP outlets (outlet points [OUPs] and reference sites (reference quality points [RQPs]), surface water flow at FDPs, select downstream receivers (water quality and flow points [WQFPs] and (water flow points [WFPs]), and one reference site (reference quality and flow point [RQFP]), and visual inspections of facility infrastructure.	✓	✓	✓	✓	-
	Ongoing monitoring related to country foods will be employed and, should the need for further mitigation measures be identified, these would be developed in consultation with regulators, Indigenous groups and stakeholders.	✓	✓	✓	✓	-



APPENDIX H

Cumulative Effects Discussion

Valentine Gold Project:

Cumulative Effects Discussion



Marathon Gold Corporation
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1.0 Potential Cumulative Effects on Caribou

1.1 INTRODUCTION

This document consolidates findings from the Environmental Impact Statement (EIS) and subsequent woodland caribou (*Rangifer tarandus*; hereafter caribou) effects analyses completed post-EIS submission to present a focused discussion of potential cumulative effects on the caribou herds in the vicinity of the Project, as requested by the Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture(NLDFFA)-Wildlife Division to facilitate regulatory review of the Valentine Gold Project (the Project). Although this document presents supplemental information to the EIS, this information does not change the conclusions of the cumulative effects assessment (CEA) as presented in the EIS, including the prediction of a significant cumulative effect on caribou. For more information on Project-related effects on caribou that was developed in accordance with federal and provincial EIS Guidelines for the Project and in consideration of federal CEA guidance (CEA Agency 2015), refer to Chapters 11 and 20, with specific reference to Section 20.8 of the EIS and the Valentine Gold Project: Caribou Supplemental Information Report (Marathon 2021).

1.2 CARIBOU LIFE HISTORY AND ENVIRONMENTAL CONTEXT

This section describes relevant life history information of caribou on the Island of Newfoundland and provides an overview of potential effects on caribou resulting from changes in habitat, movement, and mortality risk (i.e., the environmental effects used to evaluate residual and cumulative effects in the EIS).

The Newfoundland population of caribou was assessed by the Committee on the Status of Endangered Wildlife in Canada in 2014 as a species of Special Concern (COSEWIC 2014) and was listed on Schedule 1 of the federal *Species at Risk Act* (SARA) as Special Concern in 2021 (Government of Canada 2021). The species is not listed under the Newfoundland and Labrador (NL) *Endangered Species Act*; however, in 2008, the Province provided funding for research and management initiatives to address the declining caribou population. The SARA Schedule 1 listing of caribou (Newfoundland population) may result in the Province contributing to further consultations, monitoring and reporting.

The Newfoundland population of caribou is distributed over much of the Island of Newfoundland, occurring on the Northern Peninsula, Central and Eastern Newfoundland, and on the Avalon Peninsula (Government of NL 2015a) and has been grouped into herds for management purposes based on behaviour and geographic range. The Buchans, Gaff Topsails, Grey River, and La Poile caribou herds have the potential to interact with the Project, and these herds are collectively referred to in the EIS as the “assessed herds”. These four herds represent approximately 36% of the caribou population on the Island of Newfoundland (Government of NL 2019a). Additional detail on the life history and distribution of the assessed herds is provided in Section 11.2.2.1 of the EIS.

Caribou were considered abundant on the Island of Newfoundland during the early 1900s, however populations declined rapidly between 1915 and 1920 (Government of NL 2015a), possibly resulting from the introduction of parasites associated with reindeer from Norway (Ball et al. 2001). Following this



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decline, caribou herds remained in relatively low numbers until the 1980s (Government of NL 2015a). By the mid-1990s, the population had returned to historical levels, peaking in the late 1990s at an estimated 94,000 caribou (Government of NL 2015a) with a density of approximately 150 caribou/100 km² (Thomas and Gray 2002). Since then, caribou populations have declined by approximately 60% (COSEWIC 2014; Government of NL 2015a) to an estimated 30,000 caribou (NLDFLR in Randell 2019), which has led to hunting closures in some Caribou Management Areas (CMAs)¹. Recent population estimates indicate that the Grey River, Gaff Topsails, and La Poile herds have decreased by 60-80% compared to population peaks recorded in the late 1990s (Table 11.5 in Section 11.2.2.1 of the EIS). Provincial surveys in 2016 of these herds indicate that population trends for the assessed caribou herds may be stabilizing (Government of NL 2019a).

The effects of previous activities and natural environmental influences are important in determining present-day environmental conditions in which the proposed Project is situated and predicting future cumulative effects of the Project. Contributing factors affecting caribou populations include predation, hunting, parasites, climate change, habitat loss or alteration, and development (existing and future) within their range. The decline in caribou populations since the late 1990s was precipitated by a combination of food limitation and high calf mortality, primarily a result of establishment of coyote (*Canis latrans*) on the Island of Newfoundland (Government of NL 2015a). Woodland caribou require large interconnected, lichen-rich, mature coniferous forests interspersed with barrens and wetlands (Environment Canada 2012; Weir et al. 2014; Government of NL 2020b). Research on the Island of Newfoundland found that when caribou populations were declining in the 2000s, caribou diets showed an increase in the proportion of mosses consumed, and a decrease in the proportion of shrubs, graminoids and lichens consumed (Schaefer et al. 2016). The shift in diet to low-quality forage indicates that the availability of preferred forage was limited by high caribou density (Schaefer et al. 2016).

Predation is the primary cause of caribou calf mortality on the Island of Newfoundland with approximately 90% of calf deaths attributed to predation (Lewis and Mahoney 2014). While the current adult caribou mortality rate is thought to be similar to historic rates, the decrease in calf survival since the mid-1990s is due to increased predation (Government of NL 2015a).

Climate change has the potential to affect caribou populations. Warmer temperatures and changing precipitation will alter landscape-level plant composition and plant and insect phenology (timing of recurring biological events). As the assemblage of plant species in boreal regions change (Boulanger et al. 2017), the habitats selected by caribou may become less suitable as the abundance and distribution of preferred forage plants change. Warmer temperatures may cause plants to undergo spring green-up earlier which may result in a phenological disconnect in forage biomass availability and seasonal energetic needs of caribou. For example, as the length of time between green-up and calving increases, there has been an observed increase in calf mortality and a decrease in calf production (Post and Forchhammer 2008).

¹ Caribou hunting closures have been implemented in the Avalon Peninsula CMA in 2002 (Government of NL 2002), Grey River CMA in 2008 (Government of NL 2008), and Northern Peninsula CMA in 2019 (Government of NL 2019b).



Habitat loss or alteration is an important factor affecting caribou populations across North America (Vors and Boyce 2009) and it is uncertain how anthropogenic disturbance is affecting caribou populations (NLDEC 2015). Other factors, such as parasites (e.g., brain worm, tapeworms, oestrid flies), can reduce caribou health (Hughes et al. 2009) and alter behaviour (Government of NL 2010a), including habitat selection (Skarin et al. 2004).

Defoliating insects and wildfires can have dramatic effects on caribou habitat. Areas burned by forest fire are avoided by caribou, particularly in winter, as caribou may select other undisturbed habitat types with greater thermal cover and higher amounts of forage (e.g., lichen; Schaefer and Pruitt 1991).

1.3 CUMULATIVE EFFECTS ASSESSMENT APPROACH

Where residual environmental effects from the Project have potential to act cumulatively with residual effects from other past, existing and reasonably foreseeable future projects and physical activities, a cumulative effects assessment is required by the *Canadian Environmental Assessment Act, 2012* (CEAA 2012). The cumulative effects assessment for the Project as presented in the EIS, was completed in accordance with the Canadian Environmental Assessment Agency's *Operational Policy Statement (OPS) for Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012, Technical Guidance for Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012*, and Project-specific federal and provincial EIS Guidelines. The EIS acknowledged that the effects of past and present projects and activities have contributed to existing conditions upon which Project effects were assessed. Therefore, the CEA focused on caribou resiliency or sensitivity to further environmental change resulting from the Project in combination with other ongoing projects and future activities that may affect them.

In consideration of feedback received during the EIS review period, this response provides additional detail on the existing and ongoing effects of past and current projects and activities, in addition to reasonably foreseeable future activities.

The temporal boundaries for the assessment of cumulative effects on caribou consider the timing of Project activities as listed below:

- Construction phase – approximately 2 years
- Operation phase – approximately 13 years
- Decommissioning, rehabilitation and closure phase – approximately 2 years

The seasonal distribution of caribou and seasonal changes in caribou vulnerability are also important temporal considerations for the assessment of cumulative effects on caribou. Movement patterns and seasonal ranges of the assessed herds, as well as the increased vulnerability of caribou during sensitive periods (e.g., pre-calving, calving and post-calving) influence the nature and extent of interactions with the Project. It is also important to recognize that cumulative effects may be realized over a longer period of time (e.g., more than one generation) that may extend beyond the life of the Project.



The spatial boundaries for the assessment of cumulative effects on caribou are defined by a Regional Assessment Area (RAA) that accounts for the larger movements and distributions of caribou and encompasses the projects and activities outside of the Project Area that have potential to interact cumulatively with the Project (Figure 1). Spatial boundary definitions, including of the Local Assessment Area (LAA) used to assess Project-related effects on caribou, are presented in Appendix A, as is a map of the assessed herd home ranges.

The development of the Valentine Gold Project will create risks to the Buchans herd which migrates through the Project area twice annually, and to the Grey River herd whose calving grounds are located to the south of Victoria Lake Reservoir. This CEA discussion therefore focuses on potential cumulative effects of the Project on these two herds, although cumulative effects on the Newfoundland population of caribou are discussed more generally in a retrospective summary of cumulative effects from other projects and activities in the RAA (Section 2).

2.0 Other Activities and Projects and their Effects on Caribou

Past, present, and likely future projects and activities in the RAA that have contributed or may contribute in the future to anthropogenic pressures on caribou include mining and exploration; forestry; hunting, trapping and outfitting; hydroelectric development; linear features; and off-road vehicle use. Figure 1 presents notable projects and activities relative to the RAA used for the CEA. Residual effects on caribou arising from past, present, and likely future activities and projects are predicted to be similar to those resulting from the Project; however, the specific timing and extent of residual effects from individual projects and activities may differ, resulting in differences in their relative contribution to cumulative effects.

Caribou populations in Newfoundland have fluctuated over the past century due to several contributing factors such as caribou overabundance, predation, hunting, parasites, habitat loss or alteration, and anthropogenic development within their range (more details are provided in EIS Chapter 11). This section provides additional detail on the influence of other projects and activities on existing and potential future caribou conditions and the relative contribution of these activities to potential cumulative effects within the RAA.



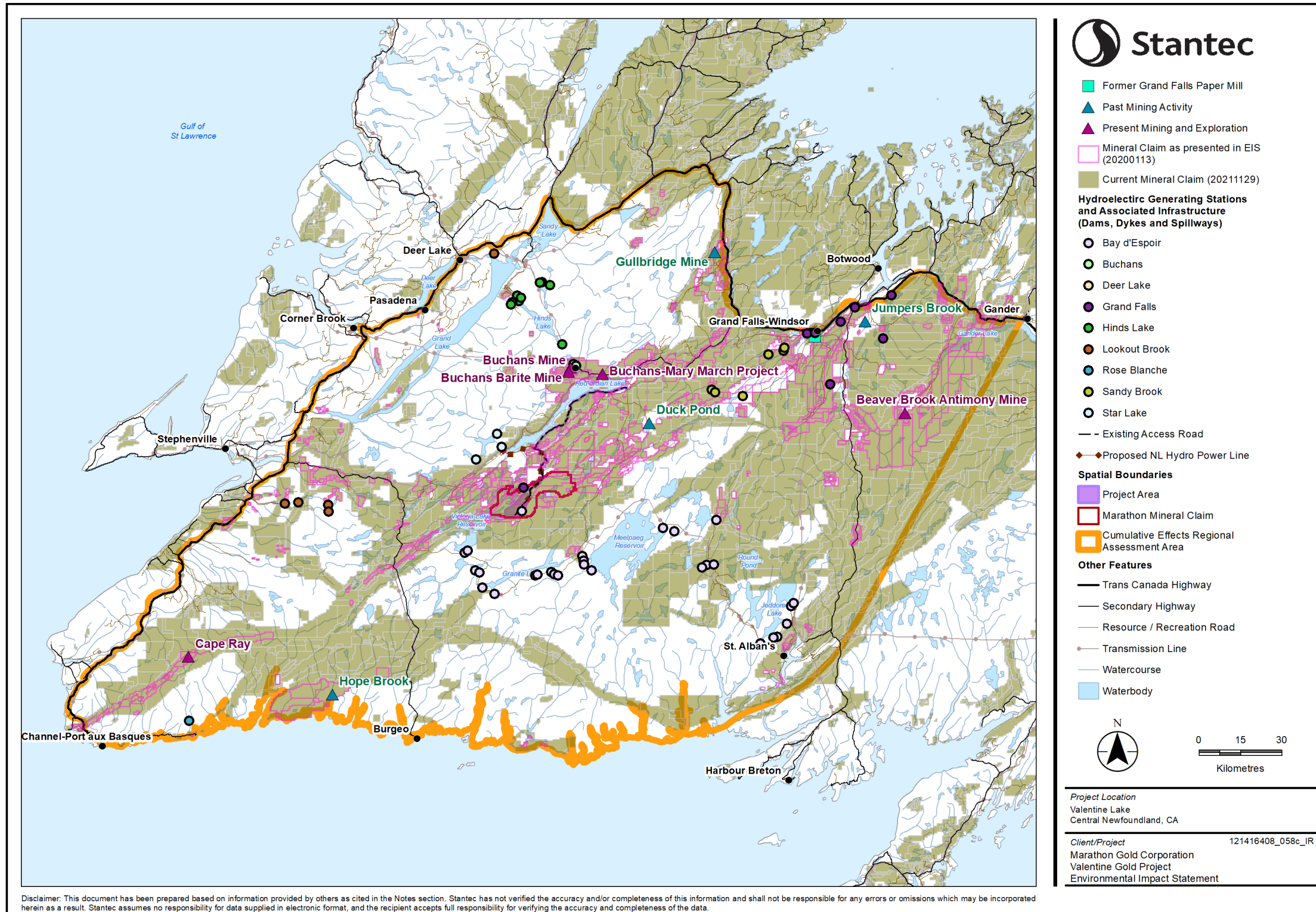


Figure 1 Other Projects and Activities Considered in the Cumulative Effects Assessment



2.1 MINERAL EXPLORATION AND MINING

The history of mining in the RAA dates back to prospecting activities in 1905 and construction of the first base metals (copper, zinc, and lead) mine in 1926 by the Buchan Minerals Corporation. The Valentine Lake area has been subject to exploration and mineralogical studies since the 1960s and the first gold exploration activities were undertaken in the early 1980s.

While historic mining exploration activities may no longer result in indirect habitat loss or alteration (i.e., sensory disturbance), these activities have altered the landscape and may continue to affect caribou. Past mining operations in the RAA (Figure 1) include:

- Buchans Mine (1962-1983; approximately 47 km from the Project Area)
- Duck Pond copper and zinc mine (2005-2015; approximately 51 km away)
- Hope Brook gold mine (1987-1997; approximately 91 km away)
- Gullbridge Mine (1967-1971; approximately 111 km away)
- Beaver Brook antimony mine (approximately 139 km away) restarted in 2019 after previous operations were suspended in 2013

The future development of mineral deposits is aligned with current Provincial direction as outlined in “Mining the Future: A Plan for Growth in the Newfoundland and Labrador Mining Industry” (Government of NL 2018) and directly linked to mineral exploration that occurs within approved mineral leases. Since the submission of the EIS, there has been a considerable increase in exploration interest from companies, as reflected in the number and extent of mineral leases approved throughout central Newfoundland, as shown in Figure 1. As exploration activities are fundamental to the discovery and subsequent development of mineral deposits, the number of leases and active exploration projects is a key indicator of long-term viability of the mining industry (Natural Resources Canada 2020). However, only a fraction of exploration projects become operating mines.² The current area of mineral claims (Figure 1) has been updated with information available as of November 2021. On the figure, new leases within and beyond the RAA are presented to illustrate the recent increase in mining activities. While mineral claims now overlap with a larger portion of the range of the assessed herds, exploration activities (and associated habitat disturbance) would only be expected to occur on a portion of the identified mineral claims.

Mining and exploration activities result in habitat loss and sensory disturbance (e.g., noise and light emissions) which may result in changes in caribou habitat availability and use, including caribou movement, and potentially contribute to reduced caribou survival. Mineral exploration activities can alter habitat through the cutting of trails, survey lines, and drill pads. On the rare occasion that mineral exploration proceeds to development, development activities are generally located on lands previously disturbed by exploration, with incremental impacts to wildlife habitat on previously undisturbed land.

²A common maxim in the mining industry is that it takes 1,000 grassroots exploration projects to identify 100 targets for advanced exploration, which in turn lead to 10 development projects, 1 of which becomes an operating mine. The area of land involved in activities reduces with each of these stages.



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Mining and exploration activities can also increase caribou mortality risk through landscape-level changes affecting caribou habitat availability and increasing access for predators and/or hunting activity, and through associated traffic increasing the risk of vehicle collisions.

The disturbances from exploration activities and proposed mining development projects that have yet to submit environmental assessment (EA) documents or file other publicly available documents (such as NI 43-101 reports³) are difficult to quantify and the anticipated areal extent of direct or indirect habitat loss or alteration is not available. Exploration programs must have an Exploration Approval before the activity can commence, with some exploration activities or activities in designated sensitive areas requiring registration under the provincial *Environmental Assessment Regulations* (Government of NL 2010b). Within the RAA, the Cape Ray, Buchans Resources Limited, and Marathon Gold leases are examples of active exploration properties. Within the Marathon lease, there are exploration activities ongoing (outside of the Project Area and scope, but within the exploration property) to determine if adjacent areas are appropriate for future development. The primary exploration work is at the 'Berry Deposit', located directly between the proposed Leprechaun and Marathon open pits, and is comprised mostly of drilling. Other, smaller exploration programs are being conducted to the northeast of the Project Area, and are comprised of reconnaissance, prospecting, and some drilling. A review of nine exploration and mining projects that have undergone or are undergoing environmental assessment in the province since 2010 demonstrates that the proposed surface footprint of each project is a relatively small area compared with the mineral claim area (i.e., 2-32%; average 13%). Proposed future mining activities would require consideration of potential environmental and socio-economic effects and associated mitigation measures to protect the environment through regulatory EA and permitting processes.

2.2 FORESTRY

Forestry has been an integral part of the Newfoundland and Labrador (NL) economy with a substantial portion of the province's forest industry once concentrated in the central area of the Island of Newfoundland. Forestry is a large landscape-scale activity that includes timber harvesting, construction of forest access roads, and silviculture activities, such as planting, thinning, and site preparation. Forestry activities in the Province are managed through the respective Forest Management District (FMDs). Every five years, each FMD plan is renewed and reviewed through the provincial EA process.

Past forestry practices have altered large tracts of caribou habitat, most extensively within the Gaff Topsails Herd home range. This same range was also that primarily affected by the creation of the railway.

³ NI 43-101 refers to National Instrument 43-101 Standards of Disclosure for Mineral Reports. These standards govern a mining company's public disclosure of scientific and technical information about its mineral projects using specific language. The reports must be approved by a "qualified person" who is independent of the mining company and the mineral property. NI 43-101 was developed by the Canadian Securities Administrators, and has been passed in provincial and territorial legislation across Canada (CIM 2021).



Forestry activities in the RAA have and will continue to result in the loss and alteration of caribou habitat (including direct loss of habitat through harvesting and indirect loss due to sensory disturbance and edge effects) as well as changing the overall function of the landscape through the altered habitats and successional forest regeneration over time. Caribou on the Island of Newfoundland have been shown to avoid recently harvested blocks in summer (Chubbs et al. 1993; Schaefer and Mahoney 2007) and winter (Smith et al. 2000). Caribou home-range size has also been found to increase with increasing clear cut density, possibly to compensate for a reduction in the availability of suitable habitat (Beauchesne et al. 2014).

The loss of habitat and a change in caribou movement can be compounded by an increase in forestry roads required for harvesting, which also contributes to potential changes in predator-prey dynamics and/or hunting access which can reduce caribou fitness and survival (e.g., calf recruitment, population demographics).

2.3 HUNTING, TRAPPING, AND OUTFITTING

Hunting, trapping and outfitting in NL provides recreational opportunities for residents and non-residents and contributes to the province's wildlife management programs and economy through local spending and the outfitting industry (NLDFLR 2019a). NLDFFA-Wildlife Division determines the number of caribou and other wildlife species that can be sustainably harvested to maintain population levels and limit overabundance (NLDFLR 2019a). Hunting and trapping activities in the province are managed by activity (e.g., trapping) and through species and specific management plans.

The RAA overlaps with several CMAs (Figure 11-14 in Section 11.2.2.1 of the EIS). The number of caribou to be harvested from each CMA are determined annually by NLDFFA- Wildlife Division. The harvesting limits are applied to both resident and non-resident licenses. Non-resident licenses are realized through the registered outfitters. Within the RAA there are 21 registered outfitters, with the closest located approximately 11 km from the Project.

Although hunting, trapping, and outfitting activities do not generally result in direct habitat loss or alteration, the creation of trails is possible (e.g., for trapping) and human activity can cause sensory disturbance that results in an indirect change in habitat, albeit likely in a negligible way. These disturbances have the potential to affect caribou habitat use within the RAA and hunting directly affects caribou survival. By the nature of the activity, there is mortality risk to caribou, however, because the province sets the annual quotas for each CMA, the harvest levels are assumed to be sustainable.

2.4 HYDROELECTRIC DEVELOPMENT

Hydroelectric developments in the RAA have altered the landscape since they were created beginning in the 1960s by changing watercourse flow patterns, flooding large tracts of land and installing transmission corridors. These developments have affected caribou habitat (e.g., through flooding) and movement patterns by altering caribou migration timing and routes. The current migration corridor of the Buchans herd, and ranges of the Buchans and Grey River herds, have evolved based on these and other developments and activities in the RAA (e.g., Star Lake development, inundation of the Victoria



reservoir). These past developments have shaped current ranges, migratory routes and movement patterns in the RAA, altering the migratory corridor.

Historic migration paths for caribou in central Newfoundland were located at the east end of Victoria Lake Reservoir (Bergerud 1971, 1974; Bergerud et al. 1984), approximately where the Project is located. By the late 1970s, a portion of the caribou range had been flooded by several hydro developments, some of which overlapped the traditional migration corridor for the Buchans herd (Bergerud et al. 1984).

The Star Lake hydro generating station, which overlaps a portion of the migration corridor for the Buchans herd, was completed in 1998 (Mahoney and Schaefer 2002a). Caribou were shown to avoid the Star Lake generating station and altered their timing of migration during construction (Mahoney and Schaefer 2002a). Subsequent research suggested that the change in timing of migration may have been influenced by the increasing population and forage limitation on the summer range (Mahoney and Schaefer 2002b). Analysis of existing telemetry data show continued use of these traditional migration corridor from 2005 to 2018.

There are no known plans for further expansion of hydroelectric development other than a new single pole transmission line linking the Star Lake generating station to the Project. This transmission line is considered further in Section 2.5.

2.5 LINEAR FEATURES

Existing linear features in the RAA include highways, roads (including extensive forestry roads), trails, and power lines (e.g., distribution and transmission lines) and each affect caribou differently depending on their size, level of use, regional density, and age.

There are primary roads in Buchans and Millertown, and provincial highways connect Millertown and Buchans to the Trans-Canada Highway. Access to the Project site is via an existing gravel public access road from Millertown, which has been in service for many decades, supporting both forestry and hydroelectric development projects.

Within the RAA, there are eight power lines operated and maintained by Newfoundland Power with a combined total length of approximately 340 km. NL Hydro is proposing to construct an approximately 45-km long 69 kV transmission line (primarily single wood pole structures) within a 20-m wide right of way to transmit power from the Star Lake generating station to the Project. The construction of this transmission line is entirely dependent on the approval and construction of the Project.

The development and maintenance of linear features results in direct loss of habitat and can lower habitat function, as it may result in an unnatural landscape break. Not all linear features have the same effect; for example, busy highways may present landscape obstacles for movement and/or increased mortality risk for caribou, while forestry roads and power lines may increase mortality risk due to increased predation rates. Use of roads and trails by vehicles (forestry, exploration, recreation) also creates sensory disturbance that influences habitat use.



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Increased access to caribou habitat through development, and access to caribou herds, can contribute to an increase in hunter efficiency and harvest rates (Boulanger et al. 2011). Following the construction of the Newfoundland railway across the central part of the Island in the late 1890s, hunters would aggregate along the railway line to hunt caribou as they migrated south in fall (Bergerud et al. 1984). Between 1900 and 1915, an estimated 15,000 caribou were hunted in this area (Bergerud 1971) as caribou continued to migrate across the railroad (Bergerud et al. 1984). Although the railways have been decommissioned for rail traffic, many of the decommissioned railbeds are now maintained as the Newfoundland T’Railway Provincial Park, a multi-use recreational trail for hiking, biking, off-road vehicles, and hunting.

The proposed transmission line from Star Lake to the Project site will cause direct habitat loss and alteration. A considerable portion of the proposed route for the transmission line will be contiguous (i.e., there will be a shared right-of-way boundary) with the existing access road to the Project and therefore will result in a widening of an existing linear feature and a small increase in the zone of influence. A small portion of the route will not be contiguous with an existing linear feature and will therefore increase habitat fragmentation and create relatively short sections of right-of-way that could improve access for predators and hunters. The transmission line is currently undergoing a separate EA review, which includes mitigation measures to reduce environmental effects on caribou. Residual effects of the proposed transmission line are not predicted to threaten the long-term persistence or viability of caribou (Stantec 2021).

2.6 OFF-ROAD VEHICLE USE

Off-road vehicle use includes snowmobiles and all-terrain vehicles (ATVs) that primarily rely on established trails and other linear features (e.g., resource roads, power lines) in the RAA. The T’Railway Provincial Park provides a trail system for snowmobiles and ATVs (NLTCII 2019) using the decommissioned railbeds across the province. In addition, there are two groomed snowmobile trails in the RAA leading to the communities of Buchans and Millertown.

Off-road vehicle use can affect habitat directly due to from creation of trails, especially in wetland areas, and indirectly through sensory disturbance (e.g., noise). Caribou may avoid off-road vehicle trails or activity which may affect caribou movement, and off-road vehicle trails may be used by predators and hunters.



3.0 SUMMARY OF PROJECT RESIDUAL EFFECTS

An evaluation of residual effects of the Project on caribou is presented in Section 11.5 of the EIS and within the Caribou Supplemental Information Report. A significant adverse residual Project effect on caribou and their habitat is defined in the EIS as one that threatens the long-term persistence or viability of one or more of the four assessed caribou herds within the RAA, including effects that are contrary to or inconsistent with the goals, objectives and activities of recovery strategies, action plans and management plans.

Predicted Project effects on caribou include:

- a change in habitat including a direct loss of habitat arising from vegetation clearing and development of the Project Area and an indirect loss or alteration of habitat resulting from sensory disturbance, dust emissions, and habitat fragmentation;
- a change in movement resulting from chronic sensory disturbance and the creation of physical barriers which is anticipated to be limited to avoidance for most herds except for the Buchans Herd, whose migration corridor traverses the Project Area; and
- a change in mortality risk resulting from direct encounters with Project-related equipment, infrastructure, and traffic and indirectly as a result of altered predator-prey dynamics and hunting pressure.

These adverse effects are interconnected and will persist through the operations, decommissioning, rehabilitation, and closure phases and have the potential to reduce caribou survival and negatively affect caribou populations.

The risk of adverse effects is related to the potential overlap of herd ranges with the Project. Animals from the Buchans herd migrate through the Project mine site biannually, while resident caribou of the Grey River herd may occur year-round near the Project (Section 11.2.2.1 of the EIS). The La Poile herd range has no overlap with the Project Area, and a small portion (< 1 km²) of the winter range of the Gaff Topsails herd overlaps with the existing access road. The assessment of Project effects on caribou thereby focuses on the resident Grey River herd and migratory Buchans herd. A summary of residual project effects on each assessed herd is available in Section 5.0 of the Caribou Supplemental Information Report.

Using a conservative assumption that all habitat within the Project Area will be cleared, the amount of high and moderate-ranked caribou habitat that will be directly lost through site preparation (e.g., vegetation clearing and mine construction) will be approximately 28.5 km². Assuming a 500 m zone of influence for sensory disturbance, indirect habitat loss attributed to sensory disturbance will increase to 57.3 km² of high and moderate-ranked habitat. When combined with direct habitat change in the Project Area, up to an estimated 85.8 km² of habitat will be altered. While a sensory disturbance zone of 500 m is based on the federal Scientific Assessment to Inform the Identification of Critical Habitat for Woodland Caribou (*Rangifer tarandus caribou*), Boreal Population, in Canada (Environment Canada 2011), it is acknowledged that there is uncertainty as to the zone of influence for caribou behaviour and monitoring of



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caribou behavioural responses as described in the CPEEMP is intended to improve certainty regarding the zone of influence.

A change in habitat, either directly or indirectly (through sensory disturbance), may also affect movement and mortality risk of caribou. Loss of habitat through vegetation clearing and sensory disturbance (e.g., noise, light) may displace caribou to habitats that are less secure or have lower forage value or require higher energetic costs for movement. Caribou avoidance of the mine site can result in altered migration paths with potential implications on energetics, body condition, pregnancy rates, and predation risk. Predator-prey dynamics can also be affected by change in habitat such that the characteristics of altered habitat could facilitate predator movements or improve hunting success.

Installation of mine site infrastructure will present obstacles to caribou movement. This includes the presence of the Marathon open pit and waste rock pile, which overlap preferred migration paths of the Buchans herd (Section 11.5.2.2 of the EIS) and present an obstacle to caribou movement and linear features (e.g., access road) which represent barriers that may be crossed but not navigated around or avoided (Beyer et al. 2016). As described in Section 11.5.2.2 of the EIS, caribou select migration paths that provide adequate forage and resting habitat (Saher 2005), are less energetically demanding (e.g., less rugged, open terrain) (Saher and Schmigelow 2005), and have relatively low predation risk compared to other potential migration paths (Bergerud et al. 1990; Ferguson and Elkie 2004).

To assist in understanding potential effects of the Project on migration patterns of the Buchans herd, a Caribou Alternate Migration Pathway Analysis was undertaken by Marathon (Appendix A in the Caribou Supplemental Information Report [Marathon 2021]). This GIS-based analysis was supported by literature relating to caribou avoidance of disturbances, the presence of physical obstacles, energetic costs, predation risk, and the use of existing migration paths outside of the identified primary migration path, which are historically used by some caribou from the Buchans herd. While it is considered unlikely that there will be a failure to migrate to the calving grounds, the creation of an obstacle within the preferred migration corridor and potential changes to the timing, movement rate, or use of stopover sites during migration may have effects on caribou recruitment and survival (e.g., increased adult and calf mortality) due to increased energetic costs, decreased forage availability and exposure to higher predation rates (e.g., if predators prefer habitat types that caribou would typically avoid).

Risk of mortality, particularly for caribou calves, could also increase through interactions with Project infrastructure and equipment. Although caribou are expected to avoid Project activities due to sensory disturbance, Project-related traffic could increase risk of caribou mortality. However, direct mortality caused by wildlife-vehicle collisions is expected to occur infrequently, as Project-related traffic volume on the access road is estimated to be incremental to existing traffic volumes and will be managed according to a Traffic Management Plan. In addition to vehicle collision, the Project may increase mortality risk due to caribou interaction with mine infrastructure (e.g., becoming trapped in a pit), or altered predator-prey dynamics.



Predation is the primary cause of caribou calf mortality on the Island of Newfoundland with approximately 90% of calf deaths attributed to predation (Lewis and Mahoney 2014). While the current adult caribou mortality rate is thought to be similar to historical rates, the decrease in calf survival since the mid-1990s has been attributed to an increase in predation (Government of NL 2015a). Increased calf mortality (either through direct or indirect interaction with the Project) has the potential to affect the Buchans and Grey River herds.

Implementation of mitigation measures will reduce the risk of adverse effects on caribou (refer to Section 5). However, even with the implementation of proposed mitigation, the Project is predicted to have a significant adverse effect on caribou because of predicted residual effects on the Buchans herd and potential Project-related changes in movement of the herd which could ultimately affect recruitment or survival of the herd.

4.0 CUMULATIVE EFFECTS

As indicated in Section 1.2 and 2, the existence of caribou has been sustained on this landscape over time, including through the creation and decommissioning of the railway system, various mining and hydroelectric developments, hunting, and on-going commercial forestry. As future developments such as the Project are proposed, it is important to evaluate the long-term viability of the species within a cumulative effects assessment framework, in recognition of past, present and likely future changes to the landscape and the affected caribou population.

The EIS evaluated Project residual effects and cumulative effects in the context of three distinct effects on caribou: change in habitat, change in movement and change in mortality, and the cumulative effects discussion below is organized in a similar manner. The effects are presented in this way to facilitate an understanding of how caribou behave and move within the current landscape that has been affected previously by anthropogenic and natural conditions, however there are important linkages between these effects, which are recognized throughout the discussion.

4.1 CUMULATIVE EFFECTS ON CARIBOU HABITAT

Changes to caribou habitat can result from a direct loss or alteration of habitat arising from vegetation clearing and development of infrastructure. An indirect loss or alteration of habitat may result from sensory disturbance (e.g., noise; human activity), dust emissions, and habitat fragmentation. Caribou react negatively to both natural (e.g., forest fire) and anthropogenic (e.g., industrial development) disturbances. Avoidance of disturbed areas that contain suitable habitat could cause a shift in caribou distribution to less suitable habitat. Caribou home-range size and the size of calving ranges have been found to increase with increasing disturbance (McCarthy et al. 2011; Beaudesne et al. 2014), possibly to compensate for a reduction in available suitable habitat. Avoidance of development could affect movement patterns and could result in increased energetic costs resulting from use of less efficient migration paths (Fullman et al. 2017; Wyckoff et al. 2018).



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As described in Section 2, past and ongoing activities have affected the availability and quality of caribou habitat in the RAA, particularly for the Gaff Topsails herd (Table 1). Development of the Project Area will result in the direct loss or alteration of 34.7 km² of habitat (including all land cover types and previously disturbed lands) within the RAA (41,641 km²), which is a < 0.1% change from existing conditions. However, it is recognized that indirect habitat loss or alteration will extend beyond the Project Area and that the Project will affect an existing migration corridor that may disproportionately affect important habitat for the species. For example, the Project will create an important change in migratory habitat for the Buchans herd, with the potential to affect greater than 50% of the proportion of caribou use in the migration corridor.

Anthropogenic disturbances are generally avoided by caribou and have been documented to result in reduced use of areas within 2 to 11 km from mines (e.g., Weir et al. 2007; Polfus et al. 2011; Boulanger et al. 2012; Johnson et al. 2015), and within 250 m to 4 km of linear features (e.g., Dyer et al. 2001; Nellemann et al. 2003; Cameron et al. 2005; Leblond et al. 2014). The intensity of sensory disturbance is expected to affect the degree of avoidance by caribou (Lesmerises et al. 2017, 2018), but uncertainty is high given the large range of variability in disturbance types, magnitude and duration of the disturbance, ecological setting, and caribou responses (e.g., Johnson et al. 2015). As described in Section 11.5 of the EIS, Project-related light and noise emissions may result in caribou avoidance due to sensory disturbance, but these effects are associated with specific Project activities for which mitigation measures exist to reduce these effects. This is also considered to be the case for other future physical activities within the RAA.

As noted in Section 2.1, the disturbances from mineral exploration or mining development projects that have yet to file publicly available documents are difficult to quantify from a cumulative effects perspective. The Buchans Resources Limited Project is expected to have activities that are similar to the Project, with similar potential effects on caribou habitat. Although the Buchans Resources Limited Project overlaps with the ranges of the Buchans and Gaff Topsails herds, based on spatial extent its project effects on caribou are likely to be negligible, and therefore have a relatively small contribution to cumulative effects. The proposed Cape Ray Gold Project (Nordmin 2016) is anticipated to result in the direct loss of approximately 18 km² of habitat. Based on existing telemetry data obtained from NLDFFA-Wildlife Division (locations from Atmospheric Research Geostationary Orbit Satellite and Global Positioning System (GPS) collars, 2005-2018), the summer ranges of the La Poile and Grey River herds are nearest to the Cape Ray Gold Project. The future EA review for the Cape Ray Gold Project will independently determine its project and cumulative effects and whether there is a significant residual adverse effect on caribou habitat.

The NL Hydro transmission line from Star Lake to the Project Area (Stantec 2021) is anticipated to result in the direct loss of approximately 1 km² of habitat within the ranges of the Grey River and Buchans herds. The Project will contribute 34.7 km² of new developed lands within the RAA. Cumulatively, these contributions equate to a direct change in habitat that would be a 0.1% change (i.e., reduction in habitat) from existing conditions in the RAA. These combined effects on change in habitat include habitats used by caribou, either directly (i.e., for forage, calving, or travel) or indirectly (i.e., as part of landscape connectivity and security).



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Vegetation clearing, including forest harvesting, can result in habitat fragmentation, which can have particularly detrimental effects on caribou that have large ranges and require large contiguous patches of habitat. As caribou require large, interconnected tracts of lichen-rich forest (Environment Canada 2011), changes in habitat that affect the interconnectivity between optimal habitats may have effects on caribou habitat use and movement, and ultimately their fitness. Caribou have been shown to avoid assemblages of different habitat types and the boundaries between them (Stuart-Smith et al. 1997; Smith et al. 2000). As indicated in Section 2.2, past forestry practices have altered large tracts of caribou habitat, most extensively within the Gaff Topsails herd home range (Table 1). This same range was also that primarily affected by the creation of the railway. While this herd range today has minimal overlap with the Project, the demands within this range related to past and present forestry activities and newly active mineral claims and associated activities are likely to cause stress on this specific herd. The Project's contribution to the cumulative effects on this herd is predicted to be limited, and is primarily associated with Project-related traffic (an increase to existing traffic) on the existing access road from Millertown. The access road has been in service for many decades, supporting both forestry and hydroelectric development projects, therefore does not represent a new linear development.

While linear features such as roads and power lines can fragment habitat and are often avoided by caribou (Dyer et al. 2002; Vistnes et al. 2004), new linear features within the RAA are expected to be limited. The NL Hydro transmission line from Star Lake to the Project Area will result in some new habitat fragmentation, although this will be limited to relatively short sections of right-of-way that deviate from existing roadways along the route. The Project will not result in the creation of trails or contribute to habitat fragmentation beyond the Project Area. The existing access road will not be extended but will be widened in some areas.

Although hunting, trapping, and outfitting activities do not generally result in direct habitat loss or alteration, the creation of trails and human activity can cause sensory disturbance that results in an indirect change in habitat. However, these effects on caribou habitat within the RAA are likely to be negligible and not substantially interact with Project effects to result in cumulative effects on caribou habitat.

Table 1 summarizes the amount of existing anthropogenic disturbance within each of the assessed caribou herd ranges (for projects and activities with available spatial data), the Project's contribution to disturbance, and the remaining undisturbed area. In general, ranges for the Buchans, Grey River, and La Poile herds are relatively undisturbed, and the Project will result in a negligible contribution to direct habitat loss; however, effects to habitat function (e.g., as a migratory pathway) extend beyond the physical footprints and sensory disturbance related to the Project infrastructure and activities. There are no established habitat thresholds for caribou on the Island of Newfoundland, however, as a general reference a 65% undisturbed habitat threshold has been used for boreal caribou (ECCC 2020). By way of comparison, the Buchans, Grey River, and La Poile ranges will remain above the 65% undisturbed habitat threshold based on this cumulative effects assessment. The Gaff Topsails range is below the 65% undisturbed habitat threshold at baseline but overlaps only a portion of the existing access road away from the mine site; Project-related effects on this herd are expected to be negligible.



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With the implementation of the Project's mitigation measures, and the assumed mitigation measures that would be used by other approved future projects, it is anticipated that cumulative environmental effects resulting from direct and/or indirect habitat loss and alteration will not affect the long-term persistence or viability of the four assessed caribou herds within the RAA. It is recognized, however, that effects associated with changes to habitat extend beyond the physical footprints and sensory disturbance related to the Project infrastructure and activities, as functional aspects provided by the habitat (e.g., as a migratory pathway) are also affected. Changes to habitat as a result of Project infrastructure, (i.e., presence of the Marathon open pit and waste rock pile which overlap preferred migration paths of the Buchans herd) are discussed below in Section 4.2 in the context of cumulative changes to caribou movement. Cumulative changes in habitat which may indirectly lead to mortality risk are discussed in Section 4.3.



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Table 1 Existing and Proposed Anthropogenic Disturbance within Caribou Herd Ranges

Caribou Herd	Range Size (km ²) ^A	Area (km ²) / Percent (%) of Disturbance								Residual Percent (%) Undisturbed
		Existing Disturbance				Project Area Disturbance		Cumulative Disturbance		
		Linear Features ^B	Mineral Claims ^C	Hydroelectric Operations ^D	Forest Harvesting ^E	Linear Features	Mineral Claims	Existing Disturbance	Project Disturbance	
Gaff Topsails	5,684.9	1,292.1 / 22.7	509.9 / 9.0	4.7 / 0.1	1,591.1 / 28	0.4 / <0.1	- / -	3,397.9 / 59.8	0.4 / <0.1	40.2
Buchans	15,649.6	1,236.0 / 7.9	1,296.3 / 8.3	29.1 / 0.2	995.7 / 6.4	100.3 / 0.6	240.0 / 1.5	3,562.2 / 22.8	340.3 / 2.2	77.2
Grey River	15,456.3	886.5 / 5.7	903.7 / 5.8	22.0 / 0.1	506.7 / 3.3	33.7 / 0.2	131.7 / 0.9	2,320.5 / 15.0	165.4 / 1.1	85.0
La Poile	11,183.2	149.7 / 1.3	452.7 / 4.0	5.5 / <0.1	16.1 / 0.1	- / -	- / -	624.5 / 5.6	- / -	94.4

Notes:

^A 95% kernel range estimate based on 2005-2018 (Buchans) and 2006-2013 (Gaff Topsails, Grey River and La Poile) telemetry data.

^B Includes roads and power lines plus a 500m buffer. The existing access road associated with the Project is included in the total.

^C Includes all developed and undeveloped claims and assumes that all habitat within the claim area is disturbed (i.e., is an overestimate of the disturbance footprint). The Project footprint (mine site) is included in the total Includes site location plus a 500m buffer.

^D Includes dams, dykes, and spillways plus a 500m buffer.

^E Includes forest harvesting activities since 1990 (plus 500m buffer) and considered the length of time (~40 years) for forests to regenerate on the Island of Newfoundland (Hébert and Weladji 2013) and that caribou in Newfoundland will use younger aged stands (Mahoney and Virgl 2003), albeit with potentially higher risk of predation (Faille et al. 2010, Wittmer et al. 2006).



4.2 CUMULATIVE EFFECTS ON CARIBOU MOVEMENT

Cumulative changes in habitat can affect habitat use and movement by caribou, thereby reducing caribou fitness. Documented effects of development on caribou movement include delays in crossing linear features, increased movement near disturbance, and avoidance of linear features and development (Murphy and Curatolo 1987; Dyer et al. 2002; Vistnes et al. 2004; MacNearney et al. 2016; Baltensperger and July 2019). Caribou select migration paths based on features that include path efficiency, foraging opportunity, and reduced predation risk (Nicholson et al. 2016; Fullman et al. 2017; Baltensperger and July 2019). Disruptions to existing migration paths may result in caribou using lower suitability habitat during migration. Long-term effects could include increased energetic demands (Fullman et al. 2017; Wyckoff et al. 2018), lower availability of suitable forage, and higher risk of predation (particularly of calves) which can have long-term population implications.

A change in movement may result from chronic sensory disturbance and the creation of physical barriers for caribou. Past and present projects and activities that contribute to cumulative effects on caribou movement in the RAA include mining, mineral exploration, hydroelectric developments, forestry, linear features, hunting, outfitting, and trapping, and off-road vehicle use. While these activities likely contribute cumulatively to affect caribou movements within the RAA, they have limited potential to interact with caribou movement in proximity to the Project because of where those activities occur within the RAA. The Project is predicted to affect caribou movement through the development of infrastructure that overlaps migration paths, and through an increase in sensory disturbance from emissions (noise, light, dust, olfactory) near to the Project.

Maintaining the functionality of migration paths by preserving connectivity between seasonal ranges is vital to sustaining viable populations of migratory ungulates (Monteith et al. 2018). The Marathon open pit and waste rock pile will be developed within the primary migration corridor for the Buchans herd. This development will create a permanent obstacle which migrating caribou will be forced to avoid. In addition to the physical obstacle, site activities (including access road traffic) and associated sensory disturbance will also affect caribou within proximity to the mine site, and direct interaction with Project features and activities, such as access road or haul road traffic, could result in injury or mortality.

Mitigation measures such as a suspension of Project activities and reduction of access road traffic during migration periods, delaying blasting activity when caribou are nearby, facilitating caribou crossings across snowbanks or ditches, and aligning crossing points with existing migration paths, will reduce the amount and effect of sensory disturbance. These mitigation measures will not however reduce the physical disruption to the existing migration path. The contribution of Project-related residual adverse effects to cumulative effects on caribou movement is predicted to be high. There remains uncertainty of how caribou will respond to effects on their migration path and how that will affect the long-term persistence or viability of the Buchans herd as well as the resident Grey River herd within the RAA.

Future mining projects anticipated within the RAA (i.e., Cape Ray Gold and Buchans Resources Limited Projects) may affect caribou movement if those project sites are avoided by caribou. However, while the activities of those projects are expected to have similar effects as the Project, neither the Cape Ray Gold nor Buchans Resources Limited mining projects appear to overlap a caribou migration corridor. Though



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there may still be some avoidance of these projects by caribou, the magnitude of effects is likely to be low if those developments do not overlap with a migration path. As such, the magnitude of effects on change in movement from future projects and activities is expected to be less than for the Project. It is anticipated that the future developments will also have mitigation measures in place to reduce project-related effects on caribou movement.

The proposed NL Hydro transmission line can also affect caribou movement. Power lines are avoided by caribou (Vistnes and Nellemann 2001; Plante et al. 2018), however some research has indicated that the degree of avoidance may decrease following the construction period (Eftestøl et al. 2016). The proposed NL Hydro transmission line will occur within the range of the Buchans herd and will cross the existing migration corridor with the access road. Therefore, it is expected that construction of the transmission line could incrementally contribute to cumulative effects. The Caribou Alternate Migration Pathway Analysis completed for the Valentine Gold Project (Appendix A in the Caribou Supplemental Information Report [Marathon 2021]) has been used to help inform planning and design of NL Hydro's proposed transmission line. During the EA process for the transmission line project, the results of Caribou Alternate Migration Pathway Analysis influenced the selection of the route, which reduced the interaction with identified potential alternate caribou migration paths. The current route for the transmission line will reduce potential cumulative effects on caribou habitat and migration relative to previously selected routes that were presented in that project's EA Registration.

Marathon has been working closely with NL Hydro to reduce potential cumulative effects on caribou and has committed to sharing caribou monitoring data to help inform planning, construction, and operational activities associated with the transmission line project.

Even with the implementation of the Project's mitigation measures, and the assumed mitigation measures that would be used by other approved future projects, the Project's contribution to cumulative environmental effects on caribou movement is high and could potentially affect the long-term persistence or viability of the Buchans herd, and potentially also affect the resident Grey River herd.

4.3 CUMULATIVE EFFECTS ON CARIBOU MORTALITY

Caribou mortality can occur through direct encounters with people or projects and activities (e.g., vehicle collisions) and indirectly from altered predator-prey dynamics and hunting pressure, particularly relating to the creation of linear features. In Newfoundland, calf mortality events result primarily from predation by black bear and coyote and the cause of mortality for adults ($n = 47$ collared adults) is primarily attributed to predation (51.1%), hunting/poaching (21.3%), and other causes (e.g., injury, accident, natural causes; 23.4%; Lewis and Mahoney 2014). Caribou-vehicle collisions represent a relatively small proportion of mortality events (4.3%; i.e., 2 of 47 individuals) whereas 20 caribou have died from being captured for collaring (Lewis and Mahoney 2014).

Changes to vegetation communities and the creation of edges resulting from clearing activities may temporarily increase moose (*Alces alces*) presence as these areas can provide high value browse. Selection of this edge habitat by moose could increase their abundance in affected areas and result in an increase in predator populations (e.g., black bear, coyote), which in turn may also increase mortality risk for caribou. Additionally, predators and hunters may use disturbances and linear features to access



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previously inaccessible, or difficult to access, areas. While increased mortality risk has the potential to directly remove individuals (calves in particular) from the population, indirect consequences include increased stress, increased energetics costs, and reduced body condition in response to increased predation risk which can lead to population-level stressors (e.g., reduced pregnancy rates, calf survival rates).

Residual effects from the Project may combine with effects of past, present and reasonably foreseeable future projects and activities such as mining and exploration activities, hydroelectric developments, forestry, linear features, hunting, outfitting, and trapping, and off-road vehicle use that can affect caribou fitness and increase mortality risk. The Project will contribute to cumulative effects where Project components have the potential to encounter caribou directly (e.g., traffic, entrapment in open excavations), and indirectly where mortality risk, including for calves, is elevated through potentially altered predator-prey dynamics or increased hunting pressure.

Direct mortality of caribou may occur because of vehicle-caribou collisions in the RAA, although mortality studies using data from collared adults in Newfoundland suggest that this is an uncommon occurrence (Lewis and Mahoney 2014). Mortality risk due to potential Project-related vehicle-caribou collisions will exist in all Project phases, but will be lowest during the decommissioning, rehabilitation, and closure phase when Project-related traffic is at its lowest. Most caribou are expected to avoid the mine site during construction and operation and vehicle-caribou collisions at the mine site are less likely, however, will increase during the migration periods. An incremental increase in mortality risk as a result of the Project is predicted for caribou associated with increased traffic along the access road.

Increased mortality risk due to vegetation clearing from the Project is unlikely as caribou are large, highly mobile animals that will likely avoid this Project activity. Potential for contact with people, machinery, open excavations, or other potential hazards is considered low, however these risks will be higher during migration. Juveniles may be more vulnerable and at greater risk of direct mortality associated with site preparation activities and site infrastructure. Direct mortality risk for adults and juveniles is expected to return to existing conditions post-closure.

The future proposed mining projects in the RAA (e.g., Cape Ray Gold and Buchans Resources Limited Projects) are expected to have similar direct mortality effects on caribou as the Project. These effects will primarily be associated with site clearing and related activities during the construction phase of each project. Cumulative direct mortality risk to caribou within the RAA may also increase due to vehicle-caribou collisions related to mining activities or vehicle use of linear features (e.g., roads, highways, trails). The Cape Ray Gold Project has a small amount of overlap with the ranges of the La Poile and Grey River herds, whereas the Buchans Resources Limited Project occurs within the range of the Gaff Topsails and Buchans herds. Mitigation measures proposed by Marathon, including road safety measures to reduce the risk of collision, restricting public access to the Project, and banning hunting by employees, will reduce caribou mortality risk on the Project. It is anticipated that future mining developments in the area will have similar mitigation measures.



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Hunting in the RAA contributes to a cumulative direct mortality risk to caribou. However, as indicated in Section 2.3, hunting of caribou is regulated by NLDFFA and one of the CMAs overlapping the Project Area (CMA 63-Grey River) is closed to hunting. Regulated harvest levels are therefore assumed to be sustainable.

Cumulative changes in habitat may indirectly lead to mortality risk by increasing access to hunters and/or altered predator-prey dynamics, particularly where linear features or other developments provide access to previously inaccessible, or difficult to access areas of the RAA. Disturbance can promote early successional habitats that provide increased forage for moose (i.e., shrubs) which can increase moose densities near the Project and lead to increased predator densities and predation of caribou, including for calves who are particularly vulnerable (James et al. 2004; Mumma et al. 2018). Additionally, linear features may be selected by black bears and coyotes, which could increase the amount of predation on caribou (Latham et al. 2013; Tigner et al. 2014; Hinton et al. 2015; Tomchuk 2019). The NL Hydro transmission line from Star Lake to the Project Area is a linear feature that has the potential to interact cumulatively and contribute to a cumulative risk to caribou mortality. However, following an analysis of transmission line route alternatives, informed in part by an analysis of potential alternate caribou migration paths completed by Marathon, NL Hydro has selected a route that is further from those alternate paths, is aligned with the existing mine access road, and reduces the amount of habitat affected and new linear feature created with the RAA.

The contribution of forestry, linear features, and off-road vehicles and recreation to a cumulative mortality risk are expected to be low given the RAA remains relatively undisturbed.

There are multiple Project-related interactions that result in increased mortality risk (Section 11.5 of the EIS), for which mitigation measures will be applied (Section 11.4 of the EIS). It is assumed that when the mitigation measures associated with the future projects / activities are applied, then the contribution of those project's effects in combination with the Project's cumulative effects on change in caribou mortality risk are not expected to affect the long-term persistence or viability of the assessed caribou herds within the RAA.

5.0 CUMULATIVE EFFECTS MANAGEMENT

Marathon has developed a Caribou Protection and Environmental Effects Monitoring Plan (CPEEMP) which includes mitigation measures aimed at reducing the risk of adverse effects on caribou during the construction, operation, closure and post-closure phases of the Project and describes the follow-up and monitoring activities that will be undertaken to verify the EIS effects predictions and mitigation effectiveness.

The purpose of the CPEEMP is to provide specific mitigation measures and monitoring protocols that will reduce the risk of Project effects on caribou. The goal of avoiding or reducing Project effects on caribou and their habitat will be achieved by linking the risk of the predicted effects directly to mitigation measures, monitoring mitigation effectiveness through performance indicators, reviewing monitoring



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results relative to performance targets with specific thresholds, and potentially refining mitigation or monitoring approaches through an adaptive management process.

As part of the CPEEMP, Project-specific measures applicable to limiting cumulative environmental effects on caribou within the RAA include, but are not limited to, the following:

- Implementation of seasonal alterations and/or operational reductions in mining activity that are timed to coincide with the spring and fall caribou migration periods to reduce Project-effects on caribou at a time when migrating caribou are most likely to interact with the Project
- Development and implementation of a Rehabilitation and Closure Plan
- Contribution of detailed annual caribou demographic information within the RAA that will be used by provincial regulators to manage caribou and support conservation initiatives

A complete list of proposed mitigation measures is provided in Section 5 of the CPEEMP. Mitigation is presented in the context of a defined hierarchy of protection levels recognizing the variation of risk to caribou based on seasonal distribution and sensitivities and caribou proximity to the Project, as well as a potential range of caribou responses to Project features and activities.

Marathon is committed to long-term follow-up monitoring of mitigation effectiveness and Project effects on caribou. A detailed monitoring program is presented in Section 6 of the CPEEMP which is overarching and encompasses various spatial and temporal scales to understand effects on caribou at the individual, group, and herd levels. In particular, the monitoring program focuses on potential changes in caribou habitat and behaviour for the Grey River and Buchans herds. The monitoring program defines measurable performance indicators with defined response thresholds, and describes monitoring techniques (e.g., collars, remote cameras, on-site monitoring, drones) and analytical approaches.

The CPEEMP has been developed in consultation with NLDFFA-Wildlife Division and will be subject to the Wildlife Division's approval in advance of implementation. The CPEEMP is considered a "live" document that will be reviewed and refined regularly over the life of the Project, incorporating information from follow-up and monitoring activities as the Project advances, and ongoing review with regulators, scientific experts, Indigenous groups, and stakeholders.

The implementation of the CPEEMP will help to understand and manage Project-specific and cumulative effects on caribou over the life of the Project.



6.0 CONCLUSION

Cumulative Effects Summary

Caribou within the RAA have been and will continue to be affected by environmental factors and anthropogenic disturbance. Although caribou in the RAA have shown resilience over a century of development and large areas of undisturbed habitat will persist and continue to support caribou, the Project is predicted to cause changes to caribou habitat, movement, and mortality risk, which could ultimately affect caribou recruitment and/or survival. Based on the assessment of residual Project effects in combination with other past/present/future projects as presented in the previous sections, cumulative effects on caribou are predicted to include:

- Changes in habitat including a direct loss of habitat arising from vegetation clearing and anthropogenic development, and an indirect loss or alteration of habitat resulting from sensory disturbance, dust emissions, and habitat fragmentation
- Changes in caribou movement resulting from sensory disturbance and the creation of physical obstacles
- Changes in mortality risk resulting from direct encounters with people, infrastructure, and traffic, and indirectly due to potentially altered predator-prey dynamics and hunting pressure
- Project contributions to cumulative effects related to mortality risk for caribou will primarily be related to the construction and operations phases, although traffic-related collisions and increased predation / harvesting can occur in all Project phases. The risk of caribou mortality resulting from activities in the broader landscape of the RAA are not anticipated to have long-term adverse consequences on the viability of caribou in the RAA.

Project-related contributions to cumulative effects on change in habitat represent a small physical change (< 0.1%) from existing conditions within the RAA (Table 1); however, the habitat-related effects of the Project will affect the functionality of migration habitat (the preferred migration corridor) used by the Buchans herd. This Project effect could potentially affect the long-term persistence or viability of the Buchans herd within the RAA. There is uncertainty in how caribou from the Buchans herd will respond to the effect on their primary migration corridor and if/how a change in movement of the Buchans herd may affect other herds. There is also uncertainty in the effectiveness of mitigation measures to reduce the effects. Given these uncertainties, and because the Project effects on their own are predicted to be significant, the cumulative effects of the Project (in combination with effects of past, present, or reasonably foreseeable future projects and activities) are also predicted to be significant.

Related Monitoring and Adaptive Management

The Project is located in an area of Newfoundland that has been subject to a variety of natural resource development over the past hundred years. In that time, the population of the caribou herds that reside and migrate through the region have varied. Uncertainty remains with regards to the response to the Project of the Buchans and Grey River herds. Monitoring caribou response to the Project and adapting mitigation measures as appropriate will be imperative in reducing the risk of adverse cumulative and



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Project-related effects to caribou. Marathon has developed a CPEEMP which describes how the predicted effects and mitigation effectiveness will be monitored, and includes an adaptive management framework to refine mitigation measures and monitoring approaches.

The CPEEMP is designed to help understand and manage predicted Project effects through long-term monitoring activities. The CPEEMP considers both direct and indirect Project and potential cumulative effects on caribou. Its implementation will increase understanding of effects on caribou from individual through to population levels over the life of the Project. The CPEEMP presents thresholds and adaptive management actions to be further developed in consultation with NLDFFA-WD, with the goal of avoiding or reducing adverse effects on caribou and their habitat. The follow-up monitoring plan includes monitoring approaches and actions, which are anticipated to be refined throughout the Project based on the collection of additional baseline data prior to construction, collection of follow-up and monitoring results as the Project advances, and ongoing review with the NLDFFA-Wildlife Division, scientific experts, Indigenous groups, and stakeholders.

As described in Section 8.0 of the CPEEMP, the information acquired through monitoring, mitigation, interpretation, and adaptive management will be reported to NLDFFA-WD and made available to a wider audience, as applicable. The information gathered and results from the strategies applied through the CPEEMP could be used to help manage project effects and cumulative effects on caribou related to future projects and activities.



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Appendix A SPATIAL BOUNDARIES

The delineation of spatial and temporal boundaries for this assessment and identification of other projects and activities occurring within those boundaries is the same with what was presented in the EIS and is repeated below.

The **Project Area** is 34.7 km², which is the anticipated area of direct physical disturbance associated with the construction, operation, and decommissioning, rehabilitation, and closure phases of the Project. This area is comprised of two distinct areas: the mine site and the access road. The mine site includes the area within which infrastructure will be located, and the access road is the existing road to the site, plus a 20 m wide buffer on either side. The mine site has been subject to existing disturbance from mine exploration activities, and the access road has been used to access the mine site, as well as for access to nearby forest harvesting and public use.

The **Local Assessment Area (LAA)** is 127.0 km² and is defined by a 1-km buffer around the mine site and a 500-m buffer around the access road. This area reflects the area within which wildlife-specific Project effects are most likely to occur, including indirect habitat loss due to sensory disturbance (i.e., displacement or avoidance) (e.g., Laurian et al. 2008; Benitez-Lopez et al. 2010; Eldegard et al. 2012). The LAA was used to assess residual effects and the significance of project effects on caribou.

The **Cumulative Effects Regional Assessment Area (RAA)** is 41,641 km² and encompasses the projects and activities outside of the Project Area that have potential to interact cumulatively with the Project; it accounts for the larger movements and distributions of caribou (Figure A-1). The RAA was used to assess cumulative effects and the significance of cumulative effects on caribou.



VALENTINE GOLD PROJECT – CUMULATIVE EFFECTS DISCUSSION

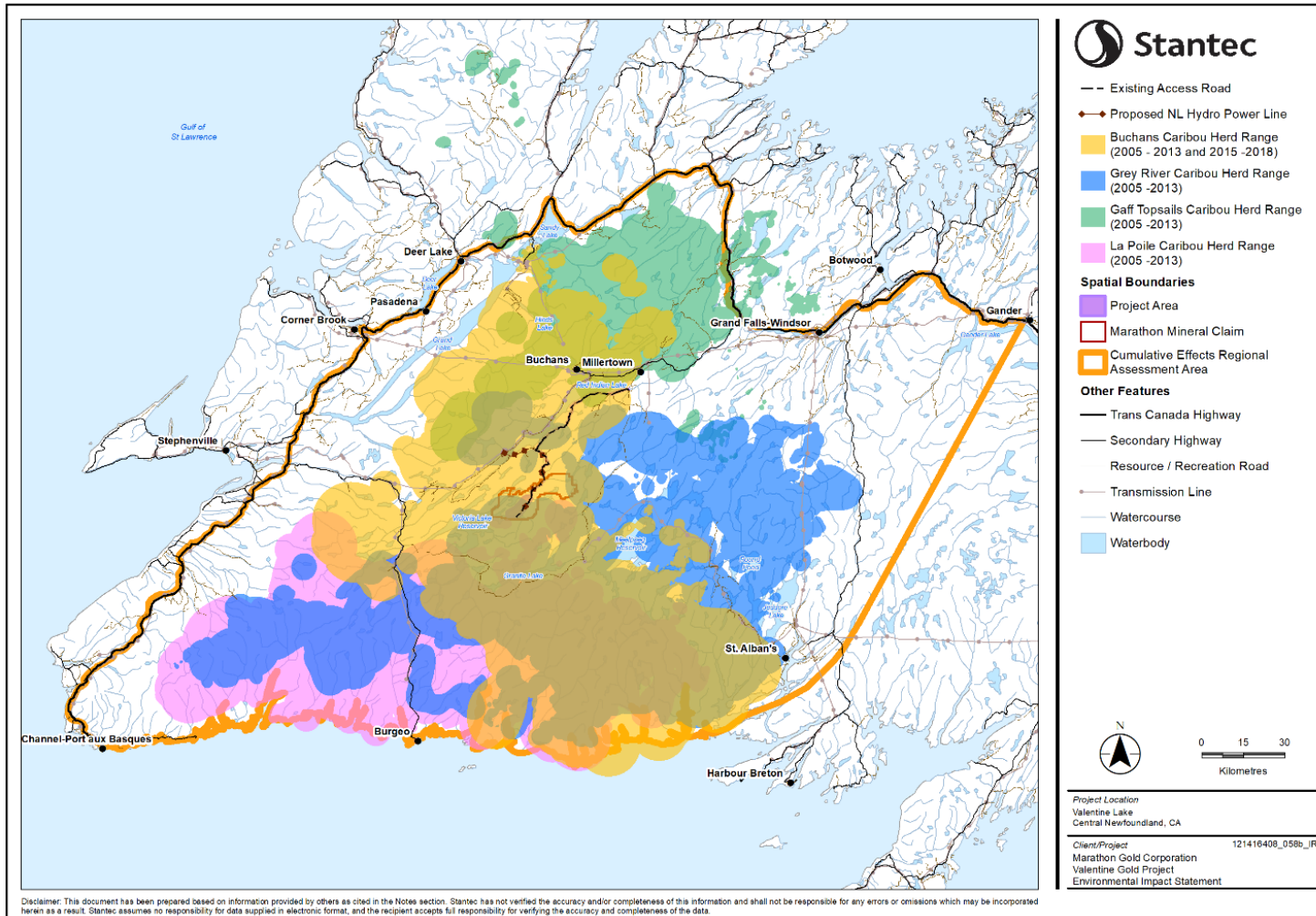


Figure A-1 Cumulative Effects Regional Assessment Area and Assessed Caribou Herds

