RESPONSE TO FFA-01

ID:	**FFA-01**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	3.0 Scope of project, factors to be considered and scope of factors 3.1 Scope of Project: Air emission sources including dust lift- off. Noise sources, expected noise levels and noise monitoring locations. Sources and frequency of vibrations including seismic.
EIS Reference:	-
Context and Rationale:	-
Information Request:	The EIS does not address the impact of dust on caribou & its habitat (see comments in Annex A). The EIS does not address noise & stress response in caribou (see comments in Annex A). The EIS mentions vibrations, such as in Sections 11.5.1.1 (page 11.53) 12.5.1.1. (pages 12.58-.59), but it does not describe how the magnitude will be measured or mitigations planned.
Follow-up Information Request:	How will visual surveys (observation) be conducted for caribou while caribou are migrating through the project area? What is the rationale for selecting distances (500m/10km) for ceasing activity? Will techniques other than visual observation be used for detection in & around the project area? For example, given that upwards of 40 Buchan's caribou are instrumented with satellite/gps collars, and whose locations can be monitored at will via website, construction/blasting activities should cease during the fall and spring migration periods. These periods can be closely monitored from the collar locations. In mitigation table it states vegetation will be maintained, where possible, to serve as a buffer for sensory disturbance. Further details on the extent & layout as well as literature to support that it will be effective is required. Also in the table, it states trees will be planted to manage line-of-sight to reduce visual & noise disturbance. It will take the duration of the project for trees to grow to a meaningful height. Literature on the effectiveness of this technique is needed. Link to planned mitigation are weak (e.g. 'use of mufflers') and no additional mitigations are outlined for the migratory periods, when disturbance could add to avoidance of an important migratory pathway. In addition, it is unclear how caribou will be searched for (collars? drone?) prior to blasting (as searching for caribou is the planned mitigation measure).

ID:	**FFA-01**
Response:	Section 4.2 of the Caribou Supplemental Information report (Appendix G) provides a discussion of sensory disturbance on caribou including the effects of dust on caribou and its habitat, noise and stress response, and vibrations. Section 6.2.1 of the Caribou Supplemental Information report (Appendix G) includes information on the monitoring approaches, tools, and technologies that will be used to understand caribou interactions with the Project including the 60 GPS-enabled caribou collars, wildlife cameras, aerial surveys, and on-site observations by Project staff and contractors. The effects of sensory disturbance are expected to decrease with increasing distance from the Project Area. Section 6.2.1.1 explains an area-based management matrix that will be used to guide management actions. Mitigation measures for sensory disturbance (e.g., dust, light, noise) are included in Table 6.3 of the Caribou Supplemental Information report (Appendix G). Measures to reduce the effects of noise and light include following industry best practices (e.g., ECCC 2009; ISEE 2011), use of noise reducing mufflers on equipment, and vegetation management, such as retention and maintenance of existing vegetation and revegetation. The effects of dust will be monitored through the Air Quality Management Plan. Section 6.2.2 of the Caribou Supplemental Information report (Table 6.3) illustrates how Marathon plans to monitor the efficacy of mitigation measures for caribou. References: Environment and Climate Change Canada (ECCC). 2009. Environmental Code of Practice for Metal Mines. Available at https://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=CBE3CD59-1&offset=2. Last accessed on March 9, 2021. International Society of Explosives Engineers (ISEE). 2011. "Blaster's Handbook, 18th Edition", Ed. Stier, J.F., International Society of Explosives Engineers, Cleveland, Ohio, USA, 1030 pp.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO FFA-02

ID:	**FFA-02**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	4.2.1.2 Woodland Caribou (Habitat, Migratory Behaviour and Cumulative Effects)
EIS Reference:	-
Context and Rationale:	-
Information Request:	a. The Baseline Caribou Study (Appendix 2 of the EIS) does not adequately: Represent the extent of use of the project area by caribou and relate it to the degree of risk posed by project components Integrate common findings between the three monitoring components (spring and fall camera surveys, population census) where these suggest accentuated risk to caribou. For example, common travel corridors used during both spring and fall migration represent increased risk due to their common use across seasons. b. Provide a comprehensive assessment of risk posed by the project as a whole to caribou migration and subsequently to caribou populations. For example, discuss implications for the Buchans caribou herd if they are unable to travel between calving and wintering grounds. c. Provide standardized analyses and summaries of data collected for all baseline studies. d. Discuss the risks to caribou migration due to specific project components (pit, road, waste rock pile) based on caribou movement through the project area. e. Propose effective mitigation measures for caribou, in particular migrating caribou, based on best practices and degree of obstruction posed by specific project components to migration during construction and operation. For example, the impact of the waste rock pile, directly in the path of a migratory corridor, is a major concern that is not evaluated or discussed. f. Camera monitoring stations are not set up throughout the project area, and include only a small number of cameras (12), some of which malfunctioned. Therefore, caribou use of the project area, with specific reference to entrance and exit points of migrating caribou during spring and fall migration, and crossing of the main road, is incomplete.

ID:	**FFA-02**
	g. A reliable baseline population estimate for Buchans caribou, the population most affected, is unavailable. The method used to census the population was applied incorrectly and as a result there is no estimate to provide a baseline for future comparisons.
Follow-up Information Request:	h. A collective assessment which integrates potential impacts of changes in the migratory pathway or absence of migration, mortality of calves and adults and changes in habitat is not provided. Information is dispersed in various tables and sections and the potential impacts to the population as a whole if caribou fail to migrate and calve successfully is not provided. i. The least-cost path analysis identifies alternate routes have increased energetic costs for caribou but no solution is provided. In addition whether monitoring of use of these pathways will occur is unclear. It is important to note that a number of these alternate paths will also interact with an additional project component, the transmission line, but this is never mentioned. j. While the population estimate for the spring 2020 calving survey is not valid, caribou observations made during the survey are (e.g. density of animals on the calving grounds, group size, number of calves/100F etc..) are useful metrics that should be reported. k. Further details are required: How tall is the pile? How wide? How will this be changed to allow caribou to pass through the area, now and in the future? How will any proposed mitigation reduce risk? l. How will the commitment to reduce/cease activity be implemented – will there be daily, thorough observations made to ensure that caribou are not in the area? What criteria will be used to modify activities? m. Fencing – Literature on effectiveness & demonstration that it will not negatively impact caribou (i.e., create further stress) required. Details on the proposed placement & design needed. n. Collared animals represent a small fraction of the total population, and cameras were not placed in key areas throughout the project area. Cameras can provide important information on behavior, group size, and localized movements and will supplement collar data. How will further monitoring address this gap prior to and during construction? o. The Brownian Bridge analysis is good addition but needs to be evaluated against actual local caribou movements in the project area. It also doesn't provide information on timing or number of individuals using particular corridors (like cameras).

ID:	FFA-02
	p. Literature required to demonstrate that lichen can be effectively transplanted. If this is chosen as a mitigative measure further details outlining techniques is required. Literature required to support the effectiveness of caribou pellets & a proposal outlining techniques needed.
Response:	a. Section 3.2 of the Caribou Supplemental Information report (Appendix G) integrates the findings from the camera surveys (BSA.2, Appendices 2-A and 2-B) and the movement analysis completed for the EIS (Section 11.2.2.1 of the EIS). The camera and migration corridor analysis identified a heavily used path that overlaps the mine site during both fall and spring migration, which corroborates information provided by the Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture (NLDFFA) - Wildlife Division (Government of NL 2019), subsequent LiDAR analysis, and the baseline path predicted by the Caribou Alternate Migration Pathway Analysis. This path is important to the Buchans herd as it provides connectivity between the winter and calving ranges. Project effects that alter use of this path could have long-term implications for the herd (e.g., reduced calving rate, increase calf or adult mortality). Section 3.2.1 of the Caribou Supplemental Information report (Appendix G) describes the remote camera placement and data. Camera placement for the fall 2019, spring 2020, and fall 2020 programs was strategically aligned along well-defined trails through the mine site to specifically obtain movement information for this path. Camera placement for these early programs was not designed provide complete camera coverage of caribou movements throughout the overall Project Area, but did provide information of group size / composition and timing, which inform future monitoring efforts. Selection of the camera placements for 2021 was based on consultation with NLDFFA-Wildlife Division, LiDAR imagery, dBBMM outputs, and the results of the Caribou Alternate Migration Pathway Analysis (Attachment A in Caribou Supplemental Information report [Appendix G]). References: Government of NL (Newfoundland and Labrador). 2019. Registration 2015: Valentine Gold Project Environmental Assessment Screening Committee. Comments for the Proponent. St. John's, NL. Unpublished. b. A comprehensive assessment of the risk of the Project to caribou populations is discussed in Section 4.1.2 of the Caribou Supplemental Information report (Appendix G). This section includes a discussion of

ID:	FFA-02
	the potential effects of changes on the migratory pathway, including the implications for the Buchans herd if they are unable to migrate and calve successfully. Potential Project effects on mortality of calves and adults are also included. Table 4.1 of Caribou Supplemental Information report (Appendix G) presents possible migration scenarios that could result from the Project and their outcomes. The Caribou Alternate Migration Pathway Analysis predicted a number of alternate paths with associated energetic costs that range from 1.01 to 1.41 times greater than the baseline least cost path (LCP) (Attachment A in Caribou Supplemental Information report [Appendix G]). Additionally, Section 5 summarizes the Project residual effects and the possible outcomes on the four assessed caribou herds. c. Section 3.2.1 of the Caribou Supplemental Information report (Appendix G) discusses the remote camera program. The Caribou Supplemental Information report (Appendix G) includes results from the fall 2020 program, which were not available when the EIS was submitted (i.e., new data that was not included in BSA.2). Section 3.2.1 also includes the standardized camera effort results [i.e., the mean number of events and mean number of caribou observed per monitoring day (± SE)] that was not presented in BSA.2. Results from the 2020 Post-Calving Survey are included in BSA-2, Attachment A. Classification results (e.g., group size and composition) for both the Buchans herd and resident caribou that calve in the ZOI are presented in Table 4.1 (BSA-2, Attachment A). d. Section 5.1 of the Caribou Supplemental Information report (Appendix G) includes a discussion of the relative risk of specific Project components (e.g., open pits, haul roads, existing access road, waste rock pile) to Buchans caribou, including details about the size of the waste rock pile and its location in relation to the primary migration path. The risk of adverse effects of these Project components on caribou will be mitigated using the measures outlined in Table 6.3 of Caribou Supplemental Information report (Appendix G). e. The effects of specific Project components on migrating caribou is discussed in Section 5.1of the Caribou Supplemental Information report (Appendix G). The effects of the Project, including the location of the Marathon waste rock pile in relation to primary migration path, considered in the overall assessment. Section 2 discusses the approach to the caribou assessment and the integration of effect

ID:	FFA-02
	pathways. The approach to mitigation is provided in Section 6. The Caribou Monitoring Plan will be developed as the Project progresses. f. The response to FFA-02 a) discusses the camera deployment locations for the surveys. While the cameras in the fall 2019 to fall 2020 programs were not positioned to provide complete coverage of caribou movements throughout the overall Project Area, or complete migratory corridor, they did provide information on the timing and number of individuals using the primary migration paths. Table 3.6 of the Caribou Supplemental Information report (Appendix G) provides the migration dates through the Project Area along the primary paths obtained from the remote cameras. Additionally, BSA.2 provides the total number of caribou, as well as group size and composition, detected by the remote cameras in fall 2019 and spring 2020 (BSA-2, Attachment A, Table 4.2, and Attachment B, Table 4.2, respectively). Table 3.1 of the Caribou Supplemental Information report (Appendix G) provides the summary metrics for caribou events and number of caribou detected in the Fall 2019, Spring 2020 and Fall 2020 remote camera programs. Information on the use of the Project Area and timing of migration will be refined through additional camera deployment in 2021 and collared caribou telemetry from the collaring program, which commenced in November 2020. The location of cameras for deployment for 2021 were selected in consultation with the NLDFFA - Wildlife Division. The spring 2021 camera data were not available for presentation at the time this response was prepared. Additional cameras may be deployed for subsequent programs to study additional or alternate paths, based on consultation with NLDFFA - Wildlife Division. As indicated, results from the remote camera program were combined with other information sources, including the collared-caribou migration analysis and the LiDAR wildlife trail analysis, to inform the discussion of Buchans caribou herd migration patterns in relation to the Project Area (Section 11.2.2.1 of the EIS). Reference: Government of NL (Newfoundland and Labrador). 2020. FW: more questions for data request. July 6, 2020. Corner Brook, NL. g. Marathon acknowledges that there were errors in the survey methods applied by the responsible consultant, and therefore a reliable 2020 population estimate is not available, per correspondence provided to NLDFFA - Wildlife Division on January 12, 2021. As noted in the

ID:	FFA-02
	correspondence, the population data developed from this survey was not used in the assessment of caribou as presented in the EIS, and therefore has no effect on the results and conclusions provided in the assessment. Section 3.4 of the Caribou Supplemental Information report (Appendix G) provides more information on population estimates for the Buchans and Grey River herds. The most recent, reliable population estimate for the Buchans herd is from 2019, when the population size was estimated at 4,112 individuals, down slightly from approximately 4,500 individuals in 2007 (Table 11.5 of the EIS). A 2021 aerial survey was designed by Marathon's consultant, approved by NLFFA - Wildlife Division and completed by a field team consisting of Marathon's consultants and a NLDFFA – Wildlife Division biologist. Although results are not available at the time this document was prepared, it is expected to provide a population estimate for the Buchans caribou herd that can be used as a reference point for comparison to population estimates during and after construction. Marathon is committed to completing post-calving/population surveys in 2021 and beyond and will continue to work with NLDFFA - Wildlife Division personnel to develop and confirm appropriate survey protocols. h. The Caribou Supplemental Information report (Appendix G) culminates various data, literature reviews and analyses of the effects of the Project on caribou, including potential impacts of changes in the migratory pathway or absence of migration (Section 4.1), mortality of calves (Section 4.5) and adults, and changes in habitat. Section 5 summarizes effects of changes to movement, habitat and mortality risk, as applicable for each caribou herd. i. Section 4.1 of the Caribou Supplemental Information report (Appendix G) summarizes the Caribou Alternate Migration Pathway Analysis (which is attached as Appendix A to the report) and describes the potential risk of change in movement to caribou populations (Section 4.2). Alternate migratory pathways, including those predicted by the Caribou Alternate Migration Pathway Analysis, may also overlap other structures, such as the Star Lake to Valentine Gold powerline which is undergoing a separate provincial environmental assessment process that is ongoing at the time of preparation of this report (https://www.gov.nl.ca/ecc/projects/project-2136/). The power line has been factored into the cumulative effects assessment for this Project, as well as other projects and activities. The Caribou Monitoring Plan to be developed for the Project will include detailed monitoring and

ID:	FFA-02
	assessment programs, which will examine the relationship between the Project and condition of caribou within the Project Area, including the use of alternate pathways (see Section 6.2 of the Caribou Supplemental Information report (Appendix G). Sources of information that will be used to understand caribou interactions with the Project are presented in Section 6.2.1 and include GPS-enabled caribou collars, wildlife cameras, aerial surveys, and on-site observations by Project staff and contractors. Mitigation to reduce effects of use of increased energetic costs include general mitigation to reduce overall effects on caribou and potentially supplemental feeding should the monitoring show migration through lower quality habitat (see Table 6.3 of the Caribou Supplemental Information report (Appendix G). j. Various population metrics (e.g., average group size, calves:100 females) were presented in the EIS (Table 4.1 BSA.2, Attachment 2-C). Section 3.4 of the Caribou Supplemental Information report (Appendix G) presents population estimates for the Buchans and Grey River caribou herds along with observations on group sizes and locations of concentrations of groups. A post-calving and population survey of the Buchans caribou herd was completed in spring 2021 with consultation and support from NLDFFA - Wildlife Division. Marathon will provide the results of the post-calving and population survey to NLDFFA - Wildlife Division in accordance with the 2021 research permit. Results of the 2021 survey were not available at the time of report preparation. k. The planned location of the Marathon waste rock pile and open pit overlaps the main migration path of the Buchans herd and is expected to act as a physical obstacle to caribou movement, as described in the EIS. The waste rock pile will be developed over several years using slopes and benches that individually are about 10 m tall, and when complete will collectively be approximately 110 m tall and have a footprint of approximately 1.5 km^2. When a bench is finished in one area, the horizontal bench and downhill slope will be covered with overburden / organics and revegetated. As part of detailed Project design, Marathon will consult with NLDFFA - Wildlife Division to consider options to move or relocate portions of the Marathon waste rock pile to the south of the Marathon pit (Table 6.1 of the Caribou Supplemental Information report [Appendix G]). Should relocations be feasible, this may reduce the width of the Project footprint in relation to the main migration path thereby potentially allowing rehabilitation, such as planting vegetation for visual barriers, in a portion of the path following mine closure. The waste rock pile and pit are assumed to be a permanent obstacle to caribou movement, but

ID:	FFA-02
	with the mitigation identified above (i.e., potentially relocating a portion of the waste rock pile to the south of the pit) there is potential for a portion of the effect associated with the waste rock pile to be reversible following mine closure. l. Section 6 of the Caribou Supplemental Information report (Appendix G) describes the mitigative strategy and monitoring plan for the Project. Section 6.2.1.1 describes an area-based management matrix which will be used to inform the establishment of thresholds and management actions. Table 6.3 outlines the proposed approach to the Caribou Monitoring Plan including monitoring approaches and thresholds. m. It is understood that fencing is not preferred, and for the purposes of a safety barrier around the high walls of the open pit it is rock berms that are preferred by the Newfoundland and Labrador Department of Industry, Energy and Technology (NLDIET) - Mines Branch to satisfy this mine safety requirement, and what are typically used in mining practice. These berms are generally implemented for the safety of people and are not specifically intended as a barrier to animals, however they will have the same effect in this case. Marathon will consult with NLDIET - Mines Branch and NLDFFA - Wildlife Division regarding the acceptability and use of the barrier, including design considerations and placement. n. The camera program is intended to provide information on group size and composition, as well as the timing of spring and fall migration through the migratory corridor. Sections 3.2.1 and 3.5 of the Caribou Supplemental Information report (Appendix G) outline the approach to camera deployment to supplement collar information. Table 6.3 of the same report identifies how the camera data will contribute to the long-term monitoring program to understand the effectiveness of the mitigations and overall condition of animals moving through the corridor. o. The dBBMM for the Buchans herd was based on the available GPS collars, however, the assumption is that the movement patterns are representative of the herds generally. Use of the primary path by Buchans Herd caribou was confirmed during both spring and fall migration via the remote camera program, and through dBBMM using caribou collar telemetry data that identified a primary spring and fall migration path through the mine site (Section 11.2.2.1 of the EIS). This information, as well as further baseline work to be completed in 2021 and monitoring programs during Project development to assess changes caribou movements, will inform the timing and nature of

ID:	**FFA-02**
	mitigations (e.g., seasonal reductions in, or suspension of, Project activities, as required). The data gathered will contribute to answering the monitoring questions as outlined in Section 6.2 of the Caribou Supplemental Information report (Appendix G). p. Marathon has identified supplemental feeding (e.g., transplanting lichen and/or distribution of caribou pellets) to increase forage value on winter and calving grounds as a potential mitigation to reduce effects on energetic demands. This mitigation will be discussed with NLDFFA - Wildlife Division and informed by relevant literature such as those references listed below: • Allen, J.L. 2017. Testing lichen transplant methods for conservation applications in the southern Appalachian Mountains, North Carolina, U.S.A., "The Bryologist" 120(3): 311-319. Available online at, (16 August 2017): https://doi.org/10.1639/0007-2745-120.3.311. Last accessed July 13, 2021. • Duncan, S.J. 2015. Woodland caribou alpine range restoration: An application for lichen transplants. Ecol. Restor. 33: 22–29. • eCollection. 2021. Video presentation: Caribou Ecology & Recovery Webinar Series: Caribou Monitoring Unit (abmi.ca) Supplemental feeding increases the growth rate of an endangered caribou herd. • Heard, D.C and K.L. Zimmerman. 2021. Fall supplemental feeding increases population growth rate of an endangered caribou herd. PeerJ 9:e10708 https://doi.org/10.7717/peerj.10708 • Rapai, S.B., R.T. McMullin, S. G. Newmaster, and R. Hanner. 2018. Restoring Cladonia subgenus Cladina in a post mine environment. The Forestry Chronicle. 94 (3): 283-291. • Roturier, S., S. Bäcklund, M. Sundén and U. Bergsten. 2007. Influence of ground substrate on establishment of reindeer lichen after artificial dispersal. Silva Fennica 41(2): 269–280.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO FFA-03

ID:	**FFA-03**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	Outline mitigations that resolve the project's effects on migratory corridors
EIS Reference:	-
Context and Rationale:	-
Information Request:	Table 11.13 does not contain mitigations that address specific projects components and their impact on caribou migration. Detailed comments are provided throughout the review. This is the primary deficiency of this EIS.
Response:	Possible migration scenarios and outcomes for the Buchans herd are described in Section 4.1.2 of the Caribou Supplemental Information report (Appendix G). Possible outcomes of caribou continuing to migrate through the mine site along preferred paths, continuing to migrate along alternate paths avoiding the mine site, and failing to migrate are considered. The effects of individual Project components on migrating caribou are discussed in Section 5.1 (Appendix G). The mitigative strategy and monitoring plan (Section 6.0 of the Caribou Supplemental Information report [Appendix G]) reflects Marathon's commitment and intent to avoid or reduce adverse effects on caribou, yet acknowledges that these measures and monitoring approaches may be refined through final mine design, Project schedule and ongoing engagement with a committee of experts, Indigenous groups, and the Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture (NLDFFA) - Wildlife Division. Mitigation measures outlined in Table 6.3 of the Caribou Supplemental Information report (Appendix G) will be used to reduce Project effects on caribou moving through the mine site. Additionally, Project activity will be modified depending on caribou proximity to the Project Area (Table 6.2). Section 6.2.1 discusses an area-based matrix that Marathon will use (including distances) to direct specific management actions based on information being gathered from the caribou monitoring program (i.e., data driven management triggers). An adaptive approach (Section 6.2.3) will be used that will propose monitoring thresholds for each mitigation, and exceedance of any threshold will trigger management actions. The detailed Caribou Monitoring Plan will be developed as the Project progresses. NLDFFA - Wildlife Division will be consulted regarding development of the monitoring thresholds. Other mitigation measures, such as the use of the transplantation of lichen or

ID:	FFA-03
	distribution of caribou pellets (including design considerations and location), will be discussed with the NLDFFA - Wildlife Division. Table 6.1 of the Caribou Supplemental Information report (Appendix G) includes information on possible offsetting measures for residual Project effects. Generally, offsetting is used when residual effects remaining after the application of avoidance, reduction, and restoration measures are considered unacceptable. While direct changes to the habitat or migration path will not be fully reversed following decommissioning, the level of sensory disturbance is expected to gradually return to baseline conditions following closure. Research indicates that caribou have a greater amount of avoidance of roads with greater disturbance levels (i.e., active roads compared to derelict roads) (Leblond et al. 2013) and during the highest traffic period (Dyer et al. 2001). Other ungulates (i.e., red deer) avoid crossing roads during periods of increased traffic (Kušta et al. 2017). Additionally, Eftestøl et al. (2019) found that reindeer resumed some use of habitats disturbed by mining activities within 2.5 days and recommend keeping mining activities to a minimum during periods when intensive use of the area is expected (i.e., during migration). This indicates that the amount of avoidance by caribou may decrease with the amount of sensory disturbance in some situations and suggests that caribou may migrate through Project Area following decommissioning. References: Dyer, S.J., J.P. O'Neill, S.M. Wasel and S. Boutin. 2001. Avoidance of industrial development by woodland caribou. Journal of Wildlife Management 65: 531-543. Eftestøl, S., K. Flydal, D. Tsegaya and J.E. Colman. 2019. Mining activity disturbs habitat use of reindeer in Finnmark, Northern Norway. Polar Biology 42: 1849-1858. Kušta, T., Z. Keken, M. Ježek, M. Holá and P. Šmíd. 2017. The effect of traffic intensity and animal activity on probability of ungulate-vehicle collisions in the Czech Republic. Safety Science 91: 105-113. Leblond, M., C. Dussault and J.-P. Ouellet, 2013. Avoidance of roads by large herbivores and its relation to disturbance intensity. Journal of Zoology 289: 32-40.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO FFA-04

<table>
<tr><td>ID:</td><td>FFA-04</td></tr>
<tr><td>Expert Department or Group:</td><td>Department of Fisheries, Forestry and Agriculture</td></tr>
<tr><td>Guideline Reference:</td><td>4.2.1.4 Fish, Fish Habitat and Fisheries</td></tr>
<tr><td>EIS Reference:</td><td>-</td></tr>
<tr><td>Context and Rationale:</td><td>-</td></tr>
<tr><td>Information Request:</td><td>The Baseline Fish, Fish Habitat and Fisheries Study (Appendix 4 of the EIS) does not adequately:
provide the necessary baseline data to support assessment of effects on the recreational fishery.
provide a description and quantification of fish and fish habitat
provide necessary baseline data to support on-going monitoring programs that assess the effectiveness of mitigation and offsetting plans
assess the upstream and downstream effects of the Project on fish, fish habitat and fisheries for all potentially affected waterbodies
describe the limnology, hydrology, freshwater biota, fish species, associated habitats and habitat distribution that have the potential to be affected by project activities.</td></tr>
<tr><td>Response:</td><td>The Baseline Study Appendix (BSA) 4 of the EIS contains the technical data reports for the aquatic field programs that were conducted in support of the Project. The existing conditions for fish and fish habitat are provided in Section 8.2 of the EIS, where the results of the aquatic field programs documented in BSA.4 are analyzed and discussed in consideration of other sources of information (e.g., publications, government data, surface water field programs) to provide a fulsome description of existing conditions. The description of baseline conditions provided in Section 8.2 of the EIS and Appendix H, includes limnology, hydrology, freshwater biota, fish species, associated habitats and habitat distribution that have the potential to be affected by Project activities.

Likewise, BSA.4 does not (and was not intended to) contain an assessment of Project effects or a description of the information needed to support planned monitoring and offsetting plans. The assessment of upstream and downstream effects of the Project on fish, fish habitat and fisheries and the quantification of fish habitat that may be subject to Harmful Alteration, Disruption and Destruction is provided in Sections 8.3 to 8.7 of the EIS.

With respect to the baseline conditions for the recreational fishery, the level of effort dedicated to establishing baseline conditions for an environmental</td></tr>
</table>

ID:	**FFA-04**
	component generally depends on several factors including: the status of a species or presence of important habitat or use within a project area; the potential for a project to affect a valued component (VC); the level of concern from stakeholders; and specific requirements of the EIS guidelines or applicable regulations. There are often multiple qualitative and quantitative approaches to establishing baseline conditions for a VC; for this Project, the EIS guidelines did not specify the baseline data to be provided or the required methods for baseline data collection. Past comparable projects in the province that have been subject to environmental assessment and approved by provincial regulators have used qualitative approaches and publicly available data for establishing baseline conditions related to land and resource use, including recreational fisheries. Stakeholder and Indigenous engagement for the Valentine Gold Project did not identify any use of waterbodies for angling within the mine site and only limited angling on Victoria Lake Reservoir and Valentine Lake. Access to the mine site will be via an existing access road; therefore, the Project will not result in the development of new publicly accessible roads or rights of way that will increase access for fishing waterbodies in the immediate vicinity of the Project (i.e., Valentine Lake and Victoria Lake Reservoir). The EIS did identify improved road access within the mine site itself, and an increase of workers on site potentially resulting in an increase in recreational fishing in the area (EIS Chapter 8, Page 8.71). However, as indicated in the EIS, this potential effect will be mitigated through the prohibition of fishing by workers staying at the accommodations camp. Given the existing low angling effort within and in the immediate vicinity of the mine site, the prohibition on fishing by workers on site, and no new public access being created by Marathon as part of the Project, the baseline information provided in the EIS is considered sufficient to assess the effects of the Project on recreational fisheries. However, in response to this request from the Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture - Wildlife Division, Marathon is planning a creel survey in 2021 to document recreational fishery effort in the vicinity of the mine site. Based on the information provided above, the results of this survey are not anticipated to affect the conclusions presented in the EIS.
Appendix:	See Appendix H: 2020 Fish and Fish Habitat Data Report

RESPONSE TO FFA-05

ID:	**FFA-05**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	4.2.1.7 Avifauna and Their Habitats Avifauna
EIS Reference:	-
Context and Rationale:	-
Information Request:	Mitigations should be extended to include collision reporting for all species, including bird and bat collisions with infrastructure, vehicles and equipment.
Response:	Comment noted. Any wildlife (e.g., birds and bats) collisions with Project infrastructure or equipment will be reported to the Environmental Technician and the Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture - Wildlife Division.
Appendix:	None

RESPONSE TO FFA-06

ID:	**FFA-06**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	4.2.1.7.5 Other Wildlife
EIS Reference:	-
Context and Rationale:	-
Information Request:	The current status of muskrat should be updated and more recent literature reviewed as part of the assessment.
Response:	Over the past 50 years, muskrat harvest numbers have declined substantially throughout Canada and the US (Ganoe et al 2020). Several studies have examined this data to determine if a decrease in harvests indicates a decrease in population. When correcting for pelt price, evidence of a population decline is observed (Roberts and Crimmins 20010; Ahlers and Heske 2017). Data from Ontario, Quebec, New Brunswick, and several states in the Northeast United States indicated a 75% decrease in harvest between 1986 and 2006 (Roberts and Crimmins 2010). This trend is also seen in Newfoundland, where trapper opinion indicated a steep population decline on the Island between 1986 and 2013 (B. Rodrigues, pers. comm., 2021). In addition, a 2015 trapper survey indicated that muskrat have disappeared from some inland areas on the Island of Newfoundland, including some southeastern portions of the Island (B. Rodrigues, pers. comm., 2021). Although the introduction of mink was thought to cause historical declines in muskrat populations, it is not clear what has led to the current and continued declines (B. Rodrigues, pers. comm., 2021). The cause(s) of muskrat population decline in Newfoundland and throughout North America is still unknown. A variety of potential causes have been discussed to explain the decline in muskrat populations, including predation, habitat loss, disease, contaminants, and pathogens (Ganoe et al 2020; Ahlers and Heske 2017; Gregory 2012). Some common diseases and pathogens observed in muskrats include tularemia and Tyzzer's disease (bacterial pathogens), and cysticercosis (a parasite) (Ganoe et al 2020). Biotoxin poisoning from cyanobacteria is also common (Ganoe et al 2020). As discussed in Section 12.2.2.2, muskrats prefer open water, open wetlands and exposed sand / gravel shorelines. These habitats are not abundant in the Project Area and will largely be unaltered as a result of the Project. Approximately 2.1% of habitat suitable (i.e., of high or moderate

ID:	FFA-06
	value) to muskrat in the Ecological Land Classification Area will be lost due to the Project. The above additional information does not change the conclusions of the effects assessment for muskrat, which was assessed as a representative furbearer species under Other Wildlife (Chapter 12 of the EIS). References: Ahlers A.A, and E.J. Heske. 2017. Empirical evidence for declines in muskrat populations across the United States. Journal of Wildlife Management 81, 1408–16. Ganoe, L.S., J.D. Brown, M.J. Yabsley, M.J. Lovallo, and W.D. Walter. 2020. A review of pathogens, diseases, and contaminants of muskrats (O*ndatra zibethicus*) in North America. Frontiers in Veterinary Science, 7, 233. Gregory, G. 2012. Investigating the potential causes of muskrat (*Ondatra zibethicus*) diversity decline on Prince Edward Island. Masters thesis, University of Prince Edward Island. Roberts N.M., and S.M. Crimmins. 2010. Do trends in muskrat harvest indicate widespread population declines? Northeast Naturalist, 17, 229–38. Personal Communication Rodrigues, B. Furbearer Management Ecologist, Wildlife Division, Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture, E-mail communication to Marathon Gold, January 2021.
Appendix:	None

RESPONSE TO FFA-07

ID:	**FFA-07**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	4.2.1.8 Species at Risk and Species of Conservation Concern
EIS Reference:	-
Context and Rationale:	-
Information Request:	Plants Mitigations are required for water nymph and marsh seedbox. A new plant species for Newfoundland and Labrador has been reported but requires verification. A monitoring and response plan is recommended should invasive alien species be detected
Response:	Marathon will plan for the transplantation of nodding water nymph (*Najas flexilis*) to a location outside of the Project Area that aligns with the pH and water depth of the current habitat as closely as possible. If enough plant material and appropriate recipient sites are available, the plant will be transplanted to multiple sites. During field surveys to complete the transplant of nodding water nymph, the recorded location of marsh seedbox (*Ludwigia palustris*) will be revisited and searched. If the species is found, photographs and a specimen (if possible, without damaging the plant) will be taken to further confirm identification. A transplantation program will be discussed with Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture (NLDFFA) following the confirmation of the presence of this species. Although there is no official list of invasive plant species in Newfoundland and Labrador, species considered invasive in neighbouring jurisdictions will be removed or controlled if observed. Marathon will provide training to environmental staff on identification and appropriate eradication and control measures for potentially invasive plant species, to be developed with input from the NLDFFA. Further details on mitigation measures and the management of potentially invasive plant species will be provided in the Environmental Protection Plan.
Appendix:	None

RESPONSE TO FFA-08

ID:	**FFA-08**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	4.2.1.3.4.3 Wetlands
EIS Reference:	-
Context and Rationale:	-
Information Request:	While the most important area for waterfowl is located outside the project area & further downstream on the Victoria River, the Wildlife Division asks that a 50 m vegetated buffer be maintained along the Victoria River, wherever feasible, to protect this sensitive habitat.
Response:	No Project infrastructure is proposed within 50 m of Victoria River, with the exception of a small section of the river which intersects with the existing access road (flowing under an existing bridge) immediately upstream of Red Indian Lake. As such, the vegetated area within 50 m of the Victoria River will be unaffected by the Project.
Appendix:	None

RESPONSE TO FFA-09

ID:	**FFA-09**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	The results of the three monitoring components are not integrated and discussed (spring camera surveys, fall camera surveys, and post- calving aerial surveys) even where there are common findings which emphasize use of particular corridors. Commonalities in use between seasons indicate accentuated risk under these circumstances. For example, in spite of differences in how caribou move through the proposed mine project area in fall versus spring migrations, there are also many similarities i.e., both fall and spring camera surveys show extensive use and movement through the proposed waste rock pile near the open pit, a feature which will likely block movement due to its extent and size. The absence of a discussion that integrates findings such as these undermine the risk posed to caribou migration by specific project components.
Response:	Please refer to the response to FFA-02, Part a) for an integration and discussion of results from the remote camera surveys. Also, FFA-02, Part b) includes a discussion of the implications of potential Project-related migration scenarios to the Buchans herd. Section 5.1 of the Caribou Supplemental Information report (Appendix G) consolidates the assessment of the Project on the Buchans herd including the effects of specific Project infrastructure or components. While the comprehensive discussion of Project risks is included with the summary for the Buchans herd, many effects of specific Project components are not limited to Buchans caribou and would be similar for any caribou interacting with the Project. Additionally, Section 5 discusses potential effects on the populations of the four assessed herds, should Buchans caribou fail to migrate and calve successfully.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO FFA-10

ID:	**FFA-10**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	One of the key findings is that there is extensive use of the project area by caribou during migration, and this needs to be an essential element of assessment of potential impacts. The proposed rock pile is showing a lot of caribou use during migration and the project area is showing a lot of use as a whole based on the data. These are important findings and as such, it is important for the EIS to have a more focused discussion on potential impacts as well as a mitigation plan that addresses the high use of caribou within the project footprint during migration.
Response:	Section 2.1 of the Caribou Supplemental Information report (Appendix G) explains the approach to the assessment, which considered the various links between Project effect pathways. Use of the Project Area by the Buchans herd during migration contributed to the determination of a significant residual adverse effect for caribou in the EIS. A focused discussion of potential effects of the Project on caribou movement through the site is presented in Sections 4.1 and 5.1 of the Caribou Supplemental Information report (Appendix G), including discussion of specific Project infrastructure and components (e.g., waste rock pile). Please refer to the response to FFA-03 for discussion on the mitigation measures and development of the Caribou Monitoring Plan.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO FFA-11

ID:	**FFA-11**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	The remote camera monitoring that took place in Fall 2019 and Spring 2020 cannot be considered a survey as the cameras are not set up into an array based on principles of experimental design, and include only a small number of cameras (12), some of which malfunctioned. Further, cameras were not placed throughout the extent of the project area, or even along wildlife trails identified within this region. For example, figure 3-2 pg. 6 (Attachment 2B 'Spring'2020 Camera Survey', section 3.1), indicates that a number of wildlife trails that traverse the project area have no cameras placed on them, as does Figure 3-1 pg. 5.
Response:	Please refer to the response to FFA-02, Part f) and Section 3.2.1 of the Caribou Supplemental Information report (Appendix G).
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO FFA-12

ID:	**FFA-12**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	As a result of cameras not being distributed throughout the project extent, gaps in knowledge of caribou use of the region persist, even though extensive use of the project site by caribou is clear i.e., ~ 700 caribou were photographed during spring migration, for cameras deployed between 60-80 days, and focal, intensive use of some areas is apparent (e.g., one camera alone detected 440 caribou Attachment 2B, Table 4.1). Consequently, knowledge of caribou use of the region is incomplete, which constrains assessment of potential impacts. For example: Attachment 2A, Section 5.0 (pg. 12) indicates that they were unable to determine where caribou exit the proposed project area during fall migration given a lack of cameras deployed in probable areas. Similarly, during spring migration the available information does not allow for a determination of how caribou approach the mine site and how many might be crossing the main road (Attachment 2B, section 5, pg 15). Given that road crossings have been identified as an impediment for Buchans caribou during a prior EA in the region (report was made available to the proponent) this significant limitation will preclude assessment of changes in road crossings before, during and after construction due to the lack of baseline information.
Follow-up Information Request:	How will use of the proposed haul road change? How will this add to other impacts (e.g. the rock pile, the pit). How will these impacts be measured, and what specific mitigations will address passage of caribou across the haul road during migration, if caribou persist in using this migratory pathway?
Response:	Please refer to response to FFA-02, Part f) for discussion on camera deployment locations and integration of camera data with other sources of information. The EIS included the assessment of the specific effects of Project roads on caribou. Section 2.1 of the Caribou Supplemental Information report (Appendix G) discusses the effect pathways and the linkages between them. Outlined in Table 6.2 of the report is an area-based matrix to define caribou management objectives, with the approach in each area varying based on risk of Project effects to caribou. The risk of adverse effects on

ID:	**FFA-12**
	caribou related to roads, both the primary site access road and operations road within the mine site (e.g., haul road), will be mitigated using the measures outlined in Table 6.3 of Caribou Supplemental Information report (Appendix G). In addition to measures such as development and implementation of a Traffic Management Plan (access road specific), limiting traffic by bussing employees to site, and reducing traffic speed during migration periods, other measures to mitigate effects of roads could include further decreasing traffic volumes in migratory periods (e.g., advance planning for decreased delivery of supplies, fuel, etc. during migration periods). Monitoring approaches, tools and technologies that will be used to understand caribou interactions with the roads are presented in Section 6.2.1 and include GPS-enabled caribou collars, wildlife cameras, aerial surveys, and on-site observations by employees and contractors. Marathon is currently developing a Caribou Monitoring Plan, including specific measurable thresholds and management actions to be developed in consultation with Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture - Wildlife Division.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO FFA-13

ID:	**FFA-13**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	While the cameras provide information on caribou presence and timing of caribou movements, group sizes and composition, the overall results from the camera trapping are poorly summarized, are not standardized, and limited data analyses took place. For example: • No standardized observations are included (e.g., # detections per camera monitoring days). Since the number of operational cameras varied by day it is unclear whether figure 4-3 Attachment 2B (page 11) and figure 4-2 Attachment 2A simply sum all observation per camera or are standardized by the monitoring effort (trapping days). • Other data summaries that could have been included given the data collected are the (standardized) number of caribou detected per calendar day for each migration period, and summaries for the mean, median and range of detections per day for each season. • No process to determine the number of discrete caribou observations was included. Since multiple images taken over a short time frame can overestimate the number of individuals, this is an oversight.
Response:	Standardized camera observations (i.e., the mean number of events and mean number of caribou observed per monitoring day [± SE]) are presented in Section 3.2.1 of the Caribou Supplemental Information report (Appendix G). Table 3.1 of that report provides the standardized number of caribou events for each migration period including summaries for the mean, median, and range of observations per monitoring day for each camera survey. This information had not been included in Baseline Study Appendix 2. The likelihood of overestimating the number of individual caribou was reduced through a combination of camera placement and image analysis technique. Please refer to Section 3.2.1 of the Caribou Supplemental Information report (Appendix G) for further discussion on the image analysis methods.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO FFA-14

ID:	FFA-14
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	Improper application of the 'distance sampling' technique in the post-calving survey to generate an estimate of population size for the Buchans caribou herd makes this estimate wholly unreliable. Consequently, current baseline information on Buchans caribou herd population size is incomplete and future comparisons to changes in abundance during and after construction cannot be made using this survey estimate.
Response:	The purpose of the 2020 post-calving / population survey was to 1) determine group size and composition for Buchans herd caribou and other caribou that calve within the Project's zone of influence (ZOI) and 2) complete a population estimate of the entire calving grounds for the Buchans herd. Marathon acknowledges that there were errors in the survey methods applied by the responsible consultant, and therefore a reliable population estimate for 2020 is not available per correspondence provided to the Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture - Wildlife Division on January 12, 2021. As noted in the correspondence, the population data developed from this survey was not used in the assessment of caribou as presented in the EIS, and therefore does not affect the results or conclusions presented in the assessment. The most recent and reliable population estimate for the Buchans caribou herd is from 2019, when the population size was estimated at 4,112 individuals, down slightly from approximately 4,500 in 2007 (Table 11.5 of the EIS). An aerial survey was completed in 2021. While results are not available at the time this document was prepared, the survey is expected to provide a reliable estimate for the Buchans caribou herd, which can be used as a reference point for comparison to population estimates during and after Project construction. Section 3.4 of the Caribou Supplemental Information report (Appendix G) provides additional information on population estimates for the Buchans caribou and Grey River caribou herds.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO FFA-15

ID:	**FFA-15**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	Fall 2019 remote camera survey: Note all references to figures and tables pertain to 'Attachment 2A'
Information Request:	Significant use of the proposed waste rock pile location during fall migration is documented e.g., section 5.0 "during fall migration caribou moved through proposed waste rock pile location near marathon pit as they travelled south"; Cameras depicted in Figure 4-1 in the proposed waste rock pile shows high numbers of caribou observations. Nonetheless, the discussion includes no reference to the fact this waste rock pile could therefore block a significant migration corridor, and what the potential impacts of such an obstruction would be for caribou returning to their wintering grounds under this circumstance.
Response:	Discussion of the waste rock pile as an obstacle to migration for the Buchans herd (and potential changes in migration pattern, including a failure to migrate) is provided in Sections 4.1 and 5.1 of the Caribou Supplemental Information report (Appendix G). Mitigation measures to address this risk are included in Table 6.3 of that report. The adaptive management plan will be developed in consultation with Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture - Wildlife Division to evaluate strategies to facilitate caribou migration adjacent to (and possibly through) the mine site (e.g., shutdowns during migratory periods) and to reduce potential adverse effects on caribou.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO FFA-16

ID:	**FFA-16**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	Spring 2020 remote camera survey: Note all references to figures and tables pertain to 'Attachment 2B'
Information Request:	A small number of camera deployments over a constrained spatial extent relative to the project area, limit the ability to describe baseline caribou activity and movements. For example, the single camera placed at the main road, an area that will have increased traffic and which caribou are likely to avoid under those circumstances, failed. Therefore, comparisons to future changes in use or avoidance of the road during spring migration cannot be made.
Response:	Please refer to FFA-02 (Part a) and Section 3.2.1 of the Caribou Supplemental Information report (Appendix G) for discussion on camera deployment locations and integration of camera data with other sources of information to characterize caribou activity and movement through the Project Area. Section 3.5 of that report also describes future baseline studies to be undertaken to support future environmental effects monitoring.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO FFA-17

ID:	FFA-17
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	Spring 2020 remote camera survey: Note all references to figures and tables pertain to 'Attachment 2B'
Information Request:	Figure 3-1 (page 5) shows generalized wildlife trails throughout the proposed mine site, including straight through waste rock pile and across the main road. However, the discussion includes no reference to the potential ramifications of this to caribou attempting to travel north through the mine site to their calving grounds. For example, the size, extent, height and location of the waste rock pile is likely to pose a significant, possibly insurmountable, obstacle. The possible impacts of this are not discussed and no mitigations are proposed.
Response:	Please refer to the response to FFA-02 for details on the assessment of risk posed by the Project to caribou migration (part b) and potential effects related specifically to the presence of the waste rock pile and other Project components (part d). The approach to mitigation, as well as measures to reduce Project effects on change in movement of Buchans herd caribou is provided in the response to FFA-03 and in Section 6 of the Caribou Supplemental Information report (Appendix G). Dimensions of the Marathon waste rock pile are provided in Section 5.1.1 of that report and in the response to FFA-02, part k). The Marathon waste rock pile and adjacent open pit will be an obstacle, and as such, movement across the pile is unlikely. Although it is expected that most caribou will show avoidance of the mine site, it will be possible for caribou to navigate around the infrastructure and pass through the site. Section 4.1.2 of the Caribou Supplemental Information report (Appendix G) discusses potential migration scenarios including continued migration through the mine site, avoidance of the mine site or other Project infrastructure, and failure to migrate. Additionally, Section 5.1 of the Caribou Supplemental Information report (Appendix G) discusses the risks associated with individual Project components. Mitigation measures to address risks to migration are included in Table 6.3 of the Caribou Supplemental Information report (Appendix G). Effects monitoring, which will be described in a Caribou Monitoring Plan, will aim to confirm the effectiveness of mitigation, contribute to ongoing evaluation of the overall condition of caribou within the Project Area, and help identify the

ID:	**FFA-17**
	potential need for adaptive management measures to further mitigate Project effects. An adaptive management framework will be applied to evaluate monitoring outcomes relative to desired goals (i.e., limit potential adverse effects of the Project on caribou migration and populations in the Project Area to an acceptable level).
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO FFA-18

ID:	**FFA-18**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	2020 Post-calving Aerial Survey: Note all references to figures and tables pertain to 'Attachment 2-C'
Information Request:	Distance sampling to estimate population size is a valid technique to estimate population size, particularly where animals are aggregated and where they can be readily observed, as is the case for post-calving regions of the Buchans caribou range. Unfortunately, the technique was improperly applied in this survey (see General comments), and the resulting population estimate is unreliable.
Response:	Please refer to the response to FFA-14.
Appendix:	None

RESPONSE TO FFA-19

ID:	**FFA-19**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	2020 Post-calving Aerial Survey: Note all references to figures and tables pertain to 'Attachment 2-C'
Information Request:	Section 3.1.1 (first paragraph, page 4) – "The data was quality reviewed to remove locations that were either low quality or faulty e.g., 'Fix status =2'. This is an ambiguous statement, as it would apply only to ARGOS location data (not GPS, for which precision is measured using DOP values). Further, since precision of ARGOS data improves with higher fix status (e.g., a value of 3 is better than 2) this statement implies that the most precise locations were in fact filtered out prior to mapping the calving range. Therefore, more detail on how data was selected based on precision for all data types used is required.
Response:	The text noted in the information request from Section 3.1.1 of the EIS should have read: "Telemetry data from ARGOS collars had a fix-rate of four days, and data from GPS collars had a fix-rate of one to two hours. The data were quality reviewed to remove locations that were either low quality or faulty. Caribou locations with higher accuracy locations were included in the analysis (i.e., ARGOS: Location Quality ≥ 2; GPS: Fix Status = 2D, 3D, and 3D-V)." This revision does not change the conclusions for this section or the effects assessment for Caribou.
Appendix:	None

RESPONSE TO FFA-20

ID:	**FFA-20**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	2020 Post-calving Aerial Survey: Note all references to figures and tables pertain to 'Attachment 2-C'
Information Request:	Since individual calving ranges for animals are not defined, why were locations for animals with 50 locations eliminated, since these are pooled to define the calving range? Also, the number of locations and individuals removed from the analysis as a result of this decision need to be indicated.
Response:	Individuals with fewer than 50 locations in the season of interest were not included in the calculation of calving range because of their potential to bias home population-level range estimates. Seaman et al. (1999) found that the bias and variance of kernel home range estimates approached an asymptote at about 50 locations per home range. The threshold of at least 50 locations per individual is a commonly used parameter for kernel estimation for caribou (e.g., Donovan et al. 2017), other ungulates (e.g., Rosatte 2016; Vander Wal and Rodgers 2012; Schrautemeier 2017), and other wildlife species (e.g., Nicholson et al. 2014; Barg et al. 2005; Tri et al. 2014). A seasonal kernel was generated for each collared caribou and included all years for which there was sufficient data. Individual kernels were then pooled to create the range estimate for the herd. The calving range estimate for the 2020 Post-Calving Caribou Survey (Baseline Study Appendix 2, Attachment 2-C) included collared caribou with 50 or more locations in the calving season (May 20 – June 10). The number of collared caribou and number of locations excluded are provided in Table FFA-20.1. The number of locations included in the calving range estimate was 21,261, and the number of locations excluded was 633. If collared caribou with fewer than 50 observations were included, it is reasonable to assume that those individual home range sizes would be biased (i.e., overestimated), and when pooled would result in an overall bias in the Buchans herd home range estimate. References: Barg, J.J., J. Jones and R.J. Robertson. 2005. Describing breeding territories of migratory passerines: suggestions for sampling, choice of estimator, and delineation of core areas. Journal of Animal Ecology 74:139–149.

ID:	FFA-20
	Donovan, V.M., G.S. Brown, and F.F. Mallory. 2017. The impacts of forest management strategies for woodland caribou vary across biogeographic gradients. PLoS ONE 12: e0170759. doi:10.1371/journal.pone.0170759 Nicholson, K.L., P.R. Krausman, T. Smith, and W.B. Ballard. 2014. Mountain lion habitat selection in Arizona. The Southwestern naturalist 59: 372-380. Rosatte, R. 2016. Home ranges and movements of elk (Cervus canadensis) restored to southern Ontario, Canada. Canadian Field-Naturalist 130: 320-331. Schrautemeier, T.J. 2017. Habitat Use of Female Columbian Black-tailed Deer in Western Oregon. M.Sc. Thesis. Oregon State University, Corvallis, Oregon, US. 82 pp. Seaman, D.E., J.J. Millspaugh, B.J. Kernohan, G.C. Bundige, K.J. Raedeke and R.A. Gitzen. 1999. Effects of sample size on kernel home range estimates. Journal of Wildlife Management 63:739–747. Tri, A.N., L.A. Brennan, F. Hernández, W.P. Kuvlesky Jr. and D.G. Hewitt. 2014. Home ranges of breeding northern bobwhite hens in south Texas with access to supplemental feed. Bulletin of the Texas Ornithological Society 47:11-16. Vander Wal, E., and A.R. Rodgers. 2012. An individual-based quantitative approach for delineating core areas of animal space use. Ecological Modelling. 224: 48-53.
Appendix:	None

Table FFA-20.1 Summary of Telemetry Data for Buchans Herd Calving Range Estimate

Year	No. Collared Caribou Included in Analysis	No. of Locations Included in Analysis	No. Collared Caribou Excluded from Analysis	No. of Locations Excluded from Analysis
2005	0	0	2	22
2006	0	0	2	24
2007	13	3,160	17	211
2008	11	2,626	11	52
2009	11	2,858	11	125
2010	12	2,357	9	127
2011	9	1,844	7	72
2012	6	1,577	0	0
2016	12	2,880	0	0
2017	15	3,959	0	0

Notes:

1. Calving season - May 20 – June 10
2. Collars excluded from analysis as they recorded less than 50 locations in the season (Seaman et al. 1999)

RESPONSE TO FFA-21

ID:	**FFA-21**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	2020 Post-calving Aerial Survey: Note all references to figures and tables pertain to ‘Attachment 2-C’
Information Request:	It is unclear whether the 95% kernels were generated for individuals or for pooled animals within the population, given the above statement.
Response:	A 95% kernel was calculated using telemetry locations from the calving period (May 20 – June 10; Emera 2013). A seasonal kernel was generated for each collared caribou for which there was sufficient data, and the individual kernels were pooled to provide a range estimate for the Buchan's herd. Please refer to the response to FFA-20 regarding the number of individuals included in the analysis. Reference: Emera Newfoundland and Labrador (Emera). 2013. Maritime Link Environmental Assessment Report. Chapter 6 – Island of Newfoundland, St. John’s, NL.
Appendix:	None

RESPONSE TO FFA-22

ID:	**FFA-22**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	2020 Post-calving Aerial Survey: Note all references to figures and tables pertain to 'Attachment 2-C'
Information Request:	On page 4 – section 3.1.1, the statement "point telemetry locations from May and June were also used to inform the survey area" is confusing since the calving period is defined as occurring throughout May and June and these locations would have been used by default.
Response:	The statement, "Point telemetry locations from May and June were also used to inform the survey area" should not have been included in Section 3.1.1 of the EIS. Removing this statement would not change the conclusions for this section or the effects assessment for Caribou.
Appendix:	None

RESPONSE TO FFA-23

ID:	**FFA-23**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	2020 Post-calving Aerial Survey: Note all references to figures and tables pertain to ‘Attachment 2-C’
Information Request:	The statement “Transects were established within the survey area in an east-west orientation at 3 km intervals, consistent with WD protocol” is misleading given that the Wildlife Division has used distance sampling on only one other occasion (Middle Ridge 2012, report provided), in which case transect lines were spaced more tightly (e.g., closer together) and were based on expected caribou densities throughout the survey extent.
Response:	The statement “Transects were established within the survey area in an east-west orientation at 3-km intervals, consistent with NLDFFA-WD survey protocol” in Baseline Study Appendix 2, Attachment 2-C of the EIS (page 4) should read, “Transects were established within the survey area in an east-west orientation at 3-km intervals.”
Appendix:	None

RESPONSE TO FFA-24

ID:	**FFA-24**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	2020 Post-calving Aerial Survey: Note all references to figures and tables pertain to 'Attachment 2-C'
Information Request:	Section 3.1.2. one reference was checked for accurate reporting of ZOI in this paragraph—and it was incorrect: caribou ZOI in Boulanger et al is 14 km, not 11 km.
Response:	The statement in Section 3.1.2 should read, "Published information on ZOIs indicate that caribou avoidance of mines ranges from 2 km to 14 km (Weir et al. 2007; Polfus et al. 2011; Boulanger et al. 2012; LeBlond et al. 2014; Johnson et al. 2015; Eftestøl et al. 2019)." A summary of caribou avoidance distances from anthropogenic footprints based on a literature review is provided in Table 11.14 in the EIS. The correct distance reference for Boulanger et al. (2012) appears in this table. This additional information does not change the conclusions for this section or the effects assessment for Caribou. Reference: Boulanger, J., K.G. Poole, A. Gunn and J. Wierzchowski. 2012. Estimating the zone of influence of industrial development on wildlife: a migratory caribou Rangifer tarandus gorenlandicus and diamond mine case study. Wildlife Biology 18: 164-179. Eftestøl, S., K. Flydal, D. Tsegaya and J.E. Colman. 2019. Mining activity disturbs habitat use of reindeer in Finnmark, Northern Norway. Polar Biology 42: 1849-1858. Johnson, C.J., L.P.W. Ehlers and D.L Seip. 2015. Witnessing extinction – Cumulative impacts across landscapes and the future loss of an evolutionarily significant unit of woodland caribou in Canada. Biological Conservation 186: 176-186. Leblond, M., C. Dussault and M.-H. St. Laurent. 2014. Development and validation of an expert-based habitat suitability model to support boreal caribou conservation. Biological Conservation 177: 100-108.

ID:	**FFA-24**
	Polfus, J.L., M. Hebblewhite and H. Keinemeyer. 2011. Identifying indirect habitat loss and avoidance of human infrastructure by northern mountain woodland caribou. Biological Conservation 144: 2637-2646. Weir, J.N., S.P. Mahoney, B. McLaren and S.H. Ferguson. 2007. Effects of mine development on Woodland Caribou *Rangifer tarandus* distribution. Wildlife Biology 13: 66-74.
Appendix:	None

RESPONSE TO FFA-25

ID:	**FFA-25**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	Survey methods (Section 3.2).
Information Request:	Survey methods: • The protocol for distance sampling was improperly applied. A key assumption of distance sampling is that the horizontal distance from the survey line perpendicular to each group of detected animals is measured. A recommended approach to accomplish this is to measure the sighting angle (using a rangefinder) from the aircraft to the centre of each group of animals. Then, a trigometric calculation of horizontal distance incorporating the accurate height of the aircraft is applied. If using waypoints to estimate altitude, the elevation height of land needs to be subtracted from aircraft height to precisely measure aircraft altitude. The survey as completed did not precisely measure the distance to caribou and did not accurately measure aircraft altitude. It also excluded over half of all caribou observations (e.g., if they were observed further than 500m away), even though caribou were readily observed at distances well beyond 500m. Therefore, the estimate of population size is invalid. • Why was perpendicular distance not directly measured with a range finder? This is a required input. • Why was the assumption made that animals would not be sighted further than 500m away? This is a key error, as the creation of a detection function which models animals sighted by distance is a vital component of distance sampling and must be derived from the survey data, and should not be assumed a priori. • Was survey altitude subtracted from a DEM? The use of altitude measured from the helicopter without taking into account the topography of the ground results is an incorrect estimate of altitude, a required input into the calculation of survey results. • Why were observation > 500 metres not included? The recommended practice is to truncate detection distances at the tail end of a histogram where detection probability is < 0.15 (Buckland 2001: 103). The decision not to directly measure distances is affecting the calculation of results here, and may have led to the unnecessary exclusion of data

ID:	FFA-25
	(how many animals were sighted beyond 500m?). For a prior survey of NF caribou (Middle Ridge), the detection function showed animals were sighted up to 1000m, and the authors of this study reported that caribou detection between 400-500m was still 75%. • Table 4.1 (page 12) How many of the 307 groups (and associated individuals) were included in the analysis? How many fell outside the 500m distance or were seen while in transit? • It would be good to see statistics on the number of groups seen per line, and the size of those groups as a component of the presentation of results. This would help to assess caribou densities throughout the survey extent. • Was group size used as a covariate or was consideration given to using size-biased regressions, as smaller groups are less likely to be detected at greater distance? • This section identifies that more than half of all observations made of animals were excluded because they were observed further than 500m away. This explains why the reported number of animals seen on transect so closely match the population estimate (1700 vs 1704 caribou). The survey population estimate infers that all animals that were present in the survey region were detected, an implausible occurrence. In fact, because distances to animals further than 500m away were not measured, the detection function could not be properly estimated. As a result, the population estimate is unreliable (it is an underestimate) and this should be elaborated on as part of the discussion regarding the discrepancy between this estimate and the one from 2019. It also means that baseline information on population size for 2020 is not available, and will constrain assessment of future impacts. • Population estimates calculated using distance functions correct for imperfect detection by incorporating variability in detection probability. Estimates are reported as an estimate of absolute density with confidence intervals that reflect variability in detection based on a number of covariates. Because distances to caribou were only measured at distances 500m (and even in this case, imprecisely, by using bins of distance classes rather than exact measures), the detection function was not fully estimated over the distance in which caribou were observed from the aircraft and the resulting population estimate assumes that nearly all caribou that were present were observed. The population estimate must be considered unreliable.

ID:	**FFA-25**
Response:	The purpose of the 2020 post-calving / population survey was to 1) determine group size and composition for Buchans herd caribou and other caribou that calve within the Project's zone of influence (ZOI) and 2) complete a population estimate of the entire calving grounds for the Buchans herd. Marathon acknowledges that there were errors in the survey methods applied by the responsible consultant, and therefore a reliable 2020 population estimate is not available per correspondence provided to the Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture (NLDFFA) - Wildlife Division on January 12, 2021. As noted in the correspondence, the population data developed from this survey was not used in the assessment of caribou as presented in the EIS, and therefore does not affect the results or conclusions presented in the assessment. The most recent and reliable population estimate for the Buchans caribou herd is from 2019, when the population size was estimated at 4,112 individuals, down slightly from approximately 4,500 in 2007 (Table 11.5 of the EIS). An aerial survey was completed in 2021. While results are not available at the time this document was prepared, the survey is expected to provide a reliable estimate for the Buchans caribou herd, which can be used as a reference point for comparison to population estimates during and after Project construction. Marathon is committed to completing post-calving/population surveys in 2021 and beyond and will continue to work with NLDFFA - Wildlife Division to confirm appropriate survey protocols.
Appendix:	None

RESPONSE TO FFA-26

ID:	**FFA-26**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Chapter 11: 11.2.1.3Page 11.11
Context and Rationale:	-
Information Request:	Error: Argos collars provide a position every 4 days not every hour. The argos system collected positions for 6 hours every 4 days and most often a class 3 position was selected via filtering.
Response:	Applicable text from Section 11.2.1.3 of the EIS should read, "Telemetry data from ARGOS collars had a fix-rate of four days, and data from GPS collars had a fix-rate of one to two hours." This revision does not change the results of analysis conducted in support of the EIS or the conclusions for this section.
Appendix:	None

RESPONSE TO FFA-27

ID:	**FFA-27**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Chapter 11 11.2.2.3Page 11.38
Context and Rationale:	-
Information Request:	In July and Aug 2018, 3 adult caribou were killed by black bears on the Buchans Caribou Management Unit indicating that adults are also taken in addition to calves.
Response:	Section 11.2.2.3 of the EIS should include the following text: “While bears generally prey less often on adult ungulates (Zager and Beecham 2006), bears can be an important predator of adult caribou (Seip 1991; Wittmer 2004). The Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture (NLDFFA)-Wildlife Division provided notation that black bear caused mortality of three adult caribou in July and August 2018 in the Buchans Caribou Management Area." This revision does not change the conclusions for this section. References: Seip, D.R. 1991. Predation and caribou populations. Rangifer, Special Issue No. 7: 46-52. Wittmer, H.U., B.N. McLellan, D.R. Seip, J.A. Young, T.A. Kinley, G.S. Watts and D. Hamilton. 2005. Population dynamics of the endangered mountain ecotype of woodland caribou (Rangifer tarandus caribou) in British Columbia, Canada. Canadian Journal of Zoology 83: 407–418. Zager, P. and J. Beecham. 2006 The role of American black bears and brown bears as predators on ungulates in North America. Ursus 17, 95–108.
Appendix:	None

RESPONSE TO FFA-28

ID:	**FFA-28**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Chapter 11 11.2.2Page 11.39
Context and Rationale:	-
Information Request:	It states that “coyotes consume mostly moose” - add carrion to this statement.
Response:	Section 11.2.2.3 (page 11.39) of the EIS that reads, "Coyote on the Island of Newfoundland consume mostly moose (*Alces alces*), as well as caribou and snowshoe hare (*Lepus americanus*) (Bridger 2006; Mumma et al. 2016)", should read as follows: "Moose (*Alces alces*) carrion, caribou, and snowshoe hare (*Lepus americanus*) are important sources of protein for coyote on the Island of Newfoundland (Blake 2006; Bridger 2006; Bastille-Rousseau et al. 2016; Mumma et al. 2016).” This revision does not change the conclusions for this section. References: Bastille-Rousseau, G., J.A. Schaefer, K.P. Lewis, M.A. Mumma, E.H. Ellington, N.D. Ray, S.P. Mahoney, D. Pouliot and D.L. Murray. 2016. Phase-dependent climate-predator interactions explain three decades of variation in neonatal caribou survival. Journal of Animal Ecology 85: 445-456. Blake, J. 2006. Coyotes in Insular Newfoundland: Current Knowledge and Management of the Islands Newest Mammalian Predator. Document produced for the Department of Environment and Conservation, Government of Newfoundland and Labrador, St. John’s, NL. Available online at: https://www.gov.nl.ca/ffa/files/publications-wildlife-51f40a0ed01.pdf Last accessed on September 20, 2020. Bridger, K. E. 2006. A comparative study of the dietary habits and helminth fauna of Canada lynx (Lynx canadensis), red fox (Vulpes vulpes) and eastern coyote (Canis latrans) on insular Newfoundland. M.Sc. Thesis. Department of Biology, Memorial University, St. John’s, NL. 151 pp. Mumma, M.A., J.R. Adams, C. Zieminski, T.K. Fuller, S.P. Mahoney and L.P. Waits. 2016. A comparison of morphological and molecular diet analyses of predator scats. Journal of Mammalogy 97: 112-120.
Appendix:	None

RESPONSE TO FFA-29

ID:	**FFA-29**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Chapter 11.3.3Table 11.11
Context and Rationale:	-
Information Request:	Section 'Change in mortality risk' does not include potential changes to calf mortality as a measurable parameter. Calf mortality is possible if females are unable to migrate successfully to calving grounds and calves are born elsewhere. Changes in calf mortality have the potential to significantly alter population size and trend.
Response:	Calf mortality was not included as a measurable parameter for the effect of change in mortality risk, nor was it listed as a source of mortality in the effects pathway in Table 11.11 of the EIS. Calf mortality was, however, fully assessed as a source of mortality in the assessment (Section 11.5.3 of the EIS) and contributed to the determination of a significant residual effect for caribou. Section 2.1 of the Caribou Supplemental Information report (Appendix G) identifies the pathways for each effect and discusses the linkages between pathways. Section 4.4 of that report presents a focused discussion on calf mortality, and the outcomes of a failure to migrate successfully to calving grounds are discussed in Sections 4.1, 4.2 and 5.1. Implications of a failure to migrate could include a reduced calving rate and increased adult and calf mortality, which could contribute to changes in population size and trend.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO FFA-30

ID:	**FFA-30**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Chapter 11.3.3Table 11.11
Context and Rationale:	-
Information Request:	Table 11.11 section 'Change in movement' does not include an impermeable migration corridor as a measurable impact. By summarizing loss only as a proportion of total migratory pathways it underestimates losses that may occur if the main corridor becomes impermeable to travel.
Response:	The effect of change in movement did not include an impermeable migration corridor as a measurable parameter. However, a failure to migrate was fully assessed as a Project effect in the assessment (Section 11.5.2 of the EIS) and contributed to the determination of a significant residual effect for caribou. The outcome of a failure to migrate due to impermeability of the primary migration path is discussed in Sections 4.1, 4.2 and 5.1 of the Caribou Supplemental Information report (Appendix G). Although the Project overlaps only a small portion of the migration corridor, the functionality of the primary migratory path may be affected if the Project alters existing migration patterns, survival rate of migrating caribou or recruitment. Project-related changes in movement, habitat or mortality risk could ultimately result in changes in recruitment or survival.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO FFA-31

ID:	**FFA-31**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Chapter 11.3.5.2Page 11.48
Context and Rationale:	-
Information Request:	To assume an avoidance zone of only 500m during construction and operation of the mine is extremely conservative (small) and inconsistent with published literature, including studies cited in the caribou component study. This affects the discussion and assessment of risk surrounding potential habitat loss.
Response:	Predicted effects on caribou habitat are expected to extend beyond the 500 m buffer, as indicated in Section 11.5.1.3 of the EIS. The amount of indirect habitat loss due to sensory disturbance was calculated within a 500 m buffer around the Project Area. This aligns with the federal Scientific Assessment to inform the Identification of Critical Habitat for Woodland Caribou in Canada (Environment Canada 2011), which uses a 500 m buffer on anthropogenic disturbances to define disturbed habitat as a correlate of population decline. The effects of sensory disturbance are expected to decrease with increasing distance from the Project Area. While the measurable parameters for change in habitat did not list habitat loss beyond the 500 m buffer (Table 11.11, EIS), sensory disturbance beyond the 500 m was fully assessed as a Project effect in the assessment (Section 11.5.1 of the EIS) and contributed to the determination of a significant residual effect for caribou. Section 2 of the Caribou Supplemental Information report (Appendix G) discusses the various effects pathways, and the linkages between them. Section 4.3 of the Caribou Supplemental Information report (Appendix G) discusses zones of influence (ZOIs) and Table 4.3 provides new data on low, moderate, and high-value caribou habitat located within a range of potential ZOIs extending up to 15 km from the mine site. This distance was selected based on information in the scientific literature (e.g., Boulanger et al. 2012) and knowledge of the Project and surrounding landscape. As noted, mechanisms that may cause caribou to avoid mines and other anthropogenic disturbances are not well understood and there is a high degree of variation in the effect of differently sized ZOIs on caribou.

ID:	**FFA-31**
	References: Boulanger, J., K.G. Poole, A. Gunn and J. Wierzchowski. 2012. Estimating the zone of influence of industrial development on wildlife: a migratory caribou Rangifer tarandus gorenlandicus and diamond mine case study. Wildlife Biology 18: 164-179. Environment Canada. 2011. Scientific Assessment to Inform the Identification of Critical Habitat for Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada: 2011 update. Ottawa, Ontario, Canada. 102 pp. plus appendices. Available online at: https://www.registrelep-sararegistry.gc.ca/virtual_sara/files/ri_boreal_caribou_science_0811_eng.pdf. Last accessed on July 8, 2021.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO FFA-32

ID:	**FFA-32**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Chapter 11.3.5.4Page 11.49
Context and Rationale:	-
Information Request:	Why is additional hunting by project workers considered a component of mortality risk if hunting and fishing will be prohibited by project workers (Table 11.13)?
Response:	The statement in Section 11.3.5.4 of the EIS should read, "Direct sources of mortality risk are estimated through predictions of increases in construction activity and equipment, and vehicular traffic". As stated in Section 11.5.3.1, "the Project will not affect the amount of caribou hunting. Employees will be bussed to site and will not be permitted to hunt while on site or bring firearms to site. An increase in hunting pressure is not anticipated as the Project will not create new access to caribou habitat, and hunting will be prohibited on site."
Appendix:	None

RESPONSE TO FFA-33

ID:	**FFA-33**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Chapter 11.3.5.4 Page 11.49
Context and Rationale:	-
Information Request:	This whole section requires further discussion with respect to the information presented in the text. Given the high volume of caribou which pass directly through the project area twice a year, the level of risk posed needs to be comprehensively presented. See also comment for Chapter 11.3.3—discuss risk posed to caribou calves if migration to calving grounds can't be completed and caribou are born elsewhere.
Response:	The approach to the effects assessment for caribou is described in Section 2.1 of the Caribou Supplemental Information report (Appendix G). An integrated discussion of the level of risk posed to caribou that pass directly through the Project Area is presented in Section 4.1.2 and includes possible migration scenarios such as implications of using alternate migration paths or failure to migrate. Section 4.4 of the Caribou Supplemental Information report (Appendix G) focuses on calf mortality and a focused discussion of Project effects on the Buchans herd is included in Section 5.1 of that report.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO FFA-34

ID:	**FFA-34**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Chapter 11.4 Page 11.50
Context and Rationale:	-
Information Request:	The text indicates that the waste rock pile was moved and reconfigured—yet the component study and the section on caribou migration indicate that it is still directly in the path of migrating caribou. Please provide further detail on how this mitigative measure will improve caribou movements through the project area.
Response:	The waste rock pile has been reconfigured from what was originally presented in the Project Registration document (submitted by Marathon to the provincial government in April 2019) and reflects efforts to reduce potential environmental effects to water resources and fish and fish habitat. However, as noted by the reviewer, the waste rock pile is still in the migration corridor for Buchans herd caribou. The statement "The Marathon waste rock pile was relocated and reconfigured, reducing the footprint perpendicular to the migration path" (pg. 11.50 of the EIS) should not have been included in the caribou assessment. Removing this statement does not change the conclusions in the EIS pertaining to caribou.
Appendix:	None

RESPONSE TO FFA-35

ID:	**FFA-35**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Chapter 11.4Page 11.50
Context and Rationale:	-
Information Request:	Noise emissions—please provide detail on how these will be monitored, and how their effects on caribou avoidance will be determined and mitigated. Place anticipated noise emissions into context relative to avoidance shown by caribou in other mining operations.
Follow-up Information Request:	What will be used to guide the extent of activity reduction when caribou are in proximity to the mine site? Will there be a decision matrix that uses 'real' data to evaluate this? For example, at other mine sites caribou within 50 km of infrastructure trigger a series of mitigations.
Response:	Please refer to Section 4.2 of the Caribou Supplemental Information report (Appendix G) for the discussion of the effects of noise emissions (including blasting noise and vibration) on caribou. As described in Section 6.2.1 (see Table 6.2) of the Caribou Supplemental Information report (Appendix G), Marathon will adopt an area-based management approach to direct specific management actions based on information gathered from various sources including GPS collars, remote cameras, observations from on-site employees and contractors, and aerial surveys (see Section 6.2.1). Marathon will develop a Caribou Monitoring Plan in consultation with Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture (NLDFFA) - Wildlife Division, which will direct effects monitoring and assessment programs and identify thresholds where further mitigation may be required. Section 6.2.2 of the Caribou Supplemental Information report (Appendix G) identifies preliminary monitoring approaches and management actions that will be further refined in consultation with NLDFFA - Wildlife Division prior to implementation. Table 6.3 provides an overview of how Marathon intends to monitor the various mitigation measures related to caribou. At least one specific element will be monitored for each mitigation measures to determine the effectiveness of the mitigation. As the monitoring framework is still under development, specific thresholds have not yet been determined. An adaptive approach (Section 6.2.3 of the Caribou Supplemental Information report [Appendix G]) will be used that will propose monitoring thresholds for

ID:	**FFA-35**
	each mitigation, and exceedance of any threshold will trigger management actions.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO FFA-36

ID:	**FFA-36**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Chapter 11.4Page 11.50
Context and Rationale:	-
Information Request:	Given extensive use of the project area by caribou, particularly during spring and fall migration, and the fact that an essential migratory pathway travels directly through the project site, it is concerning to see no targeted mitigations which address permeability of this migratory pathway, including potential shutdowns or relocations of project elements which block this pathway, during this time period. Addendum: I see these are referenced in the text pg 11.65, but should be incorporated into this table.
Response:	The functionality of the primary migratory path may be affected if the Project alters existing migration patterns, the survival rate of migrating caribou, or the recruitment rate for the Buchans herd. Section 6.1 of the Caribou Supplemental Information report (Appendix G) describes mitigative measures considered to reduce Project effects on the permeability of the migratory path. Mitigation measures related to caribou include the reduction or suspension of Project activities while caribou are migrating through the site or within a set distance from the site, delaying blasting activity if caribou are in the vicinity, facilitating caribou crossings across snowbanks or ditches, and aligning crossing points with existing migration paths. Also, as part of detailed Project design, Marathon will consult with Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture - Wildlife Division regarding options to move or relocate portions of the Marathon waste rock pile south of the Marathon pit, which could reduce its effect on caribou movement. Please refer to FFA-35 for information regarding the approach to thresholds and management triggers. Marathon's adaptive management framework including the process to evaluate the efficacy of monitoring outcomes is provided in Section 6.2.3 of the Caribou Supplemental Information report (Appendix G).
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO FFA-37

ID:	**FFA-37**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Chapter 11.5.1.2 Page 11.58
Context and Rationale:	-
Information Request:	Given the proximity of calving and post-calving regions for Grey River caribou (Figure 11-9), discuss potential implications if Grey River caribou avoid calving in these regions at levels beyond the 500m zone of influence estimated in this report.
Response:	Section 5.2 of the Caribou Supplemental Information report (Appendix G) presents a focused discussion on predicted Project effects on the Grey River caribou herd and Table 5.1 of that report provides additional information on the amount of calving range of the Grey River herd within potential zones of influence from the mine site (i.e., 1 km, 5 km, 10 km and 15 km).
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO FFA-38

ID:	**FFA-38**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Chapter 11.5.1.2 Page 11.61
Context and Rationale:	-
Information Request:	It would be useful to provide statistics on the amount of indirect habitat loss if avoidance exceeds 500m, e.g., is closer to levels reported in the broader literature. Perhaps different scenarios—low, medium and high levels of avoidance could be presented and discussed in 11.5.1.3.
Response:	Section 4.3 of the Caribou Supplemental Information report (Appendix G) discusses zones of influence (ZOIs) and Table 4.3 of that report provides new data on low, moderate and high-value caribou habitat located within a range of potential ZOIs extending up to 15 km from the mine site.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO FFA-39

ID:	**FFA-39**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Chapter 11.5.1.2 Page 11.65
Context and Rationale:	-
Information Request:	While the project area may affect 3.8% of the total migratory corridor, given that the corridor passes directly through the project area, and is obstructed by a major project feature (waste rock pile), the potential risk posed if the corridor is not passable is not fully assessed or discussed.
Response:	For the assessment, 'migration corridor' refers to an area used for migration at the population-level. The migration corridor comprises several 'migration paths', that may be used by one or more caribou. Although the Project overlaps only a small portion of the migration corridor, the functionality of the primary migratory path and the connectivity between winter and calving ranges may be affected if the Project alters existing migration patterns, survival rate of migrating caribou, or recruitment rate. The risk to the functionality of the primary migration path is discussed in Section 4.1 of the Caribou Supplemental Information report (Appendix G) and includes discussion of a failure to migrate (i.e., caribou avoidance of the Project rendering the migration path not passable). Additionally, obstruction of the primary migration path of the Buchans herd by the Marathon waste rock pile is discussed in Section 5.1 of that report. The least cost pathway mapping identified a number of potential alternate routes. Monitoring will assess the level of use of alternate migration paths. Cameras were deployed along some of the alternate paths identified in the Caribou Alternate Migration Pathway Analysis during spring 2021, which will provide information on the relative amount of use by caribou. Additionally, increased use of alternate travel routes is expected to be identifiable from collar data.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO FFA-40

ID:	**FFA-40**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Chapter 11.5.1.2 Page 11.66
Context and Rationale:	-
Information Request:	While there is some uncertainty in the degree of residual impacts on caribou, if migration is blocked or unable to occur the impact on the Buchans caribou population, which regularly uses a narrow migratory corridor that passes directly though the mine site, could be pronounced. This potentially highly detrimental impact needs to be more fully discussed as a component of risk faced by this population by this development.
Response:	Possible migration scenarios, functionality of the primary migration path, and the resulting outcomes for the Buchans herd are presented in Table 4.1 of the Caribou Supplemental Information report (Appendix G) (Section 4.1.2) and include effects of a failure to migrate. The effects of individual Project components on the Buchans herd, including loss of connectivity between seasonal ranges, are discussed in Sections 4.1.2 and 5.1 of that report.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO FFA-41

ID:	FFA-41
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Chapter 11.5.3.3Page 11.72
Context and Rationale:	-
Information Request:	Given the exposure to enhanced mortality (from vehicle collisions and from becoming tapped in the pit), when combined with the level of use shown by caribou throughout the project area, the assessment of risk as 'low' during construction and operation of the mine, is difficult to support.
Response:	Residual effects on caribou resulting from vehicular collisions and direct mortality caused by caribou becoming trapped in the pit are summarized in Section 11.5.3.2 of the EIS. It is anticipated that caribou will avoid the mine site due to ongoing human presence and sensory disturbance (Section 11.5.1 of the EIS), and therefore the risk of mortality from vehicular collisions and direct mortality caused by caribou becoming trapped in the pit is expected to be low. The mortality risk could be indirectly affected by Project related increases in calf mortality resulting from decreased body condition or increased predation. Project related mortality, including indirect mortality related to Project avoidance, was fully assessed as a source of mortality (Section 11.5.3 of the EIS) and contributed to the determination of a significant residual effect for caribou as increased adult and calf mortality could contribute to changes in population size and trend of the Buchans herd. Section 6 of the Caribou Supplemental Information report (Appendix G) describes the mitigation proposed by Marathon to reduce risk of direct and indirect mortality and proposed environmental effects monitoring. Table 6.3 presents proposed mitigation measures and associated monitoring approaches to evaluate the effectiveness of mitigation measures. Furthermore, caribou are expected to avoid the mine site due to ongoing human presence and sensory disturbance (Section 11.5.1 of the EIS; Section 4.2 of the Caribou Supplemental Information report [Appendix G), and therefore the risk of mortality from vehicular collisions and direct mortality caused by caribou becoming trapped in the pit is expected to be low. Given the combined expected avoidance behavior and change in movement/migration, as well as proposed mitigation measures, change in

ID:	**FFA-41**
	caribou mortality risk as a result of the Project is predicted to be low in magnitude. Please also refer to the response to FFA-42 for additional details on the level of magnitude assigned for change in mortality.
Appendix:	None

RESPONSE TO FFA-42

ID:	**FFA-42**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Chapter 11.5.3.3Table 11.17
Context and Rationale:	-
Information Request:	The number of adverse impacts and their frequency, duration, and irreversibility, do not support the assessment of low to moderate risk assigned for 'Mortality'. This is exacerbated since their evaluation of mortality also did not include potential calf mortality if caribou cannot reach the calving ground. Since mortality will directly affect population abundance and trends, their ranking suggests there is little risk to the Buchans population; this assessment is not supported by the available information.
Response:	Section 2 of the Caribou Supplemental Information report (Appendix G) describes the approach to the effects assessment presented in the EIS, including the linkages between effects pathways. The assessment of a change in caribou movement considered changes to mortality risk associated with increased energetics and reduced body conditions potentially resulting from the use of less ideal migration paths or a failure to migrate. Project-related calf mortality that could occur if caribou were to be unable to reach the calving grounds was fully assessed as a source of mortality (Section 11.5.3 of the EIS) and contributed to the determination of a significant residual effect for caribou, as increased calf mortality could contribute to changes in population size and trend of the Buchans herd.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO FFA-43

ID:	**FFA-43**
Expert Department or Group:	-
Guideline Reference:	-
EIS Reference:	Chapter 11.6, Page 11.74
Context and Rationale:	-
Information Request:	The statement ‘caribou may be able to circumvent project features in the migration path, and possibly the Project entirely’ is not supported by the analyses of caribou, movements or the information presented in the Caribou component study. The statement is conjectural and should be removed.
Response:	Comment noted. The risk to the functionality of the primary migration path is discussed in Section 4.1 of the Caribou Supplemental Information report (Appendix G) and includes discussion of a failure to migrate (i.e., caribou avoidance of the Project rendering the migration path not passable).
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO FFA-44

ID:	**FFA-44**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	Summary of EIS
Information Request:	A key component of the EIS guidelines was to outline mitigations that resolve the project's effects on caribou migratory corridors. The analysis of migration patterns of Buchan's caribou through the project area presented in this document (Section 11.2.2.1 page 11.31, also figures 11-12, and 11-13) indicate that there was 'only one distinct population level path identified'. Similarly, the caribou component study indicates heavy use of the project area by migrating caribou during spring and fall (See Annex A). Residual impacts for Buchans caribou are considered to be of a 'high' magnitude. However, the EIS does not present detailed or effective mitigations related to key project components.
Response:	As outlined in Section 6.1 and Table 6.1 of the Caribou Supplemental Information report (Appendix G), to limit potential adverse effects on caribou, a mitigation hierarchy has been used to systematically evaluate mitigation opportunities for each component and phase of the Project. The mitigation hierarchy, which has been applied elsewhere for caribou (e.g., Alberta; British Columbia) is: 1) Avoid; 2) Reduce; 3) Restore; and 4) Offset. Consistent with standard practice, Marathon is focused on avoiding and reducing potential Project effects on caribou to the extent feasible, and to addressing remaining residual Project effects. Specific thresholds for the various mitigation measures will be developed in consultation with Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture (NLDFFA) - Wildlife Division. The risk of adverse effects on caribou from individual Project components will be mitigated using the measures outlined in Table 6.3 of the Caribou Supplemental Information report (Appendix G). Monitoring approaches, tools and techniques that will be used to understand caribou interactions with these components are presented in Section 6.2.1 of that report and include the use of GPS-enabled caribou collars, wildlife cameras specific thresholds, aerial surveys, and on-site observations by Project staff and contractors. A Caribou Monitoring Plan, which will include for management actions and a framework for adaptive management, will be developed in consultation with NLDFFA - Wildlife Division.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO FFA-45

ID:	**FFA-45**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	Summary of EIS
Information Request:	Significant gaps in knowledge with respect to caribou use of the project area, and baseline information on population size for Buchans caribou, remain and will hinder assessment of future impacts.
Response:	Marathon has worked with, and will continue to work with, the Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture (NLDFFA) - Wildlife Division to provide additional details on caribou habitat use and movement through the Project area prior to Project development. Section 3.5 of the Caribou Supplemental Information report (Appendix G) describes the current and future initiatives undertaken by Marathon including deployment of Global Positioning System collars on caribou from the Buchans and Grey River herds, expansion of the remote camera program, and a post-calving and population survey of the Buchans herd in 2021. Marathon will provide the results of the post-calving and population survey to NLDFFA-Wildlife Division in accordance with the 2021 research permit. Marathon is also committed to working with NLDFFA - Wildlife Division to develop and undertake follow-up and monitoring activities related to caribou (see Section 6.2 of the Caribou Supplemental Information report [Appendix G] for more information on the Caribou Monitoring Plan).
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO FFA-46

ID:	**FFA-46**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	Summary of EIS
Information Request:	The potential impacts on the Buchans caribou population if caribou are unable to migrate to their calving grounds are not considered, even though calf mortality may be substantial in this case.
Response:	An integrated assessment that includes the potential level of risk to the Buchans populations is discussed in Section 4.1.2 of the Caribou Supplemental Information report (Appendix G). This section includes a discussion of the potential effects of changes on the migratory pathway, including the implications for the Buchans herd in the event that they are unable to migrate successfully to their calving grounds. Table 4.1 of the Caribou Supplemental Information report (Appendix G) presents possible migration scenarios that could result from the Project and their outcomes, and includes increased calf mortality. Additionally, Section 5 of that report summarizes effects of the Project on the four assessed caribou herds including changes in movement, habitat and mortality risk. The effects of a failure of the Buchans herd to migrate to their calving grounds were considered in the EIS (contributing to the determination of a significant adverse residual effect for caribou) and Section 5.1 of the Caribou Supplemental Information report (Appendix G). Additional information on calf mortality and associated impacts on the Buchans caribou population is provided in Section 4.4 of that report.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO FFA-47

ID:	**FFA-47**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	Summary of EIS
Information Request:	The assessment of (indirect) habitat loss is based on a very conservative level of anticipated avoidance (500 m) and will likely underestimate impacts on caribou during construction and operation phases of the development.
Response:	Please refer to the response to FFA-31 and Section 4.3 of the Caribou Supplemental Information report (Appendix G).
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO FFA-48

ID:	**FFA-48**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	Summary of EIS
Information Request:	It would be valuable to include any literature about stress responses in caribou. It is anticipated that a key migration route becoming impassable may elicit a stress response, as will disturbance from noise and activity.
Response:	Please refer to Section 4.2 of the Caribou Supplemental Information report (Appendix G) for a literature-based review of Project-related sensory disturbance from noise and other stimuli, and stress response in caribou. Section 6.1 of the Caribou Supplemental Information report (Appendix G) discusses the mitigation measures that have been considered for the Project, including those designed to limit sensory disturbance. Section 6.2.2 describes the measures that will be included in the Caribou Monitoring Plan. The Caribou Monitoring Plan will be developed as the Project progresses and will include specific monitoring thresholds, determined in consultation with Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture - Wildlife Division. Additionally, the efficacy of monitoring outcomes will be evaluated through the adaptive management framework (Section 6.2.3).
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO FFA-49

ID:	**FFA-49**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	Summary of EIS
Information Request:	The EIS does not include discussion of cumulative impacts from disturbance, habitat loss, mortality, potential changes in migration stemming from project development on the Buchans caribou herd.
Response:	The approach to the assessment of Project related effects on caribou is described in Section 2 of the Caribou Supplemental Information report (Appendix G). Three potential effects were identified by which the Project could affect caribou: change in habitat, change in movement, and change in mortality risk. Predicted effects were considered both individually and in combination (i.e., linkages between pathways were also identified and discussed) to determine if the Project will result in a residual adverse effect that exceeds the established significance threshold for the caribou (see Section 11.3.2 of the EIS). The overall significance of Project effects on change in habitat, change in movement, and change in mortality risk are summarized in Section 11.6 of the EIS. Section 4.5 of the Caribou Supplemental Information report (Appendix G) describes combined (within Project) and cumulative effects (in combination with similar effects from other projects and activities) effects on caribou. Section 5.1 of that report provides a specific summary of effects to the Buchans herd including combined effects within the Project in consideration of linkages between effects pathways.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO FFA-50

ID:	**FFA-50**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	Summary of EIS
Information Request:	The EIS only indirectly addresses the effects of noise, lights and dust on caribou. Prior environmental assessments pertaining to the influence of mining on caribou and the scientific literature both suggest that air quality (dust) and disturbance from noise and light are significant contributors to the impacts of mining on caribou and their habitat. Specifically, mining operations produce dust which results in dustfall, dust on leaves, dust on lichen, and dust on vegetation, especially within 1 km of mining operations (Chen et al 2017). In addition, it increases airborne fine particulate matter (PM2.5). Collectively dust from mining operations alters soil pH and affects vegetation within the zone of dustfall (enhanced soil alkalinity reduces the availability of lichen and forage plants such as ericaceous shrubs). Monitoring of these items is informative for understanding the quantifying the impacts of mining on caribou and their habitat. All aspects of human activity (noise and light) are key disturbance stimuli for caribou and should be considered cumulatively. Noise disturbance has been shown to affect caribou by causing physiological stress, increased movement, less rumination, displacement (which may lead to predation) and enhanced energetic costs. In addition, alarm reactions have been directly observed in caribou during activities such as blasting, dumping and bulldozing. A recent study evaluating caribou response to high and low activity periods for a surface mining operation (normal operation versus holiday shut-downs of several weeks duration) suggested that caribou reduced use within 1.5 km of the mine, but ameliorated this response during low activity periods (Eftestol et al 2019). This suggests that moderating mining activity during critical periods (e.g., migration) may be an important tool for mitigation of the mine’s effects, and should be measured and quantified.
Response:	Section 4.2 of the Caribou Supplemental Information report (Appendix G) provides additional context on effects of sensory disturbance associated with lights, noise, and dust. Section 6.2.2 of the same report identifies preliminary monitoring approaches and management actions that will be further refined in consultation with Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture (NLDFFA) - Wildlife Division prior to implementation and throughout the life of the Project. An Air Quality

ID:	FFA-50
	Management Plan will also be developed and implemented as part of the Environmental Protection Plan and will specify the mitigation measures for the management and reduction of air emissions (including noise, light, and particulates) during Project construction and operation. Dust, noise and light monitoring programs will be undertaken, and the results of these monitoring programs will be available to inform Project effects on caribou and potentially identify the need for additional mitigation measures. Table 6.3 of the Caribou Supplemental Information report (Appendix G) presents mitigation measures designed to limit sensory disturbance. General measures to limit sensory disturbance include following industry best practices (e.g., ECCC 2009; ISEE 2011) to reduce noise emissions, use of noise reducing mufflers on equipment, and maintaining trees and vegetation where possible on-site to reduce noise and visual disturbance. However, other measures will be applied while caribou are migrating through the site or within a set distance from the site including a reduction or suspension of Project activities (e.g., delaying blasting activity if caribou are in the vicinity, reduced speed limits during migratory periods). Additionally, Section 6.2.2 of the Caribou Supplemental Information report (Appendix G) describes the measures that will be included in the Caribou Monitoring Plan. Specific monitoring thresholds will be developed in consultation with NLDFFA - Wildlife Division, the efficacy of monitoring outcomes will be evaluated through the adaptive management framework (Section 6.2.3). References: Environment and Climate Change Canada (ECCC). 2009. Environmental Code of Practice for Metal Mines. Available at https://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=CBE3CD59-1&offset=2. Last accessed on March 9, 2021. Eftestøl, S., K. Flydal, D. Tsegaya and J.E. Colman. 2019. Mining activity disturbs habitat use of reindeer in Finnmark, Northern Norway. Polar Biology 42: 1849-1858. International Society of Explosives Engineers (ISEE). 2011. “Blaster’s Handbook, 18th Edition”, Ed. Stier, J.F., International Society of Explosives Engineers, Cleveland, Ohio, USA, 1030 pp.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO FFA-51

ID:	**FFA-51**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	Summary of EIS
Information Request:	The monitoring and mitigation plan developed for noise, light and particulates should include airborne fine particulate matter (PM2.5). Dust from mining operations alters soil pH and affects vegetation within the zone of dustfall (enhanced soil alkalinity reduces the availability of lichen and forage plants such as ericaceous shrubs). Monitoring of these items is informative for understanding and quantifying the impacts of mining on caribou and their habitat.
Response:	Please refer to the response to FFA-50. As indicated in Section 5.9 of the EIS, the following would be included within the Air Quality Management Plan (AQMP): • An ambient air quality (total suspended particulate matter [TSP], respirable particulate matter with an aerodynamic diameter less than 10 µm [PM_{10}] and fine particulate matter with an aerodynamic diameter less than 2.5 µm [$PM_{2.5}$] concentrations) monitoring program to be implemented and used to assess the effectiveness of dust mitigation. • Sound pressure level monitoring programs, as required, to be conducted near the most affected receptor locations. In response to reviewer comments, monitoring for light levels will also be added to the AQMP.
Appendix:	None

RESPONSE TO FFA-52

ID:	**FFA-52**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Baseline Study Appendix 4pages 1-6
Context and Rationale:	-
Information Request:	The Guidelines state fish and fish habitat must be quantifiable. A description of the standardized netting and electrofishing activities is required. For comparison with past and future projects, these procedures must be standardized and a complete description of the gear used (measurements and materials) as well as deployment technique must be provided, as provided in scientific journals. Fish presence and absence data must be standardized and similarities indices among waterbodies should be utilized. Note: Victoria Lake and Valentine Lake had minimal sampling performed; statistical analysis of the data is highly unlikely using parametric or non-parametric methods (i.e., Catch Rates, biological frequency distributions, etc...)
Response:	As required by the provincial EIS guidelines, the EIS (Section 8.2) characterizes fish, fish populations and habitat where Project activities may result in non-compliance with the fish and fish habitat protection provisions of the *Fisheries Act* (i.e., project footprint, upstream and downstream). Pages 1-6 of Baseline Study Appendix (BSA) 4 provide a high-level summary of baseline surveys conducted in support of the Project over several years. The purpose of this summary is to guide the reader to the specific study for the details in which they are interested. The detailed methods employed in each survey are provided in the individual reports that form the BSA. Note that the methods used for the aquatic field programs were consistent with Fisheries and Oceans Canada (DFO) guidance. Methods and results of these field programs have been and are being discussed with DFO on an on-going basis. Marathon will be required to complete a fish population survey every three years to satisfy environmental effects monitoring (EEM) requirements under the *Metal and Diamond Mining Effluent Regulations* (MDMER) and these surveys will follow the methods prescribed in the Metal Mining Technical Guidance Document for EEM (Environment Canada 2012). The EEM program will be developed with input from Environment and Climate Change Canada's Technical Advisory Panel, which includes representatives from the provincial government. MDMER requires statistical

ID:	**FFA-52**
	analysis of data to determine differences in growth, reproduction, condition, survival and fish tissue levels between exposure and reference areas. Additional baseline studies will be undertaken in 2021 to support future EEM under MDMER. Reference: 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.
Appendix:	None

RESPONSE TO FFA-53

ID:	**FFA-53**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Baseline Study Appendix 4, pages 8-12
Context and Rationale:	-
Information Request:	Were genetic samples taken? Contemporary sampling methods should employ DNA archive for all fish species samples. Were there any lethally taken fish?
Response:	Genetic samples were not taken, as this was not a requirement of the provincial EIS guidelines and was not considered necessary to assess the effects of the Project on fish, fish habitat or fisheries. During the 2011, 2017, 2018 and 2019 field programs, fish were not lethally taken; fish were, however, retained for tissue analysis in the fall of 2020. Marathon completed a country foods sampling program in 2020, which included sampling of fish from Victoria Lake Reservoir and other streams within the Regional Assessment Area (refer to Appendix A). Additionally, as part of the baseline environmental effects monitoring program, fish population surveys are planned for 2021 as described in the response to FFA-52 and will include the retention of fish for tissue analysis.
Appendix:	See Appendix A: Human Health Risk Assessment

RESPONSE TO FFA-54

ID:	**FFA-54**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Baseline Study Appendix 4, Tables in Appendix A
Context and Rationale:	-
Information Request:	Change effort from seconds to minutes in all tables. Seconds should not be used. In addition, table descriptions are poor. Titles for figures and tables listing data must be "stand alone" and give all pertinent details on the title descriptions (i.e., when, where, and detailed descriptions)
Response:	Electrofishing effort was standardized by seconds, and effort for fyke nets and gill nets was standardized by hours and minutes. The purpose was to standardize the effort by method to facilitate comparison. While either can be converted to a common time unit, for continuity purposes, these units remain unchanged as this is a consistent approach used throughout the baseline reports (completed and finalized over a period of years) and EIS. Comment acknowledged regarding the titles for figures and tables. As baseline reports were completed over a number of years (2011 to 2021), reviewed by Fisheries and Oceans Canada, and summarized as applicable in the EIS, it is not Marathon's intent to revise and reissue these reports.
Appendix:	None

RESPONSE TO FFA-55

ID:	**FFA-55**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Baseline Study Appendix 4 page 12
Context and Rationale:	-
Information Request:	All Tables should be "stand alone" as previously mentioned.
Response:	Comment acknowledged regarding the titles for figures and tables. As baseline reports were completed over a number of years (2011 to 2021), reviewed by Fisheries and Oceans Canada, and summarized as applicable in the EIS, it is not Marathon’s intent to revise and reissue these reports.
Appendix:	None

RESPONSE TO FFA-56

ID:	**FFA-56**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Baseline Study Appendix 4page 20-22
Context and Rationale:	-
Information Request:	This likelihood data has not been standardized and it is data deficient to suggest such likelihood unless the data has been collected in a standardized, repeatable, testable format. The data as presented is not quantifiable as per the guidelines.
Response:	This comment is assumed to be in reference to Table 4.6 of Attachment 4-B of Baseline Study Appendix 4, Valentine Project: 2018 Fish and Fish Habitat. The summary in Table 4.6 of “Likelihood of Fish Presence in Ponds, Lakes and Streams Surveyed in 2018” identifies whether lakes and ponds were considered fish bearing based on their connectivity to other fish bearing waters, where standardized methods were used to confirm fish presence. The intent was to determine if these ponds and lakes fall under the provisions of the *Fisheries Act* and inform future sampling programs. It is acknowledged that the data in the table were not standardized; however, this was not the intention of the table.
Appendix:	None

RESPONSE TO FFA-57

ID:	**FFA-57**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Baseline Study Appendix 4
Context and Rationale:	-
Information Request:	The data needs to be quantifiable. As presented in the EIS, it is not standardized and therefore, unable to compare or monitor changes to fish populations over time. In particular, representative control lakes outside of the construction zone should be established to monitor long-term effects.
Response:	Field studies were completed in 2011, 2018, 2019 and winter of 2020 to support the environmental assessment and to identify fish presence / absence and fish habitat data in the vicinity of the Leprechaun deposit (Baseline Study Appendix [BSA] 4, Attachment 4A) and the Marathon deposit (BSA.4, Attachments 4B, 4C and 4E). The establishment of reference / control lake(s) was not required to inform the environmental assessment, however, will be included as part of the environmental effects monitoring for the Project, as required by the *Metal and Diamond Mining Effluent Regulations* (MDMER). Marathon will be completing additional aquatic data collection, as needed, to monitor for changes in fish populations, fish tissue, and benthic invertebrate communities, as required by the MDMER. These data will be collected in a standardized manner in accordance with methods outlined in the Metal Mining Technical Guidance Document for Environmental Effects Monitoring (Environment Canada 2012). Fish population and fish tissue data will be statistically analyzed to determine differences in growth, reproduction, condition, survival, and fish tissue levels between an exposure area (area exposed to effluent) and a reference area(s). Implementation of an MDMER compliant fish population study to monitor effects to growth, reproduction, condition, and survival of fish, plus a fish tissue study to monitor metal uptake in fish (i.e., if triggered by MDMER requirements) is considered the appropriate mechanism through which to monitor fish populations and identify potential effects. Reference: 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.
Appendix:	None

RESPONSE TO FFA-58

ID:	**FFA-58**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Baseline Study Appendix 4
Context and Rationale:	-
Information Request:	Also data for bathymetry, if not available using sounding equipment should also be estimated using methods as shown in Hollister et al. 2011; https://doi.org/10.1371/journal.pone.0025764.
Response:	The methods used to assess bathymetry in ponds are considered appropriate, as the bottom of the majority of the ponds was easily visible as a result of shallow depths. Sounding equipment was used to determine bathymetry in Victoria Lake Reservoir, Valentine Lake, ValP3, VicP1, VicP2 and ValP1. Note that bathymetric data were collected in localized areas of Valentine Lake, Victoria Lake Reservoir and several smaller lakes. These localized areas provide detailed bathymetry around planned final discharge points. The ultimate mixing zone for the most conservative regulatory scenario extends to approximately 300 m from the outfall at which point all parameters meet the Canadian Water Quality Guidelines for Protection of Freshwater Aquatic Life. Collected bathymetry data extend beyond 300 m and sufficiently cover the ultimate receiver for the purposes of the Assimilative Capacity Assessment (Appendix 7C of the EIS). Given this, there is no practical reason to extend bathymetry further into Valentine Lake or Victoria Lake Reservoir.
Appendix:	None

RESPONSE TO FFA-59

ID:	**FFA-59**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Baseline Study Appendix 4
Context and Rationale:	-
Information Request:	To monitor the toxicity of consuming fish flesh, in the project area, immediate and long-term sampling sites should be established throughout the drainage area to advise the public of suitability for consumption. This should include all metal contaminants that pose a risk to human health, in particular metals which bio accumulate through the aquatic food chain.
Response:	Marathon completed a country foods sampling program in 2020, which included sampling of fish from Victoria Lake Reservoir and other streams within the Regional Assessment Area (refer to Appendix A). These tissue samples will be used to document baseline metal concentrations in fish tissue prior to mine development. Results of fish tissue studies will be provided to local communities and appropriate regulators (e.g., provincial departments of health and environment). It is recognized that authority and responsibility for establishing fish consumption advisories lies with the provincial regulatory agencies and not with the Proponent. Marathon will be completing additional baseline aquatic data collection in 2021, including metals in fish tissue. Marathon will monitor for changes in fish populations, fish tissue, and benthic invertebrate communities, as required by the *Metal and Diamond Mining Effluent Regulations* (MDMER). Marathon will implement an MDMER compliant fish tissue study to monitor metal uptake in fish if triggered by MDMER requirements. Fish tissue data will be statistically analyzed to assess differences in fish tissue metal concentrations between an exposure area (area exposed to effluent) and a reference area(s). Results will be submitted, as applicable, to Environment and Climate Change Canada.
Appendix:	See Appendix A: Human Health Risk Assessment

RESPONSE TO FFA-60

ID:	**FFA-60**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Baseline Study Appendix 4
Context and Rationale:	-
Information Request:	Baseline data must also include potential stream crossing locations in addition to collecting baseline data above sites, before and after construction. During past projects, stream and river crossings often are done without a detailed adherence to the *Fisheries Act* & Fisheries and Oceans Canada guidelines for installation (we found some 80% to be inadequate for fish passage on Phase III of the Trans Labrador Highway (FFA, unpublished data)). For example, the guidelines direct that a fisheries biologist be present during all stream-crossing installations to ensure adequate measures are followed as to not diminish fish passage. As the Act states: *Fisheries Act*: section 34.3(2) provides provisions for maintaining adequate flow and fish passage.
Response:	Baseline information for fish presence at potential stream crossings was collected in 2020; this was not available in time for inclusion in the EIS, but the report on this work is included as Appendix H. Marathon will design and install stream crossings based on *Fisheries Act* requirements and in consideration of Fisheries and Oceans Canada (DFO) fish and fish habitat protection provisions (DFO 2019). Marathon has and will continue to consult with DFO, including discussions on the Request for Review(s) and *Fisheries Act* Authorization. Reference: DFO (Fisheries and Oceans Canada). 2019. Measures to Protect Fish and Fish Habitat. Available online at: https://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures-eng.html
Appendix:	See Appendix H: 2020 Fish and Fish Habitat Data Report

RESPONSE TO FFA-61

ID:	**FFA-61**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Baseline Study Appendix 4
Context and Rationale:	-
Information Request:	Spawning areas for freshwater species must be identified and quantitatively sampled using standardized techniques during fall spawning season including estimates of fecundity for long-term monitoring, in particular for Victoria Lake and Valentine Lake.
Response:	The spawning habitat for freshwater species in streams and ponds on site has been identified and is quantitatively characterized as described using the approach required in the EIS guidelines (i.e., Bradbury et al. 2001 and McCarthy et al. 2007) (Figures 8-3, 8-7, 8-10 of the EIS). Maps of spawning habitat for Arctic char, which were not included in the EIS, are attached (Figures FFA-61.1 to FFA-61.4). Marathon will be completing additional aquatic data collection, as needed, to monitor for changes in fish populations, fish tissue, and benthic invertebrate communities, as required by the *Metal and Diamond Mining Effluent Regulations* (MDMER). These data will be collected in a standardized manner in accordance with methods outlined in the Metal Mining Technical Guidance Document for Environmental Effects Monitoring (EEM) (Environment Canada 2012). Fish population and fish tissue data will be statistically analyzed to determine differences in growth, reproduction, condition, survival and fish tissue levels between an exposure area (area exposed to effluent) and a reference area(s). This is considered appropriate to monitor fish populations and identify potential effects. Reproduction/fecundity of targeted fish species (e.g., brook trout and Ouananiche) will be assessed as part of the standardized EEM program required under MDMER. References: Bradbury, C., A.S. Power and M.M. Roberge. 2001. Standard Methods Guide for the Classification/ Quantification of Lacustrine Habitat in Newfoundland and Labrador. Fisheries and Oceans, St. John's, NF. 60 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.

ID:	**FFA-61**
	McCarthy, J.H., C. Grant, and D. Scruton. (2007 Draft) Standard Methods Guide for the Classification and Quantification of Fish Habitat in Rivers of Newfoundland and Labrador. Fisheries and Oceans, St. John's, NL.
Appendix:	None

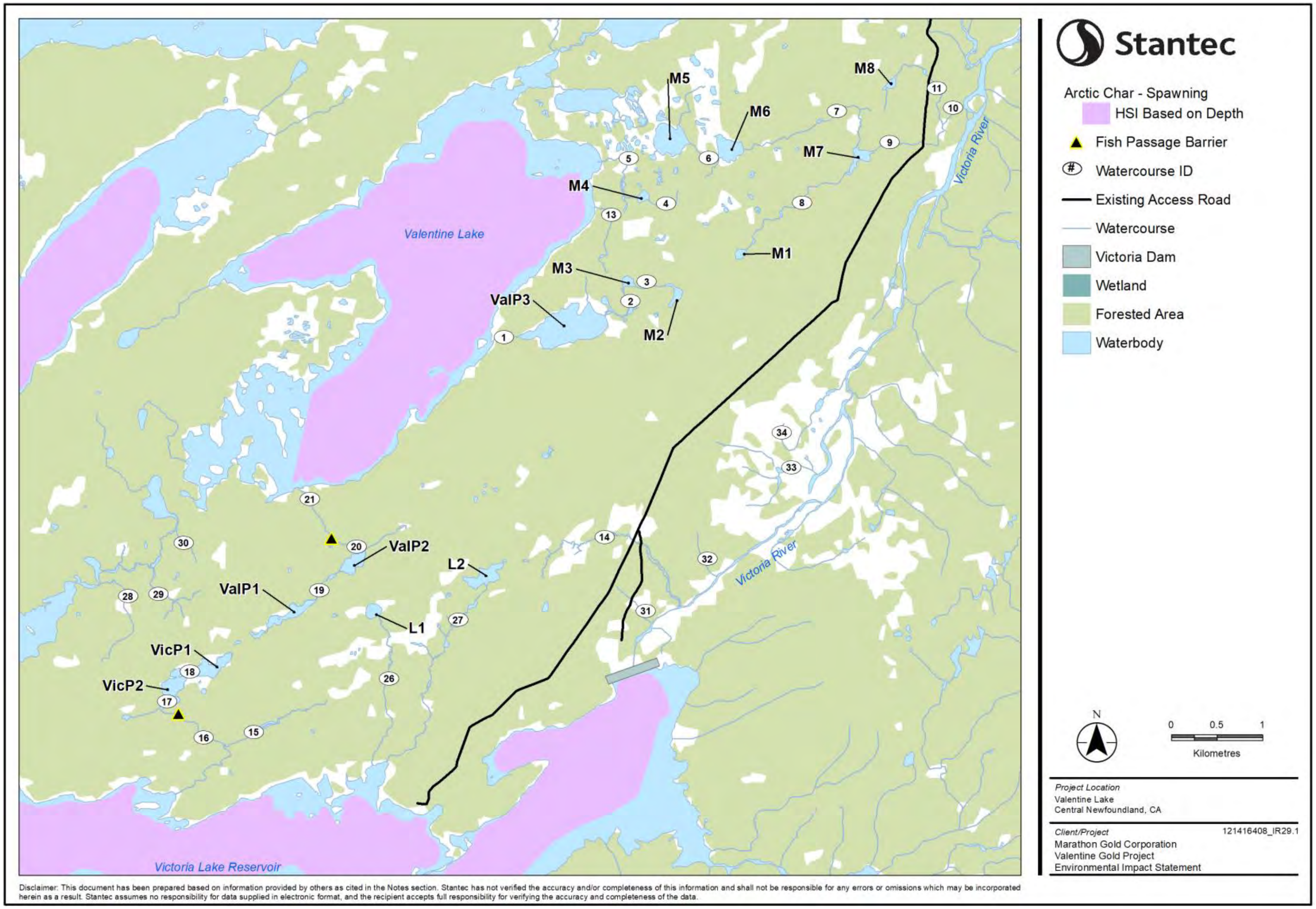


Figure FFA-61.1 Arctic Char – Spawning

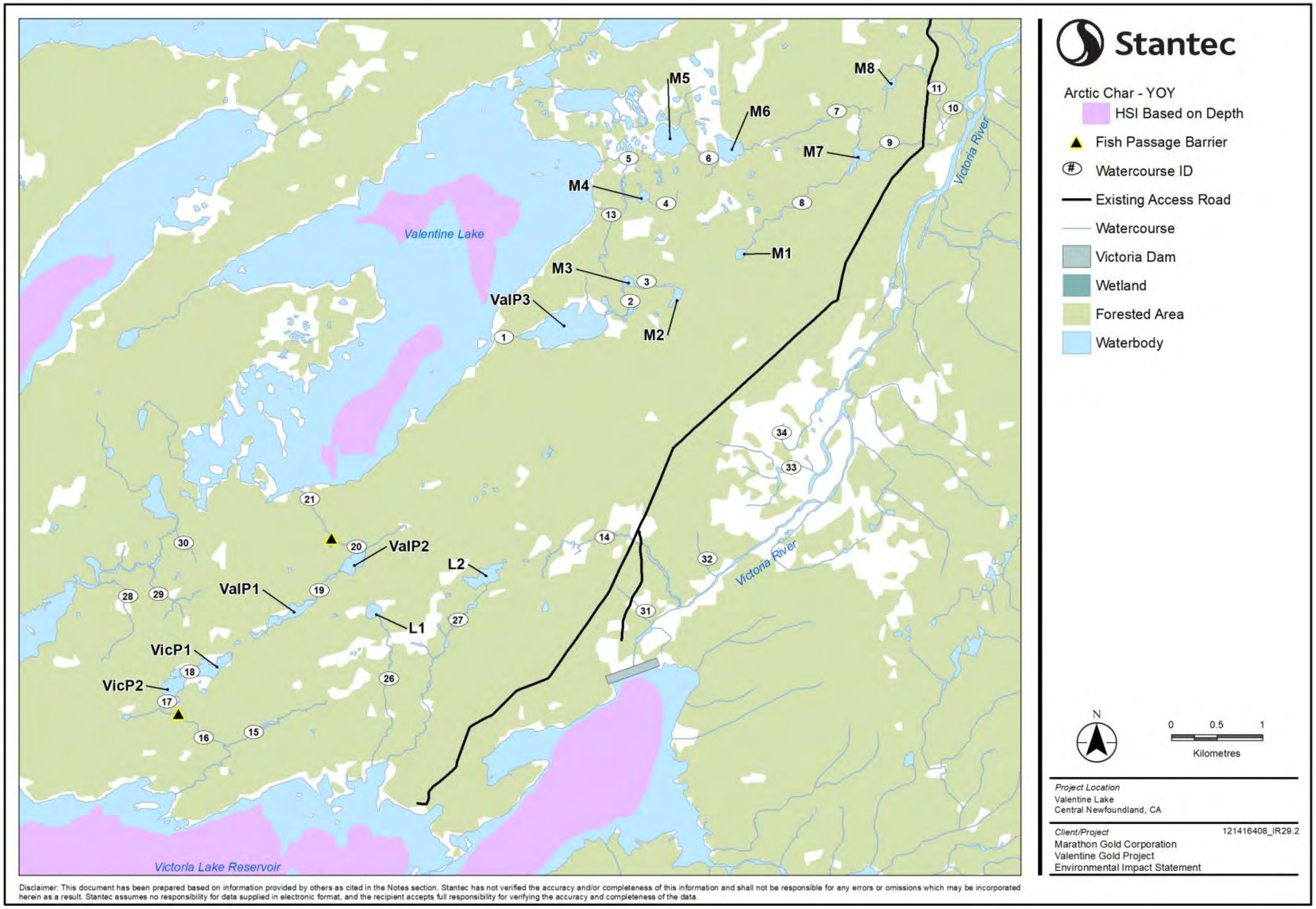
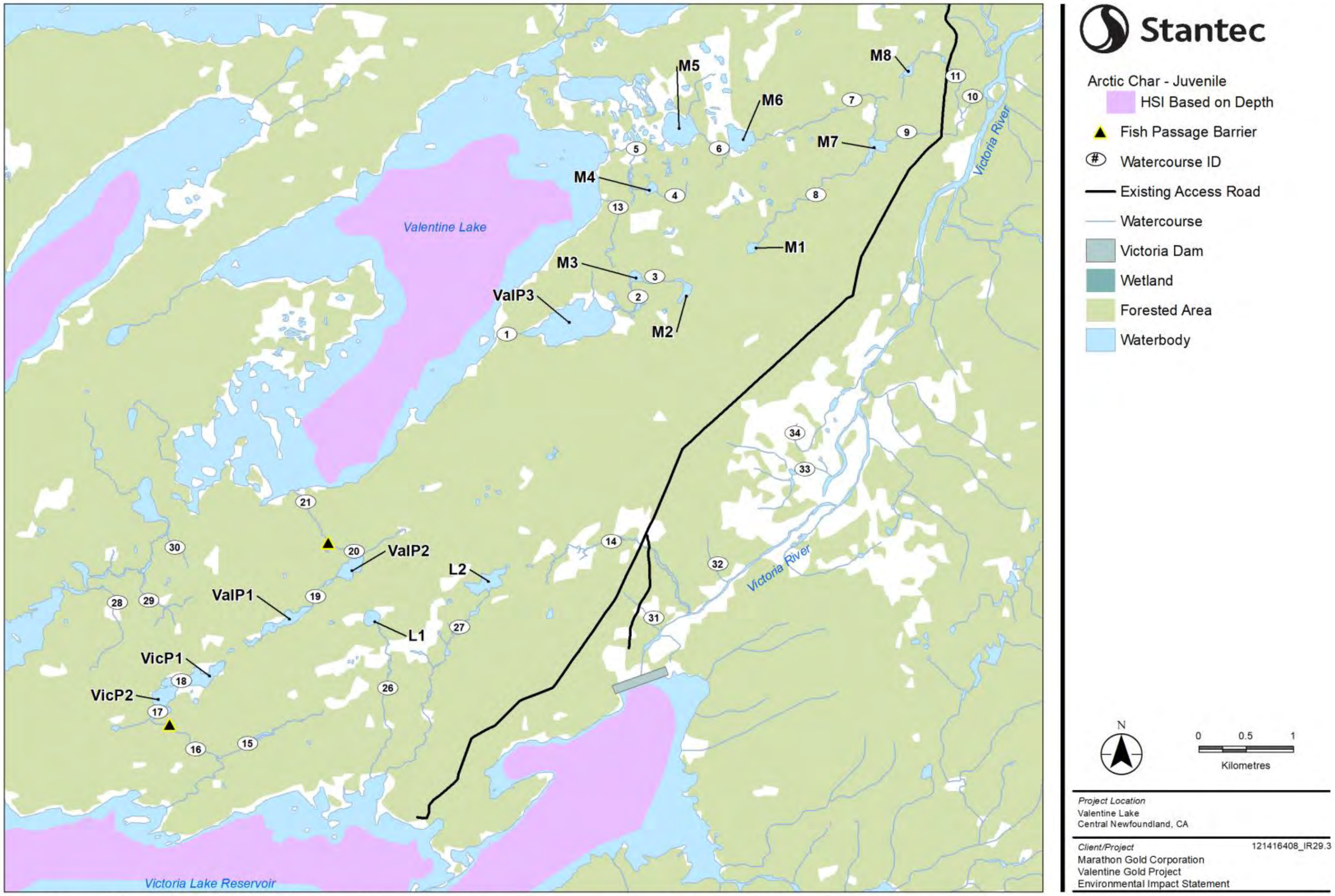


Figure FFA-61.2 Arctic Char YOY



Disclaimer: This document has been prepared based on information provided by others as cited in the Notes section. Stantec has not verified the accuracy and/or completeness of this information and shall not be responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and the recipient accepts full responsibility for verifying the accuracy and completeness of the data.

Figure FFA-61.3 Arctic Char – Juvenile

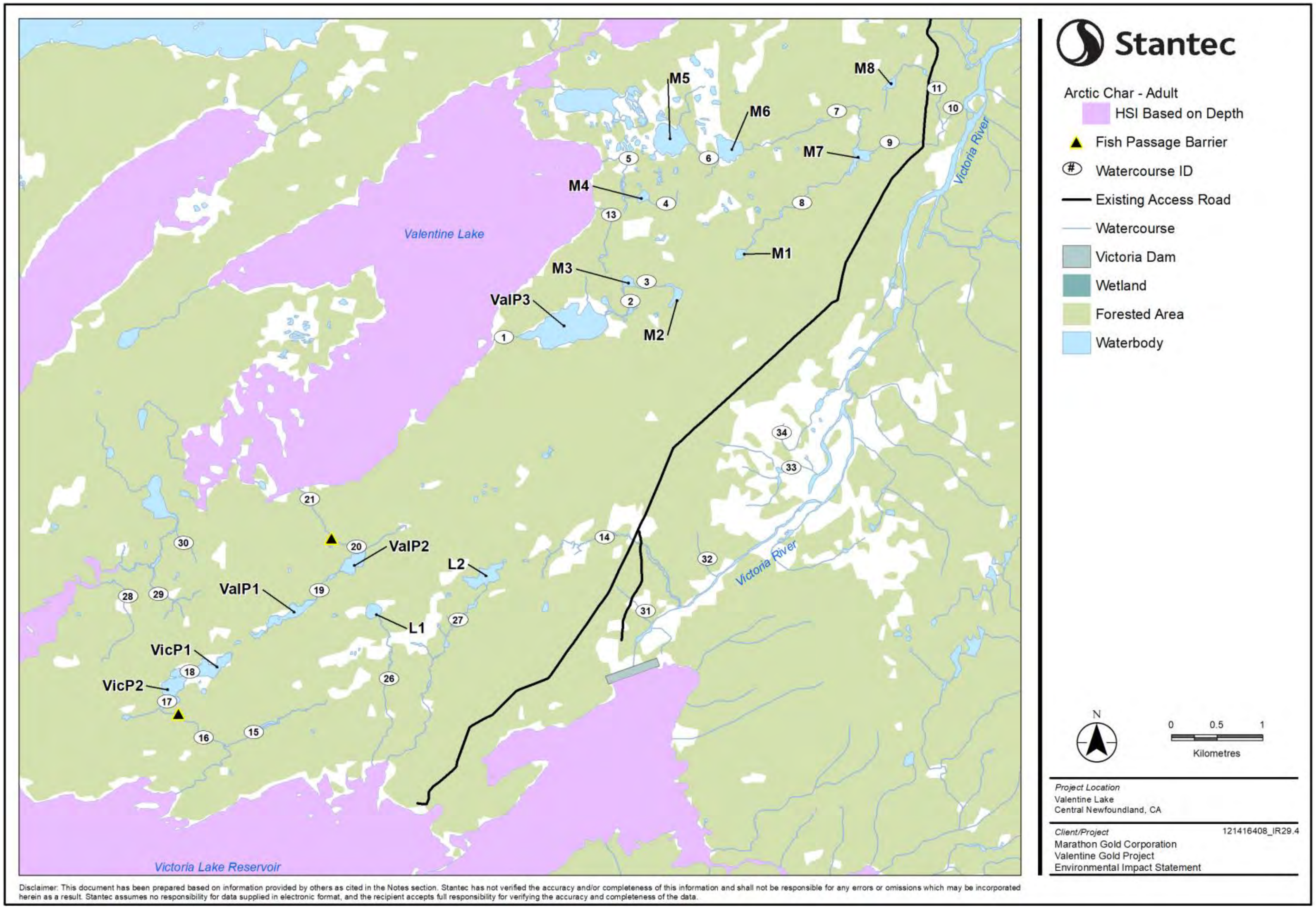


Figure FFA-61.4 Arctic Char - Adult

RESPONSE TO FFA-62

ID:	**FFA-62**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Baseline Study Appendix 4
Context and Rationale:	-
Information Request:	Age and growth profiles should be established at Valentine Lake and Victoria Lake using a minimum of 60 lethally sampled fish for Ouananiche and Brook Trout using established standardized sampling techniques. Otoliths and fin clips should be collected from all fish. Fish should be measured for length, weight, and sex. From these samples, they should be able to model growth and survivorship. These two lakes should have a standardized stock assessment performed as soon as possible, including both fisheries dependent and independent sampling.
Response:	Marathon will be completing additional baseline aquatic data collection in 2021, including Valentine Lake and Victoria Lake Reservoir. Ouananiche and brook trout will be collected using established standardized sampling techniques. Aging structures (i.e., otoliths) will be collected and length, weight, and sex determined. Data will be analyzed for size (weight, length) at age. Marathon will monitor for changes over time in fish populations, fish tissue, and benthic invertebrate communities, as required by the *Metal and Diamond Mining Effluent Regulations*. These data will be collected in a standardized manner in accordance with methods outlined in the Metal Mining Technical Guidance Document for Environmental Effects Monitoring (EEM) (Environment Canada 2012). Fish population and fish tissue data will be statistically analyzed to determine differences in growth, reproduction, condition, survival, and fish tissue levels between exposure areas (areas exposed to effluent) and reference areas. As part of the EEM biological monitoring, length, weight, sex and aging structures will be collected. Given that the proposed 2021 baseline studies will provide the information required to monitor the potential effects of the Project on fish and fish habitat, standardized stock assessments of Victoria Lake Reservoir and Valentine Lake are not considered necessary, particularly as confidence intervals associated with standardized stock assessments are too large to adequately assess changes over time.

ID:	**FFA-62**
	Reference: 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.
Appendix:	None

RESPONSE TO FFA-63

ID:	**FFA-63**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Chapter 10 page 10.1
Context and Rationale:	-
Information Request:	Special Concern' is not a category used by the Species Status Advisory Committee (SSAC), rather 'Vulnerable' is the equivalent category in Newfoundland and Labrador. There needs to be distinction between the federal and provincial designations.
Response:	Comment acknowledged. Section 10.1 of the EIS should read as follows: "Species of Conservation Concern (SOCC) are those species identified as provincially rare in Newfoundland and Labrador (ranked as S1 or S2) by the Atlantic Canada Conservation Data Centre (AC CDC). For this avifauna survey program, SOCC include those bird species: • Recommended for listing by the Species Status Advisory Committee as Endangered, Threatened or Vulnerable, however not yet listed under the NL ESA or *Species at Risk Act* • Considered provincially rare, that is species with provincial status ranks (S-ranks) of S1 (Critically Imperiled) or S2 (Imperiled), or combinations thereof (e.g., S1S2) upon review by the AC CDC (AC CDC 2020)" This revision does not affect the effects assessment or conclusions presented for Avifauna in the EIS (Chapter 10 of the EIS). Reference: AC CDC (Atlantic Canada Conservation Data Centre). 2020. Atlantic Canada Conservation Data Centre. About the AC CDC. Available online at: http://accdc.com//en/about-us.html
Appendix:	None

RESPONSE TO FFA-64

ID:	**FFA-64**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Chapter 10 and 12: 10.1.1.1 (Federal Guidance) (Page 10.2), and 12.1.1.1 (page 12.2)
Context and Rationale:	-
Information Request:	SARA listing also affords automatic protection of the residence, this is not mentioned in the text but it should be. Section 33 of SARA: No person shall damage or destroy the residence of one or more individuals of a wildlife species that is listed as an endangered species or a threatened species, or that is listed as an extirpated species if a recovery strategy has recommended the reintroduction of the species into the wild in Canada.
Response:	Comment acknowledged. The definition of Species at Risk in Sections 10.1.1 and 12.1.1 should have included, “No person shall damage or destroy the residence of one or more individuals of a wildlife species that is listed as an endangered species or a threatened species, or that is listed as an extirpated species if a recovery strategy has recommended the reintroduction of the species into the wild in Canada (section 33)." This does not change the effects assessments or conclusions presented for Avifauna (Chapter 10) or Other Wildlife (Chapter 12).
Appendix:	None

RESPONSE TO FFA-65

ID:	**FFA-65**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	10.1.1.1 (Federal Guidance) (page 10.2)
Context and Rationale:	-
Information Request:	Other non-MBCA species managed by the province include corvids and jays.
Response:	Comment acknowledged. Section 10.1.1.1 in the EIS, describing Federal Guidance with respect to protection of Avifauna under the *Migratory Birds Convention Act*, 1994, should recognize corvids and jays as additional species managed by the province. This does not change the effects assessment or conclusions presented for Avifauna in the EIS (Chapter 10 of the EIS).
Appendix:	None

RESPONSE TO FFA-66

ID:	**FFA-66**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	10.2.3.4 (page 10.20)
Context and Rationale:	-
Information Request:	The definition of Species at Risk provided here is very limited in scope. SAR status is not only determined by species rarity or a limited geographic range or an inherent sensitivity, but most often due to threats to a species that have led to population declines, or are expected to. Suggest this section be expanded with reference to other COSEWIC assessment criteria.
Response:	Comment acknowledged. Section 10.2.3.4 of the EIS should have read: "A species is defined as rare when it has relatively few individuals, it is uncommon or scarce, it occurs within a limited geographical range, or has undergone population declines, or is expected to." This does not change the effects assessment or conclusions presented in the EIS for Avifauna (Chapter 10). Species at Risk as defined in Section 10.1 of the EIS includes species listed as Extirpated, Endangered, Threatened, Vulnerable or Special Concern by the Committee on the Status of Endangered Wildlife in Canada.
Appendix:	None

RESPONSE TO FFA-67

ID:	**FFA-67**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	10.2.3.4 (numerous areas)
Context and Rationale:	-
Information Request:	The NL ESA and the federal SARA both designate and list species (they do not rank them whereas the CDC ranks species (i.e., the S ranks), and doesn't designate or list them. This point is confused under various species headings. Also, the S ranks are provincially prepared ranks in Newfoundland and Labrador and would be more accurately referred to as provincial General Status ranks. We provide them to the AC CDC for inclusion in their database but they are considered provincial ranks.
Response:	Comment acknowledged, Section 10.2.3.4 of the EIS should recognize differences in "listing" and "ranking" of species by different agencies. Applicable language describing species status in Section 10.2.3.4 should read as follows: • Olive-sided flycatcher is listed as Threatened under Schedule 1 of *Species at Risk Act* (SARA), and Threatened by Newfoundland and Labrador *Endangered Species Act* (NL ESA). It is assessed as Special Concern by Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The provincial General Status ranks for the olive-sided flycatcher are S3B, SUM. • Common nighthawk is listed as Threatened under Schedule 1 of SARA and as Threatened by NL ESA. It is assessed as Special Concern by COSEWIC. The provincial General Status rank for the common nighthawk is SNA. • Rusty blackbird is listed as Special Concern under Schedule 1 of SARA, and Vulnerable by NL ESA. It is assessed as Special Concern by COSEWIC. The provincial General Status rank for the rusty blackbird is S2S3B, SUM. • Bank swallow is listed as Threatened under Schedule 1 of SARA and assessed as Threatened by COSEWIC. The provincial General Status rank for the bank swallow is S1S2B, SUM. • Grey-cheeked thrush is listed as Threatened by the NL ESA. The provincial General Status rank for the grey-cheeked thrush is S2B, SUM. • Evening grosbeak is listed as Special Concern under Schedule 1 of SARA and assessed as Special Concern by COSEWIC. It currently has

ID:	**FFA-67**
	no rank under the NL ESA. The provincial General Status rank for evening grosbeak is S4. • Red crossbill is listed as Threatened under Schedule 1 of SARA and Endangered by the NL ESA. It is assessed as Threatened by COSEWIC. The provincial General Status rank for the red crossbill is S1S2. This does not change the effects assessment or conclusions for Avifauna as presented in the EIS (Chapter 10).
Appendix:	None

RESPONSE TO FFA-68

ID:	**FFA-68**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	10.2.3.4 (Common Nighthawk) (page 10.23)
Context and Rationale:	-
Information Request:	Should probably clarify why Common Nighthawk is listed as SNA and not a suitable target for conservation activities - it is, because it is considered 'casual/accidental'
Response:	Comment acknowledged. The EIS should have read: "The common nighthawk is ranked SNA, indicating a conservation status rank is not applicable. The species is not a suitable target for conservation activities in Newfoundland and Labrador because its occurrence in the province is considered to be casual/accidental." This does not change the effects assessment or conclusions for Avifauna as presented in the EIS (Chapter 10).
Appendix:	None

RESPONSE TO FFA-69

ID:	**FFA-69**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	10.2.3.4 (Bank Swallow) (page 10.23)
Context and Rationale:	-
Information Request:	The last paragraph under 'Bank Swallow' notes that the SSAC recommended a status of 'Not at Risk' in 2009. However, the SSAC has since reviewed and accepted the 2013 COSEWIC recommendation of Threatened and has endorsed the recommendation for designation and listing as such in the province of Newfoundland and Labrador.
Response:	Comment acknowledged. The last paragraph under "Bank Swallow" in Section 10.2.3.4 of the EIS should read: "In 2009, the Species Status Advisory Committee (SSAC) recommended a status of Not at Risk be applied to this species, citing insufficient evidence to establish that the species was at risk in Newfoundland and Labrador (NL) (SSAC 2009). However, the Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture (NLDFFA) - Wildlife Division has advised that the SSAC has since reviewed the 2013 Committee on the Status of Endangered Wildlife in Canada recommendation of Threatened and has endorsed the recommendation for designation and listing as such in the province of NL." While this species is not yet listed under the NL *Endangered Species Act*, given its status as "Threatened" under the *Species at Risk Act*, the species was assessed as a species at risk in the EIS (Chapter 10).
Appendix:	None

RESPONSE TO FFA-70

ID:	**FFA-70**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	10.2.3.4 (Bank Swallow) (page 10.23)
Context and Rationale:	-
Information Request:	It is recommended to cite the source SSAC report (2010) instead of the website. Available here: https://www.gov.nl.ca/ffa/files/wildlife-endangeredspecies-ssac-gray-cheeked-thrush-2010-ssac.pdf
Response:	Comment noted. The discussion of grey-cheeked thrush in Section 10.2.3.4 of the EIS should reference Species Status Advisory Committee (SSAC 2010). The information on breeding habitat remains valid. Reference: SSAC (Species Status Advisory Committee). 2010. The Status of Gray-cheeked Thrush (*Catharus minimus*) in Newfoundland and Labrador. The Species Status Advisory Comittee Report No. 24. June 21, 2010. Available online at: https://www.gov.nl.ca/ffa/files/wildlife-endangeredspecies-ssac-gray-cheeked-thrush-2010-ssac.pdf
Appendix:	None

RESPONSE TO FFA-71

ID:	**FFA-71**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	10.2.3.4 (Rusty Blackbird) (page 10.23)
Context and Rationale:	-
Information Request:	Rusty Blackbird does occur in suitable habitat (i.e., forested wetlands) throughout the island of Newfoundland, but is uncommon. Established populations are not limited to central Newfoundland.
Response:	Comment acknowledged. The first sentence of the second paragraph of the rusty blackbird description under Section 10.2.3.4 of the EIS should read: "This species occurs in suitable habitat (e.g., forested wetlands) throughout the Island of Newfoundland, however, it is uncommon." This revision does not change the effects assessment or conclusions for Avifauna as presented in the EIS (Chapter 10).
Appendix:	None

RESPONSE TO FFA-72

ID:	**FFA-72**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	10.5.1.1 (page 10.55)
Context and Rationale:	-
Information Request:	Suggest there be mitigations in place to ensure that slopes created by waste gravel/soil mounds be maintained at a slope unsuitable for bank swallow nesting, as to not encourage the species to nest at the site.
Response:	Comment noted. As bank swallows are known to construct nesting burrows in soil stockpiles that have steep faces and light soils amenable to burrowing, Marathon commits to the following: • Soil stockpiles will be constructed and maintained in lifts to achieve flatter slopes and to permit benching, thereby reducing erosion and maintaining moisture within the topsoil. This structure and composition will make the stockpiles less attractive to these birds, particularly during the breeding season. In addition, if soil removal from a stockpile during the breeding season has resulted in a vertical or near-vertical face, the vertical face will be knocked down with an excavator to make it unattractive to swallows.
Appendix:	None

RESPONSE TO FFA-73

ID:	**FFA-73**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Table 7.9 (page 7.57) (Mitigation Measures) and other mitigation tables
Context and Rationale:	Summary of the Environmental Impact Statement A mitigation for Wildlife/Avifauna Management is 'Wildlife-vehicle collisions, near misses or observations of wildlife (caribou, moose) road mortality on site roads and/or involving Project vehicles on the access road will be reported to the on-site environmental team and the NLDFFA-Wildlife Division. Adaptive management measures will be implemented should locations of high frequency wildlife-vehicle interactions be identified.'
Information Request:	It is suggested that collision reporting be extended to all other species, including bird or bat collisions with infrastructure, vehicles, equipment. This is not listed as a mitigation measure in 7.6 (Mitigation Measures: Avifauna).
Response:	Comment noted. Any wildlife (e.g., birds and bats) collisions with Project infrastructure or equipment will be reported to the Environmental Technician and the Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture - Wildlife Division.
Appendix:	None

RESPONSE TO FFA-74

ID:	**FFA-74**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	12.2.2.2 – Furbearers (page 12.22)
Context and Rationale:	Furbearers
Information Request:	This section notes that 'muskrat may be recovering in certain areas (Gov of NL n.d.b). This appears to be older online information. Current trends suggest muskrat populations are declining in much of Newfoundland. The provincial furbearer biologist should be contacted for information on muskrat.
Response:	Comment noted. Please refer to updated information provided in response to FFA-06.
Appendix:	None

RESPONSE TO FFA-75

ID:	**FFA-75**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Page 12.24 Figure 12-6
Context and Rationale:	-
Information Request:	Illustrates “Furbearing Trap Zones” however the trapline system in Newfoundland and Labrador is for beaver only and not all furbearers.
Response:	It is noted that the traplines are specific to beaver. The data used on Figure 12-6 of the EIS, however, used fur zones which are used to manage all furbearers.
Appendix:	None

RESPONSE TO FFA-76

ID:	**FFA-76**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Table 12.9 (page 12.30)
Context and Rationale:	-
Information Request:	Scientific name for Hoary Bat should be Lasiurus cinereus; Aeorestes is a synonym
Response:	Comment acknowledged. The scientific name for hoary bat in Table 12.9 of the EIS should read, "*Lasiurus cinereus*".
Appendix:	None

RESPONSE TO FFA-77

ID:	**FFA-77**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Page 12.82
Context and Rationale:	-
Information Request:	References Section it should read: Payne, N.F. and not Rayne for the citation: "Northcott, T. H., Payne, N.F., and Mercer, E. 1974. Dispersal of Mink in Insular Newfoundland. Journal of Mammalogy, 55:1, 243-248".
Response:	Comment acknowledged.
Appendix:	None

RESPONSE TO FFA-78

ID:	**FFA-78**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Page 12.2.2.2 (page 12.31)
Context and Rationale:	-
Information Request:	Updated literature on Hoary Bat in Newfoundland is available. See Darrian P. Washinger, Raymond Reid, and Erin E. Fraser "Acoustic Evidence of Hoary Bats (Lasiurus Cinereus) on Newfoundland, Canada," Northeastern Naturalist 27(3), 567-575, (27 August 2020).
Response:	The reference noted in the information request includes the following pertinent additional information: The hoary bat is a migratory, tree-roosting species that has been recorded on the Island of Newfoundland. In a 2020 study, acoustic monitoring was conducted for hoary bats in Gros Morne National Park from 2013 to 2019. This study concluded that the hoary bat is likely an infrequent vagrant in western Newfoundland and not a summer resident (Washinger et al. 2020). This additional information does not change the effects assessment or conclusions related to bats as provided in Other Wildlife (Chapter 12 of the EIS). Reference: Washinger, D. P., R. Reid, and E. E. Fraser. 2020. Acoustic Evidence of Hoary Bats (*Lasiurus cinereus*) on Newfoundland, Canada. Northeastern Naturalist 27(3), 567-575.
Appendix:	None

RESPONSE TO FFA-79

ID:	**FFA-79**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Page 12.2.2.3
Context and Rationale:	-
Information Request:	The two bat species have been recommended by COSEWIC for designation and listing under the NL ESA; as such the provincial status for these species could change.
Response:	Comment acknowledged. Northern long-eared myotis and little brown myotis are currently under consideration for listing under the Newfoundland and Labrador *Endangered Species Act*. As such, the provincial status could change prior to or during Project construction or operation. Marathon will observe changes in species status prior to and during Project commencement and consider potential implications to the Project, including whether additional mitigation may be necessary to protect the species and its residence. As indicated in Section 12.9 of the EIS, acoustic monitoring for bats will be conducted in the Project Area and Local Assessment Area both before and during construction and during operation. The purpose of these surveys will be to gather information on bat presence in the area and inform mitigation requirements.
Appendix:	None

RESPONSE TO FFA-80

ID:	**FFA-80**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Page 12.2.2.3
Context and Rationale:	-
Information Request:	Northern Myotis and Little Brown Myotis should be 'presumed present' (not just possibly present), as 'large amounts of high quality habitat' exists and both species have been confirmed in surrounding/adjacent areas. It also states that 'both species have patchy distribution across the Island of Newfoundland'; however, this is not true for Little Brown Myotis, which is distributed throughout the island
Response:	Marathon acknowledges that habitat for both the northern myotis and little brown myotis are present in the Local Assessment Area (LAA) and both species should be presumed present in the LAA. The effects assessment for Other Wildlife assumed presence of and potential interactions with these species. It is also acknowledged that little brown myotis is distributed throughout the Island of Newfoundland, whereas the northern long-eared myotis has patchy distribution (Park and Broders 2012). These clarifications do not change the effects assessment or conclusions related to bats as provided in Other Wildlife (Chapter 12 of the EIS). Reference: Park, A. C. and H. G. Broders. 2012. Distribution and roost selection of bats on Newfoundland. Northeastern Naturalist 19(2): 165-176.
Appendix:	None

RESPONSE TO FFA-81

ID:	**FFA-81**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Table 12.15 (page 12.47):
Context and Rationale:	-
Information Request:	Error - habitat assessment was done for Northern Myotis, not Little Brown Myotis
Response:	Comment noted. Table 12.15 of the EIS should replace "little brown bat" with "northern myotis" in the measurable parameters column with reference to the amount (km^2) of wildlife habitat directly lost for focal species, including for species at risk that may be present in the regional assessment area. This revision is made in recognition of Tables 12.13 and Table 12.22 of the EIS, which quantify the baseline habitat and predicted habitat loss, respectively, for northern myotis. In addition, Table 12.1 of the EIS should replace "little brown bat (*Myotis lucifugus*)" with "northern myotis (*Myotis septentrionalis*)" in the 'SAR/SOCC' column.
Appendix:	None

RESPONSE TO FFA-82

ID:	**FFA-82**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	12.9 (Follow-up and Monitoring) – page 12.72
Context and Rationale:	-
Information Request:	Wildlife Division supports the planned baseline survey for bats, and asks that this be a requirement. The Wildlife Division can provide advice with respect to acoustic survey planning.
Response:	Comment acknowledged. As indicated in Section 12.9 of the EIS, Marathon will consult with Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture - Wildlife Division in the planning and conduct of these surveys.
Appendix:	None

RESPONSE TO FFA-83

ID:	**FFA-83**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	9.5.1.2 (Page 9.61)
Context and Rationale:	Environmental Impact Statement Plants
Information Request:	Nodding water nymph, ranked S2 with nine other known locations in Newfoundland. The EIS states "The loss of a single individual of nodding water nymph is not expected to lead to a change in the population attributes of the species". The photo clearly shows multiple individuals, it is possible they meant "occurrence" but this needs to be made clearer. Even if they mean "occurrence", it does not follow that there will be no impact on the population in NL. Nodding Water Nymph is ranked as S2 and is therefore a species of conservation concern. As indicated in the mitigation table (9.10) states "Known occurrences of plant SOCC will be avoided. If avoidance of plant SOCC is not possible, seed collection or transplant of the plant will be considered in consultation with the applicable regulators." Therefore, Nodding Water Nymph should have mitigations considered given its status.
Response:	Marathon is planning to transplant nodding water nymph to a location outside of the Project Area that aligns with the pH and water depth of the current habitat as closely as possible. If enough plant material and appropriate recipient sites are available, the plant will be transplanted to multiple sites. A monitoring plan for evaluating the success of transplantation of nodding water nymph will be developed.
Appendix:	None

RESPONSE TO FFA-84

ID:	**FFA-84**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	9.5.1.2 (Page 9.61)
Context and Rationale:	Environmental Impact Statement Plants
Information Request:	Water Nymph has been identified as a species of conservation concern and will be negatively impacted by project activities and development. While it is not known for sure whether the species can successfully be transplanted, the WD suggests that the proponent seed suitable habitat, matched for pH and water depth, outside the project footprint and monitor it for success in establishing.
Response:	Marathon is planning to transplant nodding water nymph to a location outside of the Project Area that aligns with the pH and water depth of the current habitat as closely as possible. If enough plant material and appropriate recipient sites are available, the plant will be transplanted to multiple sites. A monitoring plan for evaluating the success of transplantation of nodding water nymph will be developed.
Appendix:	None

RESPONSE TO FFA-85

ID:	**FFA-85**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Baseline Study: Avifauna, Other Wildlife and their Habitats: ELC (Attachment 7-D) Table D8
Context and Rationale:	-
Information Request:	A plant species not previously recorded for Newfoundland, *Carex atlantica*, was reported from all three plots of the wet coniferous forest and the single plot in the riparian thicket. This would be a newly discovered species to Newfoundland. Were specimens taken and confirmed by an expert? This is a standard procedure for "new" species but it is not clear in the documentation if this occurred.
Response:	At the time of the survey, it was not known that this was a new record for Newfoundland and, therefore, samples were not retained. Attempts will be made to relocate the species during follow up rare plant surveys planned for summer 2021. If the species is located and there is sufficient plant material, a sample will be collected for verification.
Appendix:	None

RESPONSE TO FFA-86

ID:	**FFA-86**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Baseline Study: Avifauna, Other Wildlife and their Habitats: ELC (Attachment 7-D) Table D7
Context and Rationale:	-
Information Request:	This species could be misidentified; it is in a group with several similar species known from Newfoundland. However, in each of the plots where it was reported, one of the other closely related species was reported also. The identification should be confirmed.
Response:	Assuming this comment refers to *Carex atlantica*, at the time of the survey, it was not known that this was a new record for Newfoundland and, therefore, samples were not retained. Attempts will be made to relocate the species during follow up rare plant surveys planned for summer 2021, and if the species is located and there is sufficient plant material, a sample will be collected for verification.
Appendix:	None

RESPONSE TO FFA-87

ID:	**FFA-87**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Rare Plant Survey 2017 (Attachment 7-F) Pages 20-21
Context and Rationale:	-
Information Request:	Nodding Water Nymph (*Najas flexilis*) ranked S2 in Newfoundland was reported from a wetland pool and documented with a photograph of the plants in the water. The id is plausible but several Pondweed (*Potamogeton*) species look very similar and the photo is not diagnostic. Is there a specimen or a photograph of the plant out of the water that can help confirm identification?
Response:	No additional photographs of nodding water nymph are available. Attempts will be made to relocate the species during follow-up rare plant surveys planned for summer 2021. If the species is located, plant specimens will be collected at that time, assuming there is sufficient plant material and it is possible to collect without damaging the plant.
Appendix:	None

RESPONSE TO FFA-88

ID:	**FFA-88**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Rare Plant Survey 2019 (Attachment 7-I) Page 8
Context and Rationale:	-
Information Request:	*Ludwigia palustris* was reported from the project footprint, but the species is not ranked by the ACCDC was assumed to be non-native: "The province of Newfoundland and Labrador is not considered part of this species' distribution in official records (AC CDC 2015; USDA no date; VASCAN 2019), however, it was unofficially identified on the island of Newfoundland in 2012 (iNaturalist no date). Although this species does not have an assigned S-rank in Newfoundland and Labrador, it is typically common throughout its range, and there are no limiting factors or other reasons to suspect it will be rare once it becomes established in Newfoundland." A plant that is not ranked should be assumed native unless it is in an urban or garden setting, introduced in surrounding jurisdictions, etc. Otherwise, it should be treated as a species of conservation concern, with a specimen and some good photos as proof of existence. It is in the direct footprint of the project (Heap Leach Pad) and should be given the same mitigation measures. The record from 2012 has been confirmed as correct.
Response:	During field surveys to complete the transplant of nodding water nymph, the recorded location of *Ludwigia palustris* will be revisited and searched. If the species is found, photographs and, if possible without damaging the plant, a specimen will be taken to further confirm identification. Should the presence of this species be confirmed, a possible transplantation program will be discussed with the Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture. Note that the figures provided in Baseline Study Appendix (BSA) 7, Attachment 7-I, were based on a previous Project infrastructure layout, and while the heap leach pad is no longer part of the proposed Project, the plant is now within the footprint of the tailings pond.
Appendix:	None

RESPONSE TO FFA-89

ID:	**FFA-89**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Section 9, page 9.55
Context and Rationale:	-
Information Request:	The mitigation table (9.10) states, "Construction materials (soils and rock) will not be sourced from locations known to contain invasive plant species". This is not something that is commonly known. Most quarries are likely to have some invasive plants if they have ever had any sections idle for a while. Will anyone go and certify the pits "weed free"?
Response:	This mitigation measure should read as follows: As described in Sections 2.3.10.1 and 2.11.1.3, fill materials used throughout the life of the mine will be sourced locally when possible, which will reduce the probability of import or further spread of potentially invasive plant species.
Appendix:	None

RESPONSE TO FFA-90

ID:	**FFA-90**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Section 9, page 9.56, 9.58
Context and Rationale:	-
Information Request:	The mitigation table (9.10) states: "Native seed mix (free of non-native, invasive, and weed species) and native species (where available) will be used as erosion control on exposed soils and overburden stockpiles and during site rehabilitation." It is unlikely that such a seed mix will be available commercially.
Response:	If a native seed mix is not commercially available, an appropriate seed mix will be selected based on an evaluation of included species. Seed mixes that include invasive species or non-native species that are not already widely established in the areas around the Project Area will not be used for the Project.
Appendix:	None

RESPONSE TO FFA-91

ID:	**FFA-91**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	N/A
EIS Reference:	Document VGP_Summary_of_EIS_final_Sept2020 7.6.2.2 Mitigation Measures (page 7.35)
Context and Rationale:	-
Information Request:	There are mitigation measures to limit the introduction of invasive alien plant species, but an ongoing monitoring and response plan is recommended should IAS be detected (e.g., containment / control / eradication).
Response:	Although there is no official list of invasive plant species in Newfoundland and Labrador, species considered invasive in neighbouring jurisdictions will be removed or controlled if encountered. Marathon will provide training to environmental staff on the identification and appropriate eradication and control measures for potentially invasive plant species, to be developed with input from the Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture. Further details on mitigation measures and the management of potentially invasive plant species will be provided in the Environmental Protection Plan, which will be reviewed by applicable regulators prior to Project construction.
Appendix:	None

RESPONSE TO FFA-92

ID:	**FFA-92**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	5.3.4 (AC CDC Rare Vascular Plant Records) (page 5.7)
Context and Rationale:	Baseline Study: Species at Risk/Species of Conservation Concern
Information Request:	5.3.4 Red Pine (S2) is mentioned here. It should be noted that natural populations of Red Pine in Newfoundland have been assessed by the provincial SSAC as Threatened (2015), and the species is currently recommended by COSEWIC for designation and listing under the NL ESA.
Response:	Comment acknowledged. There is no evidence the Project will interact with any individuals of red pine. The status of red pine will be updated in applicable management plans to be developed for the Project. Furthermore, Marathon will observe changes to species' status prior to and/or during proposed Project activities and review its Project activities in consideration of applicable species / habitat restrictions and species recovery strategies.
Appendix:	None

RESPONSE TO FFA-93

ID:	**FFA-93**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	5.3.4 (AC CDC Rare Vascular Plant Records) (page 5.7)
Context and Rationale:	Baseline Study: Species at Risk/Species of Conservation Concern
Information Request:	In Section 6.3.1.2 (page 6.10) Common Nighthawk, it is stated that Common Nighthawk are only known to breed in southern Labrador. According to Wildlife Division records, the only Common Nighthawk nest record is in the Lab City/Wabush area on a mine site. What is the source of these southern Labrador breeding reports? The Atlantic Canada Conservation Data Centre (ACCDC) does not have them in their database so we would really like to have the original source to add to our records. Also noted in Chapter 10, Page 10.23
Response:	Information on habitat / range for the common nighthawk was obtained from the Newfoundland & Labrador (NL) Species at Risk fact sheet for the species, prepared by the Department of Environment & Conservation - Wildlife Division (Government of NL 2020). No further references are provided within the fact sheet. Reference: Government of NL (Newfoundland and Labrador). 2020. Newfoundland and Labrador Species at RiskFact Sheets. Available online at: https://www.gov.nl.ca/ffa/wildlife/endangeredspecies/birds/. Last accessed September 20, 2020.
Appendix:	None

RESPONSE TO FFA-94

ID:	**FFA-94**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Section 6.3.1Pages 6.10-6.12:
Context and Rationale:	Baseline Study: Species at Risk/Species of Conservation Concern
Information Request:	In the sections describing each bird, summaries are inconsistent. Some sections state that the species is not listed under the NL ESA, other sections have no reference to the NL ESA. Also, some sections state what habitat the bird nests in, while others don't.
Response:	In response to this request, the following additional information is provided related to nesting habitat and/or listing under the Newfoundland and Labrador *Endangered Species Act* (NL ESA). Note that these additions do not change the effects assessment or conclusions of the EIS as presented in Chapter 10. <u>Olive-sided Flycatcher</u> Olive-sided flycatchers typically build their nests on horizonal branches of conifer trees (Audubon n.d.). <u>Rusty Blackbird</u> Rusty blackbirds typically nest in conifers or shrubs near water. Nests are usually built only a few feet above the ground or water (Audubon n.d.). <u>Bank Swallow</u> Bank swallows are not listed under the NL ESA. <u>Grey-cheeked Thrush</u> Grey-cheeked thrushes typically build their nests low to the ground in shrubs, or directly on the ground at the base of alder or willow shoots (Whitaker et al. 2020). References: Audubon. n.d. Guide to North American Birds. Available online at: https://www.audubon.org/field-guide/ Whitaker, D. M., I. G. Warkentin, J. P. B. McDermott, P. E. Lowther, C. C. Rimmer, B. Kessel, S. L. Johnson, and W. G. Ellison. 2020. Gray-cheeked Thrush (*Catharus minimus*), version 1.0. In Birds of the World (P. G. Rodewald, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.gycthr.01
Appendix:	None

RESPONSE TO FFA-95

ID:	**FFA-95**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Section 8.0 (page 8.18)
Context and Rationale:	Baseline Study: Species at Risk/Species of Conservation Concern
Information Request:	In 8.0, it should be stated that the two bat species are 'presumed present' (not having potential to occur) due to high quality habitat and confirmation of the species in surrounding areas.
Response:	In Section 12.2.2 of the EIS, text should read as follows: "Northern long-eared bat (*Myotis septentrionalis*) and little brown bat (*Myotis lucifugus*) are presumed to be present in the Project Area based on the occurrence of mature mixedwood forest in the region and confirmation of the species in surrounding areas."
Appendix:	None

RESPONSE TO FFA-96

ID:	**FFA-96**
Expert Department or Group:	Department of Fisheries, Forestry and Agriculture
Guideline Reference:	-
EIS Reference:	Multiple Documents/Pages:
Context and Rationale:	Baseline Study: Species at Risk/Species of Conservation Concern
Information Request:	Note that species assessed by COSEWIC but not yet listed under the provincial NL *Endangered Species Act* are currently under consideration, and their status may change prior to or during proposed project operations (e.g., Northern Myotis; Little Brown Myotis; Bank Swallow; Barn Swallow; Evening Grosbeak). Provincial designation and listing would afford additional protections to individuals and their residences and would initiate recovery planning activities. ESA listing updates may also occur for COSEWIC-recommended status changes that are not yet reflected in provincial ESA listings (e.g., Red Crossbill, Olive-sided Flycatcher, Common Nighthawk). Note accepted common names for the two bat species are Northern Myotis and Little Brown Myotis. Please see three attached supporting documents from the Department of Fisheries, Forestry and Agriculture. Chen et al., 2017; Eftestøl et al., 2019 and Fifield, Lewis, and Gullage, 2013.
Response:	Comment acknowledged. If a species not previously listed under the *Species at Risk Act* or provincial *Endangered Species Act* becomes listed under either of these Acts, this species and its residence will require protection. It is also recognized that the Committee on the Status of Endangered Wildlife in Canada status changes may also occur prior to or during Project construction and/or operations. Marathon will observe changes to species' status prior to and/or during proposed Project activities and review its Project activities in consideration of applicable species / habitat restrictions and species recovery strategies. Throughout the EIS, references to "northern long-eared bat" and "little brown bat" should read as "northern myotis" and "little brown myotis".
Appendix:	None

RESPONSE TO DFO-01

<table>
<tr><th>ID:</th><th>DFO-01</th></tr>
<tr><td>Expert Department or Group:</td><td>DFO</td></tr>
<tr><td>Guideline Reference:</td><td>-</td></tr>
<tr><td>EIS Reference:</td><td>-</td></tr>
<tr><td>Context and Rationale:</td><td>-</td></tr>
<tr><td>Information Request:</td><td>DFO has requested further details on the Sedimentation and Erosion Control Plan through IAA Technical Review Process and has provided advice on additional sedimentation controls as stated below:
• When sedimentation/erosion controls are in use (i.e., cofferdams) downstream flows must be maintained.
• Sedimentation/erosion controls must be installed properly, checked routinely and maintained.
• Appropriate sedimentation controls should be used for any particular work (i.e., silt fences should not be used across stream/rivers).</td></tr>
<tr><td>Response:</td><td>Fisheries and Oceans Canada (DFO) advice is noted. A detailed Sedimentation and Erosion Control Plan will be incorporated in the overall Project Environmental Protection Plan (EPP) and will include measures identified through DFO Fisheries Act Authorization, letters of advice, and the Impact Assessment Agency review process. As described in Chapter 2, Section 2.7.3 of the EIS, a series of Environmental Management Plans will be developed in consultation with applicable regulators. The EPP, including the Erosion and Sedimentation Control Plan, will be included under the overarching Environmental Management System. The four basic principles that will be adopted in the implementation of erosion and sedimentation control measures for the Project will be:
• Direct runoff away from active work areas before construction commences, reducing the volume of sediment-laden water to be managed
• Limit the amount and timing of soil left exposed, to reduce the potential for erosion
• Follow erosion and sediment control measures to prevent sediment-laden runoff leaving the site
• Direct untreated / sediment-laden runoff away from sensitive receptors

Sensitive receptors on and adjacent to the mine site will require protection from sediment-laden runoff generated during site development activities. The most sensitive receptors, based on their proximity to active work areas where land disturbance will be encountered, include Victoria River,</td></tr>
</table>

ID:	**DFO-01**
	Valentine Lake, and Victoria Lake Reservoir and the associated tributaries and ponds. Erosion and sediment control measures will be implemented prior to / during construction, as applicable, monitored daily and maintained, as required, particularly prior to and immediately following a precipitation event of 25 mm or more. Erosion and sediment control measures will be put in place to ensure that regulatory limits are met in the receiving watercourse. Additional information on erosion and sedimentation control measures is provided in Section 5 of the Water Management Plan (Appendix 2-A of the EIS). The Environmental Management Plans, including the Erosion and Sedimentation Control Plan, will be based on the final Project design and submitted to government as part of Project permitting.
Appendix:	None

RESPONSE TO ECCC-01

ID:	ECCC-01
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	-
EIS Reference:	Attachment 3-C of Baseline Study Appendix 3: Water Resources [BSA.3]: Section 3.2.2
Context and Rationale:	Estimation of the mean annual flow (MAF) and monthly mean flows (MMF) is critical for water quality and low flow assessments. The proponent uses a Regional Flow Frequency Analysis (RFFA), developed by NFLD gov., which publishes four sets of equations based on drainage area, Lake Area Factor (LAF), and Lake and Swamp Factor (LSF) to estimate the MAF and MMF in four homogeneous regions. However, the original (1999) and updated (2014) RFFA reports note that the edges of the four identified homogeneous regions are approximate. The project is located at the edge of the NE region, within a few kms of the NW and SW regions. Additionally, the Water Survey of Canada (WSC) stations used to develop the NE region equations are all much further from the project location than the nearest WSC stations in the NW and SW regions. The proponent only presents MAF and MMF estimates using the NE region equations.
Information Request:	Update the estimates resulting from the RFFA (particularly the MAF and MMF) using the equations for the NW or SW which are much closer to the Project site than those used, or Provide additional rationale for using the NE region RFFA. Consider using the streamflow field data to validate this choice.
Response:	Rationale for using the Northeastern region Regional Flow Frequency Analysis includes: • The site is geographically located in the northeast (NE) hydrological region. It is assumed the other gauging stations being referred to are 02YN002- Lloyd's River below King George IV Lake in the southwest (SW) region (50 km from the site), and 02YN004 Star Brook above Star Lake (30 km from the site). Although both these stations drain to Red Indian Lake and the Exploits River system in the NE hydrological region, they were excluded by AMEC (2014) from inclusion in the NE hydrological region due to statistical dissimilarities with other stations in the region. • A sub-set of Water Survey of Canada stations closer to the site was selected from the NE region to develop regional hydrology regression equations.

ID:	ECCC-01
	• The NE region group equations were not used; a regression dataset was developed from a group of stations closer to the site. • Met station /climate data from both the NE and SW regions was used to estimate climate and meteorology. • Of the eight local Project flow gauging stations, three were operated for a longer period extending from 2012 – 2019, with the other five stations set up in either 2018 or 2019. Using the three stations with longer data (HS1, HS2 and HS3), the following is noted: – HS1 has a small watershed area of 0.397 km^2, has a regional equation based mean annual flow (MAF) and unit flow of 0.098 m^3/s and 0.0247 $m^3/s/km^2$. Using the rating curve developed for HS1, the MAF measured for the monitoring period was 0.0127 m^3/s and a unit flow of 0.032 $m^3/s/km^2$. – HS2 is also a small watershed of 1.047 km^2, has a regional equation based MAF and unit flow of 0.0264 m^3/s and 0.0264 $m^3/s/km^2$. Using the rating curve developed for HS1 and adjusting for the anomalously high extended water levels/flow from 2014 as mentioned in the comment, the MAF measured for the monitoring period was 0.021 m^3/s and a unit flow of 0.0201 $m^3/s/km^2$. – HS3 is also a small watershed of 0.702 km^2, has a regional equation based MAF and unit flow of 0.0175 m^3/s and 0.025 $m^3/s/km^2$. Using the rating curve developed for HS1 the MAF measured for the monitoring period was 0.0189 m^3/s and a unit flow of 0.0269 $m^3/s/km^2$. – Notwithstanding the fact that these are very small headwater watersheds, the MAF and unit flows for these three small, field-monitored watersheds are consistent with estimates derived from the selected regional hydrological regression dataset. • The environmental water balance for the Project site estimated climate normal evapotranspiration at 431 mm, which is 35% of climate normal precipitation and is consistent with the Water Resources Atlas of Newfoundland values of 450 – 475 mm/year. The evapotranspiration values estimated in the environmental water balance leave 65% to total streamflow. The selected NE Region gauging station subset yielded an average streamflow of 62.5%, and shows close agreement with the environmental water balance for the site. • A monthly baseflow index (BFI) was calculated using the Streamflow Analysis and Assessment Software (V4.1) based on 13 years of continuous daily flow data from Water Survey of Canada station 02YO014. Station 02YO014 is a small watershed of just 8.15 km^2 and in that respect very similar to the small watersheds characteristic of the Project site and located approximately 48 km to the NE of the site.

ID:	**ECCC-01**
	Baseflow contributions to total flow at this station for its period of record were found to vary from 23% (April) to 43% (March). The BFI calculated for the entire 13-year period of record was 35%. This BFI is considered applicable to the Local Assessment Area with some potential variations that may include higher BFI in streams located in perched water tables (i.e., HS1 and HS2 which are located in or near bogs) and potentially lower BFI in streams located in areas of highly permeable bedrock (i.e., HS7 which exhibited very low summer flows). Therefore, because the site is mapped in the NE region, a more locally based NE hydrological region gauging station dataset was used to develop regression relationships. This which yielded hydrometric statistics that were validated by local flow gauging results, the environmental water balance and baseflow index estimation methods. Further, as precipitation information from both the NE and SW region was used, the approach taken addresses that the site is located near the boundary of multiple regions. Reference: AMEC. 2014. Regional Flood Frequency Analysis for Newfoundland and Labrador 2014 Update. Prepared for Water Resources Management Division, Department of Environment and Conservation, Government of Newfoundland and Labrador.
Appendix:	None

RESPONSE TO ECCC-02

ID:	**ECCC-02**
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	-
EIS Reference:	Attachment 3-C of Baseline Study Appendix 3: Water Resources [BSA.3]: Section 3.3.1 and 4.2.2.1
Context and Rationale:	Continuous level data was collected at the project location for up to 7 years (2012-2019) and transformed to continuous streamflow data via an acceptable rating curve. However, this data does not appear to be used to validate any of the baseline estimates.*approx. 1 year of data at station HS2 is anomalously high (suspected beaver dam).
Information Request:	Use the continuous level data to validate the baseline water balance, baseflow index estimates, or RFFA.
Response:	Please refer to response in ECCC-01.
Appendix:	None

RESPONSE TO ECCC-03

ID:	**ECCC-03**
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	-
EIS Reference:	Chapter 7 of EIS, section 7.5.1.3 and Table 7.36 (p. 105)
Context and Rationale:	Table 7.36 and section 7.5.1.3 of the EIS assess the project effects on the watershed environmental flows by comparing to the expected mean annual flow (MAF). The estimates of 50% MAF for the summer environmental flows and 33% MAF for the winter environmental flows, taken from Zadeh (2012), are appropriate estimates for baseline natural conditions. However, these baseline values must be compared to expected low flows in the summer and winter months, respectively, as the expected MAF does not adequately capture the potential for low flows in a non- natural system.
Information Request:	Compare the value of the baseline environmental flows to the expected project flows from the associated months (winter: October to March and summer: April to September) for all watersheds.
Response:	To clarify the assessment method, a 10% change in Mean Annual Flow (MAF) was used as a screening level assessment. Where MAF will be decreased by >10%, the projected MAF was compared to the seasonal environmental flows. MAF and Mean Monthly Flow (MMF) for each baseline watershed is presented in Chapter 7 of the EIS, Table 7.18. Based on the screening assessment, a small number of watersheds are not expected to provide sufficient summer and winter environmental flows during the Project phases, and thus experience localized residual effects. These include WS6, WS12, WS13, and WS14 during operation, WS3, WS6, WS12, WS13, and WS14 during closure, and WS6 post-closure. However, the effect on fish habitat from decreased surface water quantity will be mitigated and compensated for, via the implementation of an offsetting plan, as discussed in Section 8.9 of the EIS. Section 7.5.1.3 and Table 7.36 of the EIS provide these results for each watershed. Chapter 7 of the EIS (Table 7.36 and Section 7.5.1.3) includes a comparison of the expected MAF for each Project phase to the winter and summer baseline environmental flows. The winter environmental flow was based on 30% of baseline MAF applied to the months of October through March, and the summer environmental flow was based on 50% of baseline MAF applied to the months of April through September. Please refer to Tables ECCC-03.1 to ECCC-03.3 for estimates of the MMF for each Project watershed. Table ECCC-03.1 represents construction and

ID:	ECCC-03
	operation. Table ECCC-03.2 represents closure, although closure is conservatively represented early in the Project phase, as the timing of rehabilitation activities is uncertain and may not be complete until toward the end of the closure period. Therefore, the MMF during closure are similar to the MMF during operation. Table ECCC-03.3 represents post-closure when all Project rehabilitation activities are assumed to be complete. The values in bold indicate months when the seasonal baseline environmental flow is not maintained. The winter environmental flows are met for all months in all Project phases. As shown in these tables, August is the driest month on record and the MMFs are below the summer baseline environmental flows for all watersheds. However, baseline summer environmental flows are repeatedly not met under pre-development conditions, with the exception of WS5, WS6, WS19, when the monthly flows are slightly above the summer environmental flows. Although during operation some watersheds are predicted to increase from baseline conditions, environmental flows in August are still below baseline environmental flows. Environmental flows return to near baseline conditions during post-closure conditions as natural drainage patterns are returned to pre-development conditions. As shown in Table ECCC-03.3, the environmental flows in August increase from operation and closure Project phases and approach the summer baseline environmental flow for baseline conditions. Comparison of August MMFs in post-closure with baseline August MMFs demonstrates return to near baseline conditions. Similarly, baseline August MMFs are characteristically lower than summer environmental flows. Thus, in post-closure the local watersheds return to near baseline conditions. While the assessment indicates that environmental flows may not be maintained during August, the assessment of environmental flows in comparison to MMFs in Table 7.18 of Chapter 7 of the EIS indicates that under baseline conditions, watersheds characteristically experience flows at or below environmental flows during August. As shown in Table ECCC-03.3 during post-closure, while August MMFs in most watersheds increase, the low water condition observed in baseline conditions continues and remains an artifact of existing, natural local conditions.
Appendix:	None

Table ECCC-03.1 Baseline Environmental Flows Compared to Mean Monthly Flows During Operation and Closure

Pre Development Watersehd ID	Winter Env Flow (L/s) (Oct - Mar)	Mean Monthly Flow for Winter Months (L/s)						Summer Env Flow (L/s) (Apr - Sep)	Mean Monthly Flow for Summer Months (L/s)					
		Oct	Nov	Dec	Jan	Feb	Mar		Apr	May	Jun	Jul	Aug	Sep
WS1	2.9	10.8	10.9	6.9	4.1	4.2	8.1	4.9	29.3	30.7	12.2	5.9	**4.4**	7.3
WS2	14.6	51.8	55.9	38.3	23.9	24.5	42.8	24.4	138.6	130.8	53.1	27.3	**21.2**	34.9
WS3	4.2	15.2	15.6	10.1	6.1	6.2	11.7	6.9	41.2	42.2	16.8	8.2	**6.2**	10.2
WS4	3.8	14.1	14.4	9.3	5.5	5.7	10.7	6.4	38.1	39.2	15.6	7.6	**5.7**	9.4
WS5	0.5	2.0	1.9	1.1	0.6	0.6	1.3	0.8	5.4	6.3	2.5	1.1	**0.8**	1.3
WS6	1.3	4.9	4.9	3.0	1.7	1.8	3.5	2.2	13.5	14.9	5.9	2.7	**2.0**	3.3
WS7	5.6	20.2	21.0	13.8	8.3	8.5	15.8	9.3	54.6	54.9	22.0	10.9	**8.2**	13.6
WS8	9.3	33.3	35.3	23.7	14.6	14.9	26.8	15.5	89.4	86.9	35.0	17.7	**13.6**	22.4
WS9	6.9	24.8	26.0	17.2	10.5	10.7	19.6	11.5	66.9	66.3	26.6	13.3	**10.1**	16.7
WS10	15.7	55.4	60.0	41.2	25.8	26.5	46.0	26.2	148.2	139.2	56.5	29.1	**22.7**	37.3
WS11	4.0	14.7	15.1	9.7	5.8	6.0	11.2	6.7	39.8	40.8	16.3	7.9	**6.0**	9.9
WS12	7.5	26.8	28.2	18.7	11.4	11.7	21.3	12.4	72.3	71.2	28.6	14.3	**11.0**	18.1
WS13	1.7	6.3	6.3	3.9	2.3	2.3	4.6	2.8	17.3	18.7	7.4	3.5	**2.6**	4.3
WS14	4.6	16.7	17.2	11.2	6.7	6.9	12.9	7.6	45.2	46.0	18.4	9.0	**6.8**	11.2
WS15	12.2	43.3	46.3	31.5	19.5	20.0	35.3	20.3	115.9	110.7	44.8	22.8	**17.7**	29.1
WS16	10.2	36.2	38.6	26.0	16.0	16.4	29.3	16.9	97.3	94.0	38.0	19.2	**14.8**	24.4
WS17	2.9	10.6	10.7	6.8	4.0	4.1	8.0	4.8	28.8	30.2	12.0	5.8	**4.3**	7.1
WS18	16.5	58.1	63.0	43.4	27.2	27.9	48.3	27.5	155.3	145.5	59.1	30.5	**23.8**	39.1
WS19	1.6	5.8	5.8	3.6	2.1	2.1	4.2	2.6	15.9	17.4	6.8	3.2	**2.4**	3.9
WS20	4.6	16.7	17.2	11.2	6.7	6.9	12.9	7.6	45.1	45.9	18.3	9.0	**6.8**	11.2
WS21	14.1	50.0	53.9	36.9	23.0	23.6	41.2	23.6	133.9	126.7	51.4	26.3	**20.5**	33.7
WS22	8.8	31.6	33.4	22.3	13.7	14.1	25.3	14.7	84.8	82.7	33.3	16.8	**12.9**	21.2

Note: **Bold** indicates when Enviromental Flows is not met for that month

Table ECCC-03.2 Baseline Environmental Flows Compared to Mean Monthly Flows During Closure

Pre Development Watersehd ID	Winter Env Flow (L/s) (Oct - Mar)	Mean Monthly Flow for Winter Months (L/s)						Summer Env Flow (L/s) (Apr - Sep)	Mean Monthly Flow for Summer Months (L/s)					
		Oct	Nov	Dec	Jan	Feb	Mar		Apr	May	Jun	Jul	Aug	Sep
WS1	2.9	10.8	10.9	6.9	4.1	4.2	8.1	4.9	29.3	30.7	12.2	5.9	**4.4**	7.3
WS2	8.7	31.2	32.9	22.0	13.5	13.9	25.0	14.5	83.7	81.8	32.9	16.6	**12.7**	21.0
WS3	5.8	20.9	21.7	14.2	8.6	8.8	16.3	9.6	56.3	56.4	22.6	11.2	**8.5**	14.0
WS4	3.8	14.1	14.4	9.3	5.5	5.7	10.7	6.4	38.1	39.2	15.6	7.6	**5.7**	9.4
WS5	0.5	2.0	1.9	1.1	0.6	0.6	1.3	0.8	5.4	6.3	2.5	1.1	**0.8**	1.3
WS6	1.3	4.9	4.9	3.0	1.7	1.8	3.5	2.2	13.5	14.9	5.9	2.7	**2.0**	3.3
WS7	5.6	20.2	21.0	13.8	8.3	8.5	15.8	9.3	54.6	54.9	22.0	10.9	**8.2**	13.6
WS8	9.3	33.3	35.3	23.7	14.6	14.9	26.8	15.5	89.4	86.9	35.0	17.7	**13.6**	22.4
WS9	6.9	24.8	26.0	17.2	10.5	10.7	19.6	11.5	66.9	66.3	26.6	13.3	**10.1**	16.7
WS10	15.7	55.4	60.0	41.2	25.8	26.5	46.0	26.2	148.2	139.2	56.5	29.1	**22.7**	37.3
WS11	4.0	14.7	15.1	9.7	5.8	6.0	11.2	6.7	39.8	40.8	16.3	7.9	**6.0**	9.9
WS12	7.5	26.8	28.2	18.7	11.4	11.7	21.3	12.4	72.3	71.2	28.6	14.3	**11.0**	18.1
WS13	1.7	6.3	6.3	3.9	2.3	2.3	4.6	2.8	17.3	18.7	7.4	3.5	**2.6**	4.3
WS14	4.6	16.7	17.2	11.2	6.7	6.9	12.9	7.6	45.2	46.0	18.4	9.0	**6.8**	11.2
WS15	12.2	43.3	46.3	31.5	19.5	20.0	35.3	20.3	115.9	110.7	44.8	22.8	**17.7**	29.1
WS16	10.2	36.2	38.6	26.0	16.0	16.4	29.3	16.9	97.3	94.0	38.0	19.2	**14.8**	24.4
WS17	2.9	10.6	10.7	6.8	4.0	4.1	8.0	4.8	28.8	30.2	12.0	5.8	**4.3**	7.1
WS18	8.8	31.4	33.2	22.2	13.6	14.0	25.1	14.6	84.4	82.3	33.2	16.7	**12.8**	21.1
WS19	1.6	5.8	5.8	3.6	2.1	2.1	4.2	2.6	15.9	17.4	6.8	3.2	**2.4**	3.9
WS20	4.6	16.7	17.2	11.2	6.7	6.9	12.9	7.6	45.1	45.9	18.3	9.0	**6.8**	11.2
WS21	14.1	50.0	53.9	36.9	23.0	23.6	41.2	23.6	133.9	126.7	51.4	26.3	**20.5**	33.7
WS22	8.8	31.6	33.4	22.3	13.7	14.1	25.3	14.7	84.8	82.7	33.3	16.8	**12.9**	21.2

Note: **Bold** indicates when Enviromental Flows is not met for that month

Table ECCC-03.3 Baseline Environmental Flows Compared to Mean Monthly Flows During Post-Closure

Pre Development Watersehd ID	Winter Env Flow (L/s) (Oct - Mar)	Mean Monthly Flow for Winter Months (L/s)						Summer Env Flow (L/s) (Apr - Sep)	Mean Monthly Flow for Summer Months (L/s)						Summer Env. Flow (L/s)
		Oct	Nov	Dec	Jan	Feb	Mar		Apr	May	Jun	Jul	Aug	Sep	August
WS1	3.6	13.3	13.6	8.7	5.2	5.3	10.1	6.0	36.1	37.2	14.8	7.2	**5.4**	8.9	**4.3**
WS2	14.6	51.8	55.9	38.3	23.9	24.5	42.8	24.4	138.6	130.8	53.1	27.3	**21.2**	34.9	**14.3**
WS3	5.8	20.9	21.7	14.2	8.6	8.8	16.3	9.6	56.3	56.4	22.6	11.2	**8.5**	14.0	**4.0**
WS4	3.8	14.1	14.4	9.3	5.5	5.7	10.7	6.4	38.1	39.2	15.6	7.6	**5.7**	9.4	**6.1**
WS5	0.5	2.0	1.9	1.1	0.6	0.6	1.3	0.8	5.4	6.3	2.5	1.1	**0.8**	1.3	1.3
WS6	1.3	4.9	4.9	3.0	1.7	1.8	3.5	2.2	13.5	14.9	5.9	2.7	**2.0**	3.3	10.9
WS7	5.6	20.2	21.0	13.8	8.3	8.5	15.8	9.3	54.6	54.9	22.0	10.9	**8.2**	13.6	**3.5**
WS8	8.4	30.0	31.7	21.1	12.9	13.3	24.0	13.9	80.6	78.9	31.8	16.0	**12.2**	20.2	15.4
WS9	5.9	21.5	22.4	14.7	8.9	9.2	16.9	9.9	58.1	58.1	23.3	11.5	**8.8**	14.5	**6.5**
WS10	14.8	52.5	56.7	38.9	24.3	24.9	43.4	24.7	140.4	132.4	53.7	27.6	**21.5**	35.3	**21.5**
WS11	2.3	8.4	8.4	5.3	3.1	3.2	6.2	3.8	22.9	24.4	9.7	4.6	**3.4**	5.7	**3.4**
WS12	17.3	60.8	66.0	45.6	28.6	29.4	50.7	28.8	162.3	151.6	61.6	31.9	**24.9**	40.9	**24.9**
WS13	4.9	17.8	18.4	12.0	7.2	7.4	13.8	8.2	48.1	48.8	19.5	9.6	**7.3**	12.0	**7.3**
WS14	11.2	39.8	42.5	28.8	17.8	18.3	32.4	18.6	106.7	102.5	41.5	21.1	**16.3**	26.8	**16.3**
WS15	12.2	43.4	46.5	31.6	19.6	20.1	35.5	20.4	116.3	111.1	45.0	22.9	**17.8**	29.2	**15.7**
WS16	10.2	36.4	38.7	26.1	16.1	16.5	29.4	17.0	97.6	94.3	38.1	19.3	**14.9**	24.5	**12.7**
WS17	6.5	23.5	24.5	16.2	9.8	10.1	18.5	10.8	63.2	62.9	25.3	12.5	**9.6**	15.8	**6.9**
WS18	16.5	58.1	63.0	43.4	27.2	27.9	48.3	27.5	155.3	145.5	59.1	30.5	**23.8**	39.1	**23.8**
WS19	1.6	5.8	5.8	3.6	2.1	2.1	4.2	2.6	15.9	17.4	6.8	3.2	**2.4**	3.9	3.0
WS20	4.6	16.7	17.2	11.2	6.7	6.9	12.9	7.6	45.1	45.9	18.3	9.0	**6.8**	11.2	7.9
WS21	14.1	50.0	53.9	36.9	23.0	23.6	41.2	23.6	133.9	126.7	51.4	26.3	**20.5**	33.7	**20.1**
WS22	8.8	31.6	33.4	22.3	13.7	14.1	25.3	14.7	84.8	82.7	33.3	16.8	**12.9**	21.2	**9.0**

Note: **Bold** indicates when Enviromental Flows is not met for that month

RESPONSE TO ECCC-04

ID:	**ECCC-04**
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	-
EIS Reference:	Chapter 7 of EIS, section 7.5.1.3and 7.5.1.4 (p.111)
Context and Rationale:	Water will be pumped from Valentine Lake to help fill Marathon Pit at closure over approx. 8 years. The proponent presents this pumping as a significant project effect in the following text: “For Valentine Lake, the proposed pumping rate corresponds to 21% of expected MAF. […] The closure MAF is projected to be 59% and 164% greater than the pre-development summer and winter environmental flows, respectively.” The proponent assesses the project effects on the Valentine Lake environmental flows by comparing to the expected mean annual flow (MAF). The expected MAF does not adequately describe the potential for project effects on low flows (see previous IR, ECCC-MSC-3). Further in the same document, the proponent states that the effects to Valentine Lake at the edge of the Local Assessment Area (LAA) is under 10% (section 7.5.1.4).
Information Request:	a. Provide further explanation for the apparent discrepancy between these two statements. b. Compare the value of the baseline environmental flows to the expected flows from the associated months (winter: October to March and summer: April to September) for Valentine Lake. c. Assess whether the pumping of Valentine Lake during the closure phase has the potential to affect the lake level, particularly during low water periods.
Response:	a. There is no discrepancy between the assessment of water taking from Valentine Lake itself and the assessment of that same taking further downstream from Valentine Lake at the boundary of the Local Assessment Area (LAA). These assessments are based on different watershed areas. Whereas the water taking is projected to reduce Mean Annual Flow (MAF) by 21% from Valentine Lake, the taking comprises < 10% reduction downstream of Valentine Lake at the LAA boundary. b. A comparison of Mean Monthly Flow (MMF) to baseline environmental flows was completed and summarized in Table ECCC-04.1 for all Project phases. The comparison was conducted at the outlet of Valentine Lake just upstream of the confluence with Long Lake. The

ID:	ECCC-04
	winter environmental flow was based on 30% of baseline MAF applied to the months of October through March and the summer environmental flow was based on 50% of baseline MAF applied to the months of April through September. The values in **bold** indicate months when the seasonal baseline environmental flow is not maintained. The winter environmental flows are met for all months in all Project phases. As shown in these tables, July and August are the driest month on record and the MMFs are below the summer baseline environmental flows for each phase. However, baseline summer environmental flows are repeatably not met under baseline conditions and reduced inflows to Valentine Lake during the summer months are primarily an artifact of existing, natural local conditions. The reduction in MMFs between baseline and the Project phases are considered negligible. c. The aquatic assessment estimated water level fluctuation on Valentine Lake is based on visual indicators to be approximately 1 m with relatively deep water along the shoreline. The effect of Marathon pit filling on Valentine Lake is estimated to be up to 0.2 m. Based on the stage, storage area relationships developed for Valentine Lake, a reduction in lake water level of 0.20 m will reduce the lake surface area by < 300 m^2. The area of Valentine Lake is estimated to be 8.23 km^2 and the water surface area reduction is negligible in comparison to the lake's total surface area. As the lake is relatively deep along the shoreline, and the potential reduction in lake water level has minimal effect on the lake surface area, the water taking for pit filling is not expected to affect the assimilative capacity of Valentine Lake nor alter the assimilative capacity assessment completed in the EIS (Appendix 7C of the EIS). The mixing zone in Valentine Lake during the water taking would remain consistent with the mixing zone predicted in Valentine Lake in Appendix 7C. Similarly, Victoria Lake Reservoir also has steep shorelines and deep nearshore areas where Project discharges require mixing zones; therefore, no change in Victoria Lake Reservoir mixing zones due to pit filling taking is anticipated. A comparison of MMF to baseline environmental flows was completed and summarized in ECCC-04.2 considering the water withdrawal from Valentine Lake to accelerate filling the Marathon pit in Years 10-12 of operation and Years 1 – 5 of closure. The winter environmental flows are met for all Project phases. The MMFs are below the summer environmental flows as it is for baseline conditions. However, in September the summer baseline environmental flows are not met

ID:	**ECCC-04**
	during operation (Years 10-12) and closure as a result of pumping to accelerate Marathon pit filling. The potential Project related effects associated with changes in water quantity with respect to fish habitat are described in Chapter 8, Section 8.5 of the EIS. A water level and flow monitoring program will be implemented specifically to monitor potential effects of the water withdrawal. Flow proportional water withdrawal methods from Valentine Lake could be used to withdraw water in consideration of natural lake water levels, and environmental flows to reduce potential Project related effects. For example, additional water could be pumped from Valentine Lake during the high flow months of March, April and May and reduced (or interrupted) in July, August, and September. Criteria for altering the pumping rate would be developed in consultation with regulators to protect flows and water levels as required and reduce potential effects on fish and fish habitat. Due to the steep nature of Valentine Lake and Victoria Lake Reservoir banks and nearshore zones and the relatively small reduction in shoreline area estimated from proposed water takings, the effects on nearshore fish spawning and rearing habitat are predicted to be negligible. Where residual adverse Project-related effects remain, these will be counterbalanced by offsetting through an authorization pursuant to the *Fisheries Act* as described in Section 8.5.1 of the EIS. The Fish Habitat Offsetting Plan is being developed in consultation with Fisheries and Oceans Canada (DFO) and will be submitted to DFO as part of the *Fisheries Act* Authorization process. The approved offsetting plan will be implemented to counterbalance the loss of fish habitat in the LAA; therefore, no significant residual effects to fish habitat are anticipated.
Appendix:	None

Table ECCC-04.1 Baseline Environmental Flows Compared to Mean Monthly Flows During the Project Phases

Pre-Development Watershed ID	Mean Monthly Flow for Winter Months (L/s)						Mean Monthly Flow for Summer Months (L/s)					
	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Sep
Valentine Lake												
Environmental Flow	209.67						349.45					
Pre-Development (Baseline)	695.0	834.2	648.4	440.7	453.7	673.2	1,816.2	1,443.8	606.7	**347.1**	**289.8**	834.2
Operation	693.9	832.9	647.3	440.0	453.0	672.1	1,813.5	1,813.5	605.8	**346.6**	**289.3**	468.5
Closure	693.9	832.9	647.3	440.0	453.0	672.1	1,813.5	1,441.7	605.8	**346.6**	**289.3**	468.5
Post Closure	693.9	832.9	0.6	440.0	453.0	672.1	1,813.5	1,441.7	605.8	**346.6**	**289.3**	468.5

Note:
Bold indicates when Environmental Flow is not met for that month

Table ECCC-04.2 Baseline Environmental Flows Compared to Mean Monthly Flows During the Project Phases considering the water withdrawal from Valentine Lake to accelerate filling the Marathon pit in Years 10-12 of operation and Years 1 – 5 of closure

Pre-Development Watershed ID	Mean Monthly Flow for Winter Months (L/s)						Mean Monthly Flow for Summer Months (L/s)					
	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Sep
Valentine Lake												
Pre-Development (Baseline)	209.67						349.45					
Baseline	695.0	834.2	648.4	440.7	453.7	673.2	1,816.2	1,443.8	606.7	**347.1**	**289.8**	834.2
Operation (Years 10-12) with Pumping	515.9	654.9	469.3	262.0	275.0	494.1	1,635.5	1,263.7	427.8	**168.6**	**111.3**	290.5
Closure with Pumping	515.9	654.9	469.3	262.0	275.0	494.1	1,635.5	1,263.7	427.8	**168.6**	**111.3**	290.5

Note:
Bold indicates when Environmental Flow is not met for that month

RESPONSE TO ECCC-05

ID:	**ECCC-05**
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	7.6.1. Effects of potential accidents or malfunctions
EIS Reference:	21.5.3 Fuel and Hazardous Materials Spill. Page 162, section 21.5.3.4 Environmental Effects Assessment.
Context and Rationale:	Sodium cyanide is a reagent used in the cyanidation phase. The EIS notes that sodium is a relatively environmentally benign product, and therefore, only cyanide was modelled for a potential hazardous spill. A two-dimensional (2D) hydrodynamic model was used to represent the fate and behavior of cyanide in the Red Indian Lake and the results are presented in figure 21-3 and 21-4. There are no discussions on the potential of cyanide to enter the atmosphere from the lake waters. According to the International Cyanide Management Code, at a pH of 7, which is generally the pH found in lakes, 99 percent of cyanide is hydrogen cyanide. Hydrogen cyanide is a toxic and flammable gas that is barely lighter than air (relative density of 0.967) and can enter the atmosphere and be transported away from the emission source.
Information Request:	Confirm the environmental behaviour, fate and effects of not only cyanide ion in water but of hydrogen cyanide in air and the surrounding environment.
Response:	For the potential fugitive releases of hydrogen cyanide (HCN) associated with a spill of sodium cyanide (NaCN) into the nearby lakes, while there would be potential for volatilization of HCN released from a spill of NaCN, based on the results of the 2-Dimenstional modelling completed, the predicted cyanide concentrations are relatively low (0-10 ug/L on the water surface) and the highest concentrations only occur in a very small area. Further, given the relatively large distance to receptors downwind, it is likely that any volatilized HCN would be diluted sufficiently such that concentrations would be below the Ontario based air quality standard of 8 ug/m^3. Therefore, even though HCN is volatile, it is unlikely that fugitive emissions due to volatilization of HCN resulting from a spill of NaCN, such as the one modeled, would result in concentrations exceeding ambient air quality standards in the area.
Appendix:	None

RESPONSE TO ECCC-06

ID:	**ECCC-06**
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	-
EIS Reference:	21.4.1.4 Watercourse Crossing Failure; 21.5.4.2 Project Design and Safety Measures to Reduce Environmental Effects
Context and Rationale:	In Chapter 22, the proponent indicates that climate and climate change can have impacts on the project with potential to cause adverse effects to the environment through accidents or malfunctions. As such, the proponent provides projections of future changes in a number of climate change related parameters over the lifetime of the project (section 22.3.1). It is not clear, however, what climate change information and methods have been used to consider climate change in the design applications described. In the quotes below, the proponent indicates that climate change will be (or is) considered in project design. 21.4.1.4 Watercourse Crossing Failure (p.21.9; emphasis added) Failure of a watercourse crossing could result from a precipitation or snowmelt event that exceeds the design capacity, causing the loss of channel form due to erosion, or damage to other watercourse crossings downstream. Failure of drainage culverts included along Project roads could result in an impediment to fish movement and sedimentation to downstream waterbodies. This would result in potential adverse effects on surface water resources and fish and fish habitat. Culverts will be inspected periodically for stability and to remove accumulated material and debris. With watercourse crossings designed to address the appropriate design precipitation events including climate change parameters, regular maintenance and monitoring, and timely and effective response to watercourse crossing failures, the potential for effects will be reduced. In the unexpected event there is an extreme condition leading to flooding or culvert damage, repairs will be quickly undertaken, and flows restored. Given the implementation of proposed mitigation measures, negligible residual adverse effects on VCs are anticipated, and therefore no further effects assessment is required. 21.5.4.2 Project Design and Safety Measures to Reduce Environmental Effects (p.21.42; emphasis added) “Design parameters for water management infrastructure includes a 15 m setback from fish-bearing waterbodies; consideration of climate change-associated precipitation events and associated flow; and maintaining flow to fish- bearing waterbodies where feasible (draining mine site components to pre- development catchment areas, where practicable). Contact runoff from the piles will be managed by perimeter ditches and treated for sediment prior to release to the environment. Sedimentation

ID:	**ECCC-06**
	pond embankments are designed to reduce seepage and will be constructed out of locally sourced, low permeability glacial till. Erosion protection will be provided through riprap lining of the embankment and spillway and a scour pad at the toe of slope of spillways. A geotextile or granular soil filter layer will be placed between materials to reduce the opportunity for piping. The design of the sedimentation ponds accounts for climate change, ice thickness during the winter, operating water levels, inactive storage to promote settling, and freeboard requirements.”
Information Request:	Provide clarification of the climate change information and methods used to apply the climate projections to relevant project design considerations.
Response:	Climate predictions presented in Chapter 22 (Effects of the Environment on the Project) of the EIS are sourced from the Government of Newfoundland (Government of Newfoundland and Labrador 2019 Climate Change – Climate Data. Available at: https://www.gov.nl.ca/eccm/occ/climate-data/). Predictions were based on the representative concentration pathways (RCPs) 8.5 scenario for two future periods, 2041-2070 and 2071-2100, at four locations as required by the EIS guidelines. Climate change precipitation and temperature projections for Red Indian Lake are also described in Baseline Study Appendix 3, Attachment 3-C Valentine Gold Project Hydrology and Water Quality Monitoring Baseline Report (2020). Projected climate change precipitation and temperature data for the Red Indian Lake region were generated using the Climate Atlas of Canada (Prairie Climate Center 2019). This online data portal provides downscaled data projections of temperature and precipitation from 24 different climate models. Projected climate changes associated with the Intergovernmental Panel on Climate Change RCPs 4.5 and 8.5 scenarios for a 30-year projection are provided. The RCP8.5 scenario was selected as it represents the highest greenhouse gas emissions, resulting from: high population, slow income growth, and modest rates of change in the technological change resulting from absence of climate change policies (Riahi et al. 2011). It is expected that future climate change could result in increased temperatures, increased frequency and intensity of precipitation, an increase in the frequency and magnitude of storm events, and increased incidence of flooding and erosion in the Project Area. Climate change projections for the region can be summarized as warmer, drier summers, with warmer and wetter conditions in fall, winter and spring. To address the potential effects of climate change (e.g., increased air temperature, precipitation, fog and visibility, winds and extreme weather events) on the Project, and in consideration of the potential normal and

ID:	ECCC-06
	extreme conditions that might be encountered throughout the life of the Project, proactive design, materials selection, planning, and maintenance are required. In particular, water management infrastructure design included consideration of climate change-associated precipitation events and associated flow. For example, the tailings management facility (TMF) operating volume was designed based on typical precipitation volumes. The 25-year wet year precipitation was used to provide a flexible operating range. The impact of extreme events is considered above the operating water level, in the environmental design flood (EDF) storage. The EDF storage requirements for each stage has been updated to be the larger of the 7-day, 100-year rainfall event or the 30-day 100-year rainfall plus snowmelt event during the freshet. Water crossings will be designed to meet the NL Department of Transportation and Infrastructure (NLDTI) design criteria. The sizing of the hydraulic capacity of each Project water crossing is based on road class. Water crossings associated with drainage of Project piles exceeds the NLDTI design criteria for sizing the hydraulic capacity of Project water crossing with respect to road class. The Project used passage of the 1:100-year return period runoff event. Culverts are sized for the 1:2 headwater:culvert diameter ratio and minimum of 30 cm freeboard from the road surface without overtopping of the adjacent ditch. The Project used the 1:100-year storm derived from the above climate change method to account for anticipated culvert capacity increases. Regarding sedimentation and collection pond sizing, the flood control volume sizing criteria is the containment of the 1:100-year return period runoff event based on the Stephenville climate station (refer also to response to ECCC-29). The representative concentration pathway (RCP) 4.5 1:100-year runoff event for this station was approximately equivalent to the 1:200-year return period runoff event. The sedimentation / collection ponds have been designed to contain the RCP4.5 1:100-year return period event volume plus 30-day snowmelt, and have been designed to manage / attenuate RCP4.5 storms up to the 1:200-year return period event without overtopping and while maintaining freeboard requirements. References: Government of Newfoundland and Labrador. 2019. Climate Change – Climate Data. Available at: https://www.exec.gov.nl.ca/exec/occ/climate-data/index.html Prairie Climate Center. 2019. Climate Atlas of Canada (version 2). Retrieved September 2019, from https://climateatlas.ca/data/city/463/annual_precip_2030_85/climo

ID:	ECCC-06
	Riahi, K., S. Rao, P. Rafaj, V. Krey, C. Cho, V. Chirkov, G. Fischer, G. Kindermann, N. Nakicenovic, and P. Rafaj. 2011. "RCP 8.5 - A scenario of comparatively high greenhouse gas emissions." Climatic Change 109 doi:10.1007/s10584-011-0149-y.
Appendix:	None

RESPONSE TO ECCC-07

ID:	**ECCC-07**
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	Section 2.2
EIS Reference:	Section 2.11
Context and Rationale:	Alternative lighting design and/or measures are a potential mitigation measure to reduce potential impacts of light attraction on migratory birds and species at risk.
Information Request:	Include Project Lighting in the “Alternative Means of Carrying out the Project” Section 2.11.
Response:	The following information provides an assessment of lighting alternatives. In addition, Chapter 5 of the EIS provides a comprehensive assessment of environmental effects of the Project on the Atmospheric Environment, including lighting. Most of the mine site preparation and construction activities will occur during daytime hours; however, there is potential for such activities to occur during night conditions depending on the construction schedule and the time of year (e.g., during the fall and winter when days are shorter). During this time, it is likely that portable lighting units would be used to meet visibility and worker safety needs. The exact number of mobile lighting units required, and their locations, are currently unknown as the development of the Project execution plan is ongoing. However, such equipment could be used throughout the Project Area, surrounding the proposed locations of construction and installation activities. When nighttime construction is necessary and mobile lighting units are required for the activity, it would be minimal and mitigated using directional lighting. The locations, types and number of permanent lighting structures are also currently unknown. Permanent lighting structures will use directed lighting (when and where required), and will likely include a combination of street, flood, and wall pack lighting. These will be installed along key site roads within the Project Area and surrounding vehicle parking lots and site buildings (e.g., accommodations camp, processing facilities, mine services area). The intensity and color of light used, whether lights are shielded or steady burning (versus flashing), and weather conditions (e.g., low cloud ceiling, fog, rain) influence the attractiveness of light for birds. Various lighting design considerations can reduce light effects on avifauna including: • Flashing versus steady-burning lights

ID:	ECCC-07
	• Directional lighting (e.g., down lighting and shielded lighting) • Light wavelengths • Light intensity • Motion sensors and programmable lighting Selection of site lighting will occur through detailed Project design. As indicated in Chapter 5, Project lighting plans will be developed using the recommended minimum lighting levels provided by the Illuminating Engineering Society (IES) of North America's IES Lighting Handbook for outdoor worksite lighting, and in consideration of guidelines established by the Commission Internationale de L'Éclairage (CIE). Table ECCC-07.1 summarizes the alternatives related to Project lighting. All identified lighting options are considered feasible for the Project and will be considered in development of the final Project lighting plan during detailed design. Additional Information: Mitigation specific to reducing Project light emissions is presented in Chapter 5 (Atmospheric Environment) and Table 10.18 in Chapter 10 (Avifauna) of the EIS. Generic mitigation measures and best management practices to reduce Project-related effects are provided in Chapter 2, Section 2.11. These are presented below. • The amount of on-site lighting will be reduced such that only the amount of lighting required for safe conduct of construction and operation activities will be installed, and exterior lights will be shielded from above (where the need is identified). • 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. • Lighting will be designed to avoid excessive use of mobile flood lighting units and will be turned off when these are not required. • Full cut-off luminaires will be used wherever practicable to reduce glare, light trespass and sky glow from Project lighting. In addition to those listed in the EIS, the following mitigation measures will be implemented, as required: • To the extent feasible without affecting safe mine operations, exterior lighting will be reduced and/or have limited time of operation during sensitive wildlife periods (e.g., migration). • Permanent lighting at the tailings management facility (TMF) and polishing pond will be minimal, as it is only needed for specific

ID:	**ECCC-07**
	infrastructure (e.g., decant pump, water treatment plant), reducing the attractiveness of these water features to avifauna. With the proposed mitigation and proper light design that incorporates guidance from IES and CIE, the levels of light emissions (light trespass and glare) will be maintained at levels representative of rural areas beyond the Project Area. A Wildlife Response Plan (WRP) will be developed and implemented as part of the Project's Environmental Protection Plan (EPP). The WRP will be developed through liaison with Environment and Climate Change Canada – Canadian Wildlife Service (ECCC-CWS) and in consideration of guidelines for effective wildlife response plans, and will include protocols for scenarios, such as should frequent bird interactions occur at the site or a migratory bird be found stranded at site. The Project will have full-time On-Site Environmental Monitors (OSEMs) who will inspect worksites and activities for conformance with the EPP. The OSEMs will be notified if birds are found injured or dead at the site and will inform regulators (e.g., ECCC-CWS), if applicable.
Appendix:	None

Table ECCC-07.1 Summary of Project Alternatives Analysis – Project Lighting Considerations

Determining Factors	Options Considered				
	Flashing Lights	**Down Lighting / Shielded Lighting**	**Light Wavelength**	**Light Intensity**	**Motion Sensors & Programmable Lighting**
Technically Feasible (including regulatory factors)	Yes	Yes	Yes	Yes	Yes
Economically Feasible (including market factors)	Yes	Yes	Yes	Yes	Yes
Environmental Considerations	Flashing lights (e.g., strobe lights, incandescent flashing lights) attract fewer birds compared to steady-burning lights.	Targets light beams to point downward to avoid spill beyond where needed (e.g., full cut-off lights).	White and red-colored lights appear to have higher rates of attraction compared to blue or green (although there is conflicting evidence). Limit shorter wavelength blue-violet light.	Bird attraction is generally correlated with light intensity. Light intensity should be no brighter than necessary.	Can reduce or extinguish non-essential lighting. Ensures lights are available only when needed.
Socio-economic Considerations	-	-	-	-	-
Implications of Failure / Malfunctions of Option	-	-	-	-	-
Options for inclusion in the Project Site Lighting Plan	✓	✓	✓	✓	✓

"-" means not applicable.

Sources:

Gaston, K.J., T.W. Davies, J. Bennie and J. Hopkins. 2012. Reducing the ecological consequences of night-time light pollution: options and developments. British Ecological Society, 49(6): 1256-1266. Available online: https://www.jstor.org/stable/23353505 Last accessed 1 March 2021.

Gehrig, J., P. Kerlinger and A.M. Manville II. 2009. Communication Towers, Lights, and Birds: Successful Methods of Reducing the Frequency of Avian Collisions. Ecological Applications, 19(2): 505-514. Available online: https://www.jstor.org/stable/27645986 Last accessed 1 March 2021.

International Dark Sky Association. 2020. Light to Protect the Night. Available online: https://www.darksky.org/joining-forces-to-protect-the-night-from-light-pollution/ Last accessed 26 February 2021.

Jones, J. and C.M. Francis. 2003. The Effects of Light Characteristics on Avian Mortality at Lighthouses. Journal of Avian Biology, 34(4): 328-333. Available online: https://www.jstor.org/stable/3677735 Last accessed 1 March 2021.

Poot, H., B.J. Ens, H. de Vries, M.A.H. Donners, M.R. Wernand and J.M. Marquenie. 2008. Green Light for Nocturnally Migrating Birds. Ecology and Society, 13 (2): 47. Available online: http://www.ecologyandsociety.org/vol13/iss2/art47/ Last accessed 27 February 2021.

Rebkea, M., V. Dierschke, C. N.Weiner, R. Aumüllera, K. Hill, and R. Hill. 2019. Attraction of nocturnally migrating birds to artificial light: The influence of colour, intensity and blinking mode under different cloud cover conditions. Biological Conservation, 233: 220-227.

RESPONSE TO ECCC-08

ID:	**ECCC-08**
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	Section 7.1.7
EIS Reference:	Section 10.2
Context and Rationale:	The EIS does not show the distribution of most avifauna field survey locations in relation to current habitats in the project assessment area and proposed project infrastructure, nor are detailed results of bird surveys provided.It appears that no bird surveys have yet been conducted along the access road, and the proponent only proposes such surveys as part of the project follow-up program, despite the fact that access road upgrades are proposed for this project.
Information Request:	Provide a detailed description of all avifauna surveys that have been conducted for the Project to date, including maps showing each survey location (e.g., each point count location) in relation to proposed infrastructure and current habitat types.Provide tables presenting detailed survey results (i.e., data provided for each survey location (i.e., for each point count point) for each survey date). Data should include species, number of individuals, sex and age (adult, juvenile) if known. Conditions (e.g., wind) that may have influenced survey results should be identified.
Response:	The results and descriptions of all avifauna surveys are included in Baseline Study Appendix (BSA) 7: Avifauna, Other Wildlife and Their Habitats. A total of four field programs were conducted between 2014 and 2019. Forest songbird surveys were conducted in 2014 and 2019, and waterfowl surveys were conducted in 2014 and 2017. The objectives, study area, methods and results of these surveys are summarized in Tables ECCC-08.1 and ECCC-08.2 in Appendix I (which is adapted from Table 2.1 in BSA 7). Maps showing the survey locations in relation to Project infrastructure as shown in the EIS are attached in Appendix J. Tables ECCC-08.3 to ECCC-08.7 (Appendix I) indicate where the mapping and detailed survey results are located for each survey. Marathon has consulted with Environment and Climate Change Canada-Canadian Wildlife Services (ECCC-CWS) and has committed to conducting an environmental effects monitoring (EEM) program for avifauna, including species at risk (SAR). A proposed monitoring plan will be developed and submitted to ECCC-CWS for review and feedback prior to initiation of the program. The objective of the EEM program will be to gain a better

ID:	**ECCC-08**
	understanding of the effects of the Project on avifauna and on SAR (including olive-sided flycatcher) and their habitat, and identify opportunities to refine mitigation measures as appropriate. Components of the EEM will include the identification of habitat that supports SAR, the identification of SAR through targeted surveys in and around the Project Area, and monitoring of SAR occurrences in relation to Project disturbance. Monitoring for olive-sided flycatchers will consider the wetland associated with the proposed Marathon waste rock pile, where several olive-sided flycatchers were observed during baseline surveys. Point count surveys will be conducted in suitable wetland habitat at varying distances from Project activities, as well as at a control site, to assess effects of the Project on olive-sided flycatcher. Pre-construction surveys in support of the EEM program are being conducted in 2021.
Appendix:	See Appendix I: ECCC-08 Tables and Appendix J: Mapbook

RESPONSE TO ECCC-09

ID:	**ECCC-09**
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	Section 7.1.7, Section 7.1.8, Section 7.3.2, Section 7.3.3
EIS Reference:	Section 10.2, Section 10.3, Section 10.4, Section 10.5
Context and Rationale:	Under ss. 79(2) of the *Species at Risk Act* (SARA), the Canadian Environmental Assessment Agency (the Agency) must ensure that an assessment of environmental effects is conducted, must identify adverse effects on all listed species, which include species of Special Concern and the critical habitat of Extirpated, Endangered and Threatened species; and if the project is carried out, ensure that measures are taken to avoid or lessen those effects and to monitor them. These measures must • be consistent with best available information including any Recovery Strategy, Action Plan or Management Plan in a final or proposed version; and • respect the terms and conditions of the SARA regarding protection of individuals, residences, and critical habitat of Extirpated, Endangered, or Threatened species. For species which are not yet listed under SARA, but are listed under provincial legislation only or that have been assessed and designated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), it is best practice to consider these species in EA as though they were listed under SARA. Proponents are expected to provide adequate information in order for the Agency to fulfill their obligations under S.79 of SARA. For species-specific technical information for terrestrial SAR not protected under the *Migratory Birds Convention Act* (MBCA), ECCC recommends that the proponent consult the Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture (NLDFFA). (a) Wetland-associated migratory bird Species at Risk (SAR) Olive-sided Flycatchers were observed in the Project area during 2011 and 2019 breeding bird surveys. In 2019, 6 individuals were associated with the wetland complex in the area of the Northern Waste Rock Pile. For those wetlands that cannot be avoided and for those where direct and indirect effects cannot be entirely minimized, conservation allowances for affected wetland habitat for landbird SAR would be an important element to consider to satisfy the requirement to minimize effects to

ID:	ECCC-09
	wetland- associated landbird SAR in the project area as per S. 79 of SARA. (b) Migratory bird SAR potentially attracted to the project area by habitat alterations Habitat alterations related to mine construction and operation may result in the creation of habitat for migratory bird SAR. Landbird SAR may nest in the Project Area, including on project infrastructure. The proponent should implement a migratory bird monitoring program throughout the lifespan of the Project to observe migratory bird SAR use of the Project Area. The proponent should implement beneficial management practices and mitigation measures to reduce the potential for migratory birds and species at risk to nest in the Project Area. Additional information on these mitigation measures, including the process to be following in the event that a migratory bird or SAR is found to be nesting in the Project Area, is required. Common Nighthawk was observed incidentally during 2011 field surveys. Common Nighthawk potential breeding in central Newfoundland would be a significant discovery, as there are no known records for breeding for this species on the Island of Newfoundland. Common Nighthawk breed in open habitats, and have been known to use gravel surfaces for breeding. Bank Swallow was reported on the edge of the Local Assessment Area, near Buchans. Bank Swallows are known to be attracted to industrial sites such as pits and quarries, where they build nest burrows in stockpiled product or banks.
Information Request:	a. Wetland associated migratory bird SAR Clarify why avoidance is not possible in instances where habitat for landbird species at risk is not avoided. Confirm plans to implement conservation allowances in cases where loss of wetland habitat for landbird species at risk is unavoidable. b. Migratory bird SAR potentially attracted to the project area by habitat alterations Develop a migratory bird monitoring program throughout the lifespan of the Project to verify attraction and use of the project area by migratory bird SAR, including modified habitats and infrastructure. Provide detailed beneficial management practices and mitigation measures that will be implemented to reduce the potential for migratory birds and species at risk to nest in the Project Area. Provide additional information on the measures to be implemented in the event that a migratory bird or SAR is found nesting in modified habitats or on project infrastructure in the Project Area.

ID:	ECCC-09
Response:	a. Wetlands were avoided wherever possible, however, given the prevalence of wetlands in this region and engineering constraints, some wetland habitat loss is unavoidable. Olive-sided flycatcher (*Contopus cooperi*), a species at risk (SAR), occurs in forested wetlands, and several individuals were observed in the wetland complex within the proposed footprint of the Marathon waste rock pile (Figure 10-8 of the EIS). Although the wetland habitat within the footprint of the Marathon waste rock pile will be directly lost, similar habitat for olive-sided flycatchers exists within the larger wetland complex located north of the Marathon waste rock pile, most of which will not be directly affected by the Project. Some of the wetland outside of the waste rock pile footprint will be indirectly affected through sensory disturbance or though hydrological changes. However, because bogs typically have low water flow (receiving nearly all their water through precipitation), drawdown effects will be limited in bog portions of the wetland (National Wetlands Working Group 1997). Because of its large size and distance from Project activities, most of this larger wetland complex is not expected to be directly or indirectly affected by the Project. The Newfoundland and Labrador Policy for Development in Wetlands (NLDECCM 2001) recognizes the relatively widespread extent of wetlands within the province and focuses on maintaining hydrologic functions and minimizing environmental impacts. Therefore, wetland compensation and conservation allowances are not part of the response to potential wetland impacts in the Province. Wetland habitat suitable for olive-sided flycatchers is abundant throughout the Local Assessment Area and Ecological Land Classification Area. As discussed in Section 10.5.1, only 4.3% of moderate or high-quality habitat for olive-sided flycatchers in the Ecological Land Classification Area is anticipated to be lost. b. An avifauna monitoring program will be implemented and conducted throughout the lifespan of the Project. Monitoring components for the life of mine will be outlined in the Avifauna Management Plan and will be developed through liaison with regulators. These may include breeding bird surveys conducted at varying distances from the mine infrastructure to determine the accuracy of effects predictions on avifauna, follow-up surveys for SAR that were identified in the Project Area, and regular inspection of facilities,

ID:	ECCC-09
	infrastructure and equipment to determine if birds are nesting on or near anthropogenic structures. Marathon has consulted with Environment and Climate Change Canada-Canadian Wildlife Services (ECCC-CWS) with respect to the proposed environmental effects monitoring (EEM) program for avifauna, including SAR. An EEM plan will be developed and submitted to ECCC-CWS for review and feedback prior to initiation of the program. The objective of the EEM program will be to gain a better understanding of the effects of the Project on avifauna and on SAR (including olive-sided flycatcher) and their habitat, and identify opportunities to refine mitigation measures as appropriate. Components of the EEM will include the identification of habitat that supports SAR, the identification of SAR through targeted surveys in and around the Project Area, and monitoring of SAR occurrences in relation to Project disturbance. Monitoring for olive-sided flycatchers will consider the wetland associated with the proposed Marathon waste rock pile, where several olive-sided flycatchers were observed during baseline surveys. Point count surveys will be conducted in suitable wetland habitat at varying distances from Project activities, as well as at a control site, to assess the effects of the Project on olive-sided flycatcher. Pre-construction surveys in support of the proposed EEM program are being conducted in 2021. The mitigation measures for avifauna identified in Table 10.18 of the EIS will serve to reduce Project effects on both SAR and non-SAR species. With specific reference to reducing the potential for migratory birds (including SAR) to nest in Project infrastructure or areas with ongoing construction activities, during regular inspection of facilities, infrastructure and equipment, employees and contractors will be instructed to report avifauna use (and in particular, nesting activity) to the Environmental Technician. These inspections will inform the need for, and help support the development of, onsite bird control features to deter nesting on, in or near mine infrastructure. To reduce the likelihood of birds nesting in or on buildings and being adversely affected by mine site activities, design features will be used where practicable to make buildings less attractive or accessible to nesting birds (e.g., minimizing ledges and sheltered areas, avoiding or sealing potential entry points/openings, installing automatic hydraulic door closers). It is also anticipated that most birds will generally avoid active areas during construction and

ID:	ECCC-09
	operation, given the noise and activity levels generated by Project activities. Bank swallows are known to construct nesting burrows in soil stockpiles that have steep faces and light soils amenable to burrowing. Soil stockpiles will be constructed and maintained in lifts to achieve flatter slopes and to permit terracing, thereby reducing erosion and maintaining moisture within the topsoil. This structure and composition will make the stockpiles less attractive to these birds. Land clearing during the breeding bird season presents one of the largest threats for birds, as active nests (including eggs or young birds) could be destroyed. To mitigate this risk, clearing and grubbing during the breeding bird season will be avoided to the extent practicable. If avoidance of the breeding bird season is not possible, nest searches will be performed prior to any clearing or construction activities (Section 10.4 of the EIS). If active nests are found, appropriate buffers/setback distances from nests will be established and remain in place until fledging has occurred. Suggested setbacks are as follows: • 30 m for passerine nests • 100 m for waterfowl/waterbird nests • Restricted activities within 200 m of active raptor nests • Restricted clearing within 800 m of active raptor nest If problematic avifauna use of the tailings management facility (TMF) is observed, adaptative management measures will be implemented. These measures may include use of deterrents or exclusionary measures. Other mitigation includes maintaining TMF and sedimentation pond embankments free of vegetation, which will limit the attraction of waterfowl and/or wildlife to these ponds for foraging or breeding. Employees and contractors will be instructed to report any active nests discovered in the Project Area to the Environmental Technician, and appropriate action or follow-up will adhere to the Avifauna Management Plan. If active nests are found, appropriate buffers/setback distances from nests (please refer to part 2b) will be established and remain in place until fledging has occurred. If a nest is found during soil stockpile development, this area (plus buffer) of the stockpile will be avoided until fledging has occurred; drawing down of soil stockpiles for progressive and ultimate rehabilitation will occur outside of breeding bird season, to the extent practicable.

ID:	**ECCC-09**
	Other relevant mitigation measures are presented in Section 10.4 of the EIS, and adaptive management will be used to guide mitigation measures throughout the lifespan of the Project. References: National Wetland Working Group. 1997. The Canadian Wetland Classification System. Second Edition. Wetlands Research Centre, University of Waterloo. Waterloo, ON. NLECCM (Newfoundland and Labrador Department of Environment, Climate Change and Municipalities). 2001. Policy for Development in Wetlands. Issued June 2, 1997, re-issued January 17, 2001.
Appendix:	None

RESPONSE TO ECCC-10

ID:	**ECCC-10**
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	Section 7.1.7Section 7.3.2
EIS Reference:	Section 10.4Section 10.5
Context and Rationale:	Proponents must comply with the *Migratory Birds Convention Act* and associated regulations for all project-related activities and during all project phases, and are expected to take appropriate measures to ensure that they avoid the disturbance or harm of migratory birds. The potential risks to migratory birds using the tailings and/or polishing ponds are not clearly articulated. In Section 10.5.2.2, the Proponent states that “A change in mortality risk may result from possible ingestion and/or absorption of water in the tailings and/or polishing ponds, with potential exceedances in POPC as outlined under the *Metal and Diamond Mining Effluent Regulations*, specifically for total cyanide, unionized ammonia (product of cyanide decomposition) and Copper (added as catalysis during cyanide destruction or leached from the ore. Wildlife, including avifauna, have been reported drinking from ponds associated with tailings management facilities (Eisler and Wiemeyer 2004; Donato et al. 2007) and could also be exposed by ingesting aquatic flora and fauna within the TMF.” but rather than proactively deterring migratory birds from using these features, the proponent proposes to monitor avifauna use of these Project features implement adaptive management measures (e.g., deterrents and/or exclusionary measures) “as required”. Section 5.1 of the MBCA indicates that it is unlawful to deposit a substance that is harmful to migratory birds, or permit such a substance to be deposited, in waters or an area frequented by migratory birds or in a place from which the substance may enter such waters or such an area. ECCC recommends that the proponent: • Monitor the use of open ponds by migratory birds, as well as monitor the presence of substances in the open ponds or associated water bodies that area harmful to migratory birds; and • Implement measures to prevent contact of migratory birds with the harmful substances, to ensure compliance with the MBCA if birds are detected on ponds or other water bodies that contain substances harmful to migratory birds. The proponent should evaluate the available suites of deterrents and hazing tools that could be useful for their project. The proponent should be aware of what methods would require a permit before use.

ID:	ECCC-10
	Eisler, R., and Wiemeyer, S.N., 2004. Cyanide hazards to plants and animals from gold mining and related water issues. Reviews of environmental contamination and toxicology. 183: 21-54.Donato, D.B., Nichols, O., Possingham, H., Moore, M., Ricci, P.F., and Noller, B.N. 2007. A critical review of the effects of gold cyanide-bearing tailings solutions on wildlife. Environment International.33(7): 974-984.
Information Request:	Describe the potential effects to migratory birds and species at risk that could result from potential interactions with the tailings management facilities and settling ponds. Outline plans/measures to deter migratory birds and species at risk from tailings management facilities and settling ponds, including beneficial management practices and/or the development of an avifauna management and monitoring plan. This plan should be sent to ECCC-CWS for review prior to its implementation. Describe potential uncertainties related to the use of proposed mitigation measures, and discuss proposed adaptive management measures to be implemented in a timely manner in the event that adverse effects to migratory birds are expected.
Response:	The following response provides supplementary information on the potential effects on avifauna and wildlife, including species at risk, that may interact with the sedimentation ponds on site (referred to by Environment and Climate Change Canada as settling ponds) and with the tailings management facility (TMF), including the polishing pond. The information provided below does not change the assessment as presented in the EIS. <u>Potential Effects to Avifauna and Other Wildlife from Exposure to the TMF</u> Cyanide has been identified as the primary gold-mining-related contaminant responsible for wildlife mortality (Donato et al. 2007; Henny et al. 1994), with effective management of cyanide concentration in tailings being identified as the primary mechanism for protecting wildlife during operation of tailings facilities (Griffiths et al. 2009). While exposure to the Project's tailings pond could pose a threat to avifauna and wildlife, this risk will be reduced through the cyanide detoxification process within the mill. Using the sulphur dioxide / air oxidation process will result in the degradation of cyanide and precipitation of metals, prior to tailings being discharged into the TMF. The International Cyanide Code guideline for Weak Acid Dissociable (WAD) cyanide is 50 mg/L for protection of birds and wildlife. WAD cyanide remaining in the tailings following cyanide detoxification (prior to discharge into the TMF) will be below 1 mg/L (destruction target). Any excess water in the tailings pond that is not reclaimed to the process plant will be treated in the water treatment plant and polishing pond prior to being discharged to the environment, with maximum concentrations in compliance with the new authorized limits as per the *Metal and Diamond*

ID:	ECCC-10
	Mining Effluent Regulations (MDMER). As the polishing pond receives effluent post-treatment plant, the water within the polishing pond will not pose a threat to migratory birds. Marathon is committed to being a signatory to the International Cyanide Management Code and is designing the process facility and process water management system in this context. Henny et al. (1994) in studying the effects of cyanide on migratory birds in Nevada, USA, documented waterfowl, shorebirds, perching birds and gulls as potentially being at-risk to exposure to cyanide in tailings facilities. The identified species at risk in Australia include waders, waterbirds, ducks, pratincoles, terns and raptors (Donato et al. 2007). Other studies have shown that waders are most likely to come into contact with tailings facilities (Hudson and Bouwman 2008). Donato et al. 2007 reported no avifauna mortalities from two mining operations that consistently discharged below the International Cyanide Code guideline for WAD cyanide over a two-year period. Research from a gold mine in South Africa found no avifauna mortality following contact with the tailing storage facility (TSF), which had a WAD cyanide level of less than 50 mg/L (Hudson and Bouwman 2008). The only species observed contacting the TSF were wading birds, which may have been feeding on flying insects that landed on the water's surface (Hudson and Bouwman 2008). Several waterfowl species were observed using the return water dams (RWDs), which contained reed beds (Hudson and Bouwman 2008). No mortalities were observed following use of the RWDs (Hudson and Bouwman 2008), which had cleaner water than the TSF. From an exposure perspective, ingestion of food items, such as invertebrates, fish and plants, provide higher exposure risk to contaminants in sediment and surface water than does ingestion of water. The tailings and polishing ponds will not contain fish, and the continuous deposition of tailings (in the tailings pond) will limit the likelihood that invertebrates will be present within the tailings impoundment. There could be some use of the TMF for resting or foraging of flying insects on the water surface (Hudson and Bouwman 2008). However, the water ingestion rate for avifauna and other wildlife is relatively low and risk from this exposure pathway is considered low compared to risk from other pathways. Hudson and Bouwman (2008) observed only a few occasions of birds drinking from the TMF. Additionally, considering the high level of human activity and sensory disturbance at the mine site, avifauna and other wildlife would be expected to spend limited time in the area.

ID:	ECCC-10
	<u>Potential Effects to Avifauna and Other Wildlife from Exposure to Sedimentation Ponds</u> As described in Chapter 7 (Surface Water) and the Water Management Plan (Appendix 2A) of the EIS, sedimentation ponds within the Project Area are required to manage surface runoff and seepage collection at the Leprechaun and Marathon Complexes and the Process Plant site. The ponds provide controlled release of contact water and are designed to provide adequate residence time for settling of suspended solids. The sedimentation ponds provide flood and erosion control, as well as water quality management functions. As summarized in Section 7.5.2.1 of the EIS and detailed in Section 6 of Appendix 7A of the EIS (Water Quantity and Water Quality Modelling Report: Leprechaun Complex and Processing Plant & TMF Complex) and Section 6 of EIS Appendix 7B (Water Quantity and Water Quality Modelling Report: Marathon Complex), the water quality model shows that no exceedance of MDMER are predicted at facilities and discharges in the Leprechaun and Marathon Complexes (waste rock pile, topsoil and overburden stockpiles, open pit, ponds) during all mine phases, at a 95th percentile confidence level. This means that all **influent** water runoff and seepage to the sedimentation ponds is predicted to meet MDMER limits (i.e., water meets the limits for discharge before entering the sedimentation ponds). As the influent or inflow to the sedimentation ponds is predicted to meet MDMER through all mine life phases, water retained in the ponds will meet effluent discharge criteria. As per *Regulations Amending the Metal Mining Effluent Regulations*: SOR/2018-99 (Canada Gazette, Part II, Volume 152, Number 11) Section 4(1) (c): *(c) the effluent is not acutely lethal.* MDMER limits are defined as being not acutely lethal. Water quality monitoring and reporting for MDMER includes acute lethality testing on rainbow trout, threespine stickleback and *Daphnia magna,* aquatic organisms, whereby these specimens reside in the sample mine effluent and are exposed to this water for 100% of the test duration. There are no Canadian MDMER effluent criteria for the protection of non-aquatic wildlife that use water. However, it is reasonable to conclude that effluent that meets MDMER criteria (and is therefore not acutely toxic to aquatic life at 100% exposure) would not pose a toxicity risk to avifauna or other wildlife that ingest or are exposed to the effluent less than 100% of the time. Similar to the discussion above for the TMF, from an exposure perspective, ingestion of food items, such as invertebrates, fish and plants, provide

ID:	ECCC-10
	higher exposure risk to contaminants in sediment and surface water than does ingestion of water. While there could be some use of the sedimentation ponds for resting or foraging of flying insects on the water surface (Hudson and Bouwman 2008), the sedimentation ponds will not contain fish, and routine maintenance (clearing out sediment build-up) in the sedimentation ponds will likely reduce the potential presence of invertebrates. Additionally, design criteria were developed to mitigate possible effects of the Project on surface water resources and are based on Project-specific guidance and industry best practices. Sedimentation pond design (summarized in Section 7.4.1.1 and the Water Management Plan [Appendix 2A] of the EIS) incorporates a permanent pool, drawdown and sedimentation residence time to remove a target of 80% of suspended solids. A submerged, reversed slope, low flow outlet pipe is proposed to discharge water from below the water surface reducing potential effects of discharging thermally charged surface water. Mitigation and Management Measures to Reduce Adverse Effects to Avifauna and Other Wildlife from the TMF and Sedimentation Ponds The tailings and sedimentation ponds for the Project will be designed and maintained in a manner that will deter use by avifauna and other wildlife. As vegetation that naturally regenerates around sedimentation ponds could potentially attract wildlife, vegetation will be removed from the embankments of the sedimentation ponds through a vegetation control program. Mitigation measures to deter birds from entering the tailings and polishing ponds are included in Section 10.4 of the EIS. Embankments of the TMF and polishing ponds will be maintained free of vegetation. This will limit the attraction of waterfowl and/or wildlife to these ponds for foraging or breeding. This is anticipated to reduce the attraction of wildlife, and avifauna in particular, to these areas for foraging or breeding and is consistent with recommendations provided by Donato et al. (2007). Removal of vegetation is also a requirement for proper maintenance and inspection of embankments and dams in accordance with the Canadian Dam Association Guidelines. Further, dams impounding the sedimentation ponds will be of rockfill construction and lined on their upstream slope with impermeable membrane liners, which will limit vegetation colonization and deter use by avifauna. Avifauna use of the TMF will be monitored (primarily targeting waterfowl but also other wildlife species). If problematic avifauna use occurs, additional mitigation measures will be implemented and adapted if required. The Avifauna Management Plan to be developed and implemented for this

ID:	ECCC-10
	Project will outline the adaptative management strategies to be employed and thresholds for triggering adaptive measures, which may include deterrents and exclusionary measures. Bird deterrents may include visual deterrents such as scarecrows, falcon effigies, kites or eye-safe lasers, and auditory deterrents such as noise cannons, wailers or other noise makers. Since birds become habituated to deterrents (e.g., Andelt et al 1997; Whisson and Takekawa 2000; Ronconi and Cassady St. Clair 2006), these must be regularly relocated and switched out. If bird use of the tailings pond or polishing pond continues after the implementation of these deterrent measures, additional mitigation measures may be required. These may include exclusionary measures, which could include the use of bird deterrent floating balls, which cover the water's surface, thus preventing birds from landing and interacting with the effluent. Another option could involve the installation of bird netting over ponds, which also prevents waterfowl from landing on these (Martin and Hager 1990). <u>Summary</u> The worst-case exposure scenario is associated with the TMF pond, where exceedances of select MDMER parameter limits are predicted and where excess water treatment through a water treatment plant and polishing pond are planned. As the predicted WAD cyanide concentration within the tailings will be below 1 mg/L and given the measures described above to monitor for and deter problematic avifauna use of the TMF, the TMF is not anticipated to represent a source of increased mortality for avifauna or other wildlife. The sedimentation ponds are expected to receive influent water that meets MDMER limits, and thus the standing water in the sedimentation ponds meets MDMER; therefore, exposure to this water should not pose an increased mortality risk to avifauna or other wildlife that may frequent the ponds. Given the above, the EIS determination of a low magnitude residual adverse effect on increased mortality risk for avifauna or other wildlife during all Project phases is considered valid. References: Andelt, W.F., T.P. Woolley and S.N. Hopper. 1997. Effectiveness of barriers, pyrotechnics, flashing lights, and Scarey Man for deterring heron predation on fish. Wildlife Society Bulletin, 25, 686–694 Donato, D.B., O. Nichols, H. Possingham, M. Moore, P.F. Ricci, and B.N. Noller. 2007. A critical review of the effects of gold cyanide-bearing tailings solutions on wildlife. Environment International 33 (2007) 974–984.

ID:	**ECCC-10**
	Griffiths, S.R., G.B. Smith, D.B. Donato, and C.G. Gillespie. 2009. Factors influencing the risk of wildlife cyanide poisoning on a tailings storage facility in the Eastern Goldfields of Western Australia. Ecotoxicol Environ Saf. 72(5):1579-86. Henny C.J., R. J. Hallock, and E.F. 1994. Hill EF. Cyanide and migratory birds at gold-mines in Nevada, USA. Ecotoxicology 3: 45–58. Hudson, A., and H. Bouwman. 2008. Birds associated with a tailings storage facility and surrounding areas from a South African gold mine. African Journal of Ecology 46: 276-281. Martin, L.R. and Hagar, S. 1990. Bird control on containment pond sites. Proceedings of the Fourteenth Vertebrate Pest Conference. 60. Available online at: https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1059&context=vpc14 Ronconi, R.A. and C. Cassady St. Clair. 2006. Efficacy of a radar-activated on-demand system for deterring waterfowl from oil sands tailings ponds. Journal of Applied Ecology, 43: 111-119. Whisson, D.A. and J.Y. Takekawa. 2000. Testing the effectiveness of an aquatic hazing device on waterbirds in the San Francisco Bay estuary of California. Waterbirds, 23, 56–63.
Appendix:	None

RESPONSE TO ECCC-11

ID:	**ECCC-11**
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	Section 7.1.7Section 7.3.2
EIS Reference:	Section 10.4Section 10.5Section 10.9
Context and Rationale:	Bird collisions at lit and floodlit structures are a potential issue for migratory birds. In Atlantic Canada, nocturnal migrants and night-flying birds are the birds most at risk of attraction to lights and lit structures. Attraction to lights may result in disorientation or collision with lit structures or their support structures, or with other birds. Disoriented birds are prone to circling a light source and may deplete their energy reserves and either die of exhaustion or drop to the ground (or a hard surface) where they are at risk of depredation. Given that the project has a large artificial light footprint that is much higher than the baseline ambient conditions, ECCC recommends that the proponent be aware that birds may be attracted to the site and may be found injured or dead on site. Additionally, ECCC notes that the proponent should be cognizant of whether frequent bird interactions are occurring at the project site. If the proponent notices that birds are frequently found injured or dead at the site, ECCC-CWS recommends that the proponent contact ECCC-CWS to develop a site monitoring plan in an effort to address the issue.
Information Request:	Describe the beneficial management practices that will be implemented to avoid potential attraction of migratory birds to project lighting. Follow-up monitoring to verify that efficacy of mitigation measures should be undertaken, and adaptive management measures implemented if needed. Contact ECCC-CWS when birds are found injured or dead at the site. If frequent bird interactions are observed, ECCC requests that the proponent consult with ECCC-CWS to develop a Project- specific site monitoring plan in an effort to address the issue.
Response:	Mitigation specific to reducing Project light emissions is presented in Chapter 5 (Atmospheric Environment) and Chapter 10 (Avifauna) of the EIS. These are presented below. • The amount of on-site lighting will be reduced. Only the amount of lighting required for safe conduct of construction and operation activities will be installed, and exterior lights will be shielded from above (where the need is identified). There will be no exterior decorative lights (such as spotlights and floodlights whose function is to highlight features of buildings or to illuminate an entire building).

ID:	**ECCC-11**
	• 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. • Lights will be designed to avoid use of mobile flood lighting units to the extent practicable and, where their use cannot be avoided, they will be turned off when not needed. • Full cut-off luminaires will be used wherever practicable to reduce glare, light trespass and sky glow from Project lighting. An adaptive management approach to be used for the duration of the Project will be specified in the Avifauna Management Plan. Environment and Climate Change Canada – Canadian Wildlife Service (ECCC-CWS) will be contacted every time an injured or dead bird is found at site, and should frequent avifauna interactions be observed, Marathon will develop a site-specific monitoring plan in consultation with ECCC-CWS. A Wildlife Response Plan (WRP) will also be developed and implemented as part of the Project's Environmental Protection Plan (EPP). The WRP will be developed through liaison with ECCC-CWS and in consideration of guidelines for effective wildlife response plans, and will include protocols for scenarios, such as should frequent bird interactions occur at the site or a migratory bird be found stranded at site. The Project will have full-time Environmental Technicians who will inspect worksites and activities for conformance with the EPP. Workers will be required to notify the Environmental Technicians if/when a bird is found injured or dead at the site and Marathon will inform ECCC-CWS. If frequent bird interactions with Project lighting are observed (which may include the discovery of dead or injured birds), further mitigation will be implemented.
Appendix:	None

RESPONSE TO ECCC-12

ID:	**ECCC-12**
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	Section 7.3.1 Fish and Fish Habitat
EIS Reference:	Chapter 4: Assessment of Effects to Surface WaterAppendix 7C – Assimilative Capacity Assessment Report
Context and Rationale:	Although not a separate VC, sediment quality is an important aspect of a healthy ecosystem especially in supporting fish health in the receiving environment. The proponent has conducted baseline sediment studies but has not modelled or predicted impacts to sediments nor is any monitoring program planned to evaluate sediment quality. While water quality modelling and monitoring programs give good information related to the health of the aquatic environment, continuous loadings of elevated COPCs may be deposited to sediments over time which may then act as an ongoing source of contamination in the benthic environment which can affect fish health. COPCs in sediments in streams and rivers can be remobilized over time or during high flow events to create risks to downstream aquatic receptors.
Information Request:	Evaluate sediment quality and potential risks to aquatic receptors as a result of sediment contamination and develop a monitoring program to evaluate changes in sediment quality.
Response:	In response to this information request, the following presents further information regarding sediment loading, quality and deposition in effluent receiving environments. A design objective for the water management infrastructure is to keep contact water (any runoff, groundwater or process water that has come into direct contact with mine rock, tailings, or terrain where mine workings and infrastructure occur) and non-contact water separate. Contact water is directed to water management ponds to allow for flow attenuation and water quality treatment prior to discharge to the environment at the final discharge points (FDPs). Non-contact water has been assumed to be represented by baseline water quality. Contact water quality, which includes surface water contacting any mine component, process water, and seepage flow out of stockpiles (ore, overburden and topsoil) and waste rock piles to and from the water management ponds, was modelled using GoldSim. As described in the EIS, the Project has a planned total of 11 FDPs. There are four FDPs at the Marathon Complex that drain to Valentine Lake and the Victoria River either directly or through tributaries. There are five FDPs at the Leprechaun Complex that drain to Victoria Lake Reservoir, either

ID:	ECCC-12
	directly to the lake or through tributaries. The processing plant and tailings management facility complex has two FDPs that flow to Victoria Lake Reservoir. Sedimentation ponds provide removal of total suspended solids (TSS); however, sedimentation effects were not incorporated into geochemical or Assimilative Capacity modeling. The following response provides additional information with respect to sediment load and sediment water quality related to contact water. **Sediment Load** Sedimentation ponds are designed to: • Provide safe and efficient runoff and seepage collection to reduce disruptions to the mine operation during wet weather events/periods • Collect and treat contact water from waste rock piles, stockpiles and open pits • Provide peak flow reduction to mitigate potential flooding issues • Provide sediment removal to meet the *Metal and Diamond Mining Effluent Regulations* (MDMER) effluent TSS concentrations of 15 mg/L The results of sediment load on the ponds are presented in Table ECCC-12.1. Long term average annual erosion rates from the Project Area were predicted using the Revised Universal Soil Loss Equation for Application in Canada (RUSLEFAC; Wall et al. 2002). The sedimentation pond design for sediment trapping efficiency was 80%. Particle size distribution was taken into account when deriving the erodibility factor in the Revised Universal Soil Loss Equation (RUSLE). It was assumed that 10% of mobile particles are sand and silt (size < 2 mm). The soil structure was assumed to be medium or coarse granular size with slow to moderate permeability. The ponds were assumed to settle out sediment particle sizes ≥ 0.005 mm. Background TSS water quality concentrations in small tributaries in the Project Area are presented in Table ECCC-12.2. Table ECCC-12.3 presents sediment load at the ultimate receivers from the contact and non-contact areas of the mine. The distance from each FDP to the ultimate receiver is different in each case; however, for the purposes of this assessment, a worst-case scenario was assumed in which 100% of the sediment load at the FDP is transported to and settles out in the ultimate receiving water mixing zone. Thus, for MA-FDP-02 discharging to Valentine Lake, it was assumed that 1,253 kg/year will be deposited in the Valentine Lake mixing zone at an approximate material density of 2.0 tonne/m³, equating to 0.616 m³ of sediment deposition. Using a mixing zone of 100 m as determined in the Assimilative

ID:	ECCC-12
	Capacity Report and calculating 100 m as the radius of a semicircle, the mixing zone area is 1.57 ha and the average sediment deposition depth is < 0.1 mm/year. Alternatively, for LP-FDP-03 (including 03A&B) and LP-FDP-05 with 16,487 kg/year sediment and an ultimate mixing zone of up to 300 m, the sediment deposition in Victoria Lake Reservoir would be approximately 8.2 m^3/year at an annual sediment depth of < 0.1 mm/year. In both cases, and covering the wide range of conservative sediment deposition, the accumulation of sediment in the ultimate receivers is comparable to natural (background) deposition rates. It is therefore not expected to result in adverse effects with respect to redd disturbance, egg smothering, groundwater discharge or sediment-water column oxygen exchange. With respect to the potential for Project discharges to adversely affect sediment chemistry, Table ECCC-12.4 presents sediment baseline chemistry as well as Canadian Environmental Quality Guidelines (CEQG) for sediment, including the Interim Sediment Quality Guidelines (ISQG) and probable effects levels (PELs). Sediment sampling was conducted in September of 2019 on small creeks and lakes representing catchment areas of the Victoria River, Valentine Lake, and Victoria Lake Reservoir. Baseline sediments exceed the CEQG ISQG for arsenic, cadmium and zinc and the CEQG PEL for arsenic. Table ECCC-12.5 presents modelling results of sediment chemistry from contact water using the geochemical model. No exceedances of CEQG ISQG and CEQG PEL are predicted for sediment in contact water leaving the sedimentation ponds. Sediment chemistry load predictions for contact areas are presented in Table ECCC-12.6 and predictions for non-contact areas are shown in Table ECCC-12.7. Sediment quality for sedimentation pond discharges was estimated based on the proportional distribution of parameters of potential concern observed in geochemical testing and modelling. Table ECCC-12.8 presents estimates of sediment quality at each FDP based on proportioning sediment load contributions from undisturbed catchment areas at baseline quality and from the sedimentation ponds at the predicted geochemical quality. Based on these predictions of ultimate combined sediment quality, the following observations are made: • Baseline sediment chemistry exceeds CSQG ISQG for arsenic, cadmium and zinc and exceeds CEQG PEL for arsenic. • No CEQG ISQG and CEQG PEL exceedances are predicted in sediments from contact areas discharging from Project sedimentation ponds

ID:	ECCC-12
	• Average sediment deposition depth in the mixing zone of ultimate receivers for all FDPs is less than 0.1 mm /year which is comparable to natural (background) deposition rates for receivers with similar hydraulics (Chien and Wan 1999) • It is anticipated that sediment quality may change due to Project discharges, however, sediment quality in these discharges will not increase above ISQG or PEL and will not diminish baseline sediment quality. Consequently, no adverse effects to fish, fish habitat or benthos are anticipated. The above assessment of sediment deposition and quality is representative of the period in operation when each pond source to each FDP is fully built-out and functional. During construction, approximately half of the proposed sedimentation ponds will be constructed to support construction phase topsoil and overburden stripping and mine facility excavation and dewatering. Except where required early to support construction, sedimentation ponds associated with the waste rock piles are planned for full commissioning in early operations when the Project begins to stockpile waste rock. Therefore, the construction phase sedimentation ponds will primarily be addressing topsoil and overburden sedimentation and dewatering activities at a portion of the site. As a result, the amount of sediment produced during this period will be less, and of better quality than the detailed assessment presented above for the operations phase. Similarly, as per the response to ECCC-15, ECCC-18 and ECC-58, the closure concept is to convert the proposed perimeter ditches to passive permeable reactive barriers and, where required, sedimentation ponds to engineered wetland features. The vegetated soil cover proposed for residual mine waste stockpiles will produce non-contact overland runoff which will be routed to natural ground. Only infiltration-based seepage will remain as contact water requiring further treatment in closure. Groundwater is naturally low in “sediment” or particulate form and metals in groundwater are typically considered in the dissolved format, thus not producing significant sediment load. Further, the passive seepage approach uses sulphate reducing bacteria and the carbon-rich material to sequester metals in the subsurface reactive barrier zone thus “discharging” to the receiving groundwater environment treated seepage in dissolved metal format. For these reasons during closure and post-closure, sediment production will be less, and its quality better, than that predicted in the detailed operations phase assessment.

ID:	**ECCC-12**
	Marathon will undertake baseline environmental effects monitoring (EEM) sediment monitoring in 2021 and will continue sediment monitoring in keeping with EEM requirements under MDMER throughout mine life. <u>Summary</u> The above assessment demonstrates that sediment deposition, even when estimated for the worst-case (operation) scenario, would not adversely affect sediment accretion depth in the ultimate receiver mixing zones. No adverse sediment deposition effects are therefore predicted for benthos, fish or fish habitat. Sediment quality will remain the same or potentially improve from baseline conditions for all parameters. The results of this sediment prediction assessment indicate that the Project will not have adverse effects on fish, fish habitat or benthos. References: Chien, N. and Z. Wan. 1999. Mechanics of Sediment Transport. ASCE Press. Wall G.J., D.R. Coote, E.A. Pringle and I.J. Shelton. 2002. RUSLEFAC – Revised Universal Soil Loss Equation for Application in Canada: A Handbook for estimating Soil Loss from Water Erosion in Canada. Research Branch, Agriculture and Agri-Food Canada, Ottawa, ON.
Appendix:	None

Table ECCC-12.1 Long Term Sediment Load Predictions from Contact Areas

Sedimentation Pond	Facility	Final Discharge Point	Discharge Location	Pond Catchment Area, ha	Long-term Average Soil Loss, kg/yr	Mean Annual Flow at Pond, m^3/day	TSS in Pond, mg/L	TSS at Pond outflow, mg/L
MA-SP-01A/B	Topsoil/Low Grade	MA-FDP-01A/B	Valentine Lake	69.1	8,524	1,492	15.6	3.1
MA-SP-01C	Waste Rock	MA-FDP-01C		18.5	2,978	389	20.9	4.2
MA-SP-02	Waste Rock	MA-FDP-02		55.6	2,931	1,196	6.7	1.3
MA-SP-03	Waste Rock	MA-FDP-03	Victoria River	34.2	2,785	728	10.5	2.1
MA-SP-04	Waste Rock	MA-FDP-04		71.9	7,464	1,556	13.1	2.6
MA-SP-05	Pit			70.4	4,837	1,522	8.7	1.7
LP-SP-01A	Low Grade	LP-FDP-01	Victoria Lake Reservoir	16.0	676	335	5.5	1.1
LP-SP-01B	Topsoil/W Rock			38.8	1,607	828	5.3	1.1
LP-SP-02A	Waste Rock	LP-FDP-02		75.0	9,004	1,623	15.2	3.0
LP-SP-03A	Waste Rock	LP-FDP-03C		52.0	30,464	1,118	74.6	14.9
LP-SP-03C	Overburden/W Rock			39.1	18,041	836	59.1	11.8
LP-SP-05	Pit	LP-FDP-05		57.8	27,622	1,244	60.8	12.2

Table ECCC-12.2 Background TSS Concentration from Non-Contact Areas

	Average TSS, mg/L	75^{th}% TSS, mg/L
LP02, LP04 (Tribs to Victoria Lake Reservoir, LP-FDP-01 to LP-FDP-05)	0.79	1.1
VL01 (Tribs of Valentine Lake, MA-FDP 01, 02)	2.1	2.7
R02 (Tribs to Victoria River, MA-FDP-03,04)	3.6	4.4

Table ECCC-12.3 Sediment Load at Final Discharge Points (FDPs)

Sedimentation Pond	Final Discharge Point	Discharge Location	Sediment Load from Contact Areas, kg/year	Sediment Load from Non-Contact Areas, kg/year	Total Load at FDP, kg/year
MA-SP-01A/B	MA-FDP-01A/B	Valentine Lake	1,705	5,790	8,090
MA-SP-01C	MA-FDP-01C		596		
MA-SP-02	MA-FDP-02		586	667	1,253
MA-SP-03	MA-FDP-03	Victoria River	557	20,205	23,222
MA-SP-04	MA-FDP-04		1,493		
MA-SP-05			967		
LP-SP-01A	LP-FDP-01	Victoria Lake Reservoir	135	557	1,014
LP-SP-01B			321		
LP-SP-02A	LP-FDP-02		1,801	85	1,885
LP-SP-03A	LP-FDP-03C		6,093	1,261	16,487
LP-SP-03C			3,608		
LP-SP-05	LP-FDP-05		5,524		

Table ECCC-12.4 Baseline Sediment Chemistry

Parameter	UNITS	CEQG ISQG	CEQG PEL	Valentine Lake Tributaries	Victoria River Tributaries	Victoria Lake Tributaries
Aluminum (Al)	mg/kg	-	-	16,500	18,000	22,000
Arsenic (As)	mg/kg	5.9	17	**125**	**120**	**114**
Cadmium (Cd)	mg/kg	0.6	3.5	**0.86**	**1.50**	**0.73**
Copper (Cu)	mg/kg	35.7	197	23.5	23.0	31.0
Iron (Fe)	mg/kg	-	-	27,500	25,000	36,500
Lead (Pb)	mg/kg	35	91.3	6.8	7.1	15.3
Manganese (Mn)	mg/kg	-	-	3,050	3,700	6,308
Zinc (Zn)	mg/kg	123	315	**144.0**	**170**	**143.8**

Notes:
CEQG - Canadian Environmental Quality Guideline
ISQG - Interim Sediment Quality Guideline
PEL – Probable Effect Level
Bold font denotes concentrations that exceed an applicable guideline (either/or ISQG, PEL)

Table ECCC-12.5 Sediment Chemistry Predictions for Sedimentation Pond Discharges (mg/kg)

Final Discharge Point	Discharge Location	Al	As	Cd	Cu	Fe	Mn	Pb	Zn
MA-FDP-01	Valentine Lake	6,533	1.10	0.150	26.6	11,976	401	2.6	12.0
MA-FDP-02/03		6,892	0.82	0.024	13.8	17,350	528	1.6	20.2
MA-FDP-04	Victoria River	9,454	1.22	0.045	23.8	19,369	736	2.7	32.2
LP-FDP-01/02	Victoria Lake Reservoir	7,030	2.19	0.046	9.7	4,716	594	11.2	41.8
LP-FDP-03/05		7,559	2.69	0.064	12.2	6,430	651	11.0	49.8

Table ECCC-12.6 Sediment Chemistry Load Predictions for Contact Areas Discharging from Sedimentation Ponds (kg/year)

Sedimentation Pond	Al	As	Cd	Cu	Fe	Mn	Pb	Zn
MA-SP-01A/B	55.7	0.009	0.0013	0.227	102.1	3.42	0.022	0.102
MA-SP-01C	20.5	0.002	0.0001	0.041	51.7	1.57	0.005	0.060
MA-SP-02	20.2	0.002	0.0001	0.041	50.8	1.55	0.005	0.059
MA-SP-03	19.2	0.002	0.0001	0.038	48.3	1.47	0.004	0.056
MA-SP-04	51.4	0.006	0.0002	0.103	129.5	3.94	0.012	0.150
MA-SP-05	45.7	0.006	0.0002	0.115	93.7	3.56	0.013	0.156
LP-SP-01A	4.8	0.001	0.0000	0.007	3.2	0.40	0.008	0.028
LP-SP-01B	11.3	0.004	0.0001	0.016	7.6	0.96	0.018	0.067
LP-SP-02A	63.3	0.020	0.0004	0.087	42.5	5.35	0.101	0.377
LP-SP-03A	214.2	0.067	0.0014	0.295	143.7	18.11	0.343	1.275
LP-SP-03C	126.8	0.040	0.0008	0.174	85.1	10.73	0.203	0.755
LP-SP-05	208.8	0.074	0.0018	0.338	177.6	17.98	0.304	1.375

Table ECCC-12.7 Sediment Chemistry Load Predictions for Non-Contact Areas (kg/year)

Final Discharge Point	Discharge Location	Al	As	Cd	Cu	Fe	Mn	Pb	Zn
MA-FDP-01	Valentine Lake	95.5	0.724	0.005	0.136	159.2	17.66	0.039	0.834
MA-FDP-02		11.0	0.083	0.0006	0.016	18.3	2.03	0.005	0.096
MA-FDP-03/04	Victoria River	363.7	2.425	0.0303	0.465	505.1	74.76	0.143	3.435
LP-FDP-01	Victoria Lake Reservoir	12.3	0.064	0.0004	0.017	20.3	3.51	0.009	0.080
LP-FDP-02		1.9	0.010	0.0001	0.003	3.1	0.53	0.001	0.012
LP-FDP-03/05		27.7	0.144	0.0009	0.039	46.0	7.96	0.019	0.181

Table ECCC-12.8 Sediment Chemistry Load Predictions at FDP (kg/year)

Final Discharge Point	Discharge Location	Al	As	Cd	Cu	Fe	Mn	Pb	Zn
MA-FDP-01	Valentine Lake	171.7	0.736	0.0063	0.404	313.0	22.65	0.066	0.996
MA-FDP-02		31.2	0.086	0.0006	0.056	69.2	3.58	0.009	0.155
MA-FDP-03/04	Victoria River	480.1	2.439	0.0308	0.722	776.6	83.73	0.173	3.797
LP-FDP-01	Victoria Lake Reservoir	28.3	0.069	0.0005	0.039	31.1	4.87	0.034	0.176
LP-FDP-02		65.2	0.029	0.0005	0.090	45.5	5.89	0.103	0.389
LP-FDP-03/05		577.5	0.325	0.0049	0.846	452.4	54.77	0.869	3.587

RESPONSE TO ECCC-13

ID:	**ECCC-13**
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	Section 7.3.1 Fish and Fish Habitat
EIS Reference:	Appendix 7C – Assimilative Capacity AssessmentReport (page 1.2)
Context and Rationale:	The study quotes CCME (2003) which defines the mixing zone as, “an area contiguous with a point source (effluent) where the effluent mixes with ambient water and where concentrations of some substances may not comply with water quality guidelines or objectives”.The study concludes that in almost all cases where Final Discharge Points (FDPs) are located on small tributaries, the effluent mixing zone extends the length of the tributary and into the ultimate downstream lake / river receivers.The study continues to quote CCME (2003) by stating that “Conditions within the mixing zone should not result in bioconcentration of POPC to levels that are harmful to organisms, aquatic-dependent wildlife, or humanhealth. Also, accumulation of toxic substances in water or sediment to toxic levels should not occur in themixing zone.”Canadian Council of Ministers of the Environment (CCME). 2003. Canadian Water Quality Guidelines for the Protection of Aquatic Life: Guidance on the Site-Specific Application of water quality guidelines in Canada: Procedures for deriving numerical water quality objectives. In: Canadian Environmental Quality Guidelines. Winnipeg
Information Request:	Confirm that these 2 conditions cited in CCME (2003) have been/will be met in the mixing zones that have been defined. Provide supporting data/information that bioconcentration or accumulation of toxic substances are not expected to reach toxic or harmful levels in water or sediments within the mixing zones.
Response:	The mixing zones in the EIS were defined as per Canadian Council of Ministers of the Environment (CCME 2003). The mixing zones represent an area where the effluent mixes with ambient water and where concentrations of some substances may not comply with water quality guidelines or objectives. Water quality in the mixing zone was assessed and modelled under conservative assumptions in terms of receiver flow (7Q20 flow), receiver water quality (75th percentile), effluent flow (maximum rates), and effluent water quality (assumed at the *Metal and Diamond Mining Effluent Regulations* [MDMER] levels). It is expected that during normal operating conditions these worst-case conditions are unlikely to happen simultaneously. As noted, the mixing zone was assessed in the tributaries and within the ultimate receivers (i.e., Victoria River, Victoria Lake Reservoir, and

ID:	ECCC-13
	Valentine Lake). These tributaries, due to their small catchment area, have little assimilative capacity. Moreover, their background concentrations for some parameters (e.g., aluminum, arsenic, manganese, phosphorus and zinc) exceed the Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life (CWQG-FAL). These parameters are not considered bioaccumulative, with the exception of arsenic which may have the potential to be bioaccumulative (EC 2012). Water quality substantially improves within the mixing zone in the ultimate receiver. Modeling of the most conservative regulatory scenario for the Marathon Complex, Leprechaun Complex, process plant and tailings management facility complex showed that the ultimate mixing zone extends approximately 300 m from the tributary mouth, at which point all parameters meet the CWQG-FAL. Water quality for the regulatory scenario meets the CWQG-FAL within 100 m of the ultimate mixing zone for most parameters of potential concern, except for the combined effluent from LP-FDP-03 and LP-FDP-05, which has potential exceedances for arsenic, copper, lead, zinc and fluoride. Additionally, some exceedances are predicted within 100 m in the combined effluent from MA-FDP-03 and MA-FDP-04 for aluminum, iron, and manganese. Unlike mercury, selenium and cadmium, the parameters that exceed their corresponding CWQG-FAL values are not bioaccumulative (EC 2012). Therefore, they would not be expected to bioconcentrate or bioaccumulate in fish or other aquatic organisms. Bioaccumulative or bioconcentrating parameters, such as cadmium, selenium, and mercury, were not detected in the geochemical testing of the ore samples. The mining processes planned for the Project do not require the use of bioaccumulative or bioconcentrating compounds. In addition, based on the results of the geochemical water quality modelling, the concentrations of these compounds are not expected to exceed CWQG-FAL or MDMER values. Effluent water will meet the MDMER limits for parameters of potential concern and as well for acute toxicity. Marathon will monitor effluent water quality and toxicity as per MDMER requirements. Sediment water quality is discussed in the response to ECCC-12. Reference: Canadian Council of Ministers of the Environment (CCME). 2003. Canadian Water Quality Guidelines for the Protection of Aquatic Life: Guidance on the Site-Specific Application of water quality guidelines in Canada: Procedures for deriving numerical water quality objectives. In: Canadian Environmental Quality Guidelines.

ID:	**ECCC-13**
	Environment Canada (EC). 2012. Metal Mining Technical Guidance for Environmental Effects Monitoring. Environment Canada.
Appendix:	None

RESPONSE TO ECCC-14

ID:	**ECCC-14**
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	-
EIS Reference:	Chapter 8, Fish and Fish Habitat, page 8.36
Context and Rationale:	Probable Effect Levels (PELs) represents the lower limit of the range of chemical concentrations that is usually or always associated with adverse biological effects and are less conservative than Interim Sediment Quality Guidelines (ISQGs). The report compares sediment concentrations to PELs and not ISQGs, which would give a better sense of the existing conditions.
Information Request:	Compare sediment concentrations to the ISQGs.
Response:	The Interim Sediment Quality Guidelines (ISQG) and Probable Effects Levels (PELs) are both used as screening tools in Canada to predict biological effects in the absence of other information used to evaluate sediment quality. The ISQG and PEL were developed with the intention of being conservative, or protective, in terms of biological effects. Studies used to develop the ISQG and PELs were mainly based on field-collected sediments using measured concentrations of potential contaminants along with other chemicals and associated biological effects. Using the guidelines as predictors, biological effects are rarely expected to occur at concentrations below the ISQG, occasionally between the ISQG and PEL, and more frequently above the PEL. The PEL represents the lower limit of the range of chemical concentrations that are usually or always associated with adverse biological effects. In response to the reviewer's comments, sediment chemistry of samples from streams, ponds, and lakes is provided in Table ECCC-14.1 and has been updated from Baseline Study Appendix (BSA).4, Attachment 4-C to include the ISQG. Many of the samples had metal levels above the ISQG as a baseline condition. The response to ECCC-12 presents the results of a sediment quality analysis and the potential for subsequent effects on benthos, fish and fish habitat. The results have been provided in reference to both the ISQGs and PELs.
Appendix:	None

Table ECCC-14.1 Sediment Chemistry Sample Results from Ponds, Lakes and Streams

Sampling Date				9/24/2019 11:01:00 AM	9/27/2019 2:17:00 PM	9/24/2019 12:19:00 PM	9/29/2019 9:28:00 AM	9/23/2019 11:20:00 AM	9/27/2019 1:40:00 PM	9/23/2019 5:13:00 PM	9/24/2019 1:25:00 PM	9/23/2019 2:45:00 PM	9/23/2019 5:10:00 PM	9/27/2019 8:55:00 AM
Habitat				**Streams (Soft Sediment)**					**Ponds**					
Metals	**UNITS**	**CSQG PEL**	**CSQG ISQG**	**C001-02 (14)**	**V1in-02 (22)**	**M1OUT-02 (8)**	**VICP2OUT-02 (16)**	**VALP2OUT-02 (20)**	**V1**	**L1**	**M7**	**VALP2**	**VICP2**	**VALP3**
Acid Extractable Aluminum (Al)	mg/kg			14000	20000	12000	18000	22000	14000	19000	18000	22000	29000	21000
Acid Extractable Antimony (Sb)	mg/kg			<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Acid Extractable Arsenic (As)	mg/kg	17	5.9	**240**	**43**	**80**	**110**	**72**	**18**	**290**	**120**	**56**	**86**	**170**
Acid Extractable Barium (Ba)	mg/kg			110	220	63	86	63	91	310	88	48	270	77
Acid Extractable Beryllium (Be)	mg/kg			<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Acid Extractable Bismuth (Bi)	mg/kg			<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Acid Extractable Boron (B)	mg/kg			<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Acid Extractable Cadmium (Cd)	mg/kg	3.5	0.6	0.33	1.6	0.78	0.75	<0.30	1.6	1.1	1.5	1.1	1.1	0.93
Acid Extractable Chromium (Cr)	mg/kg	90	37.3	24	24	17	21	32	14	17	15	17	17	18
Acid Extractable Cobalt (Co)	mg/kg			30	33	16	18	17	16	43	15	14	16	19
Acid Extractable Copper (Cu)	mg/kg	197	35.7	20	33	31	13	59	28	16	23	19	20	16
Acid Extractable Iron (Fe)	mg/kg			45000	50000	19000	36000	40000	22000	47000	25000	22000	35000	36000
Acid Extractable Lead (Pb)	mg/kg	91.3	35	6.6	9.4	8.2	8.6	8.9	9.3	18	7.1	21	26	5.4
Acid Extractable Lithium (Li)	mg/kg			11	8.1	8.2	12	12	4.4	6.4	7.5	2	4.3	21
Acid Extractable Manganese (Mn)	mg/kg			7400	19000	4600	4400	1500	7100	28000	3700	850	1600	1500
Acid Extractable Mercury (Hg)	mg/kg	0.486	0.17	<0.10	0.14	0.18	0.14	<0.10	0.18	0.2	0.21	0.23	0.17	<0.10
Acid Extractable Molybdenum	mg/kg			<2.0	7.2	5.1	2.9	<2.0	3	5.3	7.2	2.5	5.6	2.8
Acid Extractable Nickel (Ni)	mg/kg			23	24	18	17	24	15	21	19	14	15	22
Acid Extractable Rubidium (Rb)	mg/kg			5.4	3.9	2.3	2.8	8.3	2.5	2.4	2.5	<2.0	2.6	7.9
Acid Extractable Selenium (Se)	mg/kg			<1.0	<1.0	1.8	<1.0	<1.0	1.3	1.3	1.9	1.7	1.5	<1.0
Acid Extractable Silver (Ag)	mg/kg			<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Acid Extractable Strontium (Sr)	mg/kg			15	37	24	21	13	34	37	37	23	200	21
Acid Extractable Thallium (Tl)	mg/kg			<0.10	0.12	0.12	0.1	<0.10	<0.10	0.2	0.13	<0.10	0.17	0.18
Acid Extractable Tin (Sn)	mg/kg			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.1	<1.0	<1.0
Acid Extractable Uranium (U)	mg/kg			0.95	2.7	7.6	2	0.84	4.3	10	9.5	5.1	6.5	6.2
Acid Extractable Vanadium (V)	mg/kg			54	70	36	56	78	28	41	27	37	48	41
Acid Extractable Zinc (Zn)	mg/kg	315	123	110	170	88	130	76	110	250	170	140	190	200
Grain Size														
Gravel	%			6.2	2.7	<0.10	3.2	<0.10	0.28	0.88	0.19	<0.10	<0.10	2.1
Sand	%			69	67	33	52	0.66	15	50	36	23	32	63
Silt	%			15	26	39	22	79	40	27	24	37	36	21
Clay	%			10	4.2	28	23	21	45	22	41	39	32	14

Note: Bold indicates exceedance of Canadian Sediment Quality Guidelines for the Protection of Aquatic Life Probable Effect Level (CSQG PEL)

Table ECCC-14.1 Sediment Chemistry Sample Results

Sampling Date			9/24/2019 11:22:00 AM	9/24/2019 9:30:00 AM	9/24/2019 1:24:00 PM	9/25/2019 11:30:00 AM	9/25/2019 12:30:00 PM	9/25/2019 1:30:00 PM	
Habitat			**Lakes**						
Metals	**UNITS**	**CSQG PEL**	**VIC02-DP**	**VIC01-MD**	**VIC03-LT**	**VAL01-DP**	**VAL02-MD**	**VAL03-LT**	**Reporting Detection Limit**
Acid Extractable Aluminum (Al)	mg/kg		26000	19000	21000	29000	23000	18000	10
Acid Extractable Antimony (Sb)	mg/kg		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0
Acid Extractable Arsenic (As)	mg/kg	17	**79**	**95**	**95**	**280**	**68**	**71**	2.0
Acid Extractable Barium (Ba)	mg/kg		120	67	58	480	76	120	5.0
Acid Extractable Beryllium (Be)	mg/kg		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0
Acid Extractable Bismuth (Bi)	mg/kg		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0
Acid Extractable Boron (B)	mg/kg		<50	<50	<50	<50	<50	<50	50
Acid Extractable Cadmium (Cd)	mg/kg	3.5	1.1	0.34	0.3	2.9	1.2	1.3	0.30
Acid Extractable Chromium (Cr)	mg/kg	90	34	29	31	33	22	18	2.0
Acid Extractable Cobalt (Co)	mg/kg		31	17	25	50	11	14	1.0
Acid Extractable Copper (Cu)	mg/kg	197	46	39	43	75	32	23	2.0
Acid Extractable Iron (Fe)	mg/kg		47000	44000	45000	57000	27000	21000	50
Acid Extractable Lead (Pb)	mg/kg	91.3	24	8.9	8.8	19	54	37	0.50
Acid Extractable Lithium (Li)	mg/kg		13	11	15	21	6.6	3.8	2.0
Acid Extractable Manganese (Mn)	mg/kg		5100	1100	1600	29000	1800	3600	2.0
Acid Extractable Mercury (Hg)	mg/kg	0.486	0.26	0.12	0.11	<0.10	0.14	<0.10	0.10
Acid Extractable Molybdenum	mg/kg		3.6	2.6	<2.0	11	3.2	2.5	2.0
Acid Extractable Nickel (Ni)	mg/kg		30	24	28	56	17	16	2.0
Acid Extractable Rubidium (Rb)	mg/kg		9.1	5.7	6.7	7.7	4	3.1	2.0
Acid Extractable Selenium (Se)	mg/kg		1.7	<1.0	<1.0	<1.0	1.8	1.3	1.0
Acid Extractable Silver (Ag)	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50
Acid Extractable Strontium (Sr)	mg/kg		16	12	15	20	26	41	5.0
Acid Extractable Thallium (Tl)	mg/kg		0.33	<0.10	<0.10	0.66	0.12	0.18	0.10
Acid Extractable Tin (Sn)	mg/kg		1.3	<1.0	<1.0	<1.0	2	1	1.0
Acid Extractable Uranium (U)	mg/kg		3.6	1.6	1.3	2.5	1.7	1.7	0.10
Acid Extractable Vanadium (V)	mg/kg		90	74	77	76	45	35	2.0
Acid Extractable Zinc (Zn)	mg/kg	315	130	72	71	220	140	160	5.0
Grain Size									
Gravel	%		<0.10	1.4	0.16	22	<0.10	<0.10	0.10
Sand	%		3.9	9.8	17	17	23	39	0.10
Silt	%		65	64	69	39	42	32	0.10
Clay	%		31	25	14	21	35	29	0.10

Note: Bold indicates exceedance of Canadian Sediment C

RESPONSE TO ECCC-15

ID:	**ECCC-15**
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	-
EIS Reference:	APPENDIX 2A, Water Management Plan
Context and Rationale:	The report states that "Long- term CWQG-FAL are not applicable to discharges but were used to screen parameters of potential concern for receivers." CWQG-FAL may be more applicable for COPCs not listed in Schedule 4 of the MDMER and for mines that have acquired RCM status. Some parameters are reported as being "stabilized in post-closure" above CWQG-FAL. On page 7.4 of APPENDIX 2A (Water Management Plan), in reference to the parameters generated from the water quality model, the report states that, for the Marathon Complex: "These parameters decline during closure and stabilize in post closure with Cu, Hg, F, Ag, Cd, Mn, and Al remaining above CWQG-FAL."; and, for the Leprechaun Complex: "These parameters decline during closure and stabilize in post closure with Cu, Hg, Ag, and F remaining above CWQG-FAL."
Information Request:	Explain how the potential effects associated with these parameters have been quantified.
Response:	Section 7.3.5.2 of the EIS describes the methods used to assess water quality effects. A list of parameters of potential concern (POPC) was established and changes in these parameters were assessed to determine Project effects on surface water quality. Selection of the POPC is explained in detail in the Water Quantity and Water Quality Modelling Reports (Appendix 7A and 7B of the EIS). The POPC selection criteria are listed below and extend beyond *Metals and Diamond Mining Effluent Regulations* (MDMER) criteria: • Parameters found to exceed Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life (CWQG-FAL) in baseline monitoring (aluminum, cadmium, iron, arsenic, copper, lead, zinc, and nitrite) • Parameters listed in MDMER considered to be at risk of being elevated (arsenic, copper, cyanide, lead, ammonia (unionized), zinc) • Parameters considered potentially present in in mine effluent as a result of mining activities (cyanide (Weak Acid Dissociable [WAD]), fluoride, manganese, ammonia, phosphorus, sulphate) Expected surface water quality for these POPC were assessed in the Assimilative Capacity Study (Appendix 7C of the EIS) at each Final Discharge Point (FDP) location, 100 m and 250 m downstream of each FDP, and at the ultimate surface water receivers (Victoria Lake Reservoir,

ID:	ECCC-15
	Valentine Lake, and Victoria River). Chapter 7 of the EIS summarizes results and effects of the Water Quantity and Quality and effluent Assimilative Capacity modeling. While the EIS acknowledges exceedances (in the absence of treatment) of the CWQG-FAL during closure, Marathon is proposing to implement passive treatment systems during closure that will improve effluent quality to the CWQG-FAL (or baseline conditions where parameters currently exceed CWQG-FAL). The following discussion provides further detail on the two passive treatment options being considered. During mine rehabilitation (progressive and final) and closure, waste rock piles will be revegetated to reduce infiltration and ultimately seepage. Waste rock pile benches will be graded to promote run-off and remove larger voids within the rock surface before placing a soil layer to support revegetation. Two post-closure water treatment options may be employed to address the predicted post-closure exceedances: (1) conversion of the perimeter conveyance ditches into subsurface flow Permeable Reactive Barrier (PRB) trenches; and/or (2) conversion of the perimeter conveyance ditches into subsurface “French Drains” to convey effluent to an engineered wetland treatment system. Please refer to Figures DIET-05.1 and DIET 05.2 for an illustration of these two options, which are further discussed below. The seepage from the tailings management facility (TMF) is expected to require passive treatment for decades and the proposed treatment options can be designed to last for similar periods. Full details will be provided in the Rehabilitation and Closure Plan. The selection of the best option will be based upon anticipated water quality. To support the design of the PRB and the engineered wetland system, pilot scale treatment studies will be conducted to evaluate the treatment efficiency and to better define the systems’ design parameters. <u>Seepage Treatment Option #1 (Figure DIET-05.1)</u> The collection ditches will be plugged at intervals to prevent flow down the ditch and converted to sub-surface PRB trenches. In closure, the waste rock piles will be covered with soil and vegetation and therefore shed rain/runoff with non-contact water. However, a portion of precipitation will infiltrate and form seepage. The subsurface PRB will backfill the rock-lined ditches with carbon-rich organic material (e.g., compost) to promote sulfate reducing conditions and subsequent precipitation of metal sulfide solid phases. Groundwater will passively flow through the compost mixture where dissolved metals will be removed via iron sulfide precipitation reactions. Under reducing conditions, sulfate-reducing bacteria convert sulfate to sulfide by catalyzing the oxidation of organic carbon producing

ID:	**ECCC-15**
	hydrogen sulfide. Divalent metals will precipitate in the presence of high concentrations of hydrogen sulfide to form the highly insoluble iron sulfide precipitate. A 30 cm soil cap will be installed over the surface of the PRB trench to prevent oxygen diffusion into and water flow out of the reactive mixture. Rip rap will be installed over the surface, where necessary, surrounding the PRB collection chamber to prevent scouring and erosion from the conveyance of non-contact runoff from the pile cover to the surrounding undisturbed ground. The subsurface PRB will continue to receive contact seepage, albeit at a reduced seepage rate due to the presence of the soil and vegetation cover. The contact seepage will migrate through the subsurface zone of the trench (smallest proposed ditch class is trapezoidal, 1 m deep, 1 m base width and 2:1 side slopes), through the PRB under anaerobic conditions where metals removal through sulphidic precipitation can occur. Seepage water would then outlet through the opposite side of the trench to the downgradient and outside receiving groundwater environment. Soil for the trench cover and soil plugs that would be placed in the existing ditches to promote transverse seepage migration across the trench will be available as ditch excavation sidecast material proposed in operation as shallow earthen berms. The rate of seepage migration across the sub-surface trench is constrained by the seepage inflow and outflow rates which are based on local soils characteristics, hydraulic conductivity and gradients. The average linear groundwater velocity is estimated between 0.126 m/year to 12.61 m/year. Thus, the seepage residence time through the subsurface trench would range from a few days to weeks, which is sufficient retention time to promote sulfate reducing conditions and the subsequent metal sulfide precipitation reactions. Due to the predictions that seepage quality would not be substantially elevated above CWQG-FAL, the PRB would be sized based on a minimum hydraulic retention time (HRT) of 24 hours. Based on a minimal HRT of 24 hours, the highest CWQG-FAL parameters of potential concern, copper, would be reduced from 48 ug/L to 2 ug/L through treatment in the PRB. <u>Seepage Treatment Option #2 (Figure DIET-05.2)</u> For this scenario, the perimeter collection ditches would be converted to subsurface French drains to allow contact seepage from the covered stockpiles to passively intercept seepage and convey seepage downgradient to the sedimentation ponds. The sedimentation ponds would be converted to engineered wetlands or subsurface passive bioreactors, essentially creating treatment with greater capacity and HRT than the PRB.

ID:	**ECCC-15**
	Metals entering the engineered wetlands will be initially removed via sedimentation and filtration processes. Following these physical processes, metals are buried and sequestered in the wetland sediments via adsorption and chemical precipitation reactions. Within the wetland substrates, anaerobic conditions promote the growth of sulfate-reducing bacteria. The substrates are designed to be rich in organic matter and sulfates. Under anaerobic conditions, sulfate-reducing bacteria convert sulfate to sulfide by catalyzing the oxidation of organic carbon producing hydrogen sulfide. Divalent metals (e.g., iron, silver, copper, zinc, cadmium, manganese, and lead) will precipitate in the presence of high concentrations of hydrogen sulfide to form insoluble metal sulfide precipitates. These precipitates will be removed from the water and permanently sequestered within the substrate. The average HRT in the sedimentation ponds is 24 hours based on uncovered stockpile drainage. Accounting for a vegetated soil cover on the piles and assuming that seepage in closure accounts for 1/3 of uncovered runoff and seepage, the HRT could be increased to 3 days or longer with outlet control. Based on a minimal HRT of 3 days, the highest CWQG-FAL parameters of potential concern, copper would be reduced from 48 ug/L to 2 ug/L through treatment in a passive treatment cell retrofitted from the sedimentation pond footprint. Seepage water will be monitored and will not be discharged to the environment until such time that water quality has been shown to consistently meet closure effluent criteria. The engineered wetland would use existing outlet infrastructure to the extent feasible. Once the contact water collection system is retrofitted to an engineered wetland treatment system, monitoring frequencies will be adjusted based on site conditions and performance objectives.
Appendix:	None

RESPONSE TO ECCC-16

ID:	**ECCC-16**
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	-
EIS Reference:	Chapter 8: Fish and Fish Habitat Appendix 7C – Assimilative Capacity Assessment Report
Context and Rationale:	Table 8.15 and Figure 8-12 shows areas of predicted fish habitat. The report indicates that these effects (areas of predicted fish habitat loss) will be addressed through a Fish Habitat Offsetting Plan for the Project. The proponent notes that streams experiencing indirect loss are anticipated to continue to support fisheries at a reduced level of productivity for the duration of the Project. These streams will likely be less productive and contain primary (e.g., periphyton) and secondary (e.g., benthic invertebrates) producers, representative of low flow headwater communities. The proponent has estimated the magnitude of adverse effects associated with direct and indirect loss of fish habitat to be moderate. The proponent also states that residual effects on the quality of fish habitat from Project effluents and discharges are anticipated to be negligible to low, as these will be authorized and in compliance with applicable regulatory requirements. (As an aside, it is not clear if the Victoria River has been evaluated for potential habitat loss). Separate from the exercise of evaluating fish habitat loss, the Assimilative Capacity study identifies areas of aquatic habitat (tributaries, rivers, lakes and reservoirs) where exceedances of CCME FAL criteria are expected (in the mixing zone) during operation and beyond closure where there may be a loss of productivity. Many of these areas may coincide with areas identified in the evaluation of fish habitat loss.
Information Request:	Clarify whether the Victoria River has been evaluated for potential habitat loss as it does not appear in the tabulation of waters bodies experiencing habitat loss in Table 8.15. Quantify the potential loss of productivity (in terms of specific effects, magnitude and duration) resulting from concentrations of parameters of potential concern exceeding CCME FAL in mixing zones been quantified.

ID:	**ECCC-16**
Response:	Victoria River was evaluated for the potential loss of fish habitat quantity. Direct or indirect habitat loss is not anticipated in Victoria River and is therefore not included in Table 8.15 and Figure 8.12 in Section 8.5.1 of the EIS. In the normal operating conditions scenario, parameters of potential concern either return to baseline or to levels below Canadian Water Quality Guidelines for Protection of Freshwater Aquatic Life (CWQG-FAL) at 100 m into Victoria River. Elevated concentrations of aluminum, copper and fluoride are anticipated after closure and rehabilitation, and therefore would require mitigation. A focused passive treatment strategy will be implemented during closure (remaining in place post-closure) to remediate toe seepage water quality from the mine site infrastructure to meet CWQG-FAL or baseline conditions in watercourses with water quality exceedances. Water quality in toe seepage will be tracked throughout life of mine. Marathon will develop a passive treatment assessment program as part of its Rehabilitation and Closure Plan for approval by the Newfoundland and Labrador Department of Industry, Energy and Technology. Additional details on post-closure water management is provided in response to ECCC-15. The assessment of these effects on water quality, as presented in the EIS, was made without accounting for any mitigation and is therefore considered to be conservative. Given that additional mitigation will be implemented to meet CWQG-FAL, a loss of productivity as a result of changes in water quality in Victoria River is anticipated to be negligible to low and occurring over a long-term duration as appropriate mitigation is implemented.
Appendix:	None

RESPONSE TO ECCC-17

ID:	**ECCC-17**
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	-
EIS Reference:	Chapter 8: Fish and Fish Habitat Page 8.72
Context and Rationale:	The report states that "Pit lakes are expected to become stratified following closure, and waters in the bottom layers may become anoxic and may contain high concentrations of dissolved trace metals. If the pit lake turns over, the pit lake water that discharges may affect fish health and survival by reducing levels of dissolved oxygen and introducing elevated concentrations of metals (Jennings et al. 2008)." It is unclear if the additional potential risk associated with pit lake turnover has been modelled or otherwise evaluated.
Information Request:	Provide risk assessment associated with pit lake turnover.
Response:	Pit lake turnover may occur in the upper and oxygenated part of the water column, which is expected to have water quality similar to local lakes; however, destratification (full turnover from top to bottom) of the pit lakes is not expected to occur. As described below, it is anticipated that the pit lake will chemically and thermally stratify, resulting in higher densities in lower layers than overlying layers. This will prevent full turnover. Therefore, it is predicted that pit lake overflow discharge will be oxygenated, similar to baseline water quality conditions and consistent with the predicted effects on fish and fish habitat as presented in the EIS (Chapter 8). During rehabilitation and closure, the Leprechaun and Marathon pit lakes will fill with rainwater, surface water and groundwater, and runoff and seepage from the waste rock piles. Pit lake filling will be accelerated by withdrawing freshwater from Victoria Lake Reservoir and Valentine Lake, resulting in early pit discharge (overflow) water quality similar to existing local baseline water conditions. Over time, water quality in the deeper portions of the pit lake may degrade due to sedimentation, deeper zone anaerobic conditions, and chemostratification of dissolved metals associated with groundwater inflows and leaching from the pit walls. If full turnover of water in a pit lake were to occur (complete destratification), it can mix poor quality water at depth with good quality water at surface, possibly resulting in a release of water that could potentially affect fish and fish habitat. The Leprechaun and Marathon pit lakes were modeled as being fully mixed from top to bottom for a worst-case scenario for trace elements. However, the pit lakes are expected to become permanently

ID:	ECCC-17
	stratified when the conditions that cause stratification to occur are stronger than the mixing/turnover forces. In stratified pit lakes, the upper epilimnion can mix with the upper/mid layer hypolimnion, however, a deeper layer, called the monimolimnion, will develop below a permanent chemocline. Castendyk and Webster-Brown (2007) observed that stratified conditions would develop in the Martha Mine open pit lake if groundwater temperatures were ≤ 17ºC and when there was more than one water source to maintain water levels. In the case of the Marathon and Leprechaun pit lakes, groundwater temperatures will be ≤ 17ºC and the pit lakes will receive inputs from rainwater, snowmelt and overland sources. Biogenic (microbially-mediated) stratification may increase the salinity in the monimolimnion. Campbell and Torgensen (1980) document biogenic stratification in iron-rich natural lakes in northern Canada caused by iron reducing bacteria in the monimolimnion, resulting in higher concentrations of total dissolved solids in this deepest water layer. The water quality modeling for the Marathon and Leprechaun pit lakes indicates that runoff from abundant organic bog environments and seepage from waste rock will introduce metals and carbon necessary to develop higher total dissolved solids in the monimolimnion. Therefore, the geochemical model, which assumes full mixing (i.e., no stratification), predicts that some metal concentrations in the pit lake water will be elevated. It is predicted that conditions will be in place for the Marathon and Leprechaun pit lakes to develop permanent stratification based on lower temperature of groundwater, multiple water sources to maintain water depth, and chemical and biogenic conditions. Turnover may occur in the upper and oxygenated part of the water column, which is expected to have water quality similar to local lakes. However, destratification (full turnover from top to bottom) of the pit lakes is not expected to occur given the pit lake is anticipated to chemically and thermally stratify, resulting in higher densities in lower layers than overlying layers. Therefore, it is predicted that pit lake overflow discharge will be oxygenated and similar to baseline water conditions. The above information is consistent with the predicted effects on fish and fish habitat as presented in the EIS (Chapter 8). References: Campbell P. and T. Torgensen. 1980. Maintenance of iron meromixis by iron redeposition in a rapidly flushed monimolimnion. Can. J. Fish. Aquat. Sci. 37, 1303-1313.

ID:	ECCC-17
	Castendyk D.N. and J.G. Webster-Brown. 2007. Sensitivity analyses in pit lake prediction, Martha Mine, New Zealand 1: Relationship between turnover and input water density. Chemical Geology 244 (2007) 42–55. Jennings, S.R., D. Neuman and P. Blicker. 2008. Acid Mine Drainage and Effects on Fish Health and Ecology: A Review Reclamation Research Group. LLC, Bozeman, Montana.
Appendix:	None

RESPONSE TO ECCC-18

ID:	**ECCC-18**
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	-
EIS Reference:	Appendix 7C – Assimilative Capacity Assessment Report page 6.2
Context and Rationale:	During the post-closure period of the decommissioning, rehabilitation and closure phase, some CWQG-FAL exceedances are predicted in the Victoria River and Victoria Lake Reservoir for aluminum, copper, zinc, and fluoride associated with the Marathon and Leprechaun waste rock piles. The report states that “Mitigation measures should be considered, such as maintaining perimeter ditching during closure / post- closure to convey seepage to a passive wetland treatment system”.
Information Request:	As post-closure exceedances of Freshwater Aquatic Life guidelines are predicted, assess the magnitude and duration of potential effects resulting from these exceedances. Outline the mitigation options to explain how and to what extent these effects will be mitigated.
Response:	As indicated in Section 7.5.2 of the EIS, the potential effects of elevated water quality parameters on fish and fish habitat in Victoria River and Victoria Lake Reservoir arising from the Leprechaun and Marathon waste rock piles during the post-closure phase are anticipated to be of moderate magnitude and long-term duration for fish habitat quality and negligible magnitude and long-term duration for fish health and survival. The definitions of magnitude and duration are presented in Section 8.3 of the EIS. It should be noted that the geographic extent of the effects is predicted to be approximately 300 m into Victoria Lake Reservoir and Victoria River, and no water quality effects are predicted beyond the 300 m mixing zone. Since aluminum, copper, zinc, and fluoride are predicted to exceed the Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life (CWQG-FAL) guidelines in the Victoria River and Victoria Lake Reservoir within the mixing zone, additional mitigation was recommended (see b below). During the closure and post-closure periods, the objectives for water quality are set at CWQG-FAL for long term exposure to be protective of fish and fish habitat, and the mitigation options described below (in part b) will be designed to achieve these objectives. With this mitigation in place, the magnitude of residual effects to fish and fish habitat during closure and post-closure phase are anticipated to be negligible to low and of long-term duration (Section 8.3.1 of the EIS). With respect to mitigation, during mine rehabilitation and closure, waste rock piles will be revegetated to reduce infiltration and ultimately seepage.

ID:	**ECCC-18**
	Waste rock pile benches will be graded to promote run-off and remove larger voids within the rock surface before placing the soil layer to support revegetation. It is understood that under Recognized Closed Mine status the water quality threshold for discharge to water frequented by fish is the CWQG-FAL. Water quality in TMF toe seepage will be monitored through life of mine. Two post-closure water treatment options (described in detail in ECCC-15) may be employed to address the predicted post-closure exceedances: (1) conversion of the perimeter conveyance ditches into subsurface flow Permeable Reactive Barrier (PRB) trenches; and/or (2) conversion of the perimeter conveyance ditches into subsurface “French Drains” to convey effluent to an engineered wetland treatment system. The selection of the best option will be based upon estimated water quality. Marathon will develop a passive treatment testing (pilot) program to be implemented during operation to assess the effectiveness and performance of the proposed passive treatment methods. The testing program will be described in the Rehabilitation and Closure Plan submitted to the Newfoundland and Labrador Department of Industry, Energy and Technology, noting the final Plan (as finalized towards the end of the mine life) is subject to a provincial Environmental Assessment prior to approval and implementation. The passive systems would be field piloted during operation such that they can be appropriately scaled up in closure. Marathon will consult with regulators and stakeholders regarding the progress and results of passive treatment pilot testing and the application of passive treatment to closure/post-closure phases.
Appendix:	None

RESPONSE TO ECCC-19

ID:	**ECCC-19**
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	-
EIS Reference:	Appendix 7A, page iii
Context and Rationale:	The report states that “In post closure, Cu is predicted to exceed the MDMER limit due to an elevated concentration of this metal in TMF toe seepage. Therefore, a mitigation such as passive treatment of seepage should be considered.” The proponent should be aware that when/if the mine has achieved Recognized Closed Mine (RCM) status under the MDMER, any effluent from the facility will be subject to Section 36(3) of the *Fisheries Act*, which prohibits the deposit of deleterious substances into waters frequented by fish, or to any place, under any conditions, where it may enter water frequented by fish. All reasonable efforts must be made to prevent such a deposit of deleterious substances.
Information Request:	Where effects are predicted, develop an evaluation of the performance of measures to prevent the deposit.
Response:	Please refer to response in ECCC-18.
Appendix:	None

RESPONSE TO ECCC-20

ID:	**ECCC-20**
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	-
EIS Reference:	Baseline Study Appendix 3: Water Resources (BSA.3)
Context and Rationale:	In addition to the extensive water quality dataset available from other sources, the proponent has added 1 water quality sampling location for each of the 3 ultimate receiving environments; (VICRV – Victoria River, VIC01 – Victoria Lake, VAL01 – Valentine Lake). Data from these 3 locations was available for a 4 month period in 2019 only. Given the importance of these 3 ultimate receiving environments during all phases of the project, we believe that the data collected at these locations is not adequate to characterize the background water quality conditions (including seasonal variations) in these areas.
Information Request:	Use other water quality datasets (in addition to those from the 1 water quality sampling location for each of the 3 ultimate receiving environments) to characterize the background water quality conditions (including seasonal variations) in these areas.
Response:	The regional water quality summary provided in Section 7.2.2.4 of the Surface Water Resources valued component in the EIS included a review of other potential water quality data sets within the Regional Assessment Area. Aside from the local water quality sampling conducted by Marathon, no additional current information was available for Valentine Lake, Victoria Lake Reservoir and Victoria River. Three dated reports include water quality information on Victoria Lake (prior to reservoir development) (Pippy 1966), in Victoria River (Porter et al. 1974) and in Red Indian Lake (Porter et al. 1974). However, the number of parameters collected are limited and the data available is not sufficient to adequately characterize the existing conditions or seasonal variations in water quality. Marathon would be pleased to consider additional water quality data available for Victoria Lake Reservoir, Valentine Lake or the Victoria River that government reviewers may be aware of. Water quality sampling will continue to be conducted on Victoria Lake Reservoir, Valentine Lake and Victoria River in the spring, summer and fall of 2021 to continue to document baseline conditions in the ultimate receivers. The results of the additional water quality sampling would be made available to Environment and Climate Change Canada through the

ID:	ECCC-20
	environmental effects monitoring program under the *Metal and Diamond Mining Effluent Regulations*. References: Pippy, J.H.C. 1966. A Biological and Ecological Study of the Salmonidae of Victoria Lake. Environment Canada Fisheries Service. Resource Development Branch, Department of Fisheries of Canada, St. John’s, Newfoundland. Progress Report No. 38. Porter, T.R., L.G. Riche and G.R. Traverse. 1974. Catalog of Rivers in Insular Newfoundland. Environment Canada Fisheries and Marine Science. Data Record Series Number NEW/D-74-9.
Appendix:	None

RESPONSE TO ECCC-21

ID:	**ECCC-21**
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	The proponent has stated that the Study Area for the 2019 field study includes the watersheds potentially affected by development of the Leprechaun, Sprite, Marathon, and Victory Deposits. The following ponds and streams within the Study Area were sampled as part of the 2019 surveys. • Lakes - Victoria Lake and Valentine Lake • Ponds – VALP2, VICP2, VALP3, L1, M7, M2, V1 • Streams – Outlet of VALP2, Outlet of VICP2, Outlet of VALP3, C001, Outlet of M1, Outlet of M2, inlet and outlet of V1
Information Request:	Clarify whether the sediment of the Victoria River, which has been identified as one of the 3 ultimate receiving environments, has been characterized in this background study.
Response:	Sediment samples were collected from a number of representative stream locations within the Project Area to establish baseline conditions. As indicated in ECCC-12, even when estimated for the worst-case (operation) scenario, sediment quality in the ultimate receivers will remain the same or potentially improve from baseline conditions for all parameters. The results of the sediment prediction assessment provided in ECCC-12 indicate that the Project will not have adverse effects on fish, fish habitat or benthos as a result of changes in sediment quality or quantity. As required under *Metal and Diamond Mining Effluent Regulations*, further sediment samples will be collected in depositional sedimentation exposure areas in effluent mixing zones and in reference areas to support environmental effects monitoring (EEM) for benthic invertebrate communities. The Victoria River is not anticipated to be a depositional sedimentation exposure area or reference area used for EEM.
Appendix:	None

RESPONSE TO ECCC-22

ID:	**ECCC-22**
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	-
EIS Reference:	Chapter 7, Surface Water Resources 7.5.2.4, Water Quantity and Water Quality Modelling Reports (7A and 7B)
Context and Rationale:	The Summary of Residual Effects on Change in Surface Water Quality in Chapter 7 states that "Effects will be continuous and both short term (large storms, one-off events) and long term (seepage from waste rock piles and TMF) in duration. Effects on water quality for most of the watercourses / waterbodies assessed are considered reversible as conditions will return to baseline conditions once Project discharges cease. Irreversible effects may occur as a result of seepage from mine infrastructure (TMF and waste rock piles)". It is for this reason presumably that effects are labelled as both "I/R"(irreversible/reversible) in Table 7.50: Project Residual Effects on Surface Water. In the Water Quantity and Water Quality Modelling Reports (7A and 7B), there are a number of locations where the modelled parameters decline during closure and stabilize in post-closure above CWQG-FAL (presumably irreversible). These are represented graphically in Appendix E.
Information Request:	List the watercourses predicted to have irreversible effects and describe the long term mitigation planned for each.
Response:	Post-closure, water quality exceedances of the Canadian Water Quality Guidelines for Protection of Freshwater Aquatic Life (CWQG-FAL) and baseline conditions were predicted as a result of toe seepage from the tailings management facility, waste rock piles, and Leprechaun pit mine infrastructure. Water quality exceedances were predicted to occur at Stream 1, 2, 3, 6, 7, 8, 9, 10 of the Marathon complex and Stream 16, 16, 17, 26 of the Leprechaun complex (Appendix 7C in the EIS). The assessment of these effects on water quality has been made without mitigation and is therefore considered to be conservative. During rehabilitation and closure, a focused passive treatment strategy will be implemented to remediate toe seepage water quality from the mine site infrastructure and to meet CWQG-FAL in watercourses with water quality exceedances. Watercourses will continue to be monitored post-closure, and it is expected that the passive treatment system will maintain water quality in the listed watercourses within CWQG-FAL guidelines over the long term. Please refer to responses to ECCC-15 and ECCC-18 for further discussion regarding passive water treatment alternatives during closure/post-closure.

ID:	**ECCC-22**
	A passive treatment assessment program will be developed by Marathon as part of its Rehabilitation and Closure Plan to be submitted to the Newfoundland and Labrador Department of Industry, Energy and Technology.
Appendix:	None

RESPONSE TO ECCC-23

ID:	**ECCC-23**
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	-
EIS Reference:	App 2A, WATER MANAGEMENT PLAN
Context and Rationale:	The report describes the following seepage scenarios associated with the TMF: At the TMF, the low permeability of the tailings, and the presence of a synthetic liner on the upstream side of the dam will limit seepage into the groundwater and lateral seepage from the TMF to the perimeter ditches. Seepage through the dam will be low relative to average daily discharge rates at the FDP. The presence of the low permeability synthetic liner will minimize the passage of tailings water through the dam wall. Shallow seepage from the south of the tailings pond was assumed to run into the polishing pond, and seepage along the remaining perimeter of the dam is collected in ditches and recycled back into the tailings pond. Some groundwater is predicted to seep from the TMF and travel to the Victoria River and tributaries. Some seepage through and under the dams at the TMF can be anticipated. It is expected that the majority of the seepage from the dams can be collected in ditches and conveyed to small sumps and, if necessary, pumped back into the TMF. The remainder would be lost to the groundwater flow regime.
Information Request:	Confirm that all seepage is captured and accounted for in the water quality model.
Response:	Groundwater seepage from the tailings management facility (TMF) to perimeter ditches was included in the water quality model that was used to predict the water quality at the final discharge point (FDP). The FDP for the TMF discharges to Victoria Lake Reservoir. Groundwater seepage that bypasses the TMF seepage collection ditches discharges to Victoria River and was simulated using the groundwater flow model outside of the water quality model, as it does not relate to an FDP. An assessment of the effects of this seepage on the water quality in Victoria River is included in the Groundwater Valued Component (Section 6.5.2 of the EIS).
Appendix:	None

RESPONSE TO ECCC-24

ID:	**ECCC-24**
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	-
EIS Reference:	Baseline Study Appendix 5: Acid Rock Drainage / Metal Leaching (ARD/ML)
Context and Rationale:	The report states that “Tailings from Leprechaun deposits, are expected to be non-PAG and have excess of NP. This excess of NP can be used to offset ARD potential of tailings from Marathon if ores from Marathon and Leprechaun deposit are processed at the same time and mixed. Therefore, the mixed tailings are not expected to show ARD potential, unless Marathon ore is processed separately from Leprechaun ore and resulting solids are left exposed after the closure. Approximately 14% of the waste rock from the Marathon pit is conservatively estimated to be PAG. Blending PAG and non-PAG rock with excess of neutralization potential and/or encapsulation of PAG waste by non-PAG rock is recommended to neutralize acidity potentially generated in PAG pockets.”
Information Request:	With regard to plans to manage ARD for this project, confirm that mitigative measures (e.g., blending to maintain Neutralization Potential Ratios) to avoid ARD generation will be employed when waste rock is used in onsite infrastructure (e.g., road beds).
Response:	As currently planned, nearly all earthworks construction will utilize waste rock developed from the open pits. All bulk earthworks, including roads, building and stockpile pads, embankments for ditching and water management ponds, and dams for the tailings management facility (TMF) will be constructed using waste rock. Also, non-potentially acid generating (non-PAG) waste rock would be crushed and screened for use in more detailed earthworks. Additional geochemical testing will be completed during excavation of waste rock materials from the open pits for use in construction, to ensure that only non-PAG rock is used. All potentially acid generating (PAG) rock will be placed and managed within the waste rock piles in accordance with the Acid Rock Drainage/Metal Leaching Management Plan (see Appendix B for more information). A relatively small amount of quarried rock will be required to commence construction, prior to waste rock being available from the open pits, to develop temporary access roads and construction laydown areas. As part of the advancing engineering for the Project, Marathon will be investigating several potential quarry sites that exist within the footprints of future mine infrastructure (e.g., the Leprechaun waste rock pile area) to reduce overall

ID:	ECCC-24
	environmental impacts. Any potential quarry sources will be sampled, and geochemical testing completed, as part of this investigation and prior to use of borrow material in earthworks. The only construction material not sourced to date is sand for concrete. The current plan is to source sand from local suppliers who have existing sand quarries; alternatively, non-PAG waste rock will be crushed and screened to provide the sand required.
Appendix:	See Appendix B: ARD/ML Management Approach

RESPONSE TO ECCC-25

ID:	ECCC-25
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	3.2.3. Spatial and temporal boundaries
EIS Reference:	Chapter 2
Context and Rationale:	Table 2.4 states that post closure monitoring will last 6-10 years. Appendix E of Appendix 7A (TIME SERIES FOR SELECTED PARAMETERS) shows modelling for a 100 year time frame.
Information Request:	Clarify the temporal boundaries for the project.
Response:	Temporal boundaries are based on the timing and duration of Project activities and potential time scales within which Project related environmental effects could occur and require management. It is important to note that temporal boundaries differs from the residual effects characterization for 'duration' which is the time required until, in this case, surface water quantity or quality returns to its existing (baseline) condition, or the residual effects can no longer be measured or otherwise perceived. Note that long-term durations were characterized for the Surface Water Resources Valued Component, with effects anticipated to extend beyond the life of the Project. The temporal boundaries described in Table 2.4 of the EIS remain appropriate as related to Project activities. However, as discussed in Section 7.1.3 of the EIS, post-closure monitoring, to confirm that the site is chemically and physically stable, is generally six to 10 years for some components, and longer if dams are left in place for the tailings management facility (TMF). Due to the variation in timing of closure of different site features, it is difficult to precisely determine the schedule for post-closure monitoring at this stage of the Project. For example, tailings deposition to the TMF will cease in Year 9 of operations, allowing more than 3 years of rehabilitation and closure activties for the TMF prior to cessation of milling operations. The final closure and post-closure monitoring timeline will be determined during future reviews of the Rehabilitation and Closure Plan under the Newfoundland and Labrador *Environmental Protection Act*. The 100 year time frame was the model run time. Geochemical models are required to be run until they demonstrate geochemical stability. The model run time is typically selected before the model is run in order to achieve geochemical stability. Therefore, the model may predict geochemical stability in 6 -10 years of post-closure; however, was run for a further 60 – 70 years to demonstrate long term stability.
Appendix:	None

RESPONSE TO ECCC-26

ID:	**ECCC-26**
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	Part 2, Section 6.6.1 Effects of potential accidents or malfunctions
EIS Reference:	21.5.1.2 and BSA1. Attachment 1- A. BSA 3. 3-C.
Context and Rationale:	Section 21.5.1.2 gives a lower value for an extreme rain estimate than used elsewhere in the EIS. It states: “The EDF is defined as the most severe flood (i.e., largest design runoff event) that can be stored and does not result in an unscheduled discharge of water to the environment (Golder 2020; BSA.1. Attachment 1-A). The 100-year, 24-hour event (75 mm of rain) was selected as the EDF, which is on top of the 25-year return period wet hydrological conditions (Golder 2020b).” The above-mentioned 75 mm value is much lower than extreme values from IDF data presented elsewhere in the EIA, including 130 mm from Stephenville (Attachment 3-C of Baseline Study Appendix 3: Water Resources).
Information Request:	Explain the rationale for using the 75 mm as the EDF value.
Response:	Please see response to ECC-38.
Appendix:	None

RESPONSE TO ECCC-27

ID:	**ECCC-27**
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	Part 2, section 6.6.1 Effects of potential accidents or malfunctions
EIS Reference:	21.5.1.4 and BSA1. Attachment 1- A.
Context and Rationale:	Section 21.5.1.4. Two scenarios for the dam breach and inundation assessment involve flood-induced conditions of the TMF (tailing management facility) dams by piping and overtopping failure modes, with the probable maximum flood level, obtained by routing the probable maximum precipitation (PMP). BSA 1, 1-A, 4.2.2 Breach Outflow Modelling: "24-hr Probable Maximum Precipitation (PMP) depth used for the Stephenville Environment and Climate Change Canada (ECCC) meteorological station (ID: 8403800) is 309 mm (Golder 2020b)".That PMP value is based on relatively few years of older data. It is lower than updated PMP estimates available from the ECCC Engineering Climate Datasets (described in Annex C) at the same location and nearby the project area. This includes Stephenville: 377 mm, Burnt Pond: 354 mm, and Buchans: 450 mm.
Information Request:	Use update PMP estimates based on updated/longer periods of record, including for stations nearer the project site.
Response:	See response to ECC-24.
Appendix:	None

RESPONSE TO ECCC-28

ID:	ECCC-28
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	-
EIS Reference:	Section 22.3.1.1 Existing Conditions; Section 21.5.1.2
Context and Rationale:	Section 21.5.1.2 "The accumulation of water in the TMF has been modelled for the mean and 25-year wet annual precipitation conditions. Treatment and discharge will occur for eight months a year during operation (avoiding discharges during winter months). The TMF has been sized to store the excess water during the non-discharge period, including appropriate design precipitation events." Modelling was done for the monthly data for the wettest year based on Buchans data, but individual months could be more extreme. E.g., based on Buchans long-duration IDF results, a 5-year (recurrence interval) 30-day duration extreme rainfall amount is 225 mm).
Information Request:	• Carry out modelling based on return-period estimates of extreme monthly values (e.g., 30- day durations). • Consider effects of extreme rain events occurring at time of snow melt/run-off. • Indicate the expected frequency for use of the spillway to remove untreated excess water during extreme events.
Response:	The tailings management facility pond operating water volumes are not designed based on precipitation events, but on typical precipitation volumes. The 25-year wet precipitation volume was used to provide a flexible operating range. The impact of extreme precipitation events is considered above the operating water level, in the environmental design flood (EDF) storage. The EDF storage requirements for each stage has been updated to be the larger of the 7-day, 100-year rainfall event or the 30-day 100-year rainfall plus snowmelt event during the freshet (refer to response to ECC-38). Depending on the operating volume at the time of the event, any event larger than the 100-year event has the potential to activate the spillway. The spillway can safely pass events up to and including the Probable Maximum Precipitation (conservatively selected as 450 mm).
Appendix:	None

RESPONSE TO ECCC-29

ID:	**ECCC-29**
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	-
EIS Reference:	Section 22.3.1.1 Existing Conditions; Ch. 5
Context and Rationale:	Table 22.2 lists climate stations in the project area, and indicates period of record and existence of 1981-2010 climate normals. It gives distances from the station to the project site, but those distances appear to be relative to the start of the road that leads to the mine site. The Burnt Pond station is actually closer to the mine site. The Burnt Pond 1981-2010 climate normals indicate it has a wetter climate, with a mean annual precipitation of 1434 mm, about 200 mm greater than the Buchans location. The 1971- 2000 normals show a similar difference.
Information Request:	Revise the distances in the table to reflect the distances to the mine site. Consider using Burnt Pond climate data in addition to the Buchans data to inform the description of climate used for the project (although care is advised as the data are less complete in the years after 1996).
Response:	See response to ECC-46.
Appendix:	None

RESPONSE TO ECCC-30

ID:	**ECCC-30**
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	-
EIS Reference:	Applicable to all project-related activities and all project phases.
Context and Rationale:	Migratory birds, their eggs, nests, and young are protected under the *Migratory Birds Convention Act* (MBCA). Migratory birds protected by the MBCA generally include all seabirds (except cormorants and pelicans), all waterfowl, all shorebirds, and most landbirds (birds with principally terrestrial life cycles). The list of species protected by the MBCA can be found at https://www.canada.ca/en/environment- climate-change/services/migratory-birds- legal-protection/convention-act.html. Bird species not listed may be protected under other legislation. Under Section 6 of the *Migratory Birds Regulations* (MBR), it is forbidden to disturb, destroy, or take a nest or egg of a migratory bird; or to be in possession of a live migratory bird, or its carcass, skin, nest or egg, except under authority of a permit. It is important to note that under the MBR, no permits can be issued for the harm or disturbance of migratory birds caused by development projects or other economic activities. Furthermore, Section 5.1 of the MBCA describes prohibitions related to depositing substances harmful to migratory birds:"5.1 (1) No person or vessel shall deposit a substance that is harmful to migratory birds, or permit such a substance to be deposited, in waters or an area frequented by migratory birds or in a place from which the substance may enter such waters or such an area.(2) No person or vessel shall deposit a substance or permit a substance to be deposited in any place if the substance, in combination with one or more substances, result in a substance – in waters or an area frequented by migratory birds or in a place from which it may enter such waters or such an area – that is harmful to migratory birds." It is the responsibility of the proponent to ensure that activities are managed so as to ensure compliance with the MBCA and associated regulations. With regard to bird collisions at lit and floodlit structures or their support structures, or with other disoriented birds, ECCC generally recommends: • that Proponents avoid or restrict the time of operation of exterior decorative lights such as spotlights and floodlights whose function is to highlight features of buildings, or to illuminate an entire building. Especially on humid, foggy or rainy nights, their glow can draw birds from far away. ECCC generally advises that it is best for birds if these types of lights are turned off, at least during the migratory season, when

ID:	**ECCC-30**
	the risk to birds is greatest and also during periods when Leach's storm-petrels are dispersing from their colonies. • that lighting for the safety of the employees be shielded to shine down and only to where it is needed, without compromising safety. • that street and parking lot lighting be shielded so that little escapes into the sky and it falls where it is required. LED lighting fixtures are generally less prone to light trespass and it is generally recommended that these be considered. • that the minimum amount of pilot warning and obstruction avoidance lighting be used on tall structures (e.g., communication towers). The use of only strobe lights at night, at the minimum intensity and minimum number of flashes per minute (longest duration between flashes) allowable by Transport Canada, is generally recommended, as well as the use of the minimum number of lights possible. Avoidance of the use of solid-burning or slow pulsing warning lights at night is generally recommended.
Information Request:	ECCC-CWS recommends that a site monitoring plan be developed for the migratory bird breeding season as well as the spring and fall migration periods and implemented while floodlights are being used during nighttime hours. A site monitoring plan could include protocols such as dusk and dawn site inspections to look for migratory birds that may have landed on site, and/or inclusion of migratory bird searches into standard occupational health and safety daily inspections, etc. Should puffins and/or storm-petrels become stranded on the project site, both during construction and operations phases, the proponent is recommended to adhere to Procedures for handling and documenting stranded birds encountered on infrastructure offshore Atlantic Canada (attached; it should be noted that this reference document has been developed for offshore vessels, and may require modification for use on an onshore facility. ECCC-CWS should be notified if bird stranding incidents occur. Puffins should be treated in the same manner as storm- petrels). A bird handling permit will likely be required to implement the instructions in this reference document and the proponent must be advised that such a permit would have to be in place prior to the initiation of proposed activities. Please note that MBCA permit applications can be obtained from ECCC-CWS via email at Permi.atl@ec.gc.ca. If any migratory birds are found stranded on-site, the proponent should immediately contact ECCC-CWS for further instructions. The contact is Sabina Wilhelm (ECCC-CWS Marine Issues Biologist) at sabina.wilhelm@ec.gc.ca or 709-764-1957.
Response:	A site monitoring plan will be developed and included in the Avifauna Management Plan. The monitoring plan will be developed in consultation with Environment and Climate Change Canada – Canadian Wildlife Service

ID:	**ECCC-30**
	(ECCC-CWS), and with consideration of the recommendations provided in the ECCC-CWS comment above. The site monitoring plan may include regular inspection of facilities, infrastructure, and equipment to determine if birds are nesting on or near anthropogenic structures, or if any injured or stranded birds are present. Monitoring will assist in compliance with the *Migratory Birds Convention Act* and *Species at Risk Act* by identifying the need for, and helping support the development of, onsite bird control features to deter nesting on, in or near mine infrastructure. If a bird stranding incident occurs, or if an injured bird is located, ECCC-CWS will be notified. In this instance, the proponent will adhere to procedures for handling and documenting stranded birds encountered on infrastructure offshore Atlantic Canada (which may be modified for use onshore, through consultation with ECCC-CWS). The requirement for a bird handling permit will be determined in consultation with ECCC-CWS and, if required, obtained prior to Project initiation.
Appendix:	None

RESPONSE TO ECCC-31

ID:	**ECCC-31**
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	-
EIS Reference:	Section 2.4.1Section 2.7.4Section 10.4Section 10.5
Context and Rationale:	The proponent proposes to conduct “nest search surveys” or “nest sweeps” in the event that vegetation clearing is required during the general nesting period for birds in the project area.
Information Request:	Migratory bird nests can be found in a wide variety of habitats and locations. Depending on the species, nests may be found at many heights in trees, in tree cavities, in shrubs, on the ground (including in hayfields, crops and pastures), on cliffs, in burrows, in stockpiles of overburden from mines, in quarry banks, within wetlands, and on human-made structures such as bridges, ledges, and gutters. It is difficult to locate most nests. Nest sites are often hidden and adult birds avoid approaching their nests in a manner that would attract predators to their eggs or young. Moreover, the amount, and complexity of habitat to be searched often limits the success of surveys intended to locate all active nests. The nests of a few species are easier to locate, particularly those in isolated trees, on human-made structures and/or in colonies. To determine the likelihood that migratory birds, their nests or eggs are present in a particular location, use a scientifically sound approach that considers the available bird habitats, which migratory bird species are likely to be encountered in such habitats, and the time periods when they would likely be present. This will help you plan work activities to avoid having an impact on nesting birds. If further investigation is required to determine the presence of breeding birds, consider conducting an area search for evidence of nesting (e.g., presence of birds in breeding through observation of singing birds, alarm calls, distraction displays) using non-intrusive search methods to prevent disturbance to migratory birds. In the case of songbirds, for example, “point counts” (a technique to locate singing territorial males) may provide a good indication of the present of nests of these birds in an area. Please contact Environment and Climate Change Canada’s Canadian Wildlife Service office in your region for further technical information about investigation methods for non-song bird species (notably, waterfowl, waterbirds, and shorebirds). In most cases, nest search techniques are not recommended because, in most habitats, the ability to detect nests remains very low while the risk of disturbing active nests is high. Flushing birds increase the risk of predation of the eggs or young, or may cause the adults to abandon the nests or the eggs. Therefore, except when the nests searched are known to

ID:	**ECCC-31**
	be easy to locate without disturbing them, active nest searches are generally not recommended; they have a low probability of locating all nests, and are likely to cause disturbance to nesting birds. In many circumstances, harm is likely to still occur during industrial or other activities even when active nest searches are conducted prior to these activities. In some cases, nest surveys may be carried out successfully by skilled and experienced observers using appropriate methodology, and in the event that activities would take place in simple habitats (often in man-made settings) with only a few likely nesting spots or a small community of migratory birds. Examples of simple habitats include: • An urban park consisting mostly of lawns with a few isolated trees; • A vacant lot with few possible nest sites; • A previously cleared area where there is a lag between clearing and construction activities (and where ground nesters may have been attracted to nest in cleared areas or in stockpiles of soil, for instances); or • A structure such as a bridge, a beacon, a tower or a building (often chosen as a nesting spot by robins, swallows, phoebes, Common Nighthawk, gulls and others). Nest searches can also be considered when looking for: • Conspicuous nest structures (such as nests of Great Blue Herons, Bank Swallows, Chimney Swifts); • Cavity nesters in snags (such as woodpeckers, goldeneyes, nuthatches); or • Colonial-breeding species that can be located from a distance (such as a colony of terns or gulls).
Response:	Comment acknowledged. This information will be taken into consideration when preparing the Avifauna Management Plan, which will be developed in consultation with Environment and Climate Change Canada – Canadian Wildlife Service. Marathon understands the requirements of and is committed to complying with the *Migratory Birds Convention Act* and its attendant *Migratory Bird Regulations*. Construction activities are being planned such that vegetation clearing is conducted outside of the general nesting season, where/when possible. It is acknowledged, however, that there may be specific, isolated instances where this is not possible, and the reference to conducting “nest search surveys” or “nest sweeps” is applicable to these exceptional instances.
Appendix:	None

RESPONSE TO ECCC-32

ID:	ECCC-32
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	-
EIS Reference:	Section 21.5.1, Section 21.5.3
Context and Rationale:	Section 21.5 describes scenarios and response measures to minimize impacts of these events. The proponent identifies approaches to minimize impacts of accidental events, including: i. preparation of site-specific accident prevention, emergency response and contingency plans with tactical plans, ii. adoption of an incident command system (ICS), and iii. the conduct of annual emergency response exercises under the ICS system. Where there is a likely risk of direct (injury or mortality) or indirect (effects on habitat) impacts to avifauna, Wildlife Response Plans should be considered as an aspect of contingency plans and incorporated within the ICS response system.
Information Request:	Wildlife Response Plans (WRP) and avifauna surveys should be incorporated into emergency response contingency plans for scenarios that may impact avifauna directly (injury or mortality) or indirectly (impacts to habitat). In particular, WRP and associated surveys should be considered for TMF Malfunctions (Section 21.5.1) and Fuel and Hazardous Materials Spills (Section 21.5.3), especially for worst-case scenarios described with impacts surface water (e.g., Victoria River, surrounding wetlands, and lakes). ECCC-CWS has guidance documents available to support emergency response contingency planning for wildlife: • Guidelines for effective wildlife response plans • Technical guidance and protocols for migratory bird surveys for emergency response • Guidelines for the capture, transport, cleaning and rehabilitation of oiled wildlife.
Response:	Wildlife Response Plan(s) (WRPs) will be developed as part of the Project's emergency response and contingency planning. WRP(s) will be developed through liaison with Environment and Climate Change Canada – Canadian Wildlife Service (ECCC-CWS) and in consideration of guidelines for effective wildlife response plans. These will include protocols for the various accidental event scenarios identified for the Project which could impact

ID:	**ECCC-32**
	avifauna directly or indirectly. This will include, but not be limited to, procedures to be implemented immediately after an accident / malfunction with the potential to impact wildlife, incident management procedures for wildlife response, and follow-up monitoring. The WRP(s) will be incorporated as applicable in Marathon's emergency response planning documents (e.g., the emergency response plan for tailings/effluent release required under the *Metal and Diamond Mining Effluent Regulations,* spill contingency plan).
Appendix:	None

RESPONSE TO ECCC-33

ID:	**ECCC-33**
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	-
EIS Reference:	Section 10.4, Section 10.5
Context and Rationale:	The Project will require the construction of transmission lines and telecommunications infrastructure. This is standard advice regarding transmission lines and telecommunication structures.
Information Request:	It is well documented that transmission lines and telecommunication infrastructure can provide a significant risk of bird mortality through both electrocution and bird strikes. Other concerns include the effects of electromagnetic radiation, habitat loss and habitat fragmentation on bird populations. There are several factors that determine the potential impact to birds, including transmission line siting, local topography, habitat, weather conditions, transmission pole design, and line configuration, to name a few. In addition, different species groups can have differing sensitivities, and may be impacted during feeding, breeding, courtships or migration. Though the issues are complex, many can be mitigated through proper planning and project design. To reduce the risk of disturbance or harm to migratory birds related to the development of transmission and telecommunication infrastructure, ECCC-CWS recommends implementation of the following beneficial management practices: • An evaluation of the risk of collision by birds in the area (based on birds' use of the area surrounding the lines) should be completed. • Measures to avoid bird collisions and electrocution, including line placement and orientation, marking of lines (e.g., bird flight diverters), and design of structures (e.g., it is preferable to have a horizontal rather than vertical conductor configuration) should be considered during the transmission line design phase. • Markers (e.g., bird flight diverters) should be placed on the lines running across the project area to provide visual cues to birds and help reduce the incidence of bird strikes. • When selecting a Right of Way (RoW), the following measures should be considered: – Relocated RoW should be situated so as to be contiguous with existing RoWs, to the extent feasible. – The width/size of RoWs, temporary and permanent facilities, work areas, and access roads should be minimized, to the extent feasible.

ID:	**ECCC-33**
	– Old-growth, mature, and interior forest habitat for migratory birds should be avoided. – Wetlands should be avoided. • A migratory bird monitoring plan should be developed to evaluate the effectiveness of these measures. • The proponent should contact ECCC-CWS for guidance, particularly if sensitive areas in the project area are detected through wetland inventories, and/or waterfowl or landbird surveys. ECCC-CWS can also provide guidance on the development of monitoring and/or management plans, as necessary.
Response:	The transmission line to the site will be constructed and operated by NL Hydro and is subject to separate provincial environmental assessment requirements. On May 5, 2021, NL Hydro filed the Registration document for the Star Lake to Valentine Gold Transmission Line TL271 Project with the province (found here: https://www.gov.nl.ca/ecc/projects/project-2136/). As indicated in this Registration document, Marathon expects that NL Hydro will adopt industry standard mitigation with respect to avifauna in their construction and operation of the transmission line. With respect to on-site distribution power lines, mitigation measures will be implemented at locations that are determined, during the course of operations, to be high risk areas for avifauna. High risk areas are defined as those where bird collisions and/or mortalities associated with the transmission lines are observed on multiple occasions. Mitigation measures may include the implementation of avoidance devices, such as power line markers with reflective and/or glow in the dark components. Several types of power line markers are available, including bird flight diverters (including spirals) and bird flappers. If power line markers are used, monitoring will occur after installation to evaluate their efficacy.
Appendix:	None

RESPONSE TO ECCC-34

ID:	**ECCC-34**
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	-
EIS Reference:	Chapter 2
Context and Rationale:	In section 2.6, the proponent has outlined its obligations for Closure and Rehabilitation related to the *Newfoundland and Labrador Mining Act*. The proponent states that “Marathon will be required to register closure of the mine as an undertaking subject to assessment under the NL *Environmental Protection Act*” followed by “an application to relinquish the property back to the Crown”.
Information Request:	The proponent is reminded that there are also obligations under the MDMER if the proponent chooses to become a “recognized closed mine” (section 32). In general, effluent from Recognized Closed Mines may be subject to the General Prohibition of the deposit of deleterious substances of the *Fisheries Act* (Section 36(3)) rather that the MDMER effluent limits which could affect the design of project components.
Response:	Marathon understands and acknowledges the requirement under Section 32 of the *Metal and Diamond Mining Effluent Regulations* pertaining to "recognized closed mine" status and the obligations under that designation with respect to post-closure water quality. Post-closure water quality has been modelled and is presented in Chapter 7 and Water Quantity and Water Quality Modelling Reports (Appendix 7A and 7B) of the EIS, and the anticipated post-closure water quality management for parameters that are predicted to be elevated are described in the response to ECCC-15.
Appendix:	None

RESPONSE TO ECCC-35

ID:	**ECCC-35**
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	-
EIS Reference:	Appendix 2A Water Management Plan
Context and Rationale:	The proponent has stated that the proposed locations for water quality monitoring network are preliminary, and will be reviewed and modified as design proceeds in consultation with regulators, and in accordance with permits and approvals monitoring.
Information Request:	ECCC looks forward to future discussions on the details of monitoring network design (locations, parameters, frequency, etc.) for surface water and groundwater quality monitoring programs at the construction, operational and closure stages of the project.
Response:	Comment noted, thank you. The proposed Surface Water Monitoring Plan is discussed in Section 7.9.1 of the EIS; the proposed Groundwater Monitoring Plan is outlined in Section 6.9 of the EIS. These plans will be further developed based on detailed Project design and any direction provided as a result of conditions of release from the environmental assessment process and permitting approvals. These plans will be reviewed by regulatory authorities, including Environment and Climate Change Canada, as applicable.
Appendix:	None

RESPONSE TO ECCC-36

ID:	**ECCC-36**
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	-
EIS Reference:	SUMMARY, Table E.1
Context and Rationale:	The table states the requirements for MDMER schedule 2 amendments. “For projects requiring the use of natural water bodies frequented by fish for the disposal of mine waste, including tailings and waste rock and for the management of process water, the MDMER would need to be amended to add the affected water bodies to Schedule 2 to designate them as tailings impoundment areas.”
Information Request:	It is the responsibility of the proponent to demonstrate that the overprinting of such areas by mine waste, including tailings and waste rock and for the management of process water, will not negatively affect any waters frequented by fish directly or indirectly.
Response:	Comment noted, thank you. Design criteria adopted by Marathon in siting Project infrastructure included the overall reduction of Project effects on fish and fish habitat and the avoidance of fish habitat with respect to placement or deposition of mine waste. Where avoidance of water bodies was not possible, aquatic baseline programs were developed in consultation with Fisheries and Oceans Canada to confirm absence of fish species within the affected water bodies (e.g., bog holes within the footprint of the Marathon waste rock pile). All natural waterbodies currently being directly impacted by the deposition of mine waste have been confirmed to be fishless and do not constitute waters frequented by fish. In addition, and as further discussed in ECC-23, the design of the tailings management facility (TMF) has been refined and, as a consequence, it no longer directly impacts the stream. The TMF dam no longer directly impacts the stream located immediately south of the TMF, further reducing Project effects on fish and fish habitat. Therefore, as a result of careful Project planning, there are no *Metal and Diamond Mining Effluent Regulations* Schedule 2 triggers for this Project.
Appendix:	None

RESPONSE TO ECCC-37

ID:	**ECCC-37**
Expert Department or Group:	Environment and Climate Change Canada
Guideline Reference:	-
EIS Reference:	Ch. 5, 7, 21, 22, BSA 1, BSA 3
Context and Rationale:	There are no short-duration IDF (Intensity- Duration-Frequency) stations in the immediate vicinity of the project area, so the EIS relies on more remote IDF stations in particular Stephenville (with 100-yr return period (r.p,), 24-hr rainfall extreme of 130 mm). ECCC's Engineering Climate Services Unit (EGSU) (ec.scg- ecs.ec@canada.ca) has developed long- duration (one-day to 30-day) duration IDF extreme rainfall estimates based on long period of record daily data (adjusted for the fixed climate day). These include PMP (probable maximum precipitation) estimates. For example, the 100-year r.p., 1-day extreme rainfall estimates based on data from Buchans and Burnt Pond are 137 mm and 128 mm, respectively.
Information Request:	Consider using long-duration IDF results available from ECCC's climate website Engineering Climate Datasets page (https://climate.weather.gc.ca/prods_servs/ engineering_e.html) (click on Intensity- Duration-Frequency (IDF) Files, then on the folder IDF_Additional_Additionnel), for stations near the project area, as a way to confirm or improve on results from further away. This would also allow use of multi-day duration estimates for modelling/design where impacts from such events could be significant (e.g., such as Hurricane Igor, a 2- day extreme rain event). For example, the 100-year r.p., 3-day rainfall estimates from Buchans, Burnt Pond, and Stephenville are 150, 170, and 148 mm, respectively, significantly higher than the 1-day duration estimates for the same return period.
Response:	As noted, the Stephenville Station ID 8403820 Intensity-Duration-Frequency (IDF) was selected to represent precipitation at the site. The Stephenville IDF was developed based on 48 years of data (1967 – 2017). The Stephenville IDF curve has been adjusted to account for the effects of climate change for the 2011-2040-time horizon (2020s) for the Intergovernmental Panel on Climate Change (IPCC) Representative Concentration Pathways (RCP) 4.5 emissions scenario. The average increase of IDF rainfall amounts associated with the various projections are approximately 10% for the 2020s (CRA 2015). In the model, the storms were distributed using a 10-minute timestep over 24 hours based on the SCS (Soil Conservation Service) Type II distribution (representative of heavy rainfall events generated from tropical storms and hurricanes).

ID:	**ECCC-37**
	As the water management pond design considered climate change in addition to the maximum daily snow melt for the month of April of 38.6 mm/day, design represents a conservatively high total pond storage volume. The 1:100-year precipitation event of 183.4 mm, exceeds the 3-day rainfall estimates from Burnt Pond of 170 mm, the highest 1:100 year 3-day rainfall of the three nearby stations. In addition, the emergency spillways were sized to manage the 1:200-year storm events of 198.6 mm, further exceeding this 3-day rainfall estimate. The longer 2- or 3-day storm events would result in lower peak flows than a 24-hour event as the storm would be distributed over a longer duration. The higher 3-day storm event compared with a 24-hour event would be continuously dewatered through the primary and secondary outlet pipes in addition to the emergency spillway, thus resulting in a lower required flood attenuation pond volume. Therefore, a higher peak storm event would result in the conservatively higher flood attenuation pond volume. Sedimentation in the water management ponds was designed for the 1:10-year storm event of 100.7 mm over less than 24 hours. Larger precipitation events would be retained in the pond longer and draw down taking up to five days for the 1:100-year storm event. Design criteria for the tailings management facility (TMF) differed from the water management ponds as the TMF is storing tailings. The TMF spillway was designed for the Probable Maximum Precipitation (PMP) event for the Stephenville climate station. To be conservative, in detailed design the PMP is being revised from the 1-day PMP based on the Stephenville climate station to the Buchans climate station (450 mm), as this station has a higher PMP. As the Environmental Design Flood volume is to be stored, a longer duration event is more conservative than the 1-day event as the storm will have a higher volume. The TMF Environmental Design Flood event has been updated from the 1 day, 100-year event to the larger of the 7-day, 100-year rainfall event or the 30-day, 100-year rainfall plus snowmelt event during the freshet at each dam stage. Reference: CRA. 2015. Intensity-Duration-Frequency Curve Update for Newfoundland and Labrador. Mount Pearl: Conestoga-Rovers & Associates: For the Office of Climate Change and Energy Efficiency, Government of Newfoundland and Labrador.
Appendix:	None

RESPONSE TO HC-01

ID:	**HC-01**
Expert Department or Group:	Health Canada
Guideline Reference:	Section 3.3 Scope of the Factors to be Considered Section 4.2.1.9 Population Health and Community Services Infrastructure
EIS Reference:	Chapter 17
Context and Rationale:	The identification of spatial boundaries for the purpose of evaluating potential impacts to human health was inadequate. The Local Assessment Area (LAA) for Indigenous groups, (utilized by the proponent for the assessment of potential risks to human health) is confined to a 40 km by 40 km buffer around the mine site and a 500-m buffer around the access road. HC suggests that the LAA for Indigenous Groups is not adequate for the following reasons: • The LAA does not include the nearby communities of Millertown and Buchans. Qalipu First Nations (QFN) members live in these communities, which are adjacent to the area impacted by the project and are readily accessible for traditional land and resource use. • The Land and Resource Use Section (16) of the EIS illustrates extensive use of the area between the project site, Millertown and Buchans for accessing cabins, hunting, trapping and recreational use (gathering was excluded as noted in HC-23). This land use has not been differentiated as being used by Indigenous or non-Indigenous persons. • The sample size for the land use survey with the QFN was too small to be considered representative or significant. Of the 22,000 persons registered with the QFN, 11% or approximately 2,420 members reside in Central Newfoundland. The proponent only received responses from 22 members which represents ~0.1% of the total QFN membership. Of those 22 respondents, only 12 participants resided in the Central region, representing ~0.5% of the QFN membership in that region. This sample size does not provide confidence that the boundaries of the LAA are adequate for the assessment of potential impacts to Indigenous persons; especially considering the close proximity of QFN members in Millertown and Buchans and the extensive land use in the area as illustrated in the Land and Resource Use section. • Adequate information regarding land and resource use by the Miawpukek First Nations (MFN) in the area potentially impacted by the project has not been provided. "Declining use" does not adequately describe the current and future land use of the areas surrounding the project; as these are traditional use areas they still may be utilized in the

ID:	**HC-01**
	future. The EIS did not provide adequate information on potential future use of these areas in relation to the life of the project and its long-term impacts on land and resource use. The Indigenous Group LAA does not align with the LAAs that encompass country food resources potentially utilized by indigenous users such as edible plants, berries, avifauna, caribou, fish and other organisms as applicable. As these and other organisms are considered country foods, any project related impacts within these LAAs should be considered in the assessment of effects for Indigenous groups & human health.
Information Request:	Health Canada recommends the following revisions be requested from the proponent: Revise the LAA for the Indigenous Groups VC taking into account the appropriate scale and spatial extent of potential environmental effects, community knowledge and Indigenous traditional knowledge, current or traditional land and resource use by Indigenous groups, ecological, technical, social and cultural considerations.
Response:	The Local Assessment Area (LAA) selected for the assessment, as described in Section 17.1.3.1 of the EIS, was based on the area where effects to Indigenous groups are likely to be most prevalent, such as effects to harvested species, country foods and sensory disturbance effects to Indigenous land users. The 40 km by 40 km buffer around the mine site and 500-m buffer around the access road was selected given the geographic extent of exposure pathways related to changes in air quality, changes in water quality, changes in country foods (quality, access and availability), and changes in sound quality from the Project. The LAA was conservatively selected as the largest extent of direct Project-related effects and therefore adverse effects are not anticipated to occur outside of the LAA to Indigenous land users. The Regional Assessment Area selected for the assessment encompasses the province of Newfoundland and Labrador to capture the extent of potential indirect effects to socio-economic conditions, such as employment, income and community revenue, and availability of culturally important species to the Indigenous groups, including Indigenous groups and users that may live outside of the LAA. Additional information on the selection of the LAA is provided below. • While the LAA for the Indigenous Groups chapter does not include Buchans or Millertown, the LAA for Community Services and Infrastructure includes those communities that may see increased demands from Project activities and construction and operation workforce including Grand Falls-Windsor, Badger, Buchans, Buchans Junction, Bishop's Falls, and Millertown. Effects on community services and infrastructure to Indigenous and non-Indigenous residents in these

ID:	**HC-01**
	communities has been provided in the assessment of community services and infrastructure. • Given there was limited publicly available information provided on resource and recreational use of the LAA, a conservative approach was used to address uncertainty in the effects assessment for both the Land and Resource Use Chapter (Chapter 16) and the Indigenous Groups Chapter (Chapter 17). This approach increases confidence in the final determination of significance by reducing the risk of understating potential Project effects. • Information provided in the Aboriginal Traditional Knowledge (ATK) Study, provided by the Qalipu Mi'kmaq First Nation Band (Qalipu), contributed to the baseline description. Given the limited number of participants in the ATK Study, Marathon acknowledges that this information may not be a comprehensive representation of how the Qalipu use the land and resources within the area. Therefore, the assessment conservatively assumed that there was potential for the Qalipu to use the LAA, even if land and resource use activity was not identified in that area in the Study. • While MFN indicated that its use of the Project Area has declined in recent years, the assessment on Indigenous peoples' health assumed that there was the potential for Indigenous groups to use the area for traditional purposes, including for harvesting country foods. With this conservative assumption, it was predicted that the overall residual effects from the Project on a change in Indigenous health conditions are anticipated to be negligible to low in magnitude, based on the low potential for air emissions and water discharges to affect the quality of country foods. The scope of the assessment for the Indigenous Groups Chapter (Chapter 17 of the EIS) is consistent with the Federal EIS Guidelines and section 5(1)(c) of the Canadian Environmental Assessment Act, 2012. Requirements to assess Project-related effects to Indigenous groups was not included under the Provincial EIS Guidelines. Subsequent to the EIS, a quantitative human health risk assessment (HHRA) has been completed for Indigenous and non-Indigenous receptors within the LAA. The HHRA has confirmed the predictions made in the EIS. The results of the HHRA are provided in the Valentine Gold Human Health Risk Assessment (Appendix A). The assessment considered the potential changes in environmental quality for air, soil, surface water, terrestrial country food, and fish between Baseline Case and Future Case conditions. The LAA for the HHRA corresponds with the EIS LAA for the Atmospheric Environment and Surface Water Resources Valued Components. The

ID:	**HC-01**
	HHRA conservatively assumed that both Indigenous and non-Indigenous receptors spend 100% of their time in the LAA and that 100% of country food and fish are harvested from within the LAA. Country food consumption rates for Indigenous receptors were based on the 95th percentile grams of traditional food per day reported in the First Nations Food, Nutrition and Environment Study – Atlantic Region Results 2014 (Chan et al. 2017). Areas of land and resource use that fall beyond the boundaries of the Atmospheric Environment and Surface Water LAAs will not be affected by Project activities and will therefore not contribute to potential exposures to Project-related emissions. Given the assumptions noted above, use of lands and harvesting of country foods from areas beyond the LAA would only serve to reduce potential exposures to Project-related contaminants of potential concerns from country foods harvested within the LAA. Thus, land and resource areas that fall beyond the Atmospheric Environment and Surface Water LAAs have not been included in the LAA for the HHRA. The results of the HHRA 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. References: Chan, L., O. Receveur, M. Batal, W. David, H. Schwartz, A. Ing, K. Fediuk, and C. Tikhonov. 2017. First Nations Food, Nutrition and Environment Study (FNFNES): Results from the Atlantic Region 2014. Ottawa: University of Ottawa, 2017. Print. Available at: http://www.fnfnes.ca/docs/Atlantic_Regional_Report_Eng_Jan_25.pdf (Accessed February 2021)
Appendix:	See Appendix A: Human Health Risk Assessment

RESPONSE TO HC-02

ID:	HC-02
Expert Department or Group:	Health Canada
Guideline Reference:	Section 3.3 Scope of the Factors to be Considered Section 4.2.1.9 Population Health and Community Services Infrastructure
EIS Reference:	Chapter 17
Context and Rationale:	The identification of temporal boundaries for the purpose of evaluating potential impacts to human health was inadequate. The temporal boundaries for Indigenous groups and VCs related to country foods (i.e., vegetation and animal species consumed as country food) were identified as ceasing with the closure phase of the project: Decommissioning, Rehabilitation and Closure Phase – Closure rehabilitation to occur once it is no longer economical to mine or resources are exhausted. (Section 17.1.3.2) However, the temporal boundaries for the Surface Water VC extend to the post closure period due to the potential for ongoing environmental effects: "Post-closure monitoring, which is completed once the closure activities are complete to ensure that the site is chemically and physically stable is generally six to 10 years for some components, and longer if dams are left in place for the TMF…" (Section 7.1.3.2). As post-closure environmental effects have the potential to impact human health through impacts to country food, surface water, etc., the temporal boundaries for the Indigenous Group VC should be extended to encompass these post closure effects, including bioaccumulation of COPCs in country foods and chronic exposure to COPCs in all potentially impacted media.
Information Request:	Health Canada recommends the following revisions be requested from the proponent: Revise the temporal boundaries for the purpose of evaluating potential impacts to human health. The EIS should clearly document the temporal boundaries of the projected impacts to the environment—this will address the timing and lifespan of the potential impacts of the proposed project. Temporal considerations for impacts to human health may also include the differentiation between acute and chronic exposures to elevated levels of chemicals in the environment and the durations over which chronic exposures may occur. This should

ID:	**HC-02**
	include considerations such as the operating life of the project and the length of time a project may have an effect on the environment.
Response:	The temporal boundaries for the purpose of evaluating potential impacts to human health are defined in Section 3.2.2 – Temporal Boundaries of the Valentine Gold Human Health Risk Assessment (HHRA; Appendix A). The HHRA evaluated potential human health risks associated with inhalation exposures to Project-related contaminants of potential concern (COPC) using the air quality modelling predictions based on the highest production years, which provided upper-bound estimates of COPC concentrations in ambient air. The HHRA assumed these concentrations to be present in ambient air over the construction and operation phases of the Project. Post closure, air quality would be expected to return to Baseline Conditions. The HHRA evaluated potential changes in soil and country food based on deposition estimates provided in the air quality assessment. The HHRA conservatively assumed that predicted changes to soil and country foods were permanent and last over a person's lifetime. The HHRA evaluated potential changes in surface water quality based on information provided in the surface water quality assessment. The HHRA conservatively assumed that predicted changes in surface water quality were permanent and therefore a receptor could be exposed to these COPC daily over a lifetime. Thus, for soil, country food and surface water quality, the temporal boundaries extend well into the future.
Appendix:	See Appendix A: Human Health Risk Assessment

RESPONSE TO HC-03

ID:	**HC-03**
Expert Department or Group:	Health Canada
Guideline Reference:	Section 4.1.4.3 Project Location Section 4.2.1.9 Population Health and Community Services Infrastructure
EIS Reference:	Chapter 5
Context and Rationale:	The identification of receptors for the purpose of evaluating potential impacts to human health was inadequate. The EIS did not comprehensively identify all human receptors that may be present in the area potentially impacted by the project. All human receptors (both Indigenous and non-Indigenous) that may be impacted by the proposed project, their type of use (hunting, gathering, recreational water use, etc.) and duration/length of use (permanent, seasonal or temporary) currently and in the future, should be clearly listed and identified on maps and figures in the EIS, including the type of receptor location (e.g., residence, cabin, recreational use area, country food harvesting, etc.) and proximity of the receptor location to the project. When identifying potential receptors, consideration should be given to potentially sensitive receptors and vulnerable populations that may be exposed to increased levels of risk due to physiology, health status, behaviour, and/or lifestyle. Examples include seniors, pregnant or nursing mothers, infants, and consumers of higher quantities of local country foods that may receive greater exposure to COPCs. The EIS documents extensive use of the LAA and RAA by local area residents and cabin users (171 cabin plots & 2 cabin developments areas in the RAA), including hunting, fishing and trapping. Therefore, the potential for country food consumption is highly likely. As project related activities have the potential to contaminate country food, human receptors may be exposed through direct contamination of country food or through COPCs that bioaccumulate or bio- concentrate through the food chain. However, the Land and Resource Use VC did not include identification of human receptors, their location and their duration of land use activity in its assessment, and excluded information on gathering activities (i.e., berry picking & vegetation harvesting) in the LAA/RAA and project area. Recreational water use was also noted in Section 16.2.2.3 of the Land and Resource Use section; however, the location and duration of these activities and the potential receptors were not identified.

ID:	**HC-03**
Information Request:	Health Canada recommends the following revisions be requested from the proponent: a. Comprehensively identify all human receptors (both Indigenous and non-indigenous) that may be impacted by the proposed project currently and in the future. These receptors should be clearly listed and identified on maps and figures in the EIS, including the type of receptor location (e.g., residence, cabin, recreational use area, country food harvesting, etc.) and proximity of the receptor location to the project. b. Provide information on the types and duration of activities (e.g., fishing, vegetation harvesting, hunting, swimming) of receptors. c. Additionally, potential noise and air quality effects from project related traffic may impact receptors in Millertown and Buchans Junction, however these communities were also not included as potential receptors.
Response:	a. The Indigenous and non-Indigenous receptors are identified in Section 4.1 – Receptor Characterization of the Valentine Gold Human Health Risk Assessment (Appendix A), referred to herein as the HHRA. The general assumptions that govern frequency and duration of potential exposures for Indigenous and non-Indigenous receptors are provided in Section 4.1.1 of the HHRA. Receptor assumptions specific to Indigenous receptors, such as country food consumption rates, are provided in Section 4.1.2 of the HHRA. Receptor assumptions specific to non-Indigenous receptors are provided Section 4.1.3 of the HHRA. Receptor locations were selected to represent the places where human receptors are likely to be present and could be exposed to emissions from the Project. The selection of receptor locations was based on consideration of land use and input from local communities. The locations of seasonal cabins, camps, and outfitters, as well as the worker accommodations camp and exploration camp, are provided on Figure 3-1 of the HHRA. b. The HHRA conservatively assumed that both Indigenous and non-Indigenous receptors spend 100% of their time in the Local Assessment Area (LAA) and that 100% of country food and fish are harvested from within the LAA. Country food consumption rates for Indigenous receptors were based on the 95th percentile grams of traditional food per day reported in the First Nations Food, Nutrition and Environment Study – Atlantic Region Results 2014 (Chan et al. 2017). The country food consumption rates for the non-Indigenous receptor were based on the daily food ingestion rates recommended by Health Canada (Health Canada 2010).

ID:	**HC-03**
	There are no beaches or other recreational areas in the LAA where Indigenous and non-Indigenous people could reasonably be expected to come into contact with sediment on a repeated basis. Therefore, contact with sediment would not be expected to result in a change in human health risk between Baseline Case and Future Case conditions for Indigenous and non-Indigenous receptors. In addition, surface water quality in Victoria Lake Reservoir, Valentine Lake and the Victoria River meet Canadian Drinking Water Quality Standards under Baseline and Future Case conditions. Therefore, recreational exposure to surface water would represent a negligible change in human health risk for Indigenous and non-Indigenous receptors in the LAA. c. Refer to the responses to HC-12 and HC-15 for further information on potential noise and air quality effects from Project-related traffic on receptors in Millertown and Buchans Junction. References: Chan, L., O. Receveur, M. Batal, W. David, H. Schwartz, A. Ing, K. Fediuk, and C. Tikhonov. 2017. First Nations Food, Nutrition and Environment Study (FNFNES): Results from the Atlantic Region 2014. Ottawa: University of Ottawa, 2017. Print. Available at: http://www.fnfnes.ca/docs/Atlantic_Regional_Report_Eng_Jan_25.pdf (Accessed February 2021) Health Canada. 2010. Guidance on Human Health Detailed Quantitative Risk Assessment for Chemicals (DQRAChem). Available at: Microsoft Word - DQRA - English Final (publications.gc.ca)
Appendix:	See Appendix A: Human Health Risk Assessment

RESPONSE TO HC-04

ID:	**HC-04**
Expert Department or Group:	Health Canada
Guideline Reference:	Section 4.2.1.9 Population Health and Community Services Infrastructure
EIS Reference:	Chapter 14, Chapter 17
Context and Rationale:	A human health risk assessment is needed to determine potential effects of the project on human health. A Human Health Risk Assessment (HHRA) for the project and its associated activities was not completed. As there may be risks to human health (for human receptors such as hunters, gatherers, fishers, recreational users, workers living on site, etc.) due to project related changes in the environment, Health Canada (HC) recommends that the proponent complete an HHRA. An HHRA is a process used to estimate the exposure that individuals may receive from project related COPCs and to identify whether there may be potential risks associated with that exposure, accounting for the cumulative effects of current and proposed projects. An HHRA provides increased defensibility for any conclusions of an Environmental Assessment. It can also be used to provide a quantitative estimate of the potential risks in an exposed population, and highlight the need for and guide the development of appropriate mitigation measures, follow-up, monitoring plans, remediation, and/or risk management approaches to reduce or eliminate the potential human health risks associated with project activities. Where a proposed project may result in effects to multiple environmental media (e.g., air, soil, water, food) and there are multiple exposure pathways, an HHRA that evaluates all potential exposure pathways together (i.e., multi-media) is a useful tool for estimating potential risks to human health as a result of the project. As there are no applicable regulatory guidelines against which concentrations of COPCs in foods can be screened a quantitative assessment would be required. Also, it is recommended that a quantitative HHRA be conducted in the following cases: • The project is proposed for a region that is already experiencing high background levels of certain contaminants (e.g., chromium, arsenic). • The project contribution, in conjunction with cumulative effects from existing developments or foreseeable projects, leads to substantive increase of one or more COPCs.

ID:	**HC-04**
	If potential risks to human health from project related activities (as demonstrated in the exposure assessment) do not exist, justification should be provided to support this determination.
Information Request:	Health Canada recommends the following revisions be requested from the proponent: Complete a quantitative HHRA which estimates the exposure that individuals may receive from project related COPCs and identifies whether there may be potential risks associated with that exposure, accounting for the cumulative effects of current and proposed projects. Refer to Health Canada's Guidance for Evaluating Human Health Impacts in Environmental Assessments: Human Health Risk Assessment for additional information.
Response:	A quantitative human health risk assessment (HHRA) has been completed for Indigenous and non-Indigenous receptors who are assumed to live and or gather / harvest country foods within the Local Assessment Area. The assessment considered the potential changes in environmental quality for air, soil, surface water, terrestrial country food, and fish between Baseline Case and Future Case conditions. The results of the HHRA are provided in the Valentine Gold Human Health Risk Assessment (Appendix A). As discussed in Section 2.2 of the HHRA, the HHRA applied the following guidance for assessing human health for an environmental assessment: • Guidance for Evaluating Human Health Impacts in Environmental Assessment: Human Health Risk Assessment • Guidance for Evaluating Human Health Impacts in Environmental Assessment: Human Health Risk Assessment: Air Quality • Guidance for Evaluating Human Health Impacts in Environmental Assessment: Human Health Risk Assessment: Country Foods • Guidance for Evaluating Human Health Impacts in Environmental Assessment: Human Health Risk Assessment: Drinking and Recreational Water Quality
Appendix:	See Appendix A: Human Health Risk Assessment

RESPONSE TO HC-05

ID:	**HC-05**
Expert Department or Group:	Health Canada
Guideline Reference:	Section 4.2.1.9 Population Health and Community Services Infrastructure
EIS Reference:	Chapter 14, Chapter 17
Context and Rationale:	The identification of Contaminants of Potential Concern (COPCs) was inadequate for the purpose of evaluating potential impacts to human health. The EIS identifies some Parameters of Potential Concern (POPCs) which are potential surface and ground water contaminants and potential air quality contaminants, however, the list was not comprehensive. For example, chromium is identified as being elevated in Section 7-Surface Water. However, chromium is excluded in Tables 7.37-7.48 for the final discharge points "Predicted POPC Concentrations in Receiving Environment" analysis and therefore not identified as a COPC. COPCs are contaminants of which concentration(s) may become elevated in environmental media as a result of project-related activities, and which have the potential for adverse health impacts based on documented scientific evidence or suspected causal relationships. The baseline plus project scenario is typically used to identify COPCs as it estimates the potential future environmental conditions that would exist if the proposed project is approved and proceeds. The following considerations may be used to identify which chemicals may be considered as COPCs associated with the proposed project: • The concentrations of various chemicals that are present in environmental media prior to project commencement (i.e., baseline conditions) • 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) • The concentrations that models indicate will be present in various media in areas where there are human receptors • The concentrations of chemicals in environmental media that may be incidentally released during project activities • 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.

ID:	**HC-05**
	All chemicals that may be elevated in environmental media as a result of project activities may be initially considered as COPCs.
Information Request:	Health Canada recommends the following revisions be requested from the proponent: Provide a comprehensive list of COPCs for the project. Refer to Health Canada's Guidance for Evaluating Human Health Impacts in Environmental Assessments: Human Health Risk Assessment for additional information.
Response:	A comprehensive list of contaminants of potential concern (COPC) is provided in Section 3.4 of the of the Valentine Gold Human Health Risk Assessment (HHRA; Appendix A). The list of COPC considered in the HHRA include CO, SO_2, NO_2, PM_{10}, $PM_{2.5}$, DPM, HCN, As, Ba, Be, Cd, Cr Co, Cu, Pb, Hg Ni, Sr, and Zn.
Appendix:	See Appendix A: Human Health Risk Assessment

RESPONSE TO HC-06

ID:	**HC-06**
Expert Department or Group:	Health Canada
Guideline Reference:	Section 4.2.1.9 Population Health and Community Services Infrastructure
EIS Reference:	Chapter 14, Chapter 17
Context and Rationale:	The screening of Contaminants of Potential Concern (COPCs) for the purpose of evaluating potential impacts to human health was not completed using appropriate health based screening criteria. All substances that currently exceed or that are predicted in the future to exceed applicable health-based guidelines should be further evaluated in the HHRA. The EIS identified COPCs (referred to as POPCs in the EIS) for surface water and ground discharges, however screening criteria used to assess these COPCs were not appropriate for an assessment of potential impact to human health. The Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life (CWQG-FAL) and the *Metal and Diamond Mining Effluent Regulations* (MDMER) are not intended to be used as criteria to screen contaminants that may pose a risk to human health. In utilizing these screening criteria, COPCs may have been screened out that should have been carried forward to an exposure assessment. Air quality COPCs identified in the EIS were screened against the Canadian Ambient Air Quality Standards (CAAQS) and The Newfoundland & Labrador Ambient Air Quality Standards (NLAAQS). These standards may be used as part of the assessment for air quality impacts but are not appropriate health based screening criteria for an assessment of potential impact to human health. (See HC-10 for further comments related to this). In utilizing the CAAQS & the NLAAQS as screening criteria, COPCs may have been screened out that should have been carried forward to an exposure assessment; for example, PM_{10}, $PM_{2.5}$ and NO_2 are considered to be non-threshold air pollutants, meaning that health effects may occur at low levels of exposure even below air quality standards. Additionally, the International Agency for Research on Cancer (IARC) has identified air pollution as a whole, as well as component particles ($PM_{2.5}$, PM_{10} and diesel exhaust), as causes of cancer (IARC 2013, 2014). A chemical should be retained as a COPC if the predicted maximum concentration in the baseline plus project scenario exceeds the appropriate health based screening criteria. However, as there are currently no guidelines/screening criteria which are considered protective of the country

ID:	**HC-06**
	food consumption pathway, COPCs emitted by the proposed project that tend to bioaccumulate or biomagnify up the food chain should also be retained as COPCs in the exposure assessment, unless sufficient evidence is available to exclude them. All substances that currently exceed or that are predicted in the future to exceed an applicable health-based guideline value should be further evaluated in the HHRA, irrespective of whether the predicted increase is expected to be more or less than 10% from the baseline.
Information Request:	Health Canada recommends the following revisions be requested from the proponent: Re-evaluate the COPCs using appropriate health based screening criteria. Refer to Health Canada's Guidance for Evaluating Human Health Impacts in Environmental Assessments: Human Health Risk Assessment for additional information, specifically Section 7.1.2 Identification Of Contaminants of Potential Concern and Appendix C: Additional Information About Screening Chemicals of Potential Concern.
Response:	A comprehensive list of contaminants of potential concern (COPC) based on potential emissions and releases associated with Project-related activities is provided in Section 3.4 of the Valentine Gold Human Health Risk Assessment (HHRA; Appendix A). COPCs with a potential for bioaccumulation and biomagnification up the food chain were retained. Consistent with Section 7.1.4 of Health Guidance's Guidance for Evaluating Human Health Impacts in Environmental Assessments: Human Health Risk Assessment (Health Canada 2019), further screening may be conducted to exclude exposure pathways for which the potential magnitude of exposure is negligible. For air, soil, and surface water, further screening was completed by comparing Baseline Case and predicted Future Case COPC concentrations and human health-based screening criteria. Screening was completed for COPC in air (Section 4.3.1 of the HHRA), soil (Section 4.3.2 of the HHRA), and surface water (Section 4.3.3 of the HHRA). The further screening of COPCs in country foods considered Baseline Case and the potential changes from Project-related activities (Section 4.3.4 of the HHRA). 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)

ID:	**HC-06**
Appendix:	See Appendix A: Human Health Risk Assessment

RESPONSE TO HC-07

ID:	**HC-07**
Expert Department or Group:	Health Canada
Guideline Reference:	Section 4.2.1.9 Population Health and Community Services Infrastructure
EIS Reference:	Chapter 14, Chapter 17
Context and Rationale:	Identification and screening of exposure pathways for project related COPCs was inadequate. The EIS did not include identification and screening of exposure pathways for project related COPCs (i.e., ingestion of country food contaminated through deposition or food chain uptake, water ingestion, inhalation of particulates or volatile compounds, dermal contact with environmental media, etc.). As many of the COPCs were screened out using inappropriate screening criteria (see HC-06), the exposure pathways for these COPCs were not evaluated. Potential exposure to COPCs in environmental media for each project phase (construction, operation, maintenance, decommissioning, closure, etc.) should be clearly documented to evaluate how receptors may potentially come in contact with impacted media. An exposure pathway includes consideration of the contaminant source, release mechanisms, transport mechanisms within the relevant environmental medium (or media), points of exposure (receptors), and exposure routes. The exposure route refers to how a person comes into contact with a COPC (e.g., ingestion of country food contaminated through deposition or food chain uptake, water or soil ingestion, inhalation of particulates or volatile compounds, dermal contact). Exposure pathways are considered “operable” if a COPC is present and there is a route of exposure by which a receptor comes into contact with the COPC. All potential pathways of exposure should be considered operable unless evidence-based justification is provided for their exclusion. A pathway that is operable but with low exposure concentrations should not be eliminated. Further screening may be conducted to exclude exposure pathways for which the probability of exposure is very low or the potential magnitude of exposure is negligible. However, sound justification should be provided for the exclusion of any complete exposure pathway and receptor from further consideration in the risk assessment (Health Canada 2010a).

ID:	**HC-07**
Information Request:	Health Canada recommends the following revisions be requested from the proponent: Revision of the EIS to include identification and screening of exposure pathways for project related COPCs. All potential pathways of exposure should be considered operable unless evidence-based justification is provided for their exclusion. Refer to Health Canada's Guidance for Evaluating Human Health Impacts in Environmental Assessments: Human Health Risk Assessment for additional information.
Response:	A conceptual site model is provided in Section 4.4 of the Valentine Gold Human Health Risk Assessment (HHRA; Appendix A). Evidence-based justifications for the inclusions / exclusion of potential exposure pathways is provided in Table 4.7 of the HHRA.
Appendix:	See Appendix A: Human Health Risk Assessment

RESPONSE TO HC-08

ID:	**HC-08**
Expert Department or Group:	Health Canada
Guideline Reference:	Section 4.2.1.9.4.1 Population Health Section 4.1.7 Avoidance and Mitigation Measures
EIS Reference:	Chapter 14, Chapter 17
Context and Rationale:	Mitigation measures proposed in the EIS are not informed by an assessment of risk to human health. To identify appropriate mitigation measures to manage risks to human health, a HHRA should be completed. As the EIS did not contain an evaluation of potential risks to human health (in a completed HHRA); HC is unable to assess if the proposed mitigation measures are appropriate. An HHRA can be used to provide a quantitative estimate of the likelihood of potential risks in an exposed population and to highlight the need for mitigation measures where there may be elevated exposures. Risk estimates in an HHRA should also be presented with and without any proposed mitigation measures. Mitigation measures aim to eliminate, reduce or control adverse environmental effects related to a project. The EIS should provide information describing the mitigation measures addressing operable pathways where unacceptable risks to human health have been identified. These proposed mitigation measures should reduce the risk to acceptable levels and the effectiveness of these mitigations measures should be adequately supported by science.
Information Request:	Health Canada recommends the following revisions be requested from the proponent: Using the results of a completed HHRA, identify potentially unacceptable risks to human health and the mitigation measures required to reduce these risk to an acceptable level. If substantial baseline contamination exists, the potential for environmental contamination introduced by project-related activities may necessitate consideration of additional mitigation measures. If risks to human health cannot be reduced to acceptable levels with the implementation of mitigation measures then modification of project activities may be required.

ID:	**HC-08**
Response:	The assessment of Baseline Case conditions in air, soil, surface water, and country foods did not identify evidence of baseline contamination, as discussed in Section 4.3 of the Valentine Gold Human Health Risk Assessment (HHRA; Appendix A). In addition, the assessment of air, soil, water and country foods determined that contaminants of potential concern concentrations under Future Case conditions would represent negligible change in human health risks. Based on these findings, it is reasonable to conclude that additional mitigation measures specific to human health, beyond those measures already proposed in the Atmospheric Environment (Chapter 5 of the EIS) and Surface Water Resources (Chapter 7 of the EIS) assessments, are not required to address potential human health risks.
Appendix:	See Appendix A: Human Health Risk Assessment

RESPONSE TO HC-09

ID:	**HC-09**
Expert Department or Group:	Health Canada
Guideline Reference:	Section 4.2.1.9 Population Health and Community Services Infrastructure
EIS Reference:	Chapter 14, Chapter 17
Context and Rationale:	The mitigation measures proposed to address potential impacts to human health are not adequate. The effectiveness of these mitigation measures has also not been provided. To identify appropriate mitigation measures to manage risks to human health, a HHRA should be completed. The EIS does not include mitigation measures for all potential COPCs and their potential pathways of exposure. The mitigation measures presented in the EIS (Table 2.22) do not provide sufficient detail. For example, the EIS notes that "Project facilities and infrastructure will be designed to limit noise emissions" however, there is no justification or rationale to support its effectiveness. These mitigation measures are unable to be evaluated for adequacy as they lack necessary details, including: • the COPC(s) and pathway of exposure targeted • the threshold value(s) of the COPC at which mitigation is necessary (with applicable rationale as necessary) • the mitigation measure(s) to be employed for each threshold)/limit that is exceeded with evidence supporting its anticipated effectiveness • proposed monitoring activities to determine effectiveness of the proposed measure(s) • additional mitigation measures to be utilized as necessary to reduce the risk to human health to acceptable levels Additionally, the EIS proposes development of project specific mitigation measures in a series of Management Plan including those for Air Quality. These are not available for review by HC in the EIS and therefore HC cannot comment on their appropriateness.
Information Request:	Health Canada recommends the following revisions be requested from the proponent: Revise the EIS to include mitigation measures for all potential COPCs and their potential pathways of exposure. These mitigation measures should be adequately supported by evidence.

ID:	**HC-09**
Response:	The assessment of air, soil, water, and country foods determined that contaminant of potential concern (COPC) concentrations under Baseline Case and Future Case conditions would represent negligible change in human health risks. Based on these findings, it is reasonable to conclude that additional mitigation measures specific to human health, beyond those measures already detailed in the Atmospheric Environment (Chapter 5 of the EIS) and Surface Water Resources (Chapter 7 of the EIS) assessments, are not required to address potential human health risks. A summary of the proposed mitigation measures that apply to human health risks associated with exposures to COPC is provided in Section 9 of the of the Valentine Gold Human Health Risk Assessment (HHRA; Appendix A). For the purposes of this assessment, COPC refer to air and surface water contaminants. Noise was assessed separately in Section 5.5.3 of the EIS (Change in Sound Quality) and includes a discussion of effects pathways for noise, mitigation measures (Table 5.11), and assessment of residual effects. As noted in Section 5.9, sound pressure level monitoring programs are planned near the most affected receptor locations, including the accommodations camp, to monitor the effectiveness of Project mitigation measures. Air quality and surface water monitoring programs will be conducted as described in Sections 5.9 and 7.9 of the EIS, respectively, with final design of the monitoring programs subject to regulatory review and approval. In addition, environmental effects monitoring (EEM) pursuant to the *Metals and Diamond Mining Effluent Regulations* (MDMER) requires that biological studies evaluate effects of effluent to fish and fish habitat in receiving waters. Biological studies include a fish population survey (to monitor effects on growth, reproduction, condition, and survival), a fish tissue study (if selenium and mercury concentrations in effluent trigger such studies), and a benthic invertebrate community study. Biological studies are conducted every three years. EEM requirements continue throughout the life of the mine until it becomes a recognized closed mine under MDMER. In 2021, baseline studies will continue to collect information to support future EEM under MDMER. In addition, 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:	See Appendix A: Human Health Risk Assessment

RESPONSE TO HC-10

ID:	**HC-10**
Expert Department or Group:	Health Canada
Guideline Reference:	Section 4.2.1.9 Population Health and Community Services Infrastructure
EIS Reference:	Chapter 5
Context and Rationale:	The air COPCs identified are incomplete and assessment approaches are inappropriate to properly address potential human health effects. Air contaminants associated with diesel exhaust (DE), such as volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs), are not assessed, as these compounds are "not expected to be released in substantive quantities and are not typically the primary air contaminants of concern from the operation of a mine". The project-associated air pollutant emissions, especially DE from heavy mining equipment, transport trucks, and power generators may contribute considerably to elevated levels of PAHs, VOCs, and diesel particulate matter (DPM) in air. DE is a mixture of various contaminants including DPM, VOCs (e.g., formaldehyde, acetaldehyde, benzene, 1,3-butadiene) and PAHs, and most of them are considered as carcinogens. The EIS provided only an evaluation of non-cancer health effects of DPM based on the short-term (2 hr) exposure guidance values (p.17.41). Health Canada recommends the following approaches and methods to collect baseline data and assess project impacts: • VOCs - It is recommended to assess specific aldehydes that are associated with diesel exhaust (DE), such as acetaldehyde, formaldehyde, 1,3-butadiene and acrolein, as well as benzene, for the evaluation of VOCs. • PAHs - It is recommended to assess the cancer risks of human exposures to all potentially carcinogenic PAHs in mixture rather than a single surrogate substance. A mixture analysis (weighted approach) allows for determination of the cancer risks of PAHs based on benzo(a)pyrene [B(a)P] Total Potency Equivalents (TPE), or the sum of estimated cancer potency relative to B(a)P, in comparison to the appropriate health-based toxicological reference values (e.g., Health Canada's Inhalation Unit Risk). • DPM - The human health risks associated with exposure to potential project-related DE emissions should be addressed. DE is a complex mixture of gaseous and particulate compounds, including DPM. It is

ID:	**HC-10**
	recommended to follow one of the approaches below for a carcinogenic evaluation of DE: – Conduct a quantitative assessment of an incremental cancer risk associated with DE using the unit risk and inhalation slope factor available from the California Environmental Protection Agency (CalEPA) in combination with model estimates of exposure to DE. This approach provides insight as to the potential impacts a specific project would have in relation to risk associated with the diesel emissions. Or; – Provide a robust qualitative discussion on the carcinogenic risk of DE associated with the project. The discussion should include the following elements to ensure transparency: i) identification of the main sources of DE for the project and of the relative importance of DE as a source of air pollution for the project; ii) recognition that DE has been declared a human carcinogen by international agencies including Health Canada, WHO (IARC), the US EPA and the California EPA; iii) the rationale for not undertaking a quantitative analysis of DE carcinogenic risk for the project." References: California Environmental Protection Agency (CalEPA). 1998. The Report on Diesel Exhaust. Available online at: https://ww2.arb.ca.gov/sites/default/files/classic//toxics/dieseltac/de-fnds.htm.
Information Request:	Health Canada recommends the following revisions be requested from the proponent. a. Provide an inventory of all emissions and contaminants of potential concern (COPCs) resulting from the proposed project in an air quality assessment. b. Provide on-site sampling and quantitative analyses of common air pollutants (including PAHs, VOCs, DPM, as well as $PM_{2.5}$, NO_2 and SO_2) to help assess the project impacts on contaminant levels with confidence, or c. Should other assessment approaches, including the use of surrogates and/or a qualitative assessment, be more appropriate, provide a detailed rationale/explanation for any deviation from characterization/assessment approaches recommended in b), as well as an estimate of the uncertainty associated with the use of the alternative approaches. If an assessment is unnecessary for any air pollutants, provide a detailed rationale/explanation for exclusion. For more information refer to: Health Canada. 2016. Human Health Risk Assessment for Diesel Exhaust.

ID:	**HC-10**
Response:	a. The approach used in the EIS is consistent with Health Canada (2016a), Section 6.4. Specifically, an inventory of air contaminant emissions expected to be of potential concern was completed in an air quality assessment. This inventory of emissions and air contaminants of potential concern (COPCs) resulting from the proposed Project is provided in Section 5.5.1 of Chapter 5 (Atmospheric Environment) of the EIS. The air COPCs are also detailed in Section 3.4 of the Valentine Gold Project Human Health Risk Assessment (HHRA; Appendix A). b. As per Health Canada (2016b), COPCs are chemicals whose concentration(s) may become elevated in ambient air as a result of project related activities. Based on professional experience and recent air quality assessments and HHRAs conducted for similar mining projects, volatile organic compound (VOC) and polyclic aromatic hydrocarbon (PAH) emissions from the Project would be too low to substantively affect ambient air quality. Therefore, these chemical species were not included in the air dispersion modelling. While these chemical species were not included in the assessment for the Valentine Gold Project, carcinogenic and non-carcinogenic PAH and speciated VOCs have been assessed in other mining projects of similar scope and magnitude (Greenstone Gold Project – Ontario, Lynn Lake Gold Project – Manitoba, Ajax Copper-Gold Project – British Columbia). These assessments evaluated the potential human health risks for 1-hour, 24-hour, and annual average exposures for speciated VOC (including acetaldehyde, benzene, 1,3-butadiene, ethylbenzene, formaldehyde, proprionaldehyde, toluene, 2,2,4-trimethylpentane, and xylenes) and annual average exposures to non-carcinogenic and carcinogenic PAH (as Benzo[a]pyrene toxic equivalents – B[a]PTPE) and carcinogenic VOCs. For each of these projects, the hazard quotients associated with short-term (1-hour and 24 hour) and long-term (annual average) inhalation exposures to the non-carcinogenic VOC and PAH were all less than 0.2, with most being in the 10^{-4} to 10^{-6} range. These results apply to Indigenous and non-Indigenous receptors in the Local Assessment Areas (LAAs) for these projects and for workers in the worker accommodation camp (Lynn Lake Gold Project). The incremental lifetime cancer risks associated with inhalation exposures to the carcinogenic VOC (acetaldehyde, benzene, 1,3-butadiee, formaldehyde, 2,2,4-trimethylpentane) and carcinogenic PAH (as B[a]PTPE) were all below the 10^{-5} negligible cancer risk negligibility benchmark ranging between 10^{-6} and 10^{-12}. Based on the results for similar studies, where predicted human health risks are more than 10-fold below the corresponding health

ID:	HC-10
	risk benchmarks, it is reasonable to conclude that predicted human health risks associated with inhalation exposures to VOC and PAH would represent a negligible change in human health risks for Indigenous and non-Indigenous receptors in the LAA, and for off-duty workers housed in the worker accommodation camp(s). Refer to Section 3.4 of the HHRA (Appendix A) for a discussion of the air COPCs considered in the HHRA. c. Potential human health risks associated with inhalation exposures to COPC under Baseline Case and Future Case conditions were assessed in the HHRA (Appendix A). COPC concentrations in air (criteria air contaminants, diesel particulate matter [DPM], trace metals, particulate matter less than 10 um diameter, particulate matter less than 2.5 um diameter, and hydrogen cyanide) were screened against human health-based air quality criteria for Baseline Case and Future Case conditions (Section 4.3 of the HHRA). No exceedances of human health-based screening criteria were identified for Indigenous and non-Indigenous receptor locations in the LAA or at the worker accommodation facilities (worker camp and exploration camp) under Baseline Case or Future Case conditions. Based on these findings, it is reasonable to conclude that predicted COPC concentrations in ambient air represent a negligible change in human health risk. Consistent with Health Canada Toxicological Reference Values (TRVs), the potential human health risks associated with inhalation exposure to diesel exhaust (DE) (as DPM) were based on the 2-hour and annual average TRVs for non-cancer effects. Diesel exhaust from diesel engines that predate 2007 has been identified as a potential human carcinogen by several agencies including the California EPA, World Health Organization, International Agency for Research on Cancer, and Health Canada. An assessment of the potential cancer risks associated with inhalation exposures to diesel exhaust (as DPM) was not included in the assessment for the following reasons: • In 2015 the Health Effects Institute (HEI) released a detailed review of the available epidemiological information related to exposures to DE (https://www.healtheffects.org/publication/diesel-emissions-and-lung-cancer-evaluation-recent-epidemiological-evidence-quantitative). This review noted that the epidemiological evidence supports an association between occupational exposures to DE and increased incidence of lung cancer. The review also noted that notwithstanding the 1998 publication of an inhalation unit risk for DE by the California Office of Environmental Health Hazard Assessment, the general consensus within the scientific community is that the available epidemiological evidence is insufficient to undertake a

ID:	HC-10
	credible quantitative assessment of DE carcinogenicity that could support the development of an inhalation unit risk value for DE (HEI 2015, Health Canada 2016b). • As cited in HEI 2015, studies completed by Borak et. al. (2011), McClellan and Hesterberg (2012) and McDonald et. al. (2015) reported that there was no evidence of carcinogenicity or other adverse effects in rodents following lifetime exposure to emissions from newer technology diesel engines (post-2007). Although adverse effects were noted at the highest exposure concentrations, these effects were attributed to NO_2. Based on this, the authors concluded that there is sufficient evidence to suggest that the results from studies using pre-2007 diesel exhaust likely have little relevance in assessing potential human health risks associated with inhalation exposures to exhaust from newer technology diesel engines. • The Health Canada (2016b) assessment of DE did not include a quantitative nor qualitative assessment of the potential carcinogenicity of DPM. References: Borak, J., W. B. Bunn, G. R. Chase, T. A. Hall, H. J. Head, T. W. Hesterberg, G. Sirianni, and T. J. Slavin. 2011. Comments on the Diesel Exhaust in Miners Study. The Annals of Occupational Hygiene, Volume 55, Issue 3, April 2011, Pages 339–342. Available at: https://doi.org/10.1093/annhyg/mer005 Health Canada. 2016a. Guidance for Evaluating Human Health Impacts in Environmental Assessment: Air Quality. Health Canada. 2016b. Human Health Risk Assessment for Diesel Exhaust. Available at: https://www.ccacoalition.org/sites/default/files/resources/2016_Human-Health-Assessment-for-Diesel-Exhaust_Canada.pdf HEI 2015: Health Effects Institute: Diesel Emissions and Lung Cancer: An Evaluation of Recent Epidemiological Evidence for Quantitative Risk Assessment: HIE Diesel Epidemiology Panel. Available at: *https://www.healtheffects.org/publication/diesel-emissions-and-lung-cancer-evaluation-recent-epidemiological-evidence-quantitative* McClellan, R.O., T.W. Hesterberg, and J.C. Wall. 2012. Evaluation of carcinogenic hazard of diesel engine exhaust needs to consider revolutionary changes in diesel technology. Regul Toxicol Pharmacol 63:225–258.

ID:	**HC-10**
	McDonald, J.D., M. Doyle-Eisele, J. Seagrave, A.P. Gigliotti, J. Chow, and B. Zielinska. 2015. Part 1. Assessment of carcinogenicity and biologic responses in rats after lifetime inhalation of new-technology diesel exhaust in the ACES bioassay. In: Advanced Collaborative Emissions Study (ACES) Lifetime Cancer and Non-Cancer Assessment in Rats Exposed to New-Technology Diesel Exhaust. Research Report 184. Boston, MA:Health Effects Institute.
Appendix:	See Appendix A: Human Health Risk Assessment

RESPONSE TO HC-11

ID:	**HC-11**
Expert Department or Group:	Health Canada
Guideline Reference:	Section 4.2.1.9 Population Health and Community Services Infrastructure
EIS Reference:	Chapter 5
Context and Rationale:	The CAAQS were inappropriately used as comparison targets for predicted air pollutants levels. The proponent should acknowledge that the CAAQS for NO_2 and $PM_{2.5}$ are not thresholds representative of a level below which there are no health effects. Residual adverse effects of common air pollutants, such as $PM_{2.5}$, and NO_2 were assessed in comparison to only the Newfoundland and Labrador *Air Pollution Control Regulations* (NL-APCR, 2004) because “the [Canadian Ambient Air Quality Standards] CAAQS (…) are intended to be compared with measured ambient air quality data and are not considered directly applicable to industrial fence-line concentrations”. Health Canada recommends the use of the CAAQS for project- associated air quality assessments, as they are the appropriate comparison targets for measured, modeled or estimated ambient air concentrations. The CAAQS are one of the most stringent air quality criteria, especially for long-term project emissions after 2025. The proponent should acknowledge that the CAAQS for common air pollutants (e.g., $PM_{2.5}$, NO_2), do not represent acceptable air pollutants levels for protection of human health. $PM_{2.5}$ and NO_2 are non-threshold pollutants, meaning that population health effects occur at all levels of exposure including below the CAAQS. The CAAQS are numerical targets for air quality improvements across Canada. The Canadian Air Quality Management System (AQMS) explicitly recognizes that health effects occur below the CAAQS values, 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. Additionally, the magnitude of residual effects (Table 5.8 Characterization of Residual Effects on Atmospheric Environment) will be determined partly based on the percentage deviation of air pollutants levels from the baseline condition (e.g., Negligible: Less than 10% increase from baseline conditions. Low: Greater than 10% increase from baseline conditions, but less than 50% of the criteria. Moderate: Greater than 50% increase from baseline conditions, but less than the criteria. High: Frequent exceedance of the criteria). No explanation is provided on how the proposed judgement

ID:	**HC-11**
	criteria are developed or whether they are adequate to protect human health.
Information Request:	Health Canada recommends the following revisions be requested from the proponent. a. Provide a detailed assessment of air quality, including potential residual adverse effects, in comparison to the appropriate CAAQS, recognizing that CAAQS do not represent a safe threshold for human health. b. Clarify how the proposed air quality criteria would adequately protect human health at exposure levels below the CAAQS or NL-APCR. Health Canada recommends the proponent acknowledge that the CAAQS should not be considered as "pollute-up-to" levels and proposed mitigation measures should not be confined to meeting the standards, but should also be targeted towards reducing population exposure to non-threshold contaminants associated with the proposed project.
Response:	a. A detailed assessment of air quality, based on appropriate human health-based air quality criteria such as the Canadian Ambient Air Quality Standards (CAAQS), is provided in Section 4.3 of the Valentine Gold Human Health Risk Assessment (HHRA; Appendix A). Assessment of potential residual adverse effects is provided in Risk Characterization section (Section 7 of the HHRA). b. It is acknowledged that the CAAQS are not "pollute-up-to" limits (Section 17.5, page 17.41 of the EIS and in Section 4.3.1 of the HHRA). The HHRA also acknowledges that nitrogen dioxide (NO_2) and fine particulate matter with an aerodynamic diameter less than 2.5 µm ($PM_{2.5}$) are considered to be non-threshold compounds and that exposures to even low concentrations in ambient air represent a potential human health risk. The HHRA further notes that in the absence of regulatory risk acceptability benchmark for either NO_2 or $PM_{2.5}$, the CAAQS for these compounds have been used as the risk acceptability benchmarks and that predicted concentrations of these compounds that are below their respective CAAQS are considered to represent negligible change in human health risks (Section 4.3.1 of HHRA).
Appendix:	See Appendix A: Human Health Risk Assessment

RESPONSE TO HC-12

ID:	**HC-12**
Expert Department or Group:	Health Canada
Guideline Reference:	Section 4.2.1.9 Population Health and Community Services Infrastructure
EIS Reference:	Chapter 17
Context and Rationale:	Spatial boundaries of the Local Assessment Area and Regional Assessment Area were not properly determined. The Local and Regional Assessment Areas (LAA/RAA) are defined as a 40 km by 40 km area (30 km by 30 km for acoustic modelling) plus a 500 m buffer zone on either side of the 88 km-long access road extending from the turnoff near the Millertown Dam to Marathon's exploration camp. However, no rationale is provided for why project effects would cease to occur beyond the proposed LAA/RAA, especially at the 500 m buffer along the access road, as air pollutants continue to travel beyond the buffer. Additionally, it is uncertain if communities and Indigenous groups were engaged to confirm the spatial boundaries of the air quality and noise study. The first 8 km of the road from Millertown to the turnoff near the Millertown Dam was not included in the LAA/RAA as this part of the road is operated and maintained by Province of NL. The predicted maximum vehicle traffic on the access road is relatively small [i.e., approximately 18 and 10 vehicles per day during construction and operations, respectively (Summary of EIS, p.2.16)]. However, most, if not all, of the project-associated vehicles are anticipated to travel along the 8 km section of the road and through Millertown. Given the size (i.e., estimated population of 81) and location (i.e., quiet rural area) of Millertown, the predicted vehicle traffic may have substantial impacts on air quality and noise levels in the area. The proposed LAA/RAA encompasses approximately 35 seasonal residences, including three active outfitters, two inactive outfitters and 30 cabins, "which represent the nearest sensitive receptors to the Project" (Baseline Study Appendix 6, p.4). However, it remains unclear whether the study considered traditional land use activities by Indigenous communities (e.g., hunting, fishing, trapping, gathering of plants or medicines, ceremonial or spiritual practices, passing on of Indigenous knowledge and/or language, etc.) in identifying the potential human receptor locations.

ID:	HC-12
Information Request:	Health Canada recommends the following revisions be requested from the proponent. a. Provide further rationale on how the proposed LAA/RAA, including the 500-m area on either side of the access road along the 88 km section of the roadway, is sufficient to allow for conservative assessments of the project-associated changes to atmospheric environment and potential health impacts on human receptors. b. Clarify whether input from other potentially impacted Indigenous groups, communities and stakeholders were considered in development of spatial boundaries and monitoring site for air quality and noise studies. c. Identify potential human receptor locations in consideration of traditional land use activities by Indigenous peoples that may be affected by changes in air quality and noise levels. Revise the air and noise impacts assessment in consideration of these additional receptors. d. Identify potential human receptor locations in the expanded LAA/RAA that include Millertown and the first 8 km of the access road from Millertown to the turnoff near the Millertown Dam, as well as additional receptors beyond the 500-m buffer zone along the access road.
Response:	a./d. As described in Section 4.2 of the EIS (rationale for the selection of the spatial boundaries for the assessment of atmospheric environment), the main 40 x 40 km assessment area (30 x 30 km for noise) is considered sufficient to determine potential for changes to air quality in the area resulting from the Project. This determination is supported by the air contaminant dispersion modelling (conducted in support of the EIS), as the predicted concentrations decrease to close to background levels within the Local Assessment Area / Regional Assessment Area (LAA/RAA) boundaries. As presented in the EIS and in response to HC-15, the highest air contaminant concentrations occur in the immediate vicinity of the Project site and the access road, with predicted concentrations dropping rapidly with distance from the sources (refer to EIS Appendix 5F Concentration Contour Plots and response to HC-15), generally reaching background within the LAA/RAA. The 500-m buffer area surrounding the site access road is also considered sufficient, as air contaminant releases and noise emissions are not expected to have effects beyond the 500 m buffer area (as supported by the noise modelling work presented in Section 5.5.3 of the EIS). An additional screening study was conducted for road dust emissions associated with Project-related traffic on the access road, which also

ID:	**HC-12**
	supports the spatial boundaries selected. Additional details on the screening assessment are provided in response to HC-15. The assessment area includes the portion of the access road which will be upgraded and under the care and control of Marathon. Beyond this, Project vehicles will be travelling on established provincial roads, subject to the same provincial laws and regulations applicable to any non-Project vehicles travelling through the province. However, even if the LAA were extended out to Millertown, the impacts from vehicle traffic on this existing portion of the road would be similar to those considered in the EIS and would not be expected to result in a significant change in air or sound quality at sensitive receptor locations in these areas. The predicted concentrations at the sensitive receptors identified in the EIS (cabin / camp locations outside the Project Area) are below ambient air quality standards. Since other potential receptors are further from emissions sources, the air contaminant concentrations at these locations are expected to be similar to or less than those predicted at the sensitive receptors considered in the EIS. In addition, the Human Health Risk Assessment (HHRA; Appendix A) conservatively assumed that both Indigenous and non-Indigenous receptors spend 100% of their time in LAA and that 100% of country food and fish are harvested from within the LAA. The results of the HHRA 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. As Millertown and Buchans Junction are located further from the main Project sources of air contaminants (i.e., mining and processing activities occurring within the mine site), a negligible change in human health risk for these community receptors would also be anticipated. b. The spatial boundaries for air quality were not established through engagement with Indigenous groups or community stakeholders, rather in consideration of known receptors and professional experience of potential zones of influence from other mining projects. The results of air quality and noise modelling conducted for the EIS confirmed the appropriateness of the selected assessment area. Noise was not identified as an issue of concern during the engagement conducted for the Project. Engagement with stakeholders will continue throughout the permitting and approvals process. In addition, Marathon is developing a grievance mechanism to afford a process for addressing grievances on the part of non-Indigenous and Indigenous groups or Indigenous

ID:	**HC-12**
	persons resulting from the effects of the Project to these users, such as effects to land and resource use, health, socio-economic conditions, and heritage resources. c. Indigenous land use was considered in the development of the LAA/RAA in the EIS and areas most likely to be impacted were considered in the assessment. No Indigenous land use sites were identified in the LAA during engagement with stakeholders. Note that the HHRA (Appendix A) assumed that both Indigenous and non-Indigenous receptors spent 100% of their time in the LAA and that 100% of country food and fish were harvested from within the LAA. This conservative approach would capture human health risk from any unidentified use sites within the LAA. With respect to noise, the existing exploration camp is located in immediate proximity of the mine site. As assessed in Chapter 5 (Atmospheric Environment) of the EIS, the predicted day night average sound levels at this location during operation (the phase of the Project with the greatest sound emissions) was 47.1 dBA. The change in %HA from baseline to baseline plus Project operation at this closest sensitive receptor was 0.72, which is well below the 6.5% threshold provided in Health Canada guidance (Health Canada 2017). Given that the effect of noise on this closest sensitive receptor is within recommended thresholds and predicted to be not significant, it is reasonable to assume that Project effects to potential unidentified Indigenous use sites that may occur in the LAA would not pose a risk to human health. References: Health Canada. 2017. Guidance for Evaluating Human Health Impacts in Environment Assessment: Noise. January 2017. Available online at: https://iaac-aeic.gc.ca/050/documents/p80054/119378E.pdf
Appendix:	See Appendix A: Human Health Risk Assessment

RESPONSE TO HC-13

ID:	HC-13
Expert Department or Group:	Health Canada
Guideline Reference:	Section 4.2.1.9 Population Health and Community Services Infrastructure
EIS Reference:	Chapter 5
Context and Rationale:	Selection of National Air Pollutant Surveillance (NAPS) station data over site-specific air quality data to establish baseline levels. Air quality data used to establish baseline should be representative of site specific conditions. Baseline concentrations of $PM_{2.5}$, NO_2, and SO_2 are established based on ambient air quality data from the NAPS station at the Grand Falls-Windsor. The on-site NO_2 and SO_2 concentrations were measured at a single location within the project site for about three days during the summer of 2020. The on-site measurement spanning such a short period of time is unlikely to properly account for ambient air quality changes due to temporal variabilities (e.g., seasonal differences, weather conditions, etc.). The Grand Falls-Windsor station data may not be representative of site-specific conditions as it has a greater population (e.g., estimated population of > 14,000) and development density (i.e., elevated emissions from industrial/commercial sources and vehicle traffic on highways) than the project area. The station is also approximately 120 kms northeast of the mine site. The EIS information is not sufficient to confirm that the air quality data from the existing monitoring station will be representative of baseline conditions of project-related air emissions. It is critical that representative baseline data be used to provide a more accurate picture of the Project's contribution to ambient air concentrations in the area and subsequently identify mitigation measures and follow-up monitoring. Additionally, baseline air quality data for annual $PM_{2.5}$, as well as 1 hr and annual NO_2 and SO_2 (Table 5.5. Background Concentrations Used in Assessment), do not appear to be derived as per the statistical procedures defined in the Canadian Council of Ministers of the Environment (CCME) (2012, 2020a, b). References CCME. 2012. Guidance Document on Achievement Determination Canadian Ambient Air Quality Standards for Fine Particulate Matter and Ozone

<table>
<tr><th>ID:</th><th>HC-13</th></tr>
<tr><td></td><td>CCME. 2020a. Guidance Document on Achievement Determination Canadian Ambient Air Quality Standards for Nitrogen Dioxide.

CCME. 2020b. Guidance Document on Achievement Determination Canadian Ambient Air Quality Standards for Sulfur Dioxide.</td></tr>
<tr><td>Information Request:</td><td>Health Canada recommends the following information be requested from the proponent:

a. Justify how data from the selected NAPS station are representative of baseline emissions at human receptor locations.

b. If data from the NAPS station is incomplete or not representative of existing conditions at human receptor locations, consider conducting a site-specific baseline survey at potential human receptor locations for all ambient air quality parameters. Health Canada recommends a minimum of one year of baseline data to account for any seasonal variabilities. Alternatively, in the absence of representative baseline data, provide follow-up monitoring results at these locations to confirm that the predicted air pollutants and noise levels are accurate. See Section 6.5 of Health Canada's 2016 Guidance for Evaluating Human Health Impacts in Environmental Assessment: AIR QUALITY (https://www.canada.ca/en/health-canada/services/publications/healthy-living/guidance-evaluating-human-health-impacts-air-quality.html)

c. Present baseline ambient air quality data in appropriate statistical form defined in the CAAQS.</td></tr>
<tr><td>Response:</td><td>a./b. Regarding the use of ambient air quality monitoring (AAQM) data from the National Air Pollutant Surveillance (NAPS) station at Grand Falls-Windsor (GFW) to establish baseline conditions, it is noted that data from this station were obtained and used to supplement the data measured at the Project site. Additional information supporting the use of this supplemental AAMQ (GFW NAPS) data is provided below.

The onsite baseline study was scoped considering the need to characterize the baseline levels of the air contaminants of concern for the Project, and availability of lab methods / sample media relevant to a short-term monitoring event. The baseline ambient air quality monitoring survey was focused on total suspended particulate matter with an aerodynamic diameter less than 30 µm (TSP), respirable particulate matter with an aerodynamic diameter less than 10 µm (PM_{10}), nitrogen dioxide (NO_2) and sulfur dioxide (SO_2). Sampling was conducted using integrated (TSP and PM_{10} collected using a sampling pump and filter) and passive (SO_2 and NO_2 collected with passive sample media) samplers. Since the baseline survey was conducted over a short period of time, field data were supplemented with longer</td></tr>
</table>

ID:	**HC-13**
	term ambient air quality monitoring data from a nearby NAPS station located in an area with limited existing industrial activity. Hourly data from the GFW NAPS Station, located 120 km northeast of the Project site, was used to provide baseline information on fine particulate matter with an aerodynamic diameter less than 2.5 µm ($PM_{2.5}$) and NO_2 as noted in Section 5.2.2.2 (Background Concentrations) of the EIS. This data set was used since several years of hourly data were available to establish the hourly and daily background concentrations for these air contaminants. The background values established by using the AAQM data from GFW station were similar to the data measured at the Project site. Since there are no large sources of air contaminants within the Local Assessment Area or near the GFW AAQM station, concentrations of nitrogen oxides (NO_x) are expected to be low, and it is likely that most $PM_{2.5}$ is due to long-range transport from releases in the Northeastern United States. Therefore, it is considered likely that $PM_{2.5}$ concentrations measured at the GFW NAPS station are representative of the existing concentrations in the assessment area. This assumption is supported by the TSP and PM_{10} concentrations measured near the Project site, which are similar to the background concentrations that were established using $PM_{2.5}$ data from GFW. These values are therefore considered reasonably representative of the existing air contaminant concentrations in the assessment area. It is also important to note that, given the nature of the site, existing concentrations are low and well below regulatory threshold limits. This therefore constitutes a conservative baseline against which to monitor air quality changes throughout the Project phases. c. In relation to the method for estimating background concentrations for NO_2 and SO_2, background values were determined using a similar approach to that outlined in the Alberta Air Quality Model Guideline, where the hourly background value is the 90^{th} percentile of the hourly ambient data (2016-2017 GFW NAPS data). For $PM_{2.5}$, the 24-hour background concentration was estimated based on the 98th percentile of the 24-hour average concentrations (2016-2017 GFW NAPS data). The annual average background concentrations were estimated as the annual average of the hourly data from the GFW NAPS station with values greater than the hourly 90^{th} percentile excluded from the average. While this does vary slightly from most prescribed statistical approaches, the annual average background values are based on GFS NAPS data, and it is likely, given the urban area where the station is located, ambient concentrations at the GFW station would be higher

ID:	**HC-13**
	than those expected at the Project site. Therefore, the estimated annual concentrations were reduced slightly using this approach. Based on this, the background concentrations used in the EIS are considered representative of the baseline conditions at the Project site.
Appendix:	None

RESPONSE TO HC-14

ID:	**HC-14**
Expert Department or Group:	Health Canada
Guideline Reference:	Section 4.2.1.9 Population Health and Community Services Infrastructure
EIS Reference:	Chapter 5
Context and Rationale:	The predicted air contaminant levels for the construction phase are not provided. The study also did not provide contour maps of the predicted concentrations for certain common air contaminants. The assessment of potential air quality changes for the construction phase was not provided as air contaminant emissions during this period are expected to be "short-term and lower in magnitude than during operation" (p.5.37). However, the CAAQS include short-term average thresholds for $PM_{2.5}$ (24 hrs), ozone (8 hr), NO_2 (1 hr) and SO_2 (1 hr). Changes to air quality and associated health effects should be fully assessed for both short- and long-term exposures during construction and operations. Additionally, it is difficult to verify the proponent's assessment as the extent of air quality changes during construction is not provided in comparison to that of the operation phase. During operations, the highest NO_2, SO_2, and $PM_{2.5}$ concentrations are predicted to be above or to approach the CAAQS at camp / cabin locations within the LAA/RAA (Tables 5-16 and 17). The study only provided contour maps of the predicted concentrations for certain air contaminants (i.e., 24 hr TSP, 24 hr PM_{10}, 24 hr and annual PM2.5, and 24 hr NO2) (Figures 5F-1 to 5, Appendix 5). In the absence of contour maps for other common air pollutants (e.g., 1 hr and annual NO_2, 1 hr and annual SO_2, VOCs, PAHs, DPM, etc.), Health Canada is unable to validate the assessment conclusion that "(g)enerally, the predicted concentrations reach background levels within 10 to 15 km of the Project Area boundary. Maximum predicted air contaminant concentrations (including background) are also below the adopted standards at the camps" (p.5.53). If sensitive receptors within the project site (e.g., off-duty mining workers at the accommodation camp) are predicted to incur pollutant exposure concentrations that exceed applicable air quality objectives and standards, Health Canada recommends implementation of additional mitigation measures to protect workers from potential adverse health effects.
Information Request:	Health Canada recommends the following revisions be requested from the proponent.

ID:	**HC-14**
	a. Provide quantitative assessments of both short-term and long-term air pollutant levels and associated health effects during construction and operations. b. Provide appropriately scaled contour maps plotting the predicted common air pollutant levels, including $PM_{2.5}$, NO_2, SO_2, PAHs, VOCs, and DPM, in reference to the human receptor locations identified during construction and operations. c. Provide further monitoring plans and mitigation measures to reduce health risks from exposure to the elevated levels of air pollutants at the accommodation camp.
Response:	a. Construction emissions were not modelled since, as a mine, the Project activities during construction are similar to those during operation. Activities during construction are less in effort and are expected to occur over a 1-year period compared to several years of operation. To clarify, this is what was meant by "short-term", not specifically referring to short-term averaging periods applicable under the Canadian Ambient Air Quality Standards (CAAQS). Although construction is compared to operation and some concentrations slightly above or approaching CAAQS were predicted to occur during operation, it is important to note that the frequency of occurrence is expected to be low, since the likelihood of worst-case emissions (such as those included in the model) to occur frequently during meteorological conditions leading to poor dispersion is low. Further, the modelling considered emissions expected during the peak operating year of the mine and generally assumes these worst-case emissions occur continuously over the three-year period of the model to establish maximum worst case concentrations that may occur. As such, given the short duration of construction activities (1 year) and that the magnitude of emissions is expected to be lower than during the peak operation (as was modelled for the operation phase), it is unlikely that air contaminant releases due to construction activities would result in frequent exceedances or many occurrences where resulting concentrations approach the CAAQS or Newfoundland and Labrador Ambient Air Quality Standards (NLAAQS) during construction. With respect to the isopleths presented in the EIS (Appendix 5F), plots were provided for predicted concentrations of 24-hour total suspended particulate matter with an aerodynamic diameter less than 30 µm (TSP), respirable particulate matter with an aerodynamic diameter less than 10 µm (PM_{10}) and fine particulate matter with an aerodynamic diameter less than 2.5 µm ($PM_{2.5}$), annual $PM_{2.5}$, 1-hour nitrogen

ID:	HC-14
	dioxide (NO_2) and 24-hour hydrogen cyanide (HCN). The isopleth plots prepared were selected based on those air contaminants with the highest predicted maximum concentrations, at greater than 40% of the relevant NLAAQS. The potential human health risks to Indigenous and non-Indigenous receptors in the Local Assessment Area, as well as off-duty workers, is assessed in the Valentine Gold Project Human Health Risk Assessment (HHRA; Appendix A). The results of the HHRA 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. Note that Marathon is engaged with the two cabin owners closest to the Project to relocate the cabins outside of the Project Area, such that they are not adversely affected by the Project. b. Additional isopleths have been prepared in response to this information request. These include plots of the maximum predicted 24hr NO_2, and 1-hour, 3-hour and 24-hour sulphur dioxide (SO_2) concentrations (Figures HC-14.1 to HC-14.5). These additional plots were prepared on the basis of the maximum predicted concentrations being greater than 10% of the NLAAQS for a given air contaminant. The other air contaminants modelled as part of the assessment had maximum predicted concentrations at <10% of the NLAAQS, and therefore plots were not prepared. With respect to volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs), these compounds are not typically of concern with respect to a mining operation. Although these compounds are released from diesel combustion in mining equipment, given the relatively large distances from the equipment to off-site receptors and the relatively low magnitude of releases, appreciable adverse effects to air quality are not expected outside the Project Area. c. The existing exploration camp and planned accommodations camp have been included in the HHRA (Appendix A) to assess potential impacts to worker health and exposure during operation of the mine. The HHRA evaluated potential human health risks associated with inhalation exposures to Project-related contaminant of potential concern (COPC) for off-duty workers housed at the camp locations. The results demonstrated that, with the exception of 1-hour exposures to NO_2, the maximum predicted concentrations for each COPC for each of the appropriate exposure averaging periods (e.g.,1-hour, 2-hour, 24-hour, annual average) were below their respective human health-based ambient air quality standards and thus represent negligible change in

ID:	**HC-14**
	human health risks for off-duty workers housed at the camps. The results also demonstrated that the exceedances of the 1-hour NO_2 CAAQS predicted to occur at the camp locations were limited in magnitude and frequency and thus represent a negligible change in human health risk for off-duty workers. The HHRA determined that Project activities would not result in adverse residual effects on human health. Any potential for increased risk of exposure would be further mitigated through design of the accommodations camp (including high voltage alternating current [HVAC] design and placement of air intakes) and the general air quality mitigation measures identified in Section 5.4 of the EIS. Further, during the permitting phase of the Project, the required ambient air quality monitoring plan will be developed in consultation with the Newfoundland and Labrador Department of Environment and Climate Change and implemented prior to commencing construction and/or operations.
Appendix:	See Appendix A: Human Health Risk Assessment

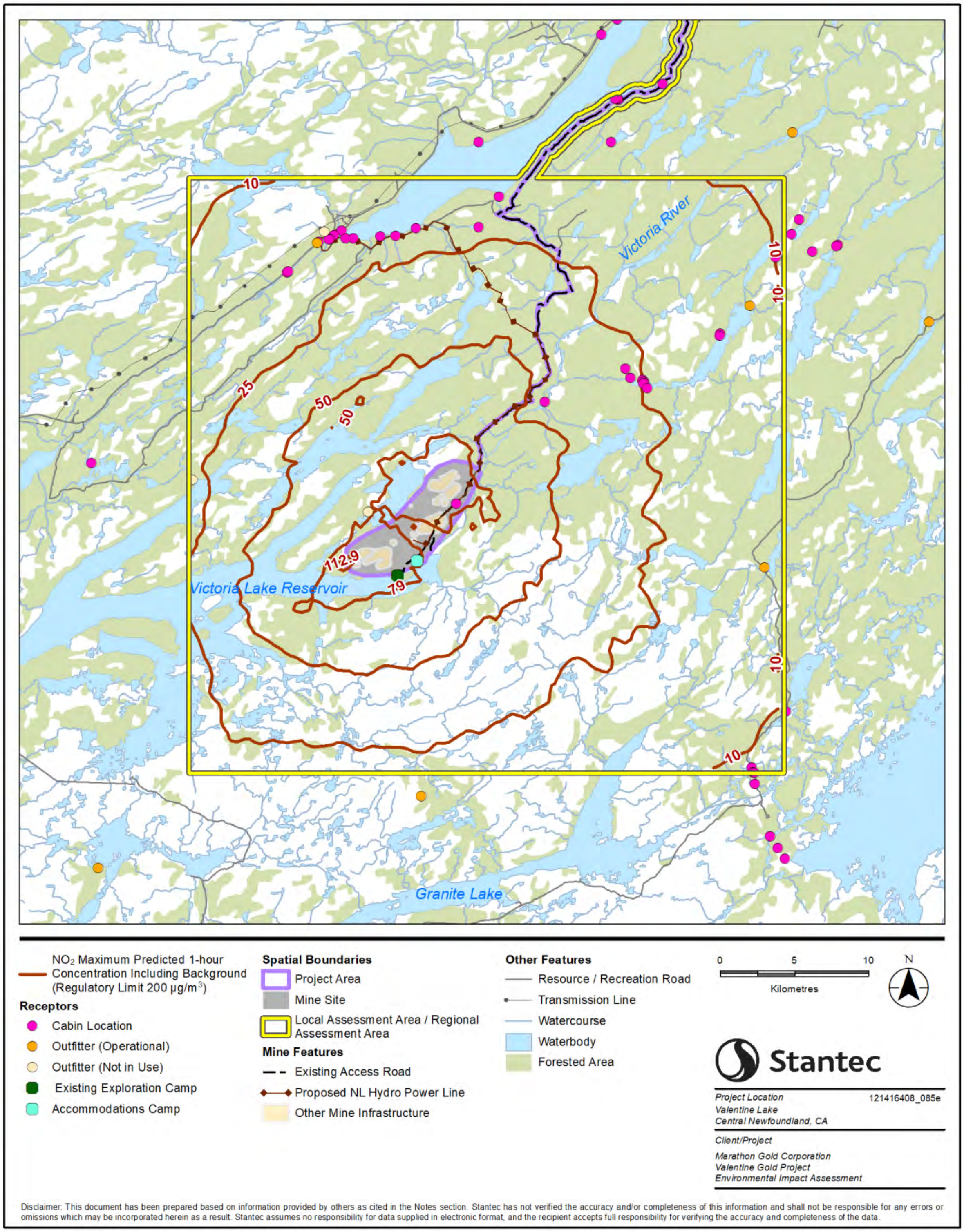


Figure HC-14.10 NO_2 Maximum Predicted 1-hour Concentration including Background (Regulatory Limit 200 µg/m³)

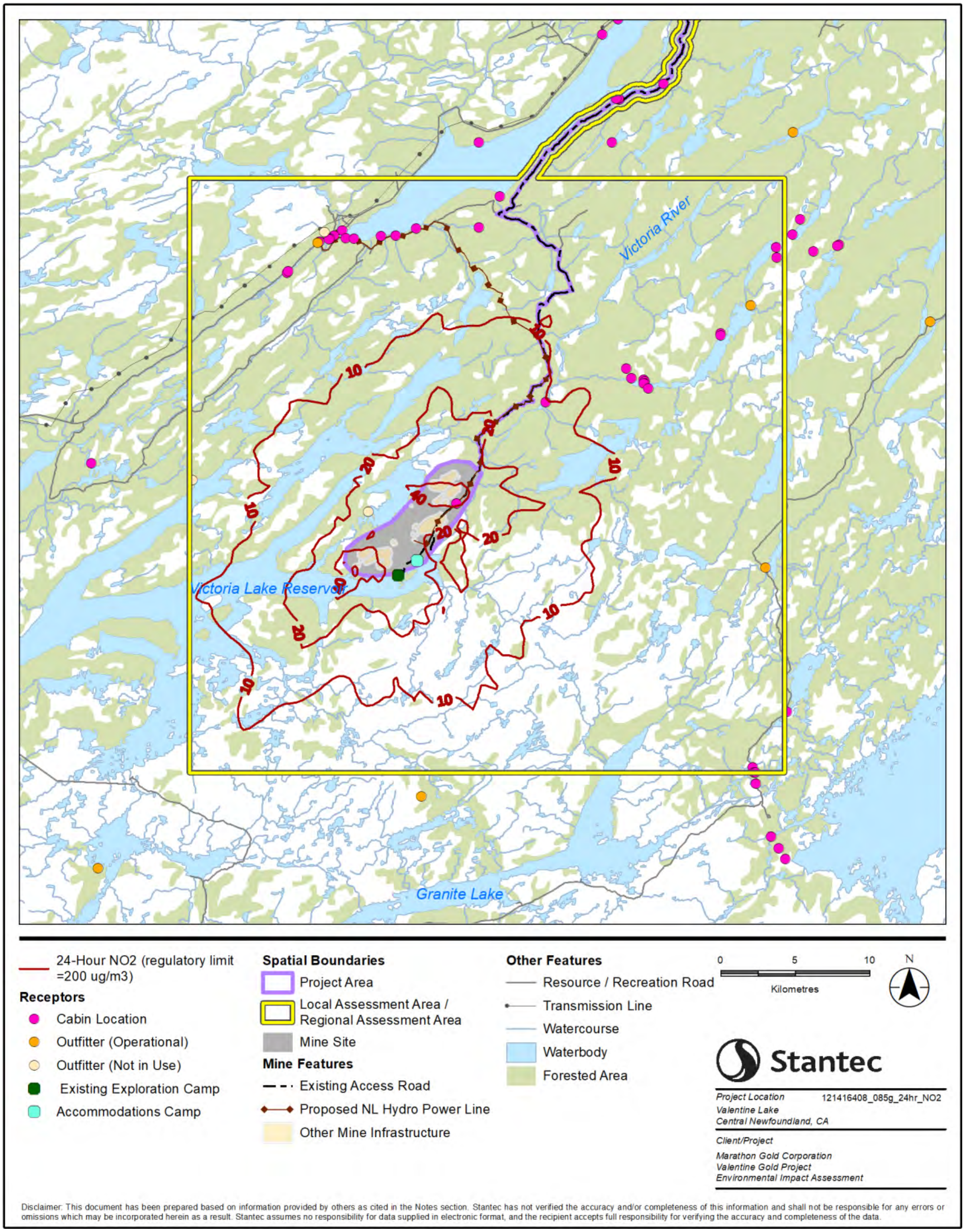


Figure HC-14.11 24-hour NO_2 (Regulatory Limit 200 µg/m³)

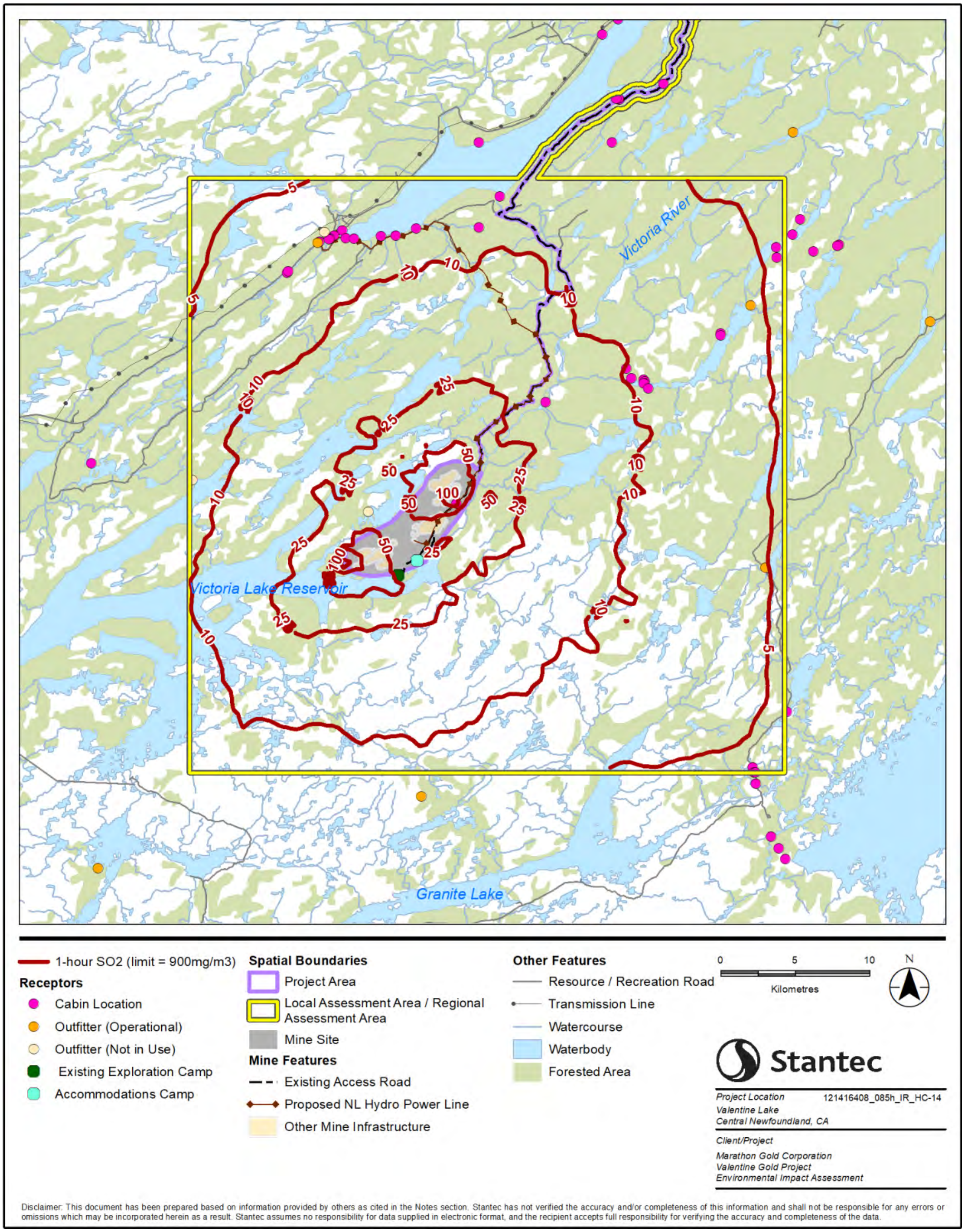


Figure HC-14.12 1-hour SO_2 (Limit = 900 mg/m³)

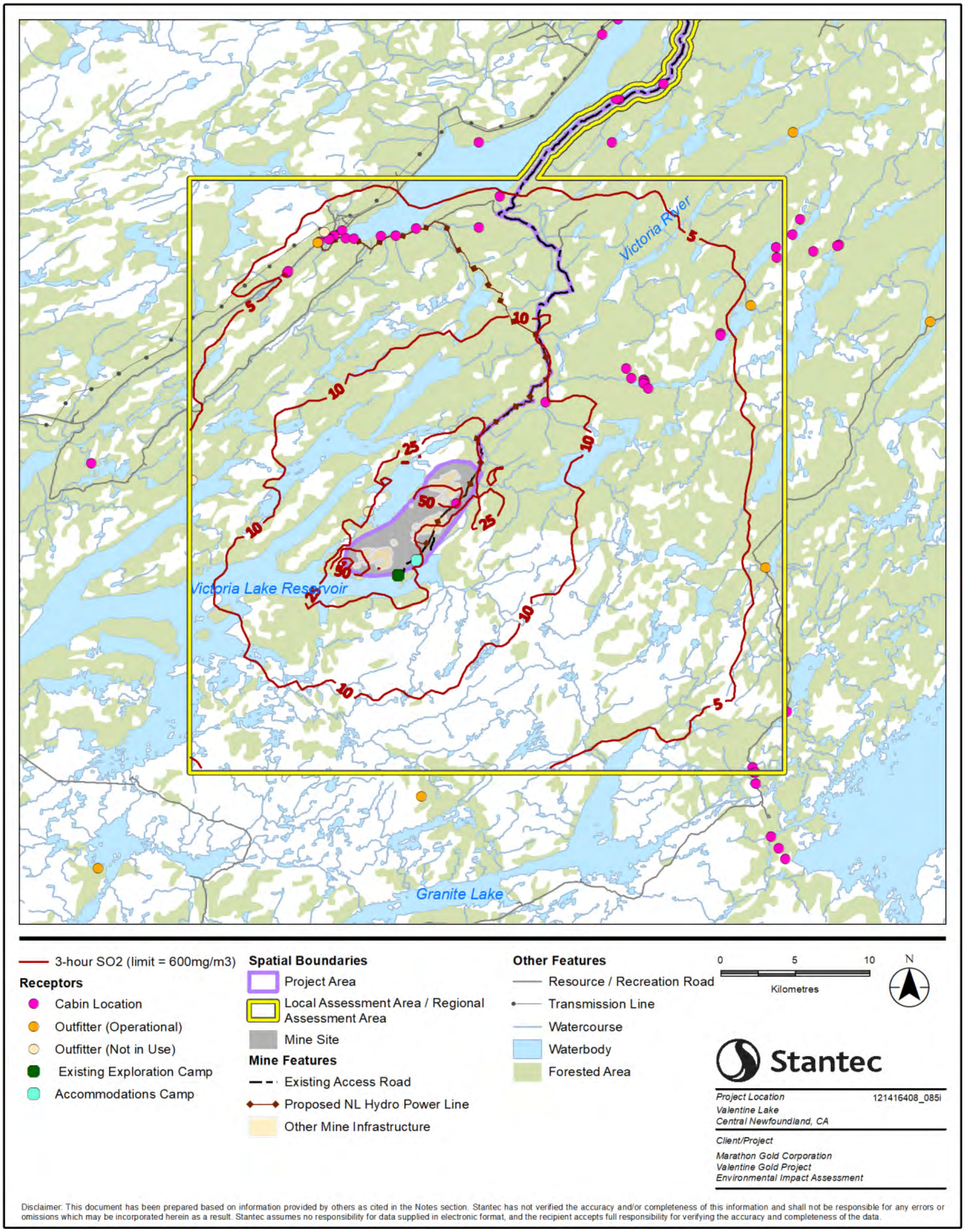


Figure HC-14.13 3-hour SO_2 (Limit = 600 mg/m³)

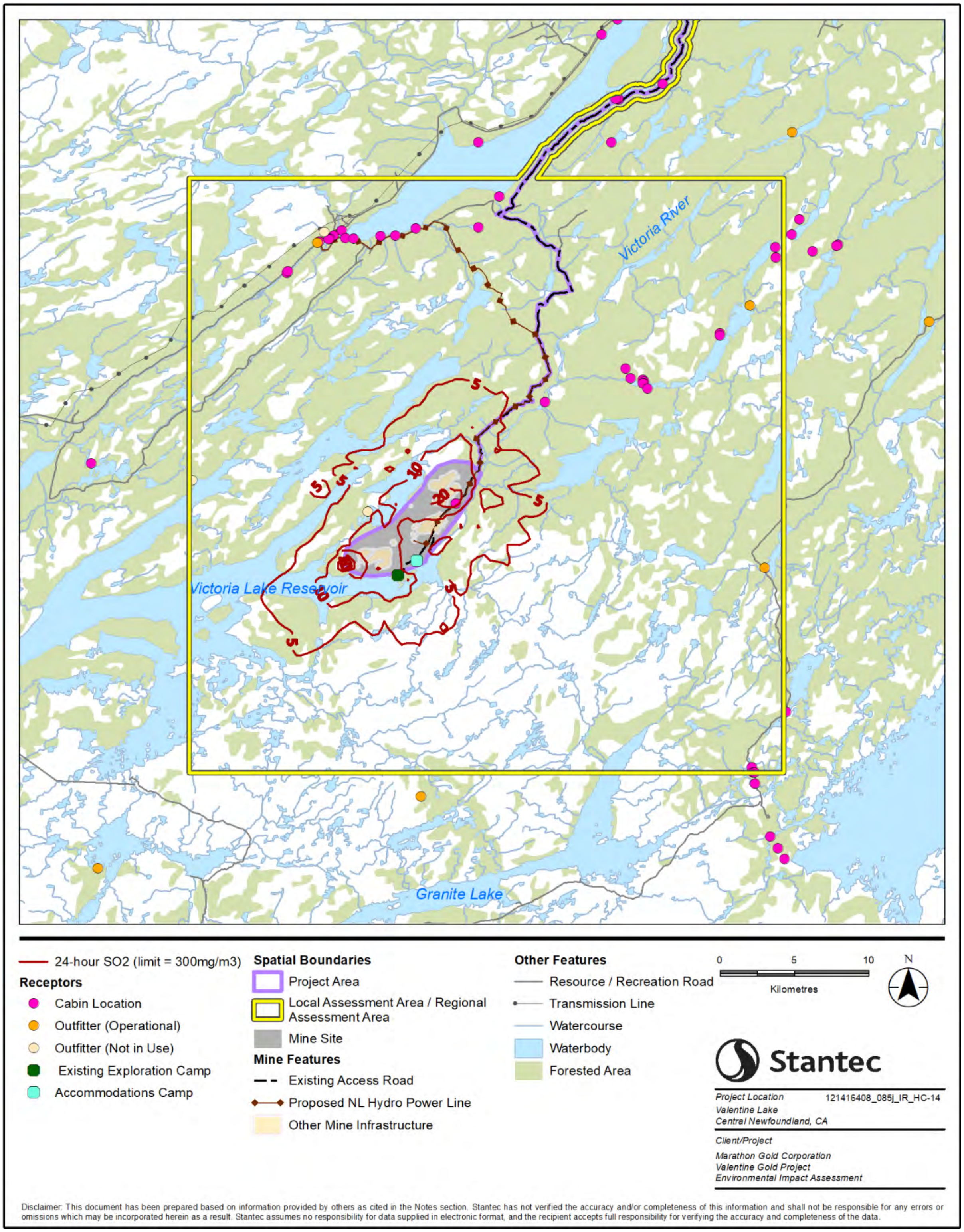


Figure HC-14.14 24-hour SO_2 (Limit = 300 mg/m³)

RESPONSE TO HC-15

ID:	**HC-15**
Expert Department or Group:	Health Canada
Guideline Reference:	Section 4.2.1.9 Population Health and Community Services Infrastructure
EIS Reference:	Chapter 5
Context and Rationale:	Vehicle traffic along the access road should also be considered as potential air pollutants emission sources during operations. The air quality assessment does not consider emissions associated with vehicle traffic on the access road during operations since such emissions are expected to be "localized (confined to the 500 m buffer surrounding the access road) and transient in nature" (p.5.46). However, heavy trucks that transport mining equipment and supplies may produce substantial air pollutants and noise emissions. Health Canada recommends assessments of air contaminants emissions from vehicle traffic along the access road. The revised air quality and noise assessments should consider project activities along the access road during construction (e.g., driving surface upgrade and construction of ditching on both sides of the road and cross drainage by culverts; Summary of EIS, p.2.15) Diesel power generators should be listed as a potential emission source for air pollutants during construction and operations.
Information Request:	Health Canada recommends the following revisions be requested from the proponent: a. Provide further rationale on how the predicted air quality changes due to vehicle traffic will be limited to the 500 m buffer along the access road. b. Provide quantitative assessments of air quality and noise impacts in consideration of project activities along the access road, including the road construction and vehicle traffic (i.e., distribution of vehicles by type over daytime and nighttime hours) during construction and operations. Include diesel power generators as an air pollutant emission source.
Response:	With respect to noise, modelling of noise related to vehicle traffic along the access road during both construction and operation was completed as part of the EIS. The details of the noise modelling and related conclusions are provided in Section 5.5.3 (Change in Sound Quality) of the EIS. For air quality, a screening-level assessment of road dust due to vehicle traffic along the access road was conducted in response to this information request to support the statements made in the EIS. Road dust was selected

ID:	HC-15
	for the screening assessment, as it is expected to be of primary concern with respect to Project related traffic on the 80 km unpaved access road. For the assessment, fugitive releases of dust (including total suspended particulate matter with an aerodynamic diameter less than 30 µm [TSP], respirable particulate matter with an aerodynamic diameter less than 10 µm [PM_{10}] and fine particulate matter with an aerodynamic diameter less than 2.5 µm [$PM_{2.5}$]) due to vehicle traffic on the access road were estimated, then input to a screening-level model to predict ambient dust concentrations within 500 m of the route to determine the potential impact on a change in air quality in the area. The road dust release estimates were based on anticipated truck trip information (during the peak year of operation) and published emission factors (from the United States Environmental Protection Agency AP-42 Emission Factors for Unpaved Roads). The release estimates are based on a single truck pass at a given location along the access road, which is considered a maximum release scenario since there are only nine truck trips per day (based on the peak operating year) on the 80 km access road. The estimated emissions for a truck pass were input to the screening level model, AERSCREEN, to predict the maximum dust concentrations that might occur within 1 km of the access road along the route. For the purpose of the model, a 50 m segment of the route was considered to characterize the short-term release associated with a truck pass along the access road. The truck weights and dimensions used for estimating the release quantities and characterizing the fugitive source inputs were assumed based on information from the Task Force on Vehicle Weights and Dimensions Policy Heavy Truck Weight and Dimension Limits for Interprovincial Operations in Canada (https://www.comt.ca/english/programs/trucking/MOU%202014.pdf). The short-term emission rates (occurring within a 50 m segment of the route) are estimated as follows: • TSP = 0.031 g/s • PM_{10} = 0.01 g/s • $PM_{2.5}$ = 0.001 g/s These emission rates and the assumed source dimensions were modelled with (the US EPA model) AERSCREEN to predict the concentrations downwind of the access road. The predicted maximum 24-hour concentrations are as follows: • TSP = 79 ug/m³ (93 ug/m³ with background) • PM_{10} = 24 ug/m³ (37 ug/m³ with background) • $PM_{2.5}$ = 2.4 ug/m³ (13 ug/m³ with background)

ID:	HC-15
	The maximum predicted 24-hour concentrations are below the respective 24-hour NL Ambient Air Quality Standards (TSP = 120 ug/m³, PM_{10} = 50 ug/m³, $PM_{2.5}$ = 25 ug/m³). These maximum concentrations occur in the immediate vicinity of the access road and drop rapidly with distance. Within 500 m (downwind of the road) the predicted concentrations reach background levels. The results of the screening assessment of road dust along the access road do not change the conclusion of the EIS that releases associated with vehicle traffic along the access road are not expected to result in a significant change in air quality in the Local Assessment Area / Regional Assessment Area [LAA/RAA]. For construction/upgrades of the access road, while releases of fugitive dust from construction activities and combustion gases from diesel combustion in construction equipment are expected, these releases are expected to be transient in nature and of relatively short duration (not confined to one specific area for an extended period of time). Therefore, releases related to construction along the access road are not likely to result in elevated concentrations of air contaminants where exceedances of the regulatory limits would occur. With respect to the question related to diesel generators, since there will be electricity available once the Project is operational, diesel generators will not be required during operation. Also, it is not anticipated that generators will be required for the access road upgrades; however, it is anticipated that during construction, five to six diesel generators, operating 10 to 12 hours per day, will be required at site. These generators are expected to consume approximately 1,600 litres per day, and associated air contaminant releases were estimated. Releases of nitrogen oxides (NO_x), carbon monoxide (CO) and PM (including TSP, PM_{10} and $PM_{2.5}$) were estimated using the expected fuel consumption, an assumed diesel engine thermal efficiency of 40%, and United States Environmental Protection Agency Tier 4 diesel engine emission standards. Releases of sulphur dioxide (SO_2) were estimated using a mass balance approach assuming ultra-low sulphur diesel will be used in the generators (with an assumed maximum sulphur content of 15 ppmw). The air contaminant release estimates from diesel combustion in generators during construction are provided in Table HC-15.1. Generally, the estimated air contaminant releases from diesel combustion in generators during construction are low in magnitude (e.g., 1 tonne/year NOx) and, when combined with other air contaminant releases during

ID:	HC-15
	construction, are not expected to result in a change that would exceed regulatory criteria outside of the Project Area.
Appendix:	None

Table HC-15.1 Air Contaminant Release Estimates from Diesel Combustion in Generators During Construction

Air Contaminant	kg/hr	kg/d	tonnes/year
NOx	0.27	2.73	1.00
CO	2.37	23.68	8.64
SO_2	3.99E-05	3.99E-04	1.46E-04
TSP*	0.0091	0.091	0.033
PM_{10}*	0.0091	0.091	0.033
$PM_{2.5}$*	0.0091	0.091	0.033
* The particulate matter released from diesel combustion is assumed to be PM1, therefore TSP=PM_{10}=$PM_{2.5}$.			

RESPONSE TO HC-16

ID:	**HC-16**
Expert Department or Group:	Health Canada
Guideline Reference:	Section 4.2.1.9 Population Health and Community Services Infrastructure
EIS Reference:	Chapter 5
Context and Rationale:	The follow-up program should expand the monitoring parameters to include all common air pollutants. The proposed follow-up program (FUP) considers only monitoring of ambient TSP, PM_{10} and $PM_{2.5}$ concentrations. It is unclear why other common air pollutants are not included in the monitoring. Health Canada recommends monitoring other common air pollutants, such as NO_2, SO_2, VOCs and PAHs.
Information Request:	Health Canada recommends the following revisions be requested from the proponent: Include other common air pollutants in the FUP monitoring or provide rationale for their exclusion.
Response:	The follow-up monitoring will be conducted in accordance with the requirements and conditions of authorization as set out in the provincial Certificates of Approval to operate and to construct. While particulate matter (and possibly selected trace metals) are expected to be primary air contaminants of concern, ambient air quality monitoring for additional compounds / air contaminants may be required. These may include combustion gases, such as nitrogen dioxide (NO_2). Volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs) are not typically of concern with respect to a mining operation. Although these compounds are released from diesel combustion in mining equipment, the releases are not expected to be of concern within the Local Assessment Area / Regional Assessment Area.
Appendix:	None

RESPONSE TO HC-17

ID:	HC-17
Expert Department or Group:	Health Canada
Guideline Reference:	Section 4.2.1.9 Population Health and Community Services Infrastructure
EIS Reference:	Chapter 5
Context and Rationale:	Health Canada recommends noise health effects, including sleep disturbance, be assessed against the recognized provincial, federal, and international standards. The proposed noise study should include all sleep disturbance analysis approaches recommended by Health Canada. Health Canada's noise guidance document (2017) states that there is a likelihood of sleep disturbance on any given night, if the sound levels exceed: 1. the max noise level, LAmax, of 60 dBA outdoor (or 45 dBA indoor) more than 15 times per night (WHO 1999); or 2. the steady-state, continuous outdoor sound levels of 45 dBA Leq (or indoor sound levels of 30 dBA Leq) during the sleep period time (WHO 1999); To limit sustained changes in sleep that may cause long-term adverse health effects, 3. the annual average Ln should not exceed 40 dBA outdoor at the most exposed façade (WHO 2009). The impacts of project-associated noise emissions on sleep disturbance were assessed based on the criteria/indicators #2 and #3 above as per Health Canada's guidance document. However, individual noise events (#1) and community complaints that is one of the most common reactions to project noise are not considered as indicators of adverse health effects. Exposure to low frequency noise (LFN), produced by blasting or heavy machinery operations, may cause a disproportionate increase in annoyance. LFN may induce vibrations or rattles in lightweight structures in residences or sleeping quarters that may be perceptible. The properties of LFN allow it to travel farther distances with less atmospheric attenuation than higher frequencies. 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-Hz octave bands be less than 70 dBZ.

ID:	HC-17
	References: 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. World Health Organization (WHO). 2009. Night Noise Guidelines for Europe. Hurtley, C. (Ed). Available online at: www.euro.who.int/en/health- topics/environment-and-health/noise/publications/2009/night-noise-guidelines-for-europe. 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.
Information Request:	Health Canada recommends the following revisions be requested from the proponent: a. Quantify sound levels at appropriate distances from any Project facility and/or activities and describe for each contributing source the timing (e.g., hours of night-time activities), number and duration of noise events and their sound characteristics, including frequency spectrum. b. Provide the hourly distribution of baseline noise events at night in comparison to predicted individual noise events at night at each receptor location. Noise mitigation measures should be considered where noise events at night are predicted to exceed 60 dBA Lmax outdoors 15 times at any noise receptor location. c. Clarify whether concerns relating to increased noise were raised by Indigenous groups or community members. Provide a rationale for excluding noise-related complaints as an indicator of adverse health effects. Health Canada recommends the proponent work with potentially affected communities and individuals to receive complaints related to noise and sleep disturbance and ensure that they are reported to residents on a regular basis to promote transparency and accountability. d. Compare low frequency noise monitoring results to ANSI 2005. Refer to Health Canada's Guidance for Evaluating Human Health Impacts in Environmental Assessments: Noise for additional information.
Response:	a. Mining-related activities, including material handling and hauling and ore processing, were assumed to occur continuously and simultaneously 24 hours a day for Project operations (i.e., activities and equipment quantities as listed in EIS Tables 5.36 [except for crew

ID:	HC-17
	vehicles], 5.37 and 5.38). Also, the peak in equipment and hauling was modelled simultaneously with the peak in ore processing. However, in reality these are not planned to overlap, as the peak in material hauling is actually expected to occur in year 3 and the peak in hauling is expected to occur in year 6. As a result, the model is expected to have overestimated the predicted sound levels during Project operations. Therefore, considering the continuous mining operation and that, even with the conservative assumptions, modelled Project sound levels are well below 60 A-weighted Decibels (dBA) at nearby receptors, it is not expected that mining operations would lead to LAmax over 60 dBA. Peak travel along the access road was assumed to occur only during daytime as peak travel is anticipated to occur during shift changes once every two weeks. This was represented by sound power levels for busses (crew shuttles) shown in Table 5.36 n the EIS. Mining activities during Project construction were assumed to occur during the day and were represented by the simultaneous operation of equipment listed in EIS Table 5.33. The potential effects from blasting during Project construction and operation were assessed qualitatively and separately from the steady state activities and traffic noise, as the potential effects from blasting on the acoustic environment are measured differently than those from steady state and traffic-related activity. 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. Blasting during Project construction and operation is impulsive and 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 dB. Vibration is energy waves transferred through the ground and measured by particle velocity. The type of geology and the blast configuration greatly influence how the energy of the blast is released into the atmosphere. During a blast, the majority of the energy is consumed in fragmenting the desired portion of rock with the remaining energy released as air blast and ground vibration. Blasting at mines routinely follows best management practices, namely the Blasters Handbook (ISEE 2011) and the Environmental Code of Practice for Metal Mines (ECCC 2009). These guides include recommended threshold values for blasting, and mitigation options to reduce air blast related noise and vibration during blasting events.

ID:	HC-17
	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. b. 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 for safety reasons. Noise generating activities near the mine site were assumed to occur continuously and simultaneously 24 hours a day. The predicted sound levels were well below the 60 dBA LAmax for Project construction and operation. c. Noise concerns were not raised during engagement with community members or Indigenous groups. Marathon is developing a grievance mechanism to afford a process for addressing grievances on the part of non-Indigenous and Indigenous groups or Indigenous persons resulting from the effects of the Project to these users, such as effects to land and resource use, health, socio-economic conditions and heritage resources. Any noise complaints received will be logged and investigated during Project construction and operation. d. 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 is naturally existing 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 is generally not readily available below 63 Hz from equipment vendors. Only some specific equipment, such as the main crusher, have available data 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 (ANSI) threshold at the receptor locations. References: Environment and Climate Change Canada (ECCC). 2009. Environmental Code of Practice for Metal Mines. Available at https://www.ec.gc.ca/lcpe-

ID:	HC-17
	cepa/default.asp?lang=En&n=CBE3CD59-1&offset=2. Last accessed on March 9, 2021. International Society of Explosives Engineers (ISEE). 2011. “Blaster’s Handbook, 18th Edition”, Ed. Stier, J.F., International Society of Explosives Engineers, Cleveland, Ohio, USA, 1030 pp.
Appendix:	None

RESPONSE TO HC-18

ID:	HC-18
Expert Department or Group:	Health Canada
Guideline Reference:	Section 4.2.1.9 Population Health and Community Services Infrastructure
EIS Reference:	Chapter 5
Context and Rationale:	The noise assessment should consider all applicable adjustments for sound characteristics. The study does not provide sufficient details to confirm whether or how the following noise adjustments will be considered in the noise assessment: • Regular impulsive sounds require a 5 dB adjustment; • Highly impulsive sounds require a 12 dB adjustment; • Evening sounds require a 5 dB adjustment; • Night sounds require a 10 dB adjustment; • Weekend day-time sounds require a 5 dB adjustment; • Quiet rural areas (≤ 45 dBA) require a 10 dB adjustment. Reference: 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.
Information Request:	Health Canada recommends the following revisions be requested from the proponent: Provide measured baseline sound levels and change in noise levels, including change in %HA, as per Health Canada's noise guidance (2017) at all receptor locations with all applicable adjustments as per ISO 1996-1 (2016). Provide a description when they have been used or when it has been decided they are not applicable in a given scenario.
Response:	The Project activities, including material handling, hauling, vehicle activities, and ore processing, are not considered to be impulsive. Therefore, impulsive noise adjustments were not required for this assessment. The nighttime adjustment of 10 A-weighted Decibels (dBA) was included in the EIS for all noise sources operating at night, as per Health Canada noise guidelines. Other adjustments for day, evening, weekend, and nighttime noise were completed, where applicable, as outlined in the 2017 Health Canada Guidelines. The day-night average sound level (L_{dn}) values from baseline measurements indicated that the region was at the threshold definition for a

ID:	**HC-18**
	quiet rural area given that the measured L_{dn} was slightly higher than 45 dBA. 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 adjustment. Alberta Directive 038 as well as other provincial regulations consider rural areas to have sound levels of 35 dBA at night and 45 dBA during the day, giving a 45 dBA L_{dn}. The estimated change in %HA was still predicted to be below 6.5% with this lower baseline noise level and the 10-dBA adjustment for a quiet rural area (Table HC-18.1 and HC-18.2).
Appendix:	None

Table HC-18.1 Estimated Project Ldn and, Total Ldn, and Change in %HA for Project Construction

Receptor ID	Baseline		Project Predicted	Total (Baseline plus Project)		Change in %HA (Between Total and Baseline)
	L_{dn} (dBA)*	%HA	L_{dn} (dBA)	L_{dn} (dBA)	%HA	
1	45	1.1	34.9	48.0	1.7	0.54
2	45	1.1	44.3	54.8	4.0	2.89
3	45	1.1	46.2	56.5	5.0	3.88
4	45	1.1	42.0	52.8	3.1	1.99
5	45	1.1	41.7	52.5	3.0	1.89
6	45	1.1	41.9	52.7	3.1	1.96
7	45	1.1	39.3	50.7	2.4	1.24
8	45	1.1	37.7	49.6	2.1	0.93
9	45	1.1	26.5	45.6	1.2	0.09
10	45	1.1	23.3	45.3	1.2	0.04
11	45	1.1	14.6	45.0	1.1	0.01
12	45	1.1	9.2	45.0	1.1	no change
13	45	1.1	9.1	45.0	1.1	no change
14	45	1.1	9.7	45.0	1.1	no change
15	45	1.1	9.9	45.0	1.1	no change
16	45	1.1	11.9	45.0	1.1	no change
17	45	1.1	11.5	45.0	1.1	no change
18	45	1.1	10.9	45.0	1.1	no change
19	45	1.1	10.3	45.0	1.1	no change
20	45	1.1	10.1	45.0	1.1	no change
21	45	1.1	10.2	45.0	1.1	no change
22	45	1.1	10.0	45.0	1.1	no change
23	45	1.1	40.2	51.3	2.6	1.46
24	45	1.1	36.5	48.8	1.9	0.74
25	45	1.1	36.9	49.1	1.9	0.80
26	45	1.1	36.0	48.5	1.8	0.67
27	45	1.1	41.1	52.1	2.8	1.71
28	45	1.1	16.8	45.1	1.2	0.01
29	45	1.1	10.2	45.0	1.1	no change
30	45	1.1	25.4	45.5	1.2	0.07
31	45	1.1	15.1	45.0	1.1	0.01

Table HC-18.1 Estimated Project Ldn and, Total Ldn, and Change in %HA for Project Construction

Receptor ID	Baseline		Project Predicted L_{dn} (dBA)	Total (Baseline plus Project)		Change in %HA (Between Total and Baseline)
	L_{dn} (dBA)*	%HA		L_{dn} (dBA)	%HA	
32	45	1.1	26.0	45.5	1.2	0.08
33	45	1.1	43.3	53.9	3.6	2.46
34	45	1.1	35.4	48.2	1.7	0.59
Accommodations Camp	45	1.1	41.5	52.4	3.0	1.83

Table HC-18.2 Estimated Project Ldn and, Total Ldn, and Change in %HA for Project Operation

Receptor ID	Baseline		Project Predicted L_{dn} (dBA)	Total (Baseline plus Project)		Change in %HA (Between Total and Baseline)
	L_{dn} (dBA)*	%HA		L_{dn} (dBA)	%HA	
1	45	1.1	32.5	46.9	1.5	0.33
2	45	1.1	41.9	52.7	3.1	1.96
3	45	1.1	43.7	54.2	3.8	2.63
4	45	1.1	39.5	50.8	2.4	1.29
5	45	1.1	39.3	50.7	2.4	1.24
6	45	1.1	39.4	50.7	2.4	1.27
7	45	1.1	36.9	49.1	1.9	0.80
8	45	1.1	35.2	48.1	1.7	0.57
9	45	1.1	24.1	45.3	1.2	0.05
10	45	1.1	20.8	45.2	1.2	0.02
11	45	1.1	12.1	45.0	1.1	no change
12	45	1.1	6.7	45.0	1.1	no change
13	45	1.1	6.7	45.0	1.1	no change
14	45	1.1	7.3	45.0	1.1	no change
15	45	1.1	7.4	45.0	1.1	no change
16	45	1.1	9.4	45.0	1.1	no change
17	45	1.1	9	45.0	1.1	no change
18	45	1.1	8.4	45.0	1.1	no change
19	45	1.1	7.8	45.0	1.1	no change
20	45	1.1	7.6	45.0	1.1	no change
21	45	1.1	7.7	45.0	1.1	no change
22	45	1.1	7.5	45.0	1.1	no change
23	45	1.1	37.8	49.6	2.1	0.94
24	45	1.1	34	47.5	1.6	0.45

Table HC-18.2 Estimated Project Ldn and, Total Ldn, and Change in %HA for Project Operation

Receptor ID	Baseline		Project Predicted L_{dn} (dBA)	Total (Baseline plus Project)		Change in %HA (Between Total and Baseline)
	L_{dn} (dBA)*	%HA		L_{dn} (dBA)	%HA	
25	45	1.1	34.5	47.8	1.6	0.50
26	45	1.1	33.5	47.3	1.5	0.40
27	45	1.1	38.7	50.2	2.3	1.11
28	45	1.1	14.3	45.0	1.1	0.01
29	45	1.1	7.8	45.0	1.1	no change
30	45	1.1	23.6	45.3	1.2	0.05
31	45	1.1	19.3	45.1	1.2	0.02
32	45	1.1	31.7	46.7	1.4	0.28
33	45	1.1	48.8	59.0	6.8	5.67
34	45	1.1	45.1	55.5	4.4	3.28
Accommodations Camp	45	1.1	52	52.8	3.1	1.99

RESPONSE TO HC-19

<table>
<tr><td>ID:</td><td>HC-19</td></tr>
<tr><td>Expert Department or Group:</td><td>Health Canada</td></tr>
<tr><td>Guideline Reference:</td><td>Section 4.2.1.9 Population Health and Community Services Infrastructure</td></tr>
<tr><td>EIS Reference:</td><td>Chapter 5</td></tr>
<tr><td>Context and Rationale:</td><td>The noise study should use the most representative human receptor locations.

A baseline noise survey was conducted at a single location outside the project area (approximately 5 km away from the project area boundary) for a limited period of time (for about 3 days) in the summer of 2020. Considering the existing mining exploration activities and camps close to the sound monitoring station, the monitored baseline noise conditions may not accurately represent the sound levels along the access road or in Milltertown. Additionally, if the baseline Ldn values along the access road or Millertown are below 45 dBA, the adjustment for quiet rural area (HC-18) should be applied in the noise assessment.</td></tr>
<tr><td>Information Request:</td><td>Health Canada recommends the following revisions be requested from the proponent:

a. Describe how the noise monitoring location is representative of baseline conditions at sensitive receptor locations. Clarify how temporal variability will be considered (e.g., seasonal variation in levels, types of human activity, weather conditions) given the limited length and timing of the baseline monitoring.

b. Ensure the baseline noise assessment includes details on current ambient day-time and night-time noise levels at key receptor points, including sensitive receptors (e.g., schools, community centres) and traditional land users, or priority areas as described by Indigenous groups, as well as information on typical noise events, such as sound sources, geographic extent and temporal variations.

c. Provide baseline noise data and predicted noise level changes in consideration of the distribution of vehicles by type over daytime and nighttime hours along the access road during operations and construction. Alternatively, in the absence of baseline data, provide follow-up monitoring results at these locations to confirm that the predicted noise levels are accurate.</td></tr>
<tr><td>Response:</td><td>a. In response to HC-18, the treatment of baseline conditions has been revised to include a lower baseline sound level consistent with other provincial recommendations for rural areas, and a 10-decibel</td></tr>
</table>

ID:	HC-19
	adjustment has been included in the results calculations to be consistent with a quiet rural area. Temporal and seasonal variability are captured through the use of these revised baseline conditions for this assessment. b. The nearby receptor locations are private cabins and were based on consultations with local land users and Indigenous land users who did not identify other potential receptor locations. The baseline sound level measurements were consistent with sound levels in other rural areas. c. The distribution of noise sources is described in more detail in response to HC-17. The access road was assumed to be in use only during daytime hours, as nighttime travel will be avoided for safety reasons. Other vehicles used for the Project were near the mine site and were assumed to be operating simultaneously and continuously over a 24-hour period. The accuracy of predicted noise levels will be confirmed through follow-up monitoring along the access road during construction and operation.
Appendix:	None

RESPONSE TO HC-20

ID:	**HC-20**
Expert Department or Group:	Health Canada
Guideline Reference:	Section 4.2.1.9 Population Health and Community Services Infrastructure
EIS Reference:	Chapter 5
Context and Rationale:	The proposed magnitude of residual effects criteria should consider sound characteristics and changes to noise levels. The magnitude of residual effects (Table 5.8 Characterization of Residual Effects on Atmospheric Environment) will be determined partly based on the “measurable change” in noise levels from the baseline condition. No explanation is provided on how the proposed judgement criteria are developed or whether they are adequate to protect human health. Changes to the characteristics of the sound from baseline (e.g., a change in frequency, changes in sound modulation, increased impulsiveness, or a shift in noise from the daytime to being more at night) may be perceived and may cause noise to be more noticeable, even if the absolute equivalent continuous sound level (in dBA) is not substantially increased. It is important to consider that people respond to sound characteristics that do not necessarily appreciably increase the sound level. Significance of residual adverse effect will be determined based on frequent exceedance of the annoyance and sleep disturbance targets recommended by Health Canada (Health Canada 2017) at noise sensitive receptors. It is inappropriate to determine significance of residual effects based solely on frequency of exceedance of the noise targets.
Information Request:	Health Canada recommends the following revisions be requested from the proponent: a. Clarify how differential responses to sound characteristics that do not necessarily appreciably increase the sound level will be considered (i.e., in addition to the comparison of predicted and baseline sound levels) in the assessment of health effects from noise. b. Consider sound characteristics and adjustments, including but not limited to the ones provided in HC-17 & HC-18, in the assessment of residual noise effects. c. Identify and implement additional mitigation measures, if detailed annoyance and sleep disturbance analysis demonstrate the potential for Project-related residual adverse effects.

ID:	**HC-20**
Response:	a./b. The EIS has considered changes in percent highly annoyed (%HA) to characterize potential changes in annoyance and has also considered nighttime thresholds of 45 A-weighted Decibels (dBA) for sleep disturbance. Additional calculations have been completed in response to HC-17 to confirm that nighttime LAmax values are expected to be well below 60 dBA. The acoustics assessment also included sound level adjustments where warranted based on the Project activities, nighttime noise sensitivities for receptor locations, and quiet rural area adjustments as outlined in the response to HC-18. Low Frequency Noise (LFN) has also been evaluated based on the best available data. Following the Health Canada 2017 guideline and using these diverse thresholds and noise level adjustments that incorporate differential responses to sound characteristics, it has been determined that change in the acoustic environment from Project activities is not significant. In addition, while the significance definition related to a change in sound quality is based on the frequency of exceedance of the annoyance and sleep disturbance targets recommended by Health Canada (Health Canada 2017), the assessment of community health has defined a significant effect as one that results in a reduction in the quality of ambient air, water or country foods, or as sound at levels predicted to result in exposures that are higher than the health-based guidelines established by regulatory organizations, that is likely to result in a substantive change in the health of communities. Therefore, potential effects from noise as it relates to community health is assessed in Section 14.5. c. Through the revised calculations as discussed in the response to HC-18, no additional mitigation requirements have been identified. Marathon is developing a grievance mechanism to afford a process for addressing grievances on the part of non-Indigenous and Indigenous groups or Indigenous persons resulting from the effects of the Project to these users, such as effects to land and resource use, health, socio-economic conditions and heritage resources. Any noise complaints received will be logged and investigated during Project construction and operation. Reference: Health Canada. 2017. Guidance for Evaluating Human Health Impacts in Environment assessment: Noise. January 2017. Available online at: https://iaac-aeic.gc.ca/050/documents/p80054/119378E.pdf
Appendix:	None

RESPONSE TO HC-21

ID:	**HC-21**
Expert Department or Group:	Health Canada
Guideline Reference:	Section 4.2.1.9 Population Health and Community Services Infrastructure
EIS Reference:	Chapter 14, Chapter 17
Context and Rationale:	Assessment of potential risk to human health associated with exposure to recreational waters potentially impacted by the project was inadequate. The EIS did not did adequately evaluate the potential risks to human health associated with exposure to recreational water that may be impacted by the project. The EIS: • did not consider all receptors, as non-Indigenous receptors were excluded completely, even though the Land and Resource Use Section demonstrated use of the LAA and RAA for recreational water activities. The data used to inform Indigenous use was inadequate (see HC-02) and potentially sensitive receptors/ receptor groups were not identified; • did not collect baseline information regarding type, location and duration of recreational water activity; • did not comprehensively identify COPCs that may impact recreational waters and their fate and transport in the environment; • screened out COPC's based on inappropriate screening criteria (i.e., CWQG-FAL & MDMER); and • did not evaluate potential risk to human health associated with recreational water use appropriately. The Guidelines for Canadian Recreational Water Quality do not include guidelines for specific chemical parameters. In the case of chemical contamination, Health Canada prefers that the potential risk to human health be assessed using a project specific approach. Considerations specific to the risk assessment of recreational water quality include the following: • Potential human exposure pathways include ingestion, inhalation and direct contact with the skin and mucous membranes. Health Canada prefers that the water quality assessments include a description of the types of activities practiced on or in the waters, to identify potential exposure pathways. • Natural recreational waters are not subject to treatment. Similar to the case of untreated source water quality, mitigation of the impact of a project on recreational water quality and related predicted changes (including possible spills and accidents) would involve developing plans

ID:	**HC-21**
	to implement measures to reduce this impact and monitor recovery in the water quality. If recreational water quality could be subjected to an environmental effect due to a project, Health Canada prefers that the appropriate authorities be notified and recreational users be informed.
Information Request:	Health Canada recommends the following revisions be requested from the proponent: Revise the EIS to adequately evaluate the potential risks to human health associated with exposure to recreational waters that may be impacted by the project. Refer to Health Canada's Guidance for Evaluating Human Health Impacts in Environmental Assessment: Water Quality for more information.
Response:	Potential exposures to surface water by non-Indigenous and Indigenous receptors were assessed qualitatively in Section 14.5 (pages 14.33 to 14.34) and Section 17.5 (pages 17.42 and 17.43), respectively, of the EIS. Potential human health risks associated with exposures to recreational water is provided in Section 4.3.3 and Section 4.4 of the Valentine Gold Human Health Risk Assessment (HHRA; Appendix A). As noted in Section 17.5 (page 17.42) of the EIS, Health Canada (2012) has not established health-based guidelines for incidental exposures to inorganic chemicals although notes that ingestion would be considered the primary pathway of exposure. Therefore, health-based drinking water guidelines that are based on daily exposures over a lifetime were used as conservative screening levels. To assess the potential human health risk associated with recreational use of surface water in Victoria Lake Reservoir, Valentine Lake, and the Victoria River for Indigenous and non-Indigenous receptors, the maximum predicted concentration of each parameter 100 m downstream of the receiving points was compared to the human health-based drinking water values (Table 4.5 of the HHRA). The maximum predicted concentration of each parameter was less than the drinking water values. These results suggest that recreational contact with these waters while swimming or boating would represent a negligible change in human health risk for Indigenous and non-Indigenous receptors.
Appendix:	See Appendix A: Human Health Risk Assessment

RESPONSE TO HC-22

ID:	**HC-22**
Expert Department or Group:	Health Canada
Guideline Reference:	Section 4.2.1.9 Population Health and Community Services Infrastructure
EIS Reference:	Chapter 14, Chapter 17
Context and Rationale:	Assessment of potential risk to human health associated with exposure to drinking water potentially impacted by the project was inadequate. The EIS did not did adequately evaluate the potential risk associated with consumption of drinking water that may be impacted by the project. The EIS: • did not consider all receptors, as non-Indigenous receptors were excluded completely, even though the Land and Resource Use Section demonstrated significant use of the area potentially impacted by the project. 171 cabin plots & 2 cabin developments areas are located in the RAA, 14 cabins are located within the LAA and three are located within the Project Area. Back country camping was also identified as an activity in the LAA/RAA; • did not identify potentially sensitive receptors/receptor groups; • did not include baseline information on drinking water sources for the cabins potentially impacted by project related activities i.e., dug or drilled well, treated or un-treated surface water, cisterns, etc. or backcountry camping activities; • did not include comprehensive baseline assessments of the drinking water contaminants in ground and surface water sources i.e., chromium in surface water; • did not comprehensively identify project related COPCs that may impact ground and surface water drinking sources; • screened out COPC's based on inappropriate screening criteria (i.e., CWQG-FAL & MDMER); • did not model predicted future concentrations of applicable COPCs in ground and surface water drinking sources that may be affected by the proposed project; and • did not provide an exposure assessment and an assessment of potential risk to human health from these potentially elevated COPCs through the drinking water exposure pathway. As potential risks associated with consumption of drinking water that may be impacted by the project were not adequately assessed, HC is unable to provide comment on the validity of this assessment.

ID:	HC-22
Information Request:	Health Canada recommends the following revisions be requested from the proponent: Revise the EIS to evaluate the potential risks to human health associated with consumption of drinking water (ground water and surface water sources) that may be impacted by the project. Refer to Health Canada's Guidance for Evaluating Human Health Impacts in Environmental Assessment: Water Quality for more information.
Response:	Potential exposures to country foods by non-Indigenous and Indigenous receptors were assessed qualitatively in Section 14.5 (page 14.34) and Section 17.5 (page 17.44), respectively, of the EIS. Potential human health risks associated with exposures through drinking water consumption is provided in Section 4.3.3 and Section 4.4 of the Valentine Gold Human Health Risk Assessment (HHRA; Appendix A). Groundwater is not used as a source of potable water in the Local Assessment Area. To assess the potential human health risk associated with the consumption of surface water from Victoria Lake Reservoir, Valentine Lake and the Victoria River for Indigenous and non-Indigenous receptors, the maximum predicted concentration of each parameter 100 m downstream of the receiving points were compared to the human health-based drinking water values (Table 4.5 of the HHRA). The maximum predicted concentration of each parameter was less than the drinking water values. These results suggest that the use of these waters as sources of potable water, on an occasional or continuous basis, would represent a negligible change in human health risk for Indigenous and non-Indigenous receptors.
Appendix:	See Appendix A: Human Health Risk Assessment

RESPONSE TO HC-23

ID:	**HC-23**
Expert Department or Group:	Health Canada
Guideline Reference:	Section 4.2.1.9 Population Health and Community Services Infrastructure
EIS Reference:	Chapter 14, Chapter 17
Context and Rationale:	Assessment of potential risk associated with consumption of country food potentially impacted by the project was inadequate. The EIS did not did adequately evaluate the potential risk associated with consumption of country food that may be impacted by the project. The EIS: • did not consider all receptors. Non-Indigenous receptors were excluded completely, even though the Land and Resource Use Section demonstrated significant use of the LAA and RAA for hunting, trapping and fishing. The data used to inform Indigenous land use was inadequate (see HC-02) and potentially sensitive receptors/receptor groups were not identified; • did not include baseline information on gathering (edible plants, berries, etc. as a part of the Land and Resource Use VC assessment; • did not identify specifically which foods are consumed by receptors or the consumption rates of each food type for the specific receptor groups; • did not include a measurement of the baseline concentrations of the contaminants in country food consumed in the area impacted by the project; • did not comprehensively identify COPCs that may impact country foods and their fate and transport in the environment; • screened out COPC's which possess the ability to bioconcentrate, bioaccumulate or biomagnify in the food chain, for example but not limited to cadmium, chromium, arsenic, mercury, selenium and PAH in emissions and discharges; • did not model predicted future concentrations of COPCs in country foods that may be affected by the proposed project; and • did not provide an exposure assessment and an assessment of potential risk to human health from these potentially elevated COPCs through the country foods exposure pathway. As potential risks associated with consumption of country food that may be impacted by the project were not adequately assesses, HC is unable to provide comment on the validity of this assessment.

ID:	**HC-23**
	Within the risk assessment of a proposed project, ingestion of contaminants via country food can be a significant pathway of exposure, particularly when chemicals that may increase as a result of project activities possess the ability to bioaccumulate or biomagnify in the food chain; and/or when the consumption of country food may constitute a significant portion of an exposed person's diet.
Information Request:	Health Canada recommends the following revisions be requested from the proponent: Revise the EIS to include an assessment of potential health risks associated with contamination of country foods through a human health risk assessment (HHRA). Refer to Health Canada's: • Guidance for Evaluating Human Health Impacts in Environmental Assessment: Country Foods • Guidance for Evaluating Human Health Impacts in Environmental Assessments: Human Health Risk Assessment for additional information.
Response:	The potential human health risks associated with exposure to contaminants of potential concern (COPC) through the consumption of country foods (vegetation, wild meat, fish) have been evaluated in Section 4.3.4 - Country Foods of the Valentine Gold Human Health Risk Assessment (HHRA; Appendix A). This includes an assessment of baseline conditions for metal concentrations in baseline country foods (vegetation, wild meat, fish). The HHRA evaluated potential human health risks associated with exposure to COPC for Baseline Case and Future Case conditions for Indigenous and non-Indigenous receptors present in the Local Assessment Area. The results demonstrated that the predicted changes in COPC exposures through country food consumption represents a negligible change in human health risk for Indigenous and non-Indigenous receptors.
Appendix:	See Appendix A: Human Health Risk Assessment

RESPONSE TO HC-24

ID:	**HC-24**
Expert Department or Group:	Health Canada
Guideline Reference:	Section 4.2.1.9 Population Health and Community Services Infrastructure
EIS Reference:	Chapter 14, Chapter 17
Context and Rationale:	An assessment of the potential health risk from methylmercury exposure through fish consumption was not provided. Mercury has been identified as a COPC for the project, associated with impoundment during construction of the Tailings Management Facility and discharge of mercury emissions to surface water such as the Victoria Lake Reservoir. Inorganic mercury can be transformed into methylmercury which bioaccumulates and biomagnifies in the aquatic food chain. Considering that there is the potential for mercury release from the project and that there may be the potential for fish consumption as a potential pathway of exposure, the exclusion of methylmercury may lead to an underestimation of health risk. A hydroelectric project also exists in the LAA/RAA, thus there may be elevated methylmercury concentrations in baseline fish tissue, especially in piscivorous fish (i.e. landlocked salmon) which live in previously impounded waterbodies such as Victoria Lake Reservoir. As baseline levels of methylmercury may be elevated and the project will contribute to mercury concentrations in the environment; HC is of the opinion that an assessment of the potential health risk from methylmercury exposure through fish consumption should be completed as part of the EIS.
Information Request:	Health Canada recommends the following revisions be requested from the proponent: Revise the EIS to include an assessment of the potential health risk from methylmercury exposure through fish consumption.
Response:	As part of country foods sampling program, muscle samples from brook trout (n=53) were analyzed for mercury, as described in Appendix C of the Human Health Risk Assessment (HHRA; Appendix A). The observed concentrations of mercury in brook trout muscle tissues (mean=0.11 mg/kg; maximum=0.327 mg/kg) are similar to those reported by Chan et al. (2017) for brook trout in Atlantic Canada (n=8, mean =0.2 mg/kg, maximum=0.6 mg/kg). Consistent with Health Canada (2007), "..., in the absence of detailed information on mercury speciation, it is simply assumed, for the purposes of health risk assessments, that 100% of total mercury is in the methylated form as methylmercury." Based on these results, there is no

ID:	**HC-24**
	indication that baseline methylmercury concentrations in fish tissue samples are elevated. Mercury was not detected in the geochemical testing of the ore samples. The mining processes planned for the Project does not require the use of mercury. In addition, the results of the geochemical water quality modelling showed that the concentrations of mercury in Victoria Lake Reservoir, Valentine Lake and Victoria River would not change from Baseline concentrations (Chapter 7, Surface Water Resources of the EIS). Given that the Project is not predicted to alter mercury concentrations in the receiving water bodies, it is reasonable to conclude that the methylmercury formation in fish tissue will remain unaltered from present levels and that the human health risks associated with exposure to methylmercury in fish tissue will remain unchanged from baseline case conditions. Environmental Effects Monitoring (EEM) pursuant to the *Metals and Diamond Mining Effluent Regulations* (MDMER) requires biological studies to evaluate effects of effluent to fish and fish habitat in receiving waters. Biological studies include a fish population survey (to monitor effects on growth, reproduction, condition, and survival), a fish tissue study (if selenium and mercury concentrations in effluent trigger such studies), and a benthic invertebrate community study. Biological studies are conducted every three years. EEM requirements continue throughout the life of the mine until it becomes a recognized closed mine under MDMER. In 2021, baseline studies will continue to collect information to support future EEM under MDMER. In addition, 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. Reference: Chan, L, O. Receveur, M. Batal, W. David, H. Schwartz, A. Ing, K. Fediuk and C. Tikhonov. First Nations Food, Nutrition and Environment Study (FNFNES): Results from the Atlantic. Table 26. Ottawa: University of Ottawa, 2017. Print. Health Canada. 2007. Human Health Risk Assessment of Mercury in Fish and Health Benefits of Fish Consumption. Bureau of Chemical Safety Food Directorate Health Products and Food Branch. Cat.: H164-54/2007E-PDF. ISBN: 978-0-662-47023-6.
Appendix:	See Appendix A: Human Health Risk Assessment

RESPONSE TO HC-25

ID:	**HC-25**
Expert Department or Group:	Health Canada
Guideline Reference:	Section 4.2.1.9 Population Health and Community Services Infrastructure
EIS Reference:	Chapter 14, Chapter 17
Context and Rationale:	The assessment of cumulative effects on human health may require re-evaluation. HC is of the opinion that the EIS has not evaluated all relevant COPCs and exposure pathways in the EIS in relation to potential impacts to human health. As a result of this, the potential risks to human health associated with this project may have been underestimated. The cumulative effects scenario predicts the cumulative potential environmental effects of the existing baseline plus project scenario in combination with effects from reasonably foreseeable future activities within the same area of influence; this scenario provides an estimate of human health risks in the future when other facilities are also in operation. As the cumulative effects scenario provides an estimate of human health risks in the future when other facilities are also in operation, changes to the risk associated with this project will affect this estimation of cumulative risk. Therefore, HC suggests that if the level of risk to human health associated with this project changes, it may require revision of the assessment of cumulative effects on human health.
Information Request:	Health Canada recommends the following revisions be requested from the proponent: Revise the cumulate effects assessment of the EIS, if the level of risk to human health associated with this project changes as a result of other requested revisions.
Response:	The human health risk assessment (HHRA) evaluated the potential human health risks associated with exposure to Project-related contaminants of potential concern in air, soil, surface water, terrestrial country foods, and fish for Baseline Case and Future Case conditions. The results are presented in the HHRA (Appendix A). The assessment determined that the residual effects on human health were negligible. Therefore, Project effects would not be expected to overlap spatially or temporally with residual human health effects from other likely future projects. The revisions requested by Health Canada have not altered the conclusions presented in the EIS and thus, a revision of the cumulative

ID:	**HC-25**
	effects assessment to address changes in human health risks is not required.
Appendix:	See Appendix A: Human Health Risk Assessment

RESPONSE TO TC-01

ID:	**TC-01**
Expert Department or Group:	Transport Canada
Guideline Reference:	-
EIS Reference:	EIS 2.3.10.4
Context and Rationale:	The EIS does not clearly identify or provide a complete list of the stream crossings that may be upgraded or newly installed. TC understands this is still subject to planning and engineering for the project; however, the information in the EIS (road work, bridges and culverts, etc.) appears to involve navigable waters not listed on the schedule. Please refer to the Advice to the Proponent column for further guidance.
Information Request:	Approval from TC may be required in some instances. TC encourages the Proponent to contact the Navigation Protection Program (NPP).Under the *Canadian Navigable Waters Act* (CNWA), owners of works - other than a minor work or a major work - that are located on navigable waterways not listed in the schedule, which may interfere with navigation, have the option to:1) either apply to the Minister of Transport; (approval review process and advertising and 30 day registry public review); or,2) seek authorization through the public resolution process, and deposit specific information regarding their work on the new Common Project Search (online registry) inviting any interested party to comment (advertising and 30 day registry public review).**Note however, that bridges with piers placed below the high water mark of a watercourse always require an approval as outlined in the Major works Order (i.e. an application for approval is required).
Response:	Marathon has been in consultation with Transport Canada's Navigation Protection Program (NPP) with regards to the Project and potential applicability of the *Canadian Navigable Waters Act* (CNWA) and understands that public notification and approval processes pursuant to the CNWA apply to 'navigable waters' as defined in the Act. Figure 2-40 in Chapter 2 of the EIS shows the locations of the potential stream crossings. These are also shown at a finer scale in a series of figures provided in Appendix 2D of the EIS. Summaries of habitat characteristics for potential stream crossings are located in Section 8.2.2.1 of the EIS (for C001 to C009) and Table 4.4 of the 2020 Fish and Fish Habitat Data Report (Appendix H) (for C0016 to C0061). A detailed scope of work with respect to potential repairs and upgrades to bridges and culverts on the existing access road will be developed in 2021, with work to be completed in 2022. There are no new bridges or culvert installations required for stream crossings along the access road, as any new culverts are required for cross-drainage only. This work will be planned

ID:	**TC-01**
	and conducted in consultation with the Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture (NLDFFA; as the owner of the road). Marathon has determined that the waterbodies proposed to be altered are not considered 'navigable waters', and/or repairs and upgrades will not interfere with navigation; however, Marathon will verify this determination directly with the NPP in advance of construction. As the design of stream crossings at the mine site and repairs/upgrades along the access road progresses through detailed engineering, Marathon will consult with the NPP, as applicable.
Appendix:	See Appendix H: 2020 Fish and Fish Habitat Data Report

RESPONSE TO TC-02

ID:	**TC-02**
Expert Department or Group:	Transport Canada
Guideline Reference:	-
EIS Reference:	EIS 2.3.4.1 Tailings Management Facility Figures 2-3, 2-5, and 2-6
Context and Rationale:	TC acknowledges the Proponent's statement that the siting of the TMF avoids the need to infill or dewater fish-bearing and/or navigable waterbodies.
Information Request:	According to some of the Figures provided in the EIS, the proposed rock stock piles and open pits for both Marathon and Leprechaun initiatives appear to overlap with unnamed waterbodies. Similar to the information provided above for the TMF, please confirm if these pits will require infilling or dewatering of fish-bearing and/or navigable waterbodies. As previously advised, if infilling or dewatering of a navigable waterbody is required an application for approval (GiC approval) will need to be submitted to TC's Navigation Protection Program (NPP).
Response:	Marathon has consulted with the Navigation Protection Program (NPP) and understands that GiC approval would be needed to infill or dewater a navigable waterbody. Marathon has determined that the waterbodies proposed to be dewatered or infilled are not considered 'navigable waters' as defined in the *Canadian Navigable Waters Act*; however, Marathon will verify this determination directly with the NPP prior to construction.
Appendix:	None

RESPONSE TO PC-01

ID:	**PC-01**
Expert Department or Group:	CPAWS
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	a. While the caribou assessment for the Valentine Gold Project EIS utilizes recent data on caribou herd ecology in the region to determine impact magnitude and significance, there are gaps in the analyses provided in the EIS that could inform impact significance predictions and the development of follow-up and monitoring programs. b. Project-specific data was gathered on caribou use of some of the movement pathways through the Project Area, but much of the analyses in the caribou assessment were based on data gathered primarily by the province of Newfoundland and Labrador which conducts a wide-ranging caribou research program on the Island of Newfoundland. As a result, the available data, as presented in the EIS, is sufficient to identify impact pathways for caribou in the region, but gaps remain that raise questions about the magnitude of potential impacts. c. Previous research has demonstrated the precarious state of caribou on the Island, where population declines have only recently begun to slow down after declining rapidly from the mid-1990s to mid-2000s (Weir et al., 2014). The main hypotheses explaining the decline are that while: “predation is the main proximate factor influencing calf survival, limited forage conditions (as a result of competition, degradation, or phenology) ultimately may have predisposed calves to higher predation rates because of smaller sizes at birth and a lower ability to escape predators … or adult nutritional stress may have resulted in reduced maternal care and defence.” (Weir et al., 2014, pg. 27). This demonstrates the complex set of interactions that are driving the density dependent response of Island caribou herds to changes in foraging conditions. The proposed project is likely to sever the main migratory corridor for the Buchans herd, but is missing an assessment of the habitat quantity, quality and connectivity in areas likely to be used as alternative migration corridors, if the Project proceeds. While the EIS acknowledges the significance of this potential impact, there is a lack of further analysis on the habitat quality of alternative movement routes to fully understand how forcing changes on caribou movement will impact herd fitness. Addressing questions about the habitat quality, quantity and connectivity along

ID:	**PC-01**
	potential alternative migration corridors would inform our understanding of the consequences of the proposed Project for the Buchans herd. d. There is a lack of quantification of information in key areas that are necessary to inform the development of follow-up and monitoring plans. For example, the amount of landscape disturbance in the region is not measured as a part of the cumulative effects analysis even though it is used in the woodland caribou recovery strategy as a metric for landscape disturbance and population sustainability (Environment Canada, 2012). This information is necessary to understand the magnitude and trajectory of cumulative effects and their potential impact on population sustainability. Further, added quantification would contribute to the definition of monitoring targets to test impact predictions and mitigation effectiveness. It would also allow for the definition of triggers for adaptive management action.
Response:	a. The methods used to prepare the EIS were developed in consideration of federal requirements under the *Canadian Environmental Assessment Act*, 2012 and the provincial *Environmental Protection Act* with specific consideration of the federal and provincial EIS Guidelines developed for the Valentine Gold Project. Please refer to Section 2.1 of the Caribou Supplemental Information Report (Appendix G) for a description of environmental assessment methods. b. Within the context of environmental assessment, the prediction of a significant adverse residual effect is the highest level of importance and gravity that can be placed on a potential Project effect; it fully acknowledges the need for careful consideration and development of meaningful mitigation, monitoring, adaptive management, and on-going consultation and cooperation with regulators and stakeholders. Marathon is committed to working with regulators, Indigenous groups, and stakeholders to implement initial mitigation measures, undertake follow-up and monitoring activities, and adapt mitigation measures as required to avoid or reduce adverse Project effects on caribou. Mitigation measures for caribou will be confirmed in consultation with Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture (NLDFFA) - Wildlife Division. Additional information on supplemental baseline information, additional environmental effects assessment, and mitigation and monitoring plans is provided in the Caribou Supplemental Information report (Appendix G). c. Marathon has, and will continue to, work with the NLDFFA - Wildlife Division to better understand caribou habitat use and movement through

ID:	PC-01
	the Project area prior to Project development. This work includes the following initiatives: • Deployment of 60 Global Positioning System collars on caribou from the Buchans and Grey River herds; these collars are in the process of being deployed by staff from NLDFFA - Wildlife Division and the data will provide additional baseline data and support future environmental effects monitoring. • The remote camera program has also been expanded to gather supplementary information on caribou entry and exit points through the mine site, and to better understand caribou use of less prominent trails within and adjacent to the mine site. The expanded remote camera program will also provide additional information on the timing of spring and fall migration in the Project Area, included variation among years. Marathon, in consultation with NLDFFA - Wildlife Division, deployed 15 additional cameras in spring 2021 in targeted locations that were supported by LiDAR imagery, dBBMM outputs, and the results of the Caribou Alternate Migration Pathway Analysis (discussed in Section 4.1.1 of the Caribou Supplemental Information report [Appendix G]). Future program refinements are anticipated based on survey outcomes and continued consultation with NLDFFA - Wildlife Division. • A post-calving and population survey of the Buchans caribou herd was completed in spring 2021 to provide additional baseline information. Marathon will provide the results of the 2021 survey to NLDFFA-Wildlife Division when these are available. Section 6.2 of the Caribou Supplemental Information report (Appendix G) describes the proposed caribou monitoring program that will be developed to confirm the effectiveness of mitigation, contribute to ongoing evaluation of the overall condition of caribou within the Project Area, and help identify the potential need for adaptive management measures to further mitigate Project effects. d. Within the EIS, effect pathways for caribou are first considered separately to demonstrate that the full range of potential effects of the Project have been assessed and characterized. Please refer to Section 4.5 of the Caribou Supplemental Information report (Appendix G) for a description of combined and cumulative effects. In recognition of IRs related to the linkages between effects pathways and differences in Project interactions with different caribou herds, summaries of effects are presented in Section 5 (Appendix G) for each caribou herd. In addition, since submission of the EIS, a Caribou Alternate Migration Pathway Analysis has been undertaken to predict potential alternate

ID:	**PC-01**
	migratory pathways that may be used by the Buchans herd for spring and fall migration during Project activities. The least cost path (LCP) analysis identifies and quantifies the quality of habitat types along potential alternate migration routes and provides a measure of the estimated incremental energetic cost relative to the current (baseline) migration path. The LCP analysis predicted a number of alternate paths based on various assumed zones of influence, and in frozen and unfrozen conditions. The alternate paths had incremental energetic costs that ranged from 1.01 to 1.41 times greater than the baseline LCP (Attachment A in Caribou Supplemental Information report; Appendix G). e. Please refer to Section 4.5 of the Caribou Supplemental Information report (Appendix G) for a description of cumulative effects, including the identification of geographic extent (Figure 4.1) and quantification (Table 4.4) of potential cumulative effects of the Project with other existing and planned projects and/or activities on caribou habitat within the Regional Assessment Area. Please refer to Section 6.2 of the Caribou Supplemental Information report (Appendix G) for additional information on the caribou monitoring framework and adaptive management.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO PC-02

ID:	PC-02
Organization or Group:	CPAWS
Context and Rationale:	-
Information Request:	The proponent indicates a total of 30 mitigation measures to reduce negative impacts on Caribou. Of these, approximately 1/3 contain vague terms such as “to the extent practicable”, “where feasible”, “limited to that which is necessary”, “proper handling and storage”. For example, when the proponent states “Vehicles and heavy equipment will be maintained in good working order and will be equipped with appropriate mufflers to reduce noise.”, many questions remain unanswered: • What is the definition of “good working order” and what standards are being followed? • What is an “appropriate muffler? • What is the reduction in noise emission expected from the implementation of the measure? • How will the proponent evaluate whether or not the measure is effective? • What will be done in case maintaining a “good working order” and using “appropriate mufflers” are found to be ineffective at mitigating noise?
Response:	As set out in Marathon’s Environment Policy, Marathon will comply with applicable environmental laws, regulations and standards and ensure that effective systems, practices and plans, based on industry best practices, are in place to prevent, mitigate and manage environmental risks. Marathon will also comply with mitigation measures as set out in the conditions of release from both the federal and provincial environmental assessment processes. As such, mitigation measures will be further refined during detailed Project planning and design and will be updated to reflect permit requirements and conditions of environmental assessment release, as applicable. In addition, the Environmental Protection Plan and environmental management and monitoring plans, which serve to operationalize the commitments set out in the EIS, will be subject to government review and approval. Mitigation measures included in the EIS are worded in recognition that while Marathon will follow and comply with industry best practices, measures also need to be economically and technically feasible. For example, Marathon will use mufflers on equipment that are consistent with or better than industry standards for the equipment in use, however, will not be retrofitting equipment with mufflers that have not been proven to be technically feasible for commercial use or that are cost prohibitive. The

ID:	**PC-02**
	engines and exhaust systems of construction and mining equipment will be subject to a full inspection and maintenance program, and vehicles and heavy equipment will be maintained to meet industry standards. In addition, while Marathon intends to implement the mitigation measures as described, circumstances or emergency situations may arise where to do so is not practicable (i.e., possible and feasible). Additional information on caribou mitigation and monitoring is provided in Section 6 of the Caribou Supplemental Information report (Appendix G). Table 6.3 of that report outlines the proposed monitoring approach and preliminary thresholds for applicable mitigation measures which will form the basis of a Caribou Monitoring Program. As outlined in Table 6.3, light and noise will be monitored as part of the Air Quality Management Plan and may be used to inform caribou models, mitigation and monitoring programs. Marathon is committed to working with regulators, Indigenous groups, and stakeholders to implement initial mitigation measures, undertake follow-up and monitoring activities, and adapt mitigation measures as required to avoid or reduce adverse Project effects on caribou.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO PC-03

ID:	**PC-03**
Organization or Group:	CPAWS
Context and Rationale:	-
Information Request:	Some of the measures are deferred, pointing to the development of management plans (e.g., “Project facilities and infrastructure will be designed to limit noise emissions”; “Marathon will develop and implement a Traffic Management Plan to manage transportation of workers and materials to site, product leaving site, the number of vehicles accessing the site, and to reduce traffic delays”). Such management and design plans should be included in the EIA documentation, as there is no way for the public to understand and evaluate their content and appropriateness as mitigation measures.
Response:	The mitigation measures provided in the EIS (Table 2.22) represent commitments with which Marathon will be required to comply and are considered to be presented in sufficient detail to support the assessment of effects. As described in Chapter 2, Section 2.7.3 of the EIS, a series of environmental management plans will be developed under an overarching Environmental Management System and will encompass the environmental regulatory requirements and commitments made for the Project. The intended audience for these plans is Marathon personnel and contractors conducting construction and operation activities on site, as these plans will operationalize the commitments made in the EIS. They will be developed to reflect applicable compliance standards and industry best management practices, formal conditions resulting from the environmental assessment (EA) processes, and subsequent requirements of federal and provincial permitting processes for the Project. Consistent with other developments in the province, the development of the environmental management plans will therefore be completed following the Ministers' decisions and in consultation with applicable regulators. These plans are considered “living documents” that will be updated as Project planning and design progresses, additional commitments and requirements are identified, and/or results of follow-up and monitoring identify the need for updates or changes. As outlined in Marathon’s Community Relations Policy, Marathon is committed to meaningful and ongoing community engagement. As such, Marathon is committed to continued engagement with the public, communities. Indigenous groups and other stakeholders beyond the EA process and throughout the life of the Project.
Appendix:	None

RESPONSE TO PC-04

ID:	**PC-04**
Organization or Group:	CPAWS
Context and Rationale:	-
Information Request:	Other measures seem to stem from arbitrary thresholds. For example, changes in Caribou habitat use have been observed to occur as far as 23 km from a mining site (Plante et al., 2018). Similarly, what is the justification for limiting project-related air-traffic to 500 m? For example, mountain Caribous still have 30 to 40% probability of reacting to helicopter passes at altitudes between 500-1000 m (Wilson & Wilmshurst, 2019). If the project involves frequent use of aircrafts and helicopters, what is the expected acoustic disturbance from such activities? And again, activities will be reduced if Caribou is sighted within 500 m from project activities. Considering that avoidance and behavioral effects can occur at tens of kilometers from the site, this threshold does not seem appropriate, especially as a buffer for blasting activities.
Response:	Project-related air traffic is expected to be infrequent during Project construction, operation and decommissioning. It has been identified Mitigation of maintaining a 500 m minimum altitude has been identified as a precaution, should helicopter use be required; this measure is consistent with the wildlife flight guidelines used by Parks Canada to limit disturbance to wildlife (Parks Canada 2021). In response to requests from Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture (NLDFFA) - Wildlife Division, Marathon has provided supplementary information on sensory disturbance and zones of influence of the Project in Sections 4.2 and 4.3, respectively of the Caribou Supplemental Information report (Appendix G). Supplementary information on mitigation for caribou, including further discussion of reducing or suspending activities when caribou are in proximity to the mine site using an area-based matrix for management action, is provided in Section 6 of the Caribou Supplemental Information report (Appendix G). The specific restrictions to be in place (including timing and triggers) will be being further defined in consultation with NLDFFA - Wildlife Division. Marathon is committed to working with regulators, Indigenous groups and stakeholders to implement initial mitigation measures, undertake follow-up and monitoring activities, and adapt mitigation measures as required to avoid or reduce adverse Project effects on caribou.

ID:	PC-04
	References: Parks Canada. 2021. Wildlife Flight Guidelines. Available online at: https://www.pc.gc.ca/en/pn-np/ab/jasper/info/plan/survols-flight
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO PC-05

ID:	**PC-05**
Organization or Group:	CPAWS
Context and Rationale:	-
Information Request:	There are different references to the adoption of adaptive management strategies in case of negative events, however, this is a reactive approach rather than a proactive approach. The adaptive management cycle should start prior to the occurrence of such events, not be triggered by them. In addition to this, adaptive management should be a project-wide strategy and the application of its principles should not be tailored to specific events. In other words, the adaptive management approach should be applied to all mitigation measures – including monitoring their outcomes and updating the measures if found to be inefficient.
Response:	Marathon will implement mitigation measures and use an adaptive management process throughout all Project phases, as applicable. The premise of adaptive management is to use a cycle of planning, implementation, monitoring, and analysis / learning to systematically determine whether mitigation is effective relative to the goal(s), while allowing for adjustments to mitigation when monitoring results indicate that the goal(s) is not being achieved. As discussed in Section 2.7 of the EIS, an Environmental Management System (EMS) will be used by Marathon to manage environmental aspects of the Project throughout its life cycle in a manner that is fully integrated with other management considerations and which will apply across all corporate levels and functions. The EMS will be regularly reviewed and revised as necessary to provide continuous improvement in environmental performance. The EMS is designed as a conceptual and systematic framework to manage environmental risks, based on principles of adaptive management and continuous improvement. Additionally, Marathon is committed to working with regulators, Indigenous groups, and stakeholders to implement initial mitigation measures, undertake follow-up and monitoring activities, and adapt mitigation measures as required to avoid or reduce adverse Project effects on caribou. A Caribou Monitoring Plan is being developed and will be refined through ongoing engagement with the Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture (NLDFFA) - Wildlife Division, Indigenous groups and other stakeholders, as applicable. Adaptative management actions will be determined through monitoring of long-term and near real-time caribou collar data, active monitoring at the mine site, and incidental

ID:	**PC-05**
	observations of caribou, whereby a series of management actions will be triggered in response to their proximity to the Project activities. Conservative monitoring thresholds for each mitigation will be proposed, such that additional management actions can be implemented when it is identified that the purpose or goal of the mitigation is not being achieved. For example, in addition to the temporal reduction or suspension of activities in the Marathon pit area during caribou migration through the corridor, the Environmental Technician will be notified if caribou are observed within a set distance from other specific Project activities within the site (e.g., blasting at Leprechaun pit) and those activities will be reduced, suspended, or delayed, as needed. Please refer to Table 6.2 in Section 6.2.1.1 of the Caribou Supplemental Information report (Appendix G) for the overall approach to area specific objectives. Such data will be tracked and used to develop trends and identify high-use areas, with mitigations adapted as required in accordance with the knowledge being gained through the monitoring efforts. Thresholds or triggers for action and the extent of change in mitigation in response to monitoring data, if needed, will be discussed, and determined in consultation with NLDFFA - Wildlife Division and outlined in the Caribou Monitoring Plan. Please refer to additional information on adaptive management provided in Section 6.2.3 of the Caribou Supplemental Information report (Appendix G).
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO PC-06

ID:	**PC-06**
Organization or Group:	CPAWS
Context and Rationale:	-
Information Request:	Lastly, there is a contrast of objectives between different proposed mitigation measures. The proponent indicates that movement of Caribou (and other wildlife) will be facilitated by, for example, creating openings in snowbanks and providing low areas when building the access roads ditches. At the same time, placing of boulders / gates / fences is indicated as a mitigation measure to limit public access to the site. How are these two measures compatible? How is the proponent making sure that the barriers put in place to restrict public access will not affect Caribou (and other wildlife) movement as well?
Response:	Project planning and the application of proven mitigation measures will be used to reduce adverse residual effects on caribou and other wildlife. Please refer to Section 6 of the Caribou Supplemental Information report (Appendix G) for additional information on mitigation measures to be implemented throughout the life of the Project. Mitigation measures related to vehicles, equipment and roads include traffic control measures to restrict public access to the mine site, which may include gating primary access points or placing large boulders and/or gated fencing at locations where motorized vehicle access needs to be deterred. These measures, if implemented, will be limited to those areas where caribou movement through the Project area is not expected to be impeded (e.g., mine site entrance). Gaps in snowbanks will be strategically placed along the edges of roads (at regular intervals, using existing wildlife trails where available) to facilitate passage of caribou. These gaps are not expected to encourage public access to off-road areas. Section 6.2 of the Caribou Supplemental Information report (Appendix G) describes the proposed monitoring approach for caribou, including monitoring the effectiveness of mitigation measures (Table 6.3). Caribou activities during the migratory periods will be monitored via visual observation, aerial surveys, telemetry data from GPS collars, and wildlife cameras; this monitoring will inform appropriate mitigation and any applicable adaptive measures. Marathon is committed to working with regulators, Indigenous groups, and stakeholders to implement initial mitigation measures, undertake follow-up and monitoring activities, and adapt mitigation measures as required to

ID:	**PC-06**
	avoid or reduce adverse Project effects on caribou. A Caribou Monitoring Plan is being developed in consultation with the Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture - Wildlife Division. Adaptative management actions will be determined through monitoring of long-term and near real-time caribou collar data, active monitoring at the mine site, and incidental observations of caribou, whereby a series of management actions will be triggered in response to their proximity to the Project activities. Conservative monitoring thresholds for each mitigation will be proposed, such that additional management actions can be implemented when it is identified that the purpose or goal of the mitigation is not being achieved. Please refer to additional information on adaptive management provided in Section 6.2.3 of the Caribou Supplemental Information report (Appendix G).
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO PC-07

ID:	**PC-07**
Organization or Group:	CPAWS
Context and Rationale:	The EIS does a reasonable job qualitatively discussing the potential impacts of the Project on caribou movement, particularly for the Buchans herd as the Project has the potential to sever its primary migratory pathway. However, the quantitative analysis of current movement routes is limited, and no predictions are made about where caribou pathways may occur if the Project proceeds. The quantitative analysis in the EIS focuses on identifying the preferred migratory path for the herd based on current use (e.g., 55.1% of collared caribou use the spring migratory corridor identified in Figure 11-12, pg. 11.32), and then calculating the proportion of the entire migratory corridor that overlaps with the Project Area. While the EIS acknowledges the significant, long-term impact the Project will have on caribou movement, there is only a qualitative discussion of landcover, or other environmental features (e.g., slope or elevation), preferred by caribou. No quantitative assessment of habitat preferences, and no figures are provided in the EIS that show the spatial configuration of preferred habitats during migration. Further, no information is provided on the habitat quality of potential alternative movement routes. This information could serve as the basis of a movement analysis to predict alternative movement routes and ultimately to estimate changes in energetic costs based on distance travelled to fully understand the potential impacts of the Project on the Buchans herd. Caribou on the Island of Newfoundland already traverse a narrow ecological pathway to acquire the resources required to grow their populations. Any upset to the ecological balance could initiate further population declines. Understanding the energetic costs of potentially significantly longer or abbreviated migrations is an important factor in fully understanding the impacts of the proposed Project. A better understanding of the relationship between caribou and their habitat would also inform reclamation planning. For example, a quantitative analysis of the caribou-habitat relationship which included not only landcover characteristics, but also additional variables which described habitat structure, such as slope or elevation, could inform the reclamation of the waste rock piles, where re-sloping will be necessary.
Information Request:	a. Please provide a quantitative analysis of caribou habitat preferences during each season. b. Please identify alternative migratory corridors based on habitat requirements and assuming a Zone of Influence (ZOI) around the

ID:	PC-07
	Project Area at different distances based on similar developments, as identified in Table 11-14, pg. 11.56, to inform predictions. c. How much farther are caribou expected to travel as they migrate around the Project Area?
Response:	a. Table 11.15 in the EIS summarizes Project-related change in caribou habitat (direct and indirect effects) for all seasons combined. Table 4.2 in the Caribou Supplemental Information report (Appendix G) provides additional information on Project-related effects on winter, spring, summer and fall caribou habitat. b./c. As described in Section 11.6 of the EIS, given the overlap between the Project and the migration corridor used by more than half of the Buchans herd, Project-related residual effects on caribou are expected to be adverse and significant. Although caribou movements will be altered, there is uncertainty as to how the Buchans herd will respond and resulting effects this may have on their population. A Caribou Alternate Migration Pathway Analysis was completed since the submission of the EIS, which examines potential outcomes based on literature-supported avoidance distances, the presence of physical barriers, energetics, and the existence of alternate routes used by caribou from the Buchans herd (e.g., low use travel paths across Red Indian Lake). This analysis is included as Attachment A to the Caribou Supplemental Information Report (Appendix G) and the results are summarized in Section 4.1.1 of that report. The additional information provided in this analysis does not change the conclusion of a significant adverse residual effect on caribou. Marathon is committed to long-term monitoring of mitigation effectiveness and Project effects on caribou. Effects monitoring will aim to confirm the effectiveness of mitigation, contribute to ongoing evaluation of the overall condition of caribou within the Project Area, and help identify the potential need for adaptive management measures to further mitigate Project effects. Please refer to additional information on monitoring provided in Section 6.2 of the Caribou Supplemental Information report (Appendix G).
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO PC-08

ID:	**PC-08**
Organization or Group:	CPAWS
Context and Rationale:	Habitat fragmentation is described qualitatively and focuses primarily on the impact of the access road. How the Project footprint, including the road, will fragment caribou habitat in different seasons is not quantified. The EIS notes the importance of interconnected habitats to caribou but provides no meaningful analysis of habitat fragmentation at baseline, or during operations, if the proposed project is approved.
Information Request:	a. Please provide an analysis of caribou habitat connectivity in the Regional Assessment Area (RAA), with and without the Project. b. Please conduct a quantitative caribou habitat fragmentation analysis, including an analysis of habitat patch size, number, distribution, and connectivity.
Response:	a/b. Figure 4.1 in the Caribou Supplemental Information report (Appendix G) shows the extent of existing and planned disturbance footprints within the RAA with a 500 m radius buffer around the footprints (i.e., visually represents the area of direct (alteration/loss) and indirect (sensory disturbance) effects on caribou habitat). Table 4.4 in the Caribou Supplemental Information report (Appendix G) quantifies the area of disturbance (existing and planned) within the overall ranges of the four assessed caribou herds. These values are then compared to the disturbance management threshold for a local population to be self-sustaining as identified in the Amended Recovery Strategy for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal population, in Canada (ECCC 2020). The presence of the Marathon pit and waste rock pile that overlap with the primary migration path of Buchans herd caribou are expected to reduce connectivity between summer and winter ranges. Marathon has completed a Caribou Alternate Migration Pathway analysis to investigate potential effects of the Project on migration and connectivity. Please refer to Section 4.1.1 and Attachment A of the Caribou Supplemental Information report (Appendix G) for the results and discussion pertaining to this analysis. References: Environment and Climate Change Canada. 2020. Amended Recovery Strategy for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal population, in Canada. Species at Risk Act Recovery Strategy

ID:	**PC-08**
	Series. Environment and Climate Change Canada, Ottawa. xiii + 143pp.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO PC-09

ID:	**PC-09**
Organization or Group:	CPAWS
Context and Rationale:	The baseline wildlife camera program was focused on estimating the timing of caribou movement through the mine site. The cameras were placed along identified caribou migration routes. Routes were identified using remote sensing data to identify game trails, and caribou sign (e.g., pellets, sheds) identified in the field. As a result, all 12 cameras deployed to examine migration timing were located in the northern half of the study area. However, game trails were identified in the southern half of the Project Area, but no cameras were placed in this area. Presumably, no caribou signs were observed in the field to confirm caribou use the other game trails across the site, but telemetry data (Valentine Gold EIS, Figures 11-13 & 11-14) shows that caribou do move across the southern half of the Project Area. Even if no caribou sign was observed in the field to confirm use, it is unclear why all the cameras were only placed in the northern half of the Project Area. At a minimum, cameras placed in the southern half of the Project Area could at least confirm that no, or very little use, by caribou occurs.
Information Request:	Please discuss relative use by caribou of different migration pathways across the Project Area. The population-level migration corridor accounts for ~50-60% of collared caribou, where does the other 40-50% of the herd migrate?
Response:	As indicated in Section 11.2.2.1 of the EIS, Dynamic Brownian bridge movement model (dBBMM) outputs were used to delineate migration corridors and paths for the Buchans herd. The dBBMM model identified a network of migration travel paths spanning approximately 30 to 86 km depending on location (page 11.31 in the EIS). Within this network of paths, one population-level (i.e., preferred) path was identified for the Buchans herd and is used during both spring and fall migration periods. Up to 55.1% to 58.4% of caribou use the preferred path during spring and fall migration, respectively, based on multiple years of collar data (2007-2012 and 2015/16-2017; page 11.12 in the EIS). In addition to this primary path, several other lower use travel paths were identified within the spring and fall migration corridors shown in Figure 11.12 and Figure 11.13 in the EIS (e.g., west of Victoria Lake Reservoir and across Red Indian Lake). These low use travel paths indicate areas used by other caribou from the Buchans herd over the same period. Please refer to Section 4.1 of the Caribou Supplemental Information report (Appendix G) for additional information related to caribou movement through the Project Area.

ID:	**PC-09**
	Information on the timing of migration through and use of the Project Area will be refined through additional cameras deployed in 2021 and collared caribou telemetry from the collaring program, which commenced in November 2020. The location of cameras for deployment have been developed in consultation with the Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture - Wildlife Division. The timing and nature of mitigations and associated seasonal reductions in, or cessation of, Project activities, as required, will be informed by existing information, additional baseline work to be completed in 2021, and monitoring programs implemented during Project development to assess changes caribou movements.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO PC-10

ID:	**PC-10**
Organization or Group:	CPAWS
Context and Rationale:	The EIS states that the Local Assessment Area (LAA) "includes a 1 km buffer surrounding the mine site and a 500 m buffer surrounding the access road (Figure 11-1). The LAA was established to reflect the area within which caribou-specific Project effects are most likely to occur, including indirect habitat loss due to sensory disturbance (i.e., displacement or avoidance) (e.g., Benítez-López et al. 2010)." (pg. 11.4) The article cited by the proponent to justify their selection of 1 km and 500 m buffers is a metanalysis of previous studies that "[r]eported effects for most … mammal populations up to about 5 km". (Benítez-López et al.2010, pg. 1314) That same article also found an average "decline in species abundance of 28-36% and 25-38% for birds and mammals within 2.6 km and 17 km from infrastructure, respectively." (Benítez-López et al. 2010, pg. 1312) Both of these results indicate a potential 'zone of influence' (ZOI) around industrial infrastructure that is larger than the buffer used to define the LAA in the EIS. While the findings of the Benítez-López et al. (2010) meta-analysis are not specific to caribou and response to industrial development obviously varies by taxa and habitat type, it is unclear why information on the response of caribou more specific to the region or type of development was not used to define the LAA.
Information Request:	a. Please discuss how the findings of Benítez-López et al. (2010) justify the selection of 1 km and 500 m buffers around project-related infrastructure to define the LAA for the caribou assessment. b. Please discuss how studies focused on caribou responses to anthropogenic structures (e.g., Table 11.14, pg. 11.56) were incorporated in the definition of the LAA.
Response:	a./b. As indicated in Section 11.1.3.1 of the EIS, the Local Assessment Area (LAA) was established to reflect the area within which caribou-specific Project effects were most likely to occur. The area within the mine site includes habitats that will be directly affected by the Project, whereas habitats in the LAA may have reduced use or seasonal avoidance by caribou that are anticipated to be recoverable at post-closure of the Project. Similar to the findings of Benítez-López et al. (2010), the EIS assumes that sensory disturbances (e.g., noise, visual, vibration, dust, and human activities) are anticipated to be more pronounced in proximity of the infrastructure (i.e., within the 500 m buffer vs. outside the 500 m buffer) and habitat within the 500 m buffer is expected to have reduced value for, and hence reduced use by, caribou through all Project phases. Predicted effects on caribou habitat are expected to

ID:	**PC-10**
	extend beyond the 500 m buffer, as indicated in Section 11.5.1.3 of the EIS. These effects, however, are expected to decrease with increasing distance from the Project Area. Section 4.3 of the Caribou Supplemental Information report (Appendix G) provides additional information on Project-related residual effects on a change in caribou habitat at potential zones of influence of up to 15 km from the mine site. The additional information does not change the prediction of a significant adverse effect on caribou. Reference: Benítez-López, A., R. Alkemade and P. Verweij. 2010. The impact of roads and other infrastructure on mammal and bird populations: A meta-analysis. Biological Conservation 143: 1307-1316.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO PC-11

ID:	**PC-11**
Organization or Group:	CPAWS
Context and Rationale:	The EIS states that: "[i]ndirect effects on habitat were measured based on the estimated area of potential sensory disturbance, primarily from sound and light emissions. The sensory disturbance zone [or Zone of Influence] defines the area over which the effects of a disturbance are assumed to reduce the effectiveness of the adjacent caribou habitat due to avoidance or underutilization. For this assessment, a sensory disturbance zone of 500 m was applied around the outer extent of the Project Area where vegetation will not be removed. The use of a 500 m buffer for caribou is aligned with the federal Scientific Assessment to Inform the Identification of Critical Habitat for Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada (Environment Canada 2011), which applies a 500 m zone to anthropogenic disturbances to determine overall disturbed caribou habitat." (pg. 11.48). Alternatively, as part of the cumulative effects analysis, the EIS states that "[a]nthropogenic disturbances (sensory disturbance) are generally avoided by caribou. Caribou have been documented to reduce use of areas within 2 to 11 km from mines" (Section 20.8.4.1, pg. 20.63). Given the documented response of caribou to mines across Canada, the choice of 500 m buffer does not appear to be reflective of the indirect effects of a mine on the distribution and abundance of caribou. As a result of the smaller ZOI used in the EIS, the potential impacts of indirect effects are likely underestimated. Currently, the EIS predicts low magnitude impacts of habitat loss, but if a larger ZOI (i.e., buffer) around the Project Area was used, the magnitude of predicted impacts due to habitat loss could be of moderate or higher magnitude.
Information Request:	a. Please provide estimates of indirect habitat loss based on previously observed zones of influence around mining projects in Canada and Newfoundland and Labrador. b. Please discuss how adjusting the ZOI and revising estimates of indirect habitat loss potentially changes predictions of impact magnitude.
Response:	a. Table 4.3 of the Caribou Supplemental Information report (Appendix G) provides supplementary information on the amount of low, moderate, and high-value caribou habitat within a range of different zones of influence (ZOI). As discussed in Section 4.3 of the Caribou Supplemental Information report (Appendix G), the ZOIs were selected based on information in the scientific literature (e.g., Boulanger et al. 2011) and knowledge of the Project and surrounding landscape. Section 4.3 of the Caribou Supplemental Information report (Appendix G) discusses ZOIs and caribou avoidance of disturbance. The

ID:	**PC-11**
	additional information does not change the prediction of a significant adverse effect on caribou. Reference: Boulanger, J., A. Gunn, J. Adamczewski and B. Croft. 2011. A data-driven demographic model to explore the decline of the Bathurst Caribou Herd. Journal of Wildlife Management 75: 883-896.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO PC-12

ID:	**PC-12**
Organization or Group:	CPAWS
Context and Rationale:	The information provided in the EIS outlines Marathon's commitment to working with regulators, Indigenous groups and stakeholders to develop a robust monitoring program, and that they are currently engaging with the provincial government on baseline and adaptive monitoring programs. The EIS states that some of the follow-up and monitoring activities are likely to include: • "Deployment of telemetry collars on Buchans caribou and resident (Grey River) caribou in the ZOI • Assessment of the effects of the Project on migration to identify changes in patterns of migration (e.g., timing, duration, location, stop-overs) • Monitoring of effects on resident caribou within the ZOI during construction and operation • Aerial post-calving surveys of the Buchans herd and resident caribou within the ZOI • Continuation of remote camera deployment and analysis of migration in spring and fall" (pg. 11.76) These activities are primarily focused on testing impact predictions. No details are provided in the EIS on how mitigation effectiveness will be examined. The EIS states that "[p]roject planning and design, and the application of proven mitigation measures, will be used to reduce adverse effects on habitat movement and mortality risk for caribou." (Section 11.4, pg. 11.49, emphasis added) No evidence is provided to 'prove' any of the proposed mitigation measures are effective. Further, the lack of a draft follow-up and monitoring plan makes it difficult to clearly understand what monitoring targets or triggers for management action will be employed in the future.
Information Request:	a. Please provide evidence from peer-reviewed literature, or monitoring reports from other developments that 'prove' the proposed mitigations will be effective. b. Please identify monitoring targets that will be used to confirm mitigation effectiveness and triggers for invoking adaptive management action.
Response:	a. Proposed mitigation measures are based on industry best practices and guidelines and have been used and accepted by provincial regulators for other mine projects that overlap with caribou herd ranges (e.g., Best Management Practices for Mineral Exploration and Development Activities and Woodland Caribou in Ontario [available

ID:	**PC-12**
	online at: http://www.ontarioprospectors.com/opawp/wp-content/uploads/2011/10/MNR_SAR_BMP_MIN_DEV_CAR_EN.pdf]). While informed by peer-reviewed literature, industry best practices and guidelines generally evolve from technical literature that progresses over time with input and feedback from regulators, Indigenous groups, and stakeholders. As detailed in Section 6.2 of the Caribou Supplemental Information report, a comprehensive Caribou Monitoring Plan will be developed alongside the Project's Environmental Protection Plan. This plan will include mitigation specific to caribou and will describe the monitoring approaches and thresholds for management actions. Adaptative management actions will be determined through monitoring of long-term and near real-time caribou collar data, active monitoring at the mine site, and incidental observations of caribou, whereby a series of management actions will be triggered in response to their proximity to the Project activities. Conservative monitoring thresholds for each mitigation will be proposed, such that additional management actions can be implemented when it is identified that the purpose or goal of the mitigation is not being achieved. For example, in addition to the temporal reduction or cessation of activities in the Marathon pit area during caribou migration through the corridor and within a set distance from the site, the Environmental Technician will be notified if caribou are observed within a set distance from certain Project activities (e.g., blasting) and those activities will be reduced or delayed, as needed. Such data will be tracked and used to develop trends and identify high-use areas, with mitigations adapted as required in accordance with the knowledge being gained through the monitoring efforts. Thresholds or triggers for action and the extent of change in mitigation in response to monitoring data, if needed, will be discussed, and determined in consultation with Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture (NLDFFA)-Wildlife Division and outlined in the Caribou Monitoring Plan. Please refer to Section 6.2.3 of the Caribou Supplemental Information report (Appendix G) for additional information on adaptive management related to caribou. Marathon is committed to working with regulators, Indigenous groups, and stakeholders to implement initial mitigation measures, undertake follow-up and monitoring activities, and adapt mitigation measures as required to avoid or reduce adverse Project effects on caribou. Final mitigation for caribou will be confirmed in consultation with the NLDFFA-Wildlife Division.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO PC-13

ID:	PC-13
Organization or Group:	CPAWS
Context and Rationale:	The cumulative effects analysis provided in the EIS is almost entirely a qualitative discussion of past, current and future effects on caribou. No quantitative analysis of total landscape disturbance levels is provided; only a qualitative description of the different projects that exist or are proposed in the Regional Assessment Area (RAA) is provided. The woodland caribou recovery strategy establishes a threshold, of 65% undisturbed habitat in a range, that is meant to provide a measurable probability (i.e., 60%) for a local population to continue to be self-sustaining (Environment Canada, 2012). We were unable to locate this information in the cumulative effects analysis for the caribou herds potentially impacted by the Project. This information is important to guide decision making around caribou conservation and management, and would be informative to regulators, Indigenous groups, and other stakeholders trying to manage cumulative effects on caribou in the region, which by its nature is a multi-stakeholder task.
Information Request:	Please complete a landscape disturbance analysis that quantifies the existing, and proposed future, levels of linear and non-linear anthropogenic disturbance in the RAA. At a minimum, all disturbances should be buffered by 500 m when calculating disturbance levels for each caribou herd range potentially impacted by the Project.
Response:	Section 20.8.4 of the EIS describes the pathways of potential cumulative effects resulting from the Project and past, present and future activities / projects that are predicted to contribute to cumulative effects on Caribou (including mining and exploration, forestry, hunting, outfitting, trapping, fishing, off-road vehicles, hydroelectric developments, and existing linear features). Section 4.5 of the Caribou Supplemental Information report (Appendix G) provides additional context around cumulative effects, showing the extent of existing and planned linear and non-linear disturbance footprints in the caribou Regional Assessment Area, with a 500 m radius buffer around the footprints (i.e., zone of influence) (see Table 4.4 for a quantitative cumulative assessment of changes in habitat). The 500-m buffer is consistent with the federal Scientific Assessment to Inform the Identification of Critical Habitat for Woodland Caribou (*Rangifer tarandus caribou*), Boreal Population, in Canada (Environment Canada 2011). References: Environment Canada. 2011. Scientific Assessment to Inform the Identification of Critical Habitat for Woodland Caribou (*Rangifer tarandus* caribou), Boreal Population, in Canada: 2011 update. Ottawa, Ontario, Canada. 102 pp. plus appendices. Available online at: https://www.registrelep-

ID:	PC-13
	sararegistry.gc.ca/virtual_sara/files/ri_boreal_caribou_science_0811_eng.pdf Last accessed on August 9, 2020.
Appendix:	None

RESPONSE TO PC-14

ID:	**PC-14**
Organization or Group:	CPAWS
Context and Rationale:	“Acoustic environment was selected as a subcomponent of the atmospheric environment because noise resulting from the Project can affect human health and wellbeing, and wildlife and wildlife habitat. The acoustic assessment includes baseline sound pressure level monitoring near the Project and predicted noise levels associated with construction and operation activities using acoustic modelling. The baseline and predicted noise levels were used to estimate the potential effects of the Project activities on the acoustic environment. The acoustic assessment was based on equivalent sound pressure levels (Leq) for the daytime and nighttime periods (Ld and Ln), and the day-night average sound level (Ldn). The predicted and baseline noise levels were assessed using criteria recommended by Health Canada (2017), which includes a threshold associated with an estimate of the change in percentage of people highly annoyed (%HA) by noise emissions from Project activities.” (Valentine Gold Project Environmental Impact Statement Chapter 5 – Atmospheric Environment, page 5.2)
Information Request:	Although the Environmental Impact Statement recognizes that noise affects both human health and wildlife, the estimation of noise pollution is tailored to human health only, without any specific evaluation of wildlife impacts. The EIA disregards a large and growing body of work documenting the effects of anthropogenic noise on wildlife (For example, see: Farina, 2017; Kight & Swaddle, 2011; Kunc & Schmidt, 2019; Shannon et al., 2016). More importantly, many of the taxonomic groups considered as VC have been shown to be affected by noise pollution. Bats (Bunkley & Barber, 2015), birds (Francis et al., 2009; Injaian et al., 2018; Ng et al., 2020), and even Caribous (Slabbekoorn et al., 2018) respond to anthropogenic noise and can be negatively impacted by it. Bradshaw et al. (1997) showed how blasting for petroleum exploration may reduce foraging time and induce temporary habitat loss in woodland Caribou. Blasting is recognized as a source of noise in the EIA and this activity is scheduled to happen during daytime, with one pit active at a time, and if sensitive wildlife receptors are in the area, this may result in negative effects. Some species of bats, for example, may reduce the use of areas in which blasting activity occur (Tanalgo et al., 2017). However, the proposed analysis and results are most likely underestimating the overall acoustic output of the project and related activities. Blasting is not explicitly included in the acoustic evaluation, even though Health Canada identifies blasting as being either a highly impulsive or a high-energy impulsive type of noise, recommending

ID:	PC-14
	the implementation of a + 12 dB adjustment for the estimated project acoustic footprint.
Response:	Blasting was included in the acoustic evaluation presented in the EIS (note that Appendix 5H of the EIS lists sound sources associated with equipment only - blasting is addressed separately). As the potential effects from blasting on the acoustic environment are measured differently than those from steady state and traffic-related activity, these were assessed qualitatively and separately from the steady state activities and traffic-related noise. 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. Blasting during Project construction and operation is impulsive and 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 (dB). Vibration consists of energy waves transferred through the ground and measured by particle velocity. The type of geology and the blast configuration greatly influence how the energy of the blast is released into the atmosphere. During a blast, the majority of the energy is consumed in fragmenting the desired portion of rock, with the remaining energy released as air blast and ground vibration. Blasting at mines routinely follows best management practices, namely the Blasters Handbook (ISEE 2011) and the Environmental Code of Practice for Metal Mines (ECCC 2009). These guides 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 substantially less explosive and is much more localized, thereby resulting in less air blast -related noise and vibration. Therefore, noise and vibration emissions from blasting during Project construction and operation are anticipated to conform with the recommended thresholds outlined in these best-practice guides. As noted above, blasting was included in the acoustic evaluation. The assessment of Project effects on wildlife (avifauna, caribou, other wildlife, and species at risk) also considered blasting, as indicated in the Project interactions tables (Table 10.17, Table 11.12, and Table 12.16 of the EIS). Blasting, along with other sources of noise and sensory disturbance, was included and assessed as a Project activity. The assessments largely relied on studies that describe sensory disturbance to wildlife in general, as the specific effects of blasting on wildlife are not well documented in the

ID:	**PC-14**
	scientific literature. Noise emissions during blasting will be monitored and reduced by following the above-referenced best practices. As blasting is expected to be limited to daytime hours (i.e., between 7 am and 7 pm), noise and vibration related effects on nighttime wildlife activities will be avoided. Activities in the Marathon pit area that may result in sensory disturbance to migrating caribou (e.g., blasting, loading, hauling) will be reduced or suspended while caribou are migrating within a set distance from the site (e.g., 10 km north or south) and through the corridor at site. The extent of the activity reduction, and the conditions regarding caribou migration proximity will be determined in consultation with the Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture - Wildlife Division. In addition, to reduce sensory disturbance, a visual survey for caribou will be conducted prior to blasting. If caribou are observed within a 500 m blasting radius buffer, blasting will be delayed until animals have left the buffer. Please refer to Section 4.2 of the Caribou Supplemental Information report (Appendix G) for a description of sensory disturbances (including noise and vibration from blasting) and Section 6 for applicable mitigation measures. References: ECCC (Environment and Climate Change Canada). 2009. Environmental Code of Practice for Metal Mines. Available at https://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=CBE3CD59-1&offset=2. ISSE (International Society of Explosives Engineers). 2011. Blaster’s Handbook (18th Edition).
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO PC-15

ID:	**PC-15**
Organization or Group:	CPAWS
Context and Rationale:	"Current ambient sound levels within the Study Area were characterized by conducting a baseline sound quality monitoring survey. The baseline sound quality monitoring survey was conducted from June 15 to 19, 2020 at one location near the mine site (Figure 3-1) and is representative of the nearest seasonal receptor." (Valentine Gold Project Baseline Study Appendix 6 – Pages 6 and 14)
Information Request:	The acoustic assessment is based on the contrast between the estimated project sound input and the measured baseline values. However, the baseline relies on four days of sound quality monitoring at a single location. Only two full records (midnight to midnight), collected in June 16 and 17 2020 were used to calculate the Ld, Ln, Lnd, and %HA values, indicating that the baseline estimated by the proponent relies solely on two days of acoustic monitoring. Two days of monitoring at a single location are not enough to capture the natural variability of the project area acoustic environment. Seasonal and daily changes in natural background noise occur throughout the year and are caused by changes in environmental conditions (e.g., temperature, precipitations, presence of snow and fog), and by changes in species distribution. For example, dusk and dawn are known to be times at which species vocal activity tend to increase, resulting in significant changes to the acoustic environment and in a higher potential of noisy project activities to cause disturbance. Furthermore, acoustic propagation is not constant across space, as natural features (e.g., exposed rocks, tree cover, natural barriers) and environmental conditions (e.g., humidity and temperature) contribute to small changes in acoustic propagation at the macro (kilometers) and micro (meters) scale. This means that the baseline presented in this study is characteristic of the recorder's specific location, not of the entire project area.
Response:	The Project site is located in a rural area, with no substantial sources of noise (unwanted sounds) contributing to the baseline within 50 km. The potential impacts on the acoustic environment were assessed following guidance published by Health Canada (2017) in "Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise". The Health Canada guidance recommends the collection of measured baseline data to be used in the assessment, and states that: "sounds that are not generated by human activity (e.g., ocean, wind and animal noises) should not be included in determining a baseline sound level". As there are no nearby sources of sound generated by human activity, it is very likely that the

ID:	**PC-15**
	existing acoustic environment is not highly variable. This is confirmed by the baseline monitoring conducted for the assessment. Baseline monitoring was conducted to estimate the sound pressure levels for the region. The monitoring confirmed that the region is relatively quiet and similar to many other rural areas in Atlantic Canada, with daytime noise levels (Ld) near 45 dBA (A-weighted decibels) and nighttime noise levels (Ln) near 38 dBA. The noise monitoring was undertaken during times of low winds and no precipitation and also excluded extraneous sources that may contaminate or otherwise artificially raise the measured sound levels. The measurements are therefore a reasonable indication of noise levels in the region. Therefore, it is reasonable to conclude that the two days of baseline data are sufficient to characterize the baseline noise environment in the area and the data are adequate for use in assessing potential Project-related effects. Reference: Health Canada. 2017. Guidance for Evaluating Human Health Impacts in Environment assessment: Noise. January 2017. Available online at: https://iaac-aeic.gc.ca/050/documents/p80054/119378E.pdf
Appendix:	None

RESPONSE TO PC-16

ID:	**PC-16**
Organization or Group:	CPAWS
Context and Rationale:	-
Information Request:	Another shortcoming is the absence of regular acoustic monitoring during all of the project phases (construction, operation, decommission). The proponent needs to provide evidence that the mitigation measures contained in the EIS will actually result in noise levels that are below the threshold of disturbance for the different Valued Components.
Response:	Monitoring plans, including acoustic monitoring, will be implemented to verify the predictions of the assessment. These plans and programs will be more fully developed in consultation with government agencies, Indigenous groups and stakeholders, where relevant. As discussed in Section 5.9 of the EIS, sound pressure level monitoring programs will be conducted near receptor locations to monitor the effectiveness of Project mitigation measures. The results of these monitoring programs will be available to inform Project effects on caribou and other wildlife and the potential need for additional mitigation measures. A Caribou Monitoring Plan will be developed in consultation with Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture (NLDFFA) - Wildlife Division. This plan will include a commitment to reduce or suspend activities that may result in sensory disturbance to caribou during critical periods (Table 11.13 in the EIS). The extent of activity reduction and conditions regarding caribou proximity to the mine site will be determined in consultation with NLDFFA - Wildlife Division. Monitoring programs will also be implemented for various other valued components identified in the EIS. As described in Chapter 2, Section 2.7.3 of the EIS, a series of environmental management plans will be developed and will encompass the environmental regulatory requirements and commitments made for the Project. The Air Quality Management Plan and Wildlife Management Plan will be developed and implemented as components of the Environmental Protection Plan.
Appendix:	None

RESPONSE TO PC-17

ID:	**PC-17**
Organization or Group:	Brian McLaren and Richard Huang
Context and Rationale:	Comments related to the disturbance to caribou that will occur throughout the construction, operation and closure periods of the Valentine Gold Project, over at least 15 years should it move forward as described, are the justifiable focus of this brief report on the fish and wildlife impacts described in the EIS. The report draws on caribou data obtained from the Newfoundland and Labrador Wildlife Division. The report illustrates a high level of concern that the EIS is underplaying the serious potential effect of the project particularly on the Buchans Plateau caribou herd, and to a lesser extent on the Grey River and La Poile caribou herds. Caribou, as acknowledged by the EIS authors, are an indicator species, responsive to the range of potential project impacts (from loss of habitat to air and water contamination, to noise). Moreover, and also underplayed in the EIS, all caribou populations in Canada and the U.S. are experiencing declines, and outside of Newfoundland, cumulative effects on the stability of their populations have put most of the woodland caribou subspecies in either a threatened or an endangered status.
Information Request:	The EIS should include long-term modeling of caribou demographics given a range of potential effects of loss of functional habitat due to on-site activities, road travel, and sensory disturbance. The modeling should include the parturition and calf survival analysis on the most recent data from the Buchans Plateau collared caribou, and a rationale—like the one in the footnote below—for a period of restricted activity. The model outcomes, which should be in the form of a sensitivity analysis, must then be compared to past effects of other developments to put the project proposal in context. This is one example of a cumulative effects documentation that should be a separate section of the EIS.
Response:	The assessment of potential Project and cumulative effects on caribou includes consideration of effects on habitat (seasonally and annually), movement, and mortality risk. Please refer to Section 4.5 of the Caribou Supplemental Information report (Appendix G) for details on the combined (within Project) and cumulative (in combination with similar effects from other projects and activities) effects on caribou. The assessment is based on existing information and Project-specific field studies, including demographic parameters. Please refer to Section 3.4 of the Caribou Supplemental Information report (Appendix G) for details on population estimates.

ID:	PC-17
	Section 6.2 of the Caribou Supplemental Information report (Appendix G) outlines the framework for the caribou monitoring plan. Follow-up and monitoring specific to caribou are included in the EIS as potential activities to be confirmed in consultation with the Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture (NLDFFA) - Wildlife Division (Section 11.9). It is anticipated that such programs will evolve over time to reflect updated knowledge of caribou in the Project Area. Marathon will continue to engage with the NLDFFA - Wildlife Division with respect to ongoing monitoring programs, and monitoring programs will continue and be adapted as required over the life of the Project (including closure and post-closure monitoring).
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO PC-18

ID:	**PC-18**
Organization or Group:	Brian McLaren and Richard Huang
Context and Rationale:	Comments related to the disturbance to caribou that will occur throughout the construction, operation and closure periods of the Valentine Gold Project, over at least 15 years should it move forward as described, are the justifiable focus of this brief report on the fish and wildlife impacts described in the EIS. The report draws on caribou data obtained from the Newfoundland and Labrador Wildlife Division. The report illustrates a high level of concern that the EIS is underplaying the serious potential effect of the project particularly on the Buchans Plateau caribou herd, and to a lesser extent on the Grey River and La Poile caribou herds. Caribou, as acknowledged by the EIS authors, are an indicator species, responsive to the range of potential project impacts (from loss of habitat, to air and water contamination, to noise). Moreover, and also underplayed in the EIS, all caribou populations in Canada and the U.S. are experiencing declines, and outside of Newfoundland, cumulative effects on the stability of their populations have put most of the woodland caribou subspecies in either a threatened or an endangered status.
Information Request:	Noise should be modelled on the terrain and then monitored throughout the construction and operation phases, and any changes to mitigation measures should be put in place as needed with maximum sound recommendations agreed upon by the assessment agencies and the proponent, in consultation with the Newfoundland and Labrador Wildlife Division. This is the first of the adaptive management approaches that should be detailed throughout the EIS and applies to sensory disturbance to a number of other wildlife species, e.g., hibernating bats.
Response:	As described in Chapter 2, Section 2.7.3 of the EIS, a series of environmental management plans, will be developed and will encompass the environmental regulatory requirements and commitments made for the Project. An Air Quality Management Plan and a Wildlife Management Plan will be developed and implemented as part of the Environmental Protection Plan. The Air Quality Management Plan will specify mitigation measures for the management and reduction of atmospheric emissions (including noise, light, and particulate matter) and the Wildlife Management Plan will include mitigation specific to wildlife other than caribou. A stand-alone Caribou Monitoring Plan will also be developed. Please refer to Section 6.2 of the Caribou Supplemental information report (Appendix G) for details on the caribou monitoring plan. This plan will include a commitment to reduce or suspend activities that may result in sensory disturbance to caribou during critical periods. The extent of activity reduction and conditions regarding

ID:	PC-18
	caribou proximity to the mine site will be determined in consultation with Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture - Wildlife Division. The acoustic modelling for both Project construction and operation included the local topography within the modelling domain/local assessment area. The results of the acoustic assessment, including consideration of a worst-case scenario (i.e., when the most equipment is operating and the activity level is highest during operation at the one time), indicate that Health Canada criteria will not be exceeded. Further, as presented in Section 5.9 of the EIS, sound pressure level monitoring programs will be conducted near receptor locations to verify the EIS predictions and monitor the effectiveness of Project mitigation measures. The proposed monitoring programs will be more fully developed in consultation with government agencies, Indigenous groups and stakeholders, as applicable. Additional monitoring will be conducted on an as-needed basis to protect human health and wildlife. An adaptive management approach will be taken in the Wildlife Management Plan and the Caribou Monitoring Plan. If monitoring indicates that noise levels are causing adverse effects on wildlife, further mitigation measures will be implemented. Please refer to Section 6.2 of the Caribou Supplemental Information report (Appendix G) for details on the caribou monitoring plan. With regards to bats, it is anticipated that the known hibernacula (located approximately 12.2 km from the Project Area) is a sufficient distance such that disturbance to hibernating bats is not anticipated (Government of British Columbia n.d.). Reference: Government of British Columbia. No date. Wildlife Habitat Features Field Guide (Kootenay Boundary Region) – A Bat Hibernaculum. Available at: https://www2.gov.bc.ca/assets/gov/environment/natural-resource-policy-legislation/legislation-regulation/frpa-pac/wildlife-habitat-features/whf_field_guide_kootenay_boundary_bat_hibernaculum.pdf
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO PC-19

ID:	PC-19
Organization or Group:	Brian McLaren and Richard Huang
Context and Rationale:	Most Buchans Plateau caribou females, either in their last term of pregnancy or with calf at heel, pass through an area that is within 6 km of the planned project site. They do so twice per year, and most do not choose alternate routes in successive years. (The pattern is created by the relatively narrow upland area between Valentine and Victoria lakes and the numerous surrounding wetlands that otherwise interrupt a straight path from the Buchans Plateau to the south coast.) Their relatively predictable behaviour during these fall and spring migrations was already interrupted during the construction of the Star Lake hydroelectric dam in 1997-99 and made narrower by the flooding of Star Lake and Victoria Lake in 1968-69. These are cumulative effects that must be considered.
Information Request:	Valentine Lake mine disturbance area should consider a 6 km buffer, which is more realistic than the 0.5 km buffer drawn in the EIS, especially when calving caribou are at their most sensitive. This larger disturbance distance was illustrated amply by monitoring effects on the La Poile caribou herd when the Hope Brook Gold Mine was in construction and operation phases.
Response:	Please refer to Section 4.3 of the Caribou Supplemental Information report (Appendix G) for clarification on the use of a 500 m sensory disturbance buffer for caribou and information on Project-related residual effects on a change in caribou habitat at potential zones of influence of up to 15 km from the mine site. In addition, an analysis of alternate caribou migration routes has been conducted, including potential outcomes based on literature-supported avoidance distances, the presence of physical barriers, energetics, and the existence of alternate routes used by caribou from the Buchans herd (e.g., low use travel paths across Red Indian Lake). Details of the analysis are provided in the Caribou Alternate Migration Pathway Analysis appended to the Caribou Supplemental Information report (Appendix G) and the results are further discussed in Section 4.1.1 of the report. As stated in Table 20.14 (Section 20.8) of the EIS, with mitigation, cumulative effects on caribou are expected to be significant. Section 4.5 of the Caribou Supplemental Information report (Appendix G) provides additional information on cumulative effects.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO PC-20

ID:	**PC-20**
Organization or Group:	Brian McLaren and Richard Huang
Context and Rationale:	Another very important consideration, acknowledged in the EIS, is that observations and monitoring to date on environmental impacts to caribou in Newfoundland have largely occurred before the establishment of substantial coyote predation. Precarious declines in the Grey River and La Poile caribou herds, very likely as a result of the arrival of coyotes since around 2000, suggest that developing a gold mine in areas where females from these herds calve is once again equivalent to treading the dangerous waters of cumulative effects. (The arrival of coyotes to Newfoundland is ultimately a human-caused phenomenon, because their migration eastward was only possible after wolves were eradicated from eastern North America.) A key issue when considering cumulative effects on a large mammal like caribou is that they may only show up over generations.
Information Request:	A commitment to monitoring and to adaptive management will be essential to any industrial developments in a land of declining caribou.
Response:	Marathon is committed to monitoring and adaptive management as described in Section 11.9 of the EIS. Please refer to Section 6.2 of the Caribou Supplemental Information report (Appendix G) for details on the proposed Caribou Monitoring Plan including a discussion on adaptive management for caribou. Marathon will continue to engage with the Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture - Wildlife Division with respect to ongoing monitoring programs, and it is anticipated that these monitoring programs will continue and will be adapted as required over the life of the Project (including closure and post-closure monitoring).
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO PC-21

ID:	**PC-21**
Organization or Group:	Brian McLaren and Richard Huang
Context and Rationale:	--
Information Request:	The most serious potential effect on fish in the area appears to be groundwater contamination. It is impossible to understate the importance of continuous monitoring of mitigative measures to contain the effects of mine operations on groundwater, from sanding and plowing roads in winter, to in-stream work, to precipitation runoff from waste rock piles; monitoring these potential sources of harm must be taken seriously. It is appreciated that the proponent recognizes the potential harm from increased access to fisheries by anglers using the improved access road. Banning recreational fishing among workers at the worksite is appropriate near-term mitigation but working with authorities and local stewards on limiting future access to avoid overfishing must be part of a longer-term mitigation. Who will monitor the outcome of a goal for net gain of fish habitat as required by the *Fisheries Act*? For the EIS to lead to satisfactory outcomes on promised wetland restoration to this end, this goal of net habitat gain implies monitoring and rehabilitation beyond the three-year closure period.
Response:	Monitoring of fish habitat offsetting project(s) will occur in accordance with an Offsetting Plan approved by DFO as part of the *Fisheries Act* Authorization. As described in the Policy for Applying Measures to Offset Adverse Effects on Fish and Fish Habitat Under the *Fisheries Act* (DFO 2019), monitoring measures (to assess the effectiveness of the measures to offset relative to the objectives) are required to be included in the offsetting plan. Additionally, the monitoring measures must include contingency measures and associated monitoring measures to be implemented should deficiencies be detected. These monitoring measures and associated reporting requirements will be included as conditions of the *Fisheries Act* authorization, and Marathon will be responsible for the implementation and reporting. Wetland restoration is not part of the Fish Habitat Offsetting Plan and is not a mitigation measure discussed within the EIS for the loss of natural wetlands in the Project Area. If engineered wetlands are developed to treat surface and groundwater on the mine site, Marathon will be responsible for monitoring and regulatory reporting of water quality at the wetland outflows.

ID:	**PC-21**
	Reference: DFO (Fisheries and Oceans Canada). 2019. Policy for Applying Measures to Offset Adverse Effects on Fish and Fish Habitat Under the *Fisheries Act*. Available at: https://waves-vagues.dfo-mpo.gc.ca/Library/40939698.pdf
Appendix:	None

RESPONSE TO PC-22

ID:	**PC-22**
Organization or Group:	Brian McLaren and Richard Huang
Context and Rationale:	The sections of the EIS dealing with these ecosystem components are written comprehensively to show the extent of habitat loss, but are confused by the inclusion of many broad animal and plant surveys that are less pertinent than would be a detailed plan for on-site remediation of habitat, as well as a clear list of other mitigative measures related to negative impacts of road use and on-site and near-site activities.
Information Request:	Mitigating the effects of machinery and noise in flagged sensitive areas should occur throughout the duration of mine operation and decommissioning, and not just during construction. (The list given of examples of flagged areas on page 9.54 includes wetlands, hibernacula, mineral licks, roosts, and caribou migration corridors.)
Response:	As indicated in Table 2.22 of the EIS, sensitive areas will be identified and flagged prior to construction, specifically prior to site clearing and preparation. If site clearing activities were required post-construction, these measures would also be applied. Additional mitigation measures have been identified in Table 2.22 of the EIS to reduce adverse effects to sensitive areas from Project activities, including from vehicles and equipment. These mitigation measures will occur throughout the life of the Project. For example, vehicles and heavy equipment will be maintained in good working order and will be equipped with appropriate mufflers to reduce noise during construction, operation and decommissioning. Furthermore, vehicles will use existing roads / trails while operating at the mine site. All-terrain vehicles used by Marathon personnel will also be restricted to existing roads, trails and corridors to the extent possible. Additionally, specific mitigation measures including monitoring and use of operational buffer zones have been identified for caribou to reduce adverse effects during applicable Project phases. Observations of bat hibernacula and discovery of bird nests during any Project phase will trigger appropriate mitigation and/or follow-up measures. Mitigation measures to reduce effects of machinery and noise on sensitive areas are not limited to construction, but rather planned for implementation as applicable throughout all Project phases.
Appendix:	None

RESPONSE TO PC-23

ID:	**PC-23**
Organization or Group:	Brian McLaren and Richard Huang
Context and Rationale:	Threats of invasive species, success in regenerating habitats, particularly wetland habitats, the loss of rare plants and waterfowl, and effects on other long-lived species, like bats, must be taken seriously. The sections of the EIS dealing with these ecosystem components are written comprehensively to show the extent of habitat loss but are confused by the inclusion of many broad animal and plant surveys that are less pertinent than would be a detailed plan for on-site remediation of habitat, as well as a clear list of other mitigative measures related to negative impacts of road use and on-site and near-site activities. Mitigating the effects of machinery and noise in flagged sensitive areas should occur throughout the duration of mine operation and decommissioning, and not just during construction. (The list given of examples of flagged areas on page 9.54 includes wetlands, hibernacula, mineral licks, roosts, and caribou migration corridors.)
Information Request:	Concerns about potential changes to flows in the Victoria Steadies Sensitive Wildlife Area seem to be downplayed on page 10.11, when these are real possibilities downstream of the proposed project area, where changes to groundwater flow are of course expected.
Response:	The Victoria Steadies Sensitive Wildlife Area was established for the protection of wetland habitat used as breeding, brood rearing and staging grounds for waterfowl. Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture has indicated that the waterfowl habitat that was likely the focus of this designation are “steadies” on the Victoria River system located well to the north of the mine site, before the river drains into Red Indian Lake (B. Adams, pers. comm., 2020). A larger area was likely designated to highlight the need for continued drainage of the Victoria River watershed from Victoria Lake Reservoir to Red Indian Lake, to maintain wetland habitat for waterfowl species. A number of ponds / wetlands drain into the Victoria River, and following the establishment of two dams in the 1960s, these appear to be the central aspects of waterflow to the special management areas / steadies, which flow into Red Indian Lake (B. Adams, pers. comm, 2020). Therefore, maintaining wetland / watershed integrity and drainage patterns on the key ponds and wetlands was identified as a central conservation goal relating to this Sensitive Wildlife Area. Changes to waterfowl habitat in the Victoria Steadies Sensitive Wildlife Area are not anticipated based on the extent of predicted Project-related changes to the Victoria River. The potential changes to flow within the

ID:	PC-23
	Victoria River are addressed within the Surface Water Valued Component (VC; Chapter 7), and the potential interaction between those predicted changes to the Victoria River and the wetlands within the Victoria Steadies Sensitive Wildlife Area are addressed in the Vegetation, Wetlands, Terrain and Soils VC (Chapter 9). An excerpt from the Vegetation, Wetlands, Terrain and Soils VC is provided below. Removal of wetlands and reduction in flows into the Victoria River are predicted following the construction of and during the operation of the tailings management facility (TMF) (Section 7.5.2.2 and Figure 7-22 of the EIS). A reduction in wetland area and function near the TMF, as well as the diversion of water from that area to Victoria Lake, and the reduction in groundwater flow beneath the TMF, will result in a reduction in flow into the Victoria River. However, the net effect of the reductions in groundwater flow and surface water flow to mean annual flow of the Victoria River at the boundary of the Surface Water Resources Local Assessment Area (LAA) is expected to decrease by only 1% (Section 7.5.2.2). Changes to wildlife habitat within wetlands of concern that are part of the Victoria Steadies Sensitive Wildlife Area are not expected, as the habitat that is of primary focus for protection is located further downstream on the Victoria River than the Surface Water Resources LAA boundary (B. Adams pers. comm. 2020). As defined in Section 7.1.3.1 of the EIS, the LAA for surface water resources was considered to incorporate the Project Area and watersheds that intersect with the Project Area and included portions of Victoria Lake Reservoir in the expected effluent mixing zones (typically considered to be up to several hundred metres from points of discharge in the lake), and changes to flows due to groundwater interactions. The LAA included Valentine Lake and Victoria River to the point downstream where Project-affected tributaries converge with the main branch of the river and the Project access road extending from the Exploits River Crossing to the Project Area. It also included a 500-m buffer around the access road. References: Adams, B. Director, Wildlife Division, Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture, E-mail communication to Marathon Gold, July 2020.
Appendix:	None

RESPONSE TO PC-24

ID:	**PC-24**
Organization or Group:	Brian McLaren and Richard Huang
Context and Rationale:	-
Information Request:	It is a concern that up to six olive-sided flycatchers, a threatened species, were recorded in the project area in 2019 (page 10.21).
Response:	Olive-sided flycatcher (*Contopus cooperi*), a species at risk (SAR), occurs in forested wetlands, and several observations of olive-sided flycatcher were made in the wetland complex within the proposed footprint of the Marathon waste rock pile (Figure 10-8 of the EIS). Although the wetland habitat within the footprint of the Marathon waste rock pile will be directly lost, similar habitat for olive-sided flycatcher exists within the larger wetland complex located north of the Marathon waste rock pile, most of which will not be directly affected by the Project. Some of the wetland outside of the waste rock pile footprint will be indirectly affected through sensory disturbance or though hydrological changes. However, because bogs typically have low water flow (receiving nearly all their water through precipitation), drawdown effects will be limited in bog portions of the wetland (National Wetlands Working Group 1997). Given its large size and distance from Project activities, most of this larger wetland complex is not expected to be directly or indirectly affected by the Project. Habitat suitable for olive-sided flycatcher is abundant throughout the Local Assessment Area and Ecological Land Classification Area. As discussed in Section 10.5.1, only 4.3% of moderate or high-quality habitat for olive-sided flycatchers in the Ecological Land Classification Area is anticipated to be lost. An avifauna monitoring program will be implemented and conducted throughout the lifespan of the Project. Monitoring components for the life of mine will be outlined in the Avifauna Management Plan and will be developed in consultation with regulators. These may include breeding bird surveys conducted at varying distances from the mine infrastructure to determine the accuracy of effects predictions on avifauna, follow-up surveys for SAR that have been identified in the Project Area, and regular inspection of facilities, infrastructure and equipment to determine if birds are nesting on or near anthropogenic structures. In addition, Marathon has consulted with Environment and Climate Change Canada-Canadian Wildlife Services (ECCC-CWS) and has committed to conducting an environmental effects monitoring (EEM) program for SAR. A proposed monitoring plan is being developed and will be submitted to

ID:	**PC-24**
	ECCC-CWS for review and feedback prior to initiating the program. The objective of the EEM program will be to gain a better understanding of the effects of the Project on avifauna SAR (including olive-sided flycatcher) and their habitat and identify opportunities to refine mitigation measures as appropriate. Components of the EEM will include the identification of habitat that supports SAR, the identification of SAR through targeted surveys in and around the Project Area, and monitoring of SAR occurrences in relation to Project disturbance. Monitoring for olive-sided flycatchers will focus on the wetland associated with the proposed Marathon waste rock pile where olive-sided flycatchers were observed during baseline surveys. To assess the effects of the Project on olive-sided flycatcher, point count surveys will be conducted in suitable wetland habitat at varying distances from Project activities, as well as at a control site. Pre-construction surveys required as part of the proposed EEM program are being conducted in 2021. Reference: National Wetland Working Group. 1997. The Canadian Wetland Classification System. Second Edition. Wetlands Research Centre, University of Waterloo. Waterloo, ON.
Appendix:	None

RESPONSE TO PC-25

ID:	**PC-25**
Organization or Group:	Brian McLaren and Richard Huang
Context and Rationale:	-
Information Request:	A plan should be outlined for working with authorities and local stewards on limiting future access to avoid overfishing that may be introduced by improvement and extension of road access to the area.
Response:	The access road existed prior to Marathon's exploration work in the area, and has been maintained for access for exploration works. This road is the only access to the Victoria Dam for NL Hydro to complete inspections and maintenance and would otherwise need to be maintained in similar condition for their continuing work on this large dam. Improvements to the existing road are proposed to improve driving conditions and address health and safety concerns for resource users and project personnel. This will serve to improve travel times and ease slightly, however, there will be no measurably improved access to lakes and rivers in the area due to the development and operation of the Project as public access to the site will not be permitted. Post-closure, several site access roads will remain to provide access for long-term inspections, as required. Marathon will work with the regulators and stakeholders to limit access to the area's fishing and hunting resources. Improved access to areas for hunters and resource users (including anglers) due to the upgraded access road was assessed in Sections 8.5.3 and 16.5.2 of the EIS. Given it is an existing access road that is currently maintained in a condition that allows regular use by Marathon staff and contractors involved in exploration activity, as well as local outfitters and cabin owners, the number of additional resource users as a result of proposed road upgrades and maintenance is considered to be limited. Therefore, the resulting change in fishing activity is also predicted to be low. To reduce the potential risk to fish populations in the area, angling will be prohibited on the mine site. Workers will not be permitted to angle during their rotation and will not be permitted to bring angling gear to site. This mitigation will reduce the predicted residual effect on fish health and survival as a result of angling to negligible throughout the life of the Project.
Appendix:	None

RESPONSE TO PC-26

ID:	**PC-26**
Organization or Group:	Brian McLaren and Richard Huang
Context and Rationale:	-
Information Request:	A separate section of the document should describe cumulative effects of the proposed Valentine Gold Project given the two other environmental impacts in the area, i.e., the Star Lake hydroelectric project and the Victoria Lake diversion.
Response:	Cumulative effects are assessed in Chapter 20 of the EIS. 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 Regional Assessment Area (RAA). The other past, present, ongoing, and future physical activities considered in this assessment are identified in Table 20.1 and shown in Figure 20-1 of the EIS. It is acknowledged in Table 20.1 of the EIS that the cumulative effects RAA is an area of substantial hydroelectric development with several generating stations located with the RAA. This includes the Star Lake generating station approximately 21 km north, and the Victoria Dam and Victoria Lake Reservoir, which are part of the Bay d'Espoir Hydroelectric Development and are located 500 m from the Project Area. Effects from past and present projects / activities have been provided in Chapter 20 of the EIS for each Valued Component, as well as considered in the existing conditions characterizations in Chapters 5 to 19. Additional discussion of cumulative effects on caribou is provided in the response to PC-17.
Appendix:	None

RESPONSE TO PC-27

ID:	**PC-27**
Expert Department or Group:	Brian McLaren and Richard Huang
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	The proponent, Marathon Gold, lists in the EIS the importance of caribou to Indigenous people; from a Mi'kmaq point of view, the impact on caribou is especially serious, because of the cultural significance of caribou to Newfoundland Mi'kmaq and the already perilous state of the caribou. Three specific concerns were raised from consultations done for the EIS: a. in consultation with Qalipu, on the project's decommissioning, rehabilitation and closure, b. in consultation with Miawpukek, on the size of the project's footprint, and c. in other consultations, on the potential long-term effects of the project on fish and wildlife.
Response:	Marathon has engaged Indigenous groups throughout the environmental assessment (EA) and is continuing to work in a spirit of cooperation with Qalipu Mi'kmaq First Nation (Qalipu) and Miawpukek First Nation (MFN) as the assessment of the Valentine Gold Project progresses. Issues and concerns raised during regulatory, Indigenous and stakeholder engagement, including those noted in the reviewer's comment, were documented and addressed with these groups as described in Chapter 3 of the EIS. The following provides additional information on the points raised in the reviewer's comments: a. Marathon has engaged with both Indigenous groups regarding project decommissioning, rehabilitation and closure, and will continue to provide information and seek feedback as the Rehabilitation and Closure Plan (requirement under the Newfoundland and Labrador (NL) *Mining Act* for permitting) progresses. Marathon has also committed to involving the Indigenous groups in working with Marathon on specific rehabilitation and closure aspects such as revegetation. A concern that has been consistently raised is the need for 'insurance' for rehabilitation in the event Marathon does not complete the project. Marathon has advised both groups that under the NL *Mining Act*, administered by the NL Department of Industry, Energy, and Technology, Mines Branch, Financial Assurance is required to be in place prior to the commencement of construction of a mining project. The Financial

ID:	PC-27
	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. b. The footprint of the Project has been discussed as part of the ongoing engagement. Additional detail on specific Project components has been provided in the response to PC-52. c. Marathon is commitment to undertaking the Project in a way that avoids and reduces adverse effects on the environment. Marathon is developing a series of environmental management plans, including a Caribou Monitoring Plan and Wildlife Management Plan, directed at mitigating adverse effects to caribou as described in Section 6.2 of the Caribou Supplemental Information report (Appendix G). Marathon is committed to working with regulators, Indigenous groups, fish and wildlife organizations, and stakeholders to employ robust monitoring programs and adaptive mitigations respecting caribou migration patterns and populations. Marathon is currently engaging with the Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture-Wildlife Division with respect to ongoing baseline monitoring programs, and these monitoring programs will continue and adapt as required over the life of the Project (including closure and post-closure). d. Marathon has also been actively engaging with representatives of salmonid associations to discuss the Project, potential effects on fish and fish habitat, and associated mitigations, including potential fish habitat offsetting projects. Marathon is committed to continued engagement with salmonid groups including SAEN, Indigenous groups and other relevant stakeholders, regarding fish habitat offsetting to counterbalance Project-related direct and indirect loss of fish habitat. Marathon continues to meet and engage with both groups with respect to the EA and formalizing the relationships in terms of communication, engagement, employment and procurement opportunities, and environmental reporting and monitoring. Marathon also participates in quarterly meetings with the Mi'kmaq Alsumk Mowimsikik Koqoey Association (MAMKA) and has specifically discussed with MAMKA their potential involvement in environmental monitoring. Marathon is committed to working with Qalipu and MFN to involve these groups in environmental monitoring and to exchange environmental information regarding the Project.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO PC-28

ID:	**PC-28**
Expert Department or Group:	Brian McLaren and Richard Huang
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	Before returning to caribou, three critical comments on the approach of the EIS relating generally to impact are warranted; they will be followed by a few comments on other wildlife (sections 8, 9, 10 and 12). First, mention is made of two other prior major impacts in the immediate region, but the reader is left to ponder their cumulative impacts in lieu of these being presented in a separate analytical section. Notably, (1) in 1968-69, the construction of the Victoria Dam reversed flows, drew down groundwater, raised the water level of Victoria Lake some 35 m, narrowed the Victoria River, and flooded over 12 km^2 of habitat; and (2) in 1997-99, the Star Lake hydroelectric project flooded an additional 15 km^2 of habitat in the same general project area. The region has sensitive wetlands and narrow routes for migration of caribou. The proposed loss of an additional 35 km^2 of habitat, plus the sensory disturbance and other impacts of the Valentine Lake project, should be put in the context of these cumulative effects. A second criticism of the approach of the EIS: the post-shutdown vision beyond three years of monitoring during the closure phase lacks detail and often even mention. Again, context is key: the project proposal envisions 13 years of mine operation, but some long-term effects will be felt at least as long after closure. These latter effects suggest a plan is required over at least a decade to monitor, e.g., the leaching of any contaminants in slow-moving groundwater, revegetation of disturbed areas, and demographic effects on long-lived animals like caribou, for which behavioural changes may imply modest short-term, but cumulative long-term effects on persistence. Third, and related to a call for long-term monitoring, the EIS misses an opportunity for adaptive management that, in fact, could document the success of some proposed novel mitigative measures.
Response:	Cumulative effects are assessed in Chapter 20 of the EIS. 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 Regional Assessment Area (refer to Table 20.1 and Figure 20-1 of the EIS).

ID:	**PC-28**
	The effects of previous activities and natural environmental influences are reflected in the existing conditions for the Caribou VC (Section 11.2). This includes the current condition (e.g., health or quality) of wetlands and current status (e.g., population size and demographics) of caribou from the Buchans herd. As described in Section 20.8.1 of the EIS, hydroelectric developments between the 1970s and late 1990s, including the construction of the Victoria Dam and Star Lake hydroelectric project, resulted in flooding of a portion of the caribou range, including the traditional migration corridor of the Buchans herd that overlapped with the Star Lake project. Caribou were shown to avoid the Star Lake development and altered their timing of migration during its construction (Mahoney and Schaefer 2002a), although subsequent research suggested that the change in timing of migration may also have been influenced by the increasing population and forage limitation on the summer range (Mahoney and Schaefer 2002b). Analysis of existing telemetry data shows continued use of these traditional corridors between 2005 and 2018, and the results of the remote camera program from 2019 to 2021 confirm that caribou are still using these corridors. Please refer to Section 4.5 of the Caribou Supplemental Information report (Appendix G) for a description of cumulative effects, including the identification of geographic extent (Figure 4.1) and quantification (Table 4.4) of potential cumulative effects of the Project with other existing and planned development on caribou habitat within the Regional Assessment Area. Marathon is committed to monitoring and adaptive management as described in Section 11.9 of the EIS. Please refer to Section 6.2 of the Caribou Supplemental Information report (Appendix G) for additional information on the caribou monitoring framework and adaptive management. Marathon will continue to engage with the Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture - Wildlife Division with respect to ongoing monitoring programs, and it is anticipated that these monitoring programs will continue and be adapted as required over the life of the Project (including closure and post-closure monitoring). References: Mahoney, S.P. and J.A. Schaefer. 2002a. Hydroelectric Development and the Disruption of Migration in Caribou. Biological Conservation 107: 147-153. Mahoney, S.P. and J.A. Schaefer. 2002b. Long-term changes in demography and migration of Newfoundland caribou. Journal of Mammalogy 83: 957-963.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO PC-29

ID:	**PC-29**
Expert Department or Group:	Brian McLaren and Richard Huang
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	The mitigating measures for caribou cannot rely on the actions of monitors; during a sensitive period before and after calving, all construction and mining operations must cease.
Response:	Various approaches will be used to understand caribou (particularly the Buchan's herd) and interactions with the Project. These approaches include monitoring and assessing data from 60 GPS caribou collars, wildlife cameras placed proximate to and within the LAA, on-site observations, and systematic aerial surveys (e.g., post-calving surveys), which will continue to be coordinated with Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture (NLDFFA) - Wildlife Division. Historical collar data indicates that the Grey River herd use an area south of the Victoria reservoir as calving grounds. However, the analysis of collar data showed that the 95% kernels include some of the Project Area during the pre-calving, calving, and post-calving seasons. During these sensitive periods, Grey River collars will be monitored frequently to assess proximity to the Project, as well, Marathon staff will be on alert within the Project site and advise of observations of caribou. Appropriate management responses will be determined in consultation with NLDFFA - Wildlife Division and adapted as required to address potential adverse effects of the Project on the Grey River herd. Please refer to Section 6.2 of the Caribou Supplemental Information Report (Appendix G) for further details on the approach to mitigation and monitoring.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO PC-30

ID:	**PC-30**
Expert Department or Group:	Brian McLaren and Richard Huang
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	At less sensitive times of the year (e.g., following the logic of the footnote, from 25 July to 15 May, with an option to shorten the period, either 15 September to 15 May or with a second restricted period timed to the fall migration of the Buchans Plateau caribou), any loud noises like blasting must not occur within a 3-km buffer (not a 0.5-km buffer) of any caribou spotted by monitors or crew.
Response:	Please refer to Section 4.3 of the Caribou Supplemental Information report (Appendix G) for clarification on the use of a 500 m sensory disturbance buffer for caribou. Mitigation measures to reduce sensory disturbance to caribou include visual surveys for caribou prior to blasting and the reduction or suspension of sensory disturbances (e.g., blasting) while caribou are migrating through the site or within a specified distance of the site. Section 6.2.1 of the Caribou Supplemental Information report (Appendix G) describes proposed monitoring approaches, tools and technologies to be implemented on the Project, including spatial and temporal considerations to direct mitigation and monitoring efforts. Marathon will continue to work with Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture - Wildlife Division to develop monitoring protocols for caribou and a series of management actions that will be triggered in response to caribou proximity to Project activities.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO PC-31

ID:	**PC-31**
Expert Department or Group:	Brian McLaren and Richard Huang
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	A long-term plan should be presented to monitor recovery where it is expected to take longer than three years. Examples are monitoring effectiveness of revegetation of disturbed sites, including tracking invasive species, monitoring quantity and quality of ground and surface waters, and ensuring a net increase in fish habitat.
Response:	Marathon will continue environmental monitoring at the site in accordance with the final Rehabilitation and Closure Plan (which is subject to regulatory approval) and in consultation with regulators until the site is considered rehabilitated. See the response to PC-43 regarding the duration of the post-closure monitoring period. Please refer to Section 6.2 of the Caribou Supplemental Information report (Appendix G) for information on the caribou monitoring plan.
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO PC-32

ID:	**PC-32**
Expert Department or Group:	Brian McLaren and Richard Huang
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	Refer to pages 4 – 7 of the submission provided by Brian McLaren and Richard Huang, dated December 30, 2020
Information Request:	The EIS is quite clear on the paramount significance of the potential development impacts on the Buchans Plateau caribou herd, and to a lesser extent on three other herds (La Poile, Grey River, and Gaff Topsails). However, two important points need to be made here that implicate failures in the EIS and its background data analysis. The first is that, in addition to acknowledging the new complexities of environmental impacts with the establishment of coyotes as a major predator of caribou calves, the proponent needs also to recognize that the long-term implications are part of the cumulative effects of past developments, plus the arrival of the coyote. They will play out over the long term and via generations of changes to calf recruitment (Mahoney et al. 2016, Lewis et al. 2017). Dynamics by herd will differ, as the literature indicates: variable effects of predation depend on weather (Bastille-Rousseau et al. 2015) and on changes to caribou behaviour with food limitation (Schaefer et al. 2016). The second point deserving mention involves the distance over which sensory disturbance will occur to caribou, to be discussed ahead.
Response:	As indicated in Chapter 12 of the EIS, coyote (*Canis lantrans*) – a major predator of caribou calves on the Island of Newfoundland – was confirmed near the mine site and has the potential to occur in suitable habitat elsewhere in the Regional Assessment Area (RAA) for the Project. The presence of predators, such as coyote and black bear (*Ursus americanus*), can be particularly detrimental to caribou populations where primary prey, such as moose, are also abundant, which supports high predator densities (Section 11.5.3.1 – Indirect Mortality Risk). Moose have been confirmed near the mine site, with more than 140 photographed during the remote camera program in 2019 and 2020 (Chapter 12 of the EIS). The combined presence of coyote, black bear and moose has potential long-term implications for a caribou population; however, this potential effect is not isolated to the Project Area and is expected to exist throughout the ranges of the various caribou herds in the region. As indicated in the EIS (Chapter 11 – Caribou), the Project will contribute to additional stress and have adverse effects on caribou, the effects of which may lag behind the

ID:	**PC-32**
	construction and operation of the Project. As such, cumulative adverse effects on the population may take several years to be realized. Section 4.4 of the Caribou Supplemental Information report (Appendix G) provides additional information on Project-related effects on calf mortality and Sections 4.2 and 4.3 of the same report provide additional context around effects of sensory disturbance and zones of influence. Marathon is committed to monitoring and adaptive management as described in Section 11.9 of the EIS. Please refer to Section 6.2 of the Caribou Supplemental Information report (Appendix G) for additional information on the proposed caribou monitoring program, including an approach to adaptive management. Marathon will continue to engage with the Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture - Wildlife Division with respect to ongoing monitoring programs, and it is anticipated that these monitoring programs will continue and be adapted as required over the life of the Project (including closure and post-closure monitoring).
Appendix:	See Appendix G: Caribou Supplemental Information Report

RESPONSE TO PC-33

ID:	**PC-33**
Organization or Group:	Mining Watch Canada/J. Kuipers P.E.
Context and Rationale:	According to Table 2.1 Key Refinements, Heap Leach Process and Infrastructure, Revised Project Design, with removal of the heap leach process, most of the low-grade ore that would have been processed via heap leach will now be stockpiled and processed within the milling process later in the mine life. A relatively small percentage of the lowest grades may not be processed at all and will end up mixed in with waste rock. (underline added) Ultimately, this percentage will depend on a number of factors, including market prices for gold and operating costs at any stage of the mine life.
Information Request:	Do the geochemical characterization and water quality predictions in the EIS account for the potential impacts to waste rock discharges that might occur due to this change? What is “a relatively small percentage?” A range should be provided by the proponent relative to the market price of gold, and consideration should be given to the potential impact on water quality predictions associated with the waste rock piles should this occur, based on the actual range of percentages and geochemical characterization of the low-grade ore that could be reclassified as waste rock. If potential impacts are reasonably possible, which would best be confirmed by modelling this scenario versus the base case, the water quality predictions in the EIS should include a scenario that addresses this possibility.
Response:	Yes, the geochemical characterization and water quality modeling accounts for the potential impact to waste rock discharges from placement of low-grade ore (LGO) material in the waste rock facility. In terms of the potential environmental effects from placing LGO in the waste rock facility, the potential addition of marginal ore is addressed through the use of conservative modeling, the results of which are summarized here. No exceedances of *Metal and Diamond Mining Effluent Regulations* (MDMER) limits are predicted in the discharges from LGO stockpiles with a 95% level of confidence indicating that treatment of the effluent is not required (Appendix 7A, Sections 6.2.2 and 6.3.1 and Appendix 7B, Sections 6.2.2 and 6.3.1). Furthermore, there are no exceedances of MDMER limits predicted for drainage from the waste rock facility. Therefore, if some of the marginal LGO is added to the waste rock facility, treatment of discharge from waste rock would not be required during operation. For closure and post-closure, acidic leaching rates for the potentially acid generating (PAG) portion of waste rock from the Marathon pit were conservatively developed using data from the acid generating

ID:	PC-33
	humidity cell of LGO (Appendix 7B, Section 5.3.1.1, p. 52). This input assumes a scenario identified by the reviewer that was included in the base case model, wherein all PAG waste rock (14%) has chemical properties of the LGO. No exceedances of MDMER limits are predicted in the discharges from Marathon waste rock with a 95% level of confidence, indicating there is no requirement for treatment of discharge from the waste rock facility (Appendix 7A, Sections 6.2.2 and 6.3.1 and Appendix 7B, Sections 6.2.2 and 6.3.1). These results were further used in the Receiving Water Assimilative Capacity Study for the Final Discharge Points serving both the Marathon and Leprechaun low-grade ore stockpiles and waste rock (Appendix 7C). The results indicate there is no exceedances of Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life within the proposed mixing zones. In summary, the addition of marginal LGO to the waste rock stockpile will not impact water quality. Periodic model updates will be completed per the Acid Rock Drainage/Metal Leaching (ARD/ML) Management Plan, as indicated in Appendix B. As noted by reviewer, changes in mineral prices are a standard variable in mine operations, resulting in changes to cut-off grades and definition of what mined materials become waste or ore. Fundamentally, the difference between “ore” and “waste rock” is truly a function of the market. Consequently, the geochemical difference between “ore” and “waste rock” is more an economic construct than an actual difference in geochemical properties. The basic assumption of every geochemical analysis made for a mining project is that the geochemical properties of “low grade” ore are essentially the same as the geochemical properties of “waste rock” because at any time what was once “low grade” ore could become “waste rock.” Thus, the analysis included in the baseline studies and presented in the EIS is as good an evaluation of market effects on “ore” versus “waste rock” as could reasonably be expected. As discussed below, there are no consequences on the predicted drainage water chemistry from variations in the market conditions that distinguish ore from waste rock. Any variation in geochemical properties has already been included, and reported, in the analysis. Any potentially acid-generating LGO placed within the waste rock pile will be encapsulated within acid-buffering waste rock and isolated from oxygen and seepage. If marginal LGO exist within the LGO stockpile which are not milled and cannot be properly encapsulated within the waste rock pile, they will be returned to the base of the open pit prior to closure (flooding). The Rehabilitation and Closure Plan and associated estimate will address the PAG material remaining within the LGO stockpile (see response to PC-39).

ID:	**PC-33**
Appendix:	See Appendix B: ARD/ML Management Approach

RESPONSE TO PC-34

ID:	**PC-34**
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	EIS - Groundwater/Surface Water
Context and Rationale:	According to Table 2.1 Key Refinements, Tailings Management Facility Location, Revised Project Design, A detailed siting/location assessment for the TMF was completed as part of the PFS, which assessed a total of 14 potential locations up to 12 km from the previous TMF location. After reviewing the environmental, engineering and economic factors of the potential locations, the TMF was relocated to the north of its originally proposed location. The updated TMF footprint avoids fish bearing and/or navigable waterbodies.
Information Request:	The EIS in Section 2.3.4.1 states that Golder first proceeded with a high-level options evaluation to select the best tailings deposition method and TMF site. (underline added) As the assessment is not actually referenced or provided, whether it is "high-level" or "detailed" cannot be determined. However, as the assessment did not involve a Multiple Accounts Analysis such as recommended by MAC 2019, we do not believe it could be considered to be a "detailed" analysis.
Response:	As noted in Section 2.11.1.6 of the EIS (which describes the alternatives evaluation for tailings), additional information regarding the tailings management facility (TMF) siting evaluation is provided in EIS Appendix 2-B. The site selection technical memo includes a detailed description and tabulation of the criteria used to evaluate 14 potential locations, and a quantitative evaluation matrix used to determine the best location. Given the limiting factors for siting the TMF (including the need to avoid a potential cascade failure of the Victoria Dam, and reducing potential effects to migrating caribou), a formal Multiple Accounts Analysis (MAA; best suited to evaluating a large number of potentially closely weighted factors) was not conducted. Use of the quantitative matrix was suitable for the site and facilitated the comparison of factors and sites in a similar fashion to a formal MAA.
Appendix:	None

RESPONSE TO PC-35

ID:	**PC-35**
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	EIS - Groundwater/Surface Water
Context and Rationale:	According to Table 2.1 Key Refinements, Tailings Management Facility Location, Benefits to… and Stakeholders, Eliminates potential interaction and risks associated with the Victoria Dam and Victoria Lake Reservoir.
Information Request:	The idea of locating the TSF where it could result in potential interaction and risks associated with the Victoria Dam and Victoria Lake Reservoir to begin with was highly ill-advised from the standpoint of fundamental facility engineering safety considerations. The choice of this critically flawed approach is an example of the limited capacity of an exploration company to develop a major mining project.
Response:	It is acknowledged that the location of the tailings management facility (TMF) proposed in the initial engineering study (Preliminary Economic Assessment) carried risks associated with the Victoria Dam that were not fully understood at that time. In 2019, prior to the completion of the next level of engineering study (Prefeasibility Study) and the development of the EIS, Marathon's Board of Directors took steps, including transitioning of senior management up to and including the CEO, from an exploration-focused company to a development-focused company. The substantial, collective mine development and operational experience of the new senior management team has been used to guide the environmental and engineering work contributing to the Pre-Feasibility Study and EIS, reassessing and refining the Project to better address environmental effects and risks, such as the location of the TMF.
Appendix:	None

RESPONSE TO PC-36

ID:	**PC-36**
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	EIS - Groundwater/Surface Water
Context and Rationale:	According to Table 2.1 Key Refinements, Tailings Deposition Type, Benefits to… and Stakeholders: • Increases tailings stability within the TMF and therefore decreased dam height. Also reduces the risk of TMF failure due to piping in the dam or tailings liquefaction. • Substantially reduces water storage within the tailings impoundment (storage component of the TMF), thereby reducing risk of a TMF failure due to piping or overtopping. • Reduces tailings effluent (water), improving the general water quality within the TMF as direct precipitation acts to dilute. • Reduces water within the TMF, decreasing the risk of groundwater infiltration, and reduces the potential inundation area (the area impacted by tailings and/or water) in the unlikely event of a dam failure. • Increases the deposited density of the tailings, which should improve settlement with time and aid in mine rehabilitation and closure, as well as the longer term, post-closure stability of the facility.
Information Request:	The EIS should avoided the use of generalizations and provide actual values whenever possible. How much is the tailings stability increased (e.g., minimum FOS increased from x to y)? How much was the dam height decreased as a result of increased tailings stability? By what actual volume is water storage reduced? How does reducing the volume reduce the risk of TMF failure due to piping or overtopping? How much is tailings effluent water reduced, or water quality within TMF improved? How much is the risk of groundwater infiltration decreased, or potential inundation area reduced? How much does the deposited density of the tailings increase, and how will that improve settlement over time and aid in mine rehabilitation and closure and post-closure stability of the facility? While there may be some small improvement in some of the tailings and TSF characteristics as suggested, they are overstated if they are compared to other tailings deposition types such as paste or filtered tailings. In some cases, the benefits are limited. For example, while increasing the deposited density of the tailings will increase the rate at which consolidation of tailings takes place, allowing mine rehabilitation and closure to take place more quickly, it will not by itself improve the long-term tailings density, and

ID:	PC-36
	therefore will not significantly (e.g., by more than a few years over the longer term) aid in post-closure stability of the facility. These values should be put in perspective as compared to paste or filtered tailings.
Response:	It is acknowledged that the points listed above from Table 2.1 of the EIS are qualitative in nature. By changing the proposed location of the tailings management facility (TMF), the footprint/layout of the TMF itself changed to accommodate differences in topography, therefore a quantitative comparison of the TMF characteristics would not be relevant. Further information regarding the comparison of alternatives (e.g., thickened and filtered tailings deposition) is presented in Section 2.11 of the EIS.
Appendix:	None

RESPONSE TO PC-37

ID:	PC-37
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	EIS - Groundwater/Surface Water
Context and Rationale:	According to Table 2.1 Key Refinements, In-Pit Tailings Deposition, Benefits to… and Stakeholders. See list of benefits in EIS.
Information Request:	a. The EIS should avoided the use of generalizations and provide actual values whenever possible (i.e., How much is the tailings stability increased (e.g., minimum FOS increased from x to y)? How much was the dam height decreased as a result of increased tailings stability? By what actual volume is water storage reduced? How does reducing the volume reduce the risk of TMF failure due to piping or overtopping? How much is tailings effluent water reduced, or water quality within TMF improved? How much is the risk of groundwater infiltration decreased, or potential inundation area reduced? How much does the deposited density of the tailings increase, and how will that improve settlement over time and aid in mine rehabilitation and closure and post-closure stability of the facility?) b. The EIS should note however that the tailings deposited within the exhausted open pit do post a potential risk of release of Mining Influenced Water (MIW) via groundwater. c. Has co-disposal of waste rock and tailings in open pit to bring to original contours been considered?
Response:	a. See response to PC-36. b. The potential for interaction between the water associated with tailings deposition within the Leprechaun pit and the adjacent and downstream groundwater resources is assessed in Chapter 7 of the EIS. c. Co-disposal of waste rock and tailings in the open pit has been considered, however as tailings deposition within the open pit represents only 15% of the volume of the pit, this alternative is analogous to backfilling the open pit with waste rock only. This alternative is assessed in Section 2.11 of the EIS.
Appendix:	None

RESPONSE TO PC-38

ID:	**PC-38**
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	EIS - Groundwater/Surface Water
Context and Rationale:	According to Table 2.1 Key Refinements, Waste Rock Piles, Benefits to… and Stakeholders: • Pile design now considers aesthetic features for closure (revegetation). • Note that current designs include ditching and ponds to manage and treat water runoff prior to release.
Information Request:	The inclusion of revegetation as part of closure as well as capture of water runoff during operations are both long recognized best practices, and rather than being refinements, should be considered as fixes to fatal flaws in the original design. It is concerning that the exploration company that proposes to advance and ultimately operate the project would not, on their own, have included standard design and reclamation practices such as revegetation and stormwater capture in their original plans.
Response:	The purpose of Table 2.1 of the EIS was to identify the changes that had occurred to the Project concept and engineering design since submission of the Environmental Assessment Registration / Project Description document, and describe associated benefits to the environment, Indigenous groups, and stakeholders, as specified in the federal EIS Guidelines. It is not the case that Marathon had not considered revegetation and stormwater capture in the original plans, and the Environmental Assessment Registration / Project Description included high-level descriptions of revegetation of disturbed areas and stormwater management infrastructure. These aspects are referenced in Table 2.1 to indicate that these plans have been sufficiently advanced such that they have been incorporated into the designs.
Appendix:	None

RESPONSE TO PC-39

ID:	**PC-39**
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	EIS - Groundwater/Surface Water
Context and Rationale:	According to Table 2.1 Key Refinements, Ore Stockpiles, Benefits to… and Stakeholders: • The stockpiles added are temporary as the materials will be processed in the mill; therefore, the stockpile areas can be completely rehabilitated after use, whereas the heap leach pile would have simply been covered and revegetated.
Information Request:	What assurance is there that the low-grade stockpiles will be processed if the price of gold drops?
Response:	The risk associated with the low-grade ore stockpiles not being processed is addressed via the Rehabilitation and Closure Plan (RCP) and associated Financial Assurance under the Newfoundland and Labrador (NL) *Mining Act*. The NL Department of Industry, Energy, and Technology, Mines Branch requires that ore stockpiles that contain potentially acid-generating material be considered in the RCP as permanent, requiring an engineered cover to prevent acid rock drainage / metal leaching (ARD/ML) drainage or movement of the materials to an acceptable location (open pit, tailings facility, underground workings) for permanent disposal, sufficiently submerged to prevent ARD/ML generation. The Mines Branch is the principal reviewer of the RCP, and the Branch refers this component of the permitting under the NL *Mining Act* to other provincial and federal regulators for review and comment, including the NL Environmental Assessment Division.
Appendix:	None

RESPONSE TO PC-40

ID:	**PC-40**
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	Project Description
Context and Rationale:	According to the EIS, note that Figure 2-6 shows the Leprechaun waste rock pile overprinting water management infrastructure. During summer 2020 field work, it was determined that the NL 1:50,000 mapping contains an error in relation to the extent of Stream VIC-15, which extends eastward approximately 200 m farther than mapped. The Leprechaun waste rock pile has been adjusted to avoid this fish habitat; however, the design of the water management infrastructure design could not be updated in time for the EIS submission. The water management design will be updated as part of the Feasibility Study that is scheduled to be completed in early 2021.
Information Request:	The updated water management design is important with respect to mitigation and should be required to be completed and included in the EIS.
Response:	The level of design and associated information provided in the EIS is sufficient to assess the potential environmental effects associated with the waste rock pile. The updated design will be provided to the regulators for review in the Development Plan requirement for permitting under the Newfoundland and Labrador *Mining Act* which is reviewed by a wide range of provincial and federal regulators prior to approval.
Appendix:	None

RESPONSE TO PC-41

ID:	**PC-41**
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	Project Description
Context and Rationale:	According to the EIS, …disturbed areas will be graded, covered with overburden and organic materials, and seeded to promote natural revegetation.
Information Request:	What about topsoil? The EIS is not consistent. Is topsoil = organic materials?
Response:	Comment acknowledged. The last bullet of Section 2.6.3 of the EIS should read: "Graded and/or scarifying disturbed areas, covering these with topsoil / organic materials and overburden, where required, and seeding to promote natural re-vegetation."
Appendix:	None

RESPONSE TO PC-42

ID:	PC-42
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	Project Description
Context and Rationale:	The Rehabilitation and Closure Plan will detail methods to be used for progressive and closure rehabilitation and post-closure monitoring.
Information Request:	The lack of a requirement for a detailed Rehabilitation and Closure Plan (RCP) is not typical of best practice, which instead suggests that the entire mining life-cycle should be considered at the initial design stage for planning and environmental assessment. A conceptual but reasonably detailed RCP is required in order to consider the effects of the proposed project as discussed further in these comments.
Response:	The rehabilitation and closure information presented in Section 2.6 is responsive to the provincial and federal EIS guidelines and is considered sufficient to assess the closure and post-closure environmental effects as presented throughout the EIS. The Newfoundland and Labrador (NL) Department of Industry, Energy, and Technology, Mines Branch, requires the submission of a Rehabilitation and Closure Plan (RCP) as part of the permitting process under the NL *Mining Act*, prior to commencement of construction. The RCP is reviewed by provincial and federal regulators including a review for consistency with the EIS commitments, conditions, and assessed effects presented in the EIS.
Appendix:	None

RESPONSE TO PC-43

ID:	**PC-43**
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	Project Description
Context and Rationale:	According to Table 2.4 Anticipated Timeframes, Frequencies and Durations of Main Project Activities, Post Closure and Long-Term Monitoring: • Commencing following closure rehabilitation in 2036 (Y14), with anticipated duration of 6-10 years for post-closure monitoring, may be shorter as major infrastructure (pits, TMF) will start closure in 2031 • Monitoring plans to be developed once design and operation activities have been sufficiently advanced.
Information Request:	What is the basis for the presumption of no post-closure maintenance or any activity past Year 10? Why are monitoring plans not being included in the EIS?
Response:	The post-closure monitoring period of 6 to 10 years is based on the overall Project schedule, progressive rehabilitation activities, availability of the tailings management facility and waste rock piles for final closure activities in Year 9 (3 years prior to mine closure) and accelerated pit flooding. This timeframe is consistent with other Rehabilitation and Closure Plans (RCPs) developed in this jurisdiction. As described elsewhere, the Mines Branch considers the RCP developed prior to project construction as preliminary, and a 'live' document that is updated regularly to address any changes to the project, changes in regulations, and operational monitoring findings. As described in Section 2.6.5 of the EIS, post-closure monitoring plans will be developed based on the experience gained through pre-construction baseline and construction and operations monitoring plans. It is anticipated that the closure monitoring plans will mirror the operational monitoring programs for flora, fauna and water resources to provide continuity of data and a historical baseline. Approximately 1 year prior to closure, the Mines Branch requires that the RCP be finalized, including detailed designs / plans for final closure activities. This 'final' RCP is reviewed by both federal and provincial regulators.
Appendix:	None

RESPONSE TO PC-44

ID:	**PC-44**
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	Project Description
Context and Rationale:	n/a
Information Request:	What is the material balance of the organics stockpiles, and are “organics” = topsoil?
Response:	The volumes and capacities of stockpiles, including overburden and topsoil piles, are provided in Table 2.7 of the EIS. The terms “organics” and “topsoil” have been used interchangeably in the Project Description.
Appendix:	None

RESPONSE TO PC-45

ID:	**PC-45**
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	Project Description
Context and Rationale:	Approximately one-half of the Marathon's LGO is conservatively classified as PAG. The minimum ARD onset time in PAG LGO is approximately six years, based on maximum laboratory leaching rates. There were no exceedances of MDMER limits observed in humidity cell leachates from LGO under neutral conditions. Based on kinetic testing, Al, P and Zn have moderate leaching potential. The Marathon LGO stockpile effluent has been segregated from other mine component flow streams in the overall mine design to facilitate collection and further ARD treatment, if required. About 10% of LGO from Leprechaun pit is estimated to be PAG. The LGO stockpile is not expected to generate ARD before all the LGO has been processed at the mill. Kinetic testing suggests moderate leaching potential for Al and P and no exceedances of MDMER limits.
Information Request:	The EIS, as well as the RCP and financial assurance estimate, should consider the potential for the ore stockpiles, in particular the LGO, to be left in place and not processed. A contingency for moving the LGO to the waste rock pile at closure should be considered in the event the company, at some point, were to abandon the mine.
Response:	See response to PC-39, PC-42 and DIET-08.
Appendix:	None

RESPONSE TO PC-46

ID:	**PC-46**
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	Project Description
Context and Rationale:	According to the EIS, Golder Associates Ltd. (Golder) was engaged to complete a pre-feasibility level TMF design. However, the actual design study is not formally referenced by this section of the EIS or included as a reference to this section of the EIS. It is, however, identified in Appendix A, Dam Safety: Golder Associated Ltd. (Golder) (2020a). Marathon Gold: Prefeasibility Study for Tailings Disposal at the Valentine Gold Project, Newfoundland. Report prepared for Marathon Gold Corporation, Mississauga, Ontario. March 2020. Also, according to the EIS, as part of its mandate, Golder first proceeded with a high-level options evaluation to select the best tailings deposition method and TMF site. No actual options evaluation is formally referenced by this section of the EIS. However, the EIS does reference: Golder Associates Ltd. 2020a. Valentine Gold Project - Tailings Storage Facility Site Selection Study. Technical Memorandum. Prepared for Marathon Gold. While Appendix A, Dam Safety includes the following reference: Golder (2020b). Design Basis Memorandum: Design Basis for the Dam Breach and Inundation Assessment – Valentine Gold Project. Report prepared for Marathon Gold Corporation, Mississauga, Ontario. May 2020.
Information Request:	After review of the EIS with the expectation of locating these documents within its contents, the reviewer was unable to locate them. Without this information, a thorough review of the proposed TMF design is not possible. However, ultimately, we would expect to be disappointed in the level of detail provided for a pre-feasibility level TMF design. Based on our recent experience in performing technical reviews and working with independent review panels on multiple TSF design projects over the past 5 years, a higher level of design is necessary prior to permitting to provide the necessary basis for assessment. Otherwise, the purpose of the technical and independent review is compromised, as those reviews might decide to reconsider the siting location, dam design, or tailings methods proposed in the EIS. In particular, we would note that without a rigorous site

ID:	PC-46
	characterization, geotechnical and geological hazards analysis, climate analysis, geohydrological analysis, as well as other critical information such as a detailed Rehabilitation and Closure Plan, the EIS must depend more on speculation and proposals for what is to be done, than on actual scientific findings of fact.
Response:	The first two referenced documents are located in Appendix 2B of the EIS and the Dam Breach Assessment and Inundation Study is provided in Baseline Study Appendix 1, Attachment 1-A, and references to this appendix are made in Chapter 2 of the EIS. Specifically, Section 2.11.1.6 which is the section describing the alternatives evaluation for tailings identifies that additional information regarding the tailings management facility siting evaluation is located in Appendix 2B of the EIS. The site selection technical memo included a detailed description and tabulation of the criteria used to evaluate 14 potential locations, and the use of a quantitative evaluation matrix to determine the best location.
Appendix:	None

RESPONSE TO PC-47

ID:	PC-47
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	Project Description
Context and Rationale:	According to the EIS, It is a requirement that the TMF dams are founded on compact to dense native tills and/or bedrock with low permeability characteristics to limit seepage.
Information Request:	This is the only location in this section of the EIS that addresses TMF lining other than suggesting earlier in the section that A geomembrane liner will be incorporated into the upstream slope of the embankment to retain water within the impoundment. The EIS should clarify if the primary purpose of the geomembrane liner on the upstream slope of the embankment is based on limiting seepage, or based on stability concerns related to allowing water to seep into the embankment. Depending on dense native tills and/or bedrock with low permeability characteristics to limit seepage is speculative, particularly in the absence of a reliable site characterization, and a preferable approach would be to use a geomembrane liner over the entire interior of the TMF. This alternative should be considered by the EIS.
Response:	The geomembrane liner is intended to limit seepage from the tailings management facility (TMF) and dam, as described in detail in the Pre-Feasibility Study TMF design report included in Appendix 2B of the EIS. Since the submission of the EIS, additional geotechnical and hydrogeological work has been completed within the TMF dam and impoundment area which has confirmed the consistency and low hydraulic conductivity of the glacial till and upper bedrock surface beneath the TMF area. As such, the liner is not required beneath the full TMF footprint to manage seepage from the facility. The anticipated seepage (quantity and quality) and the associated environmental effects are assessed in Chapter 7 of the EIS for the life of mine.
Appendix:	None

RESPONSE TO PC-48

ID:	**PC-48**
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	Project Description
Context and Rationale:	According to the EIS, the dam safety program established in NL requires that dams must be designed, operated and maintained to meet the requirements of the Canadian Dam Association (CDA) and Mining Association of Canada (MAC) guidelines, Global Industry Standards on Tailings Management (ICMM et al. 2020), as well as applicable provincial requirements. The Global Industry Standards on Tailings Management (GISTM)2 is considered by most practitioners to be the current industry standard. Many of the reviewer's comments and suggestions are based on application of the GISTM to TSF design and environmental assessment processes with ICMM member companies that have been undertaken with a concerted effort to meet GISTM requirements.
Information Request:	The GISTM contains specific requirements relative to each principle. We believe it would be highly informative for the project proponent and their consultant, and the responsible regulatory agencies, to perform a gap analysis for the project and its present status with respect to the GISTM Principles requirements. Performance of the gap analysis would show that the current level of design and information provided in the EIS is not consistent with those requirements and would provide the parties a sound basis for both resolving the inadequacies of the present EIS and as project plans proceed.
Response:	Based on the comments in PC-46 and PC-47, the reviewer has not located / reviewed the tailings management facility design report included in Appendix 2B of the EIS which should help address the comment above. Since the submission of the EIS, Marathon has become a member of the Mining Association of Canada and is now committed to the Towards Sustainable Mining protocol that includes the Tailings Management Protocol. This protocol has recently (2021) been updated to include provisions specific to the Global Industry Standards on Tailings Management released in 2021. Marathon is committed to upholding these standards in addition to specific provincial requirements, which include adherence to the Canadian Dam Association guidelines.

ID:	**PC-48**
	Marathon has also engaged a third-party, independent reviewer for the ongoing TMF engineering and design program. Mr. Mark E. Smith, M.Sc., P.E., P.Eng., G.E, D.GE, S.E., who is the Chief Advisor – Geotechnical for Piteau Associates USA Ltd., has over 40 years of experience including the design, construction, operation and closure of more than 100 tailings management facilities. He has directed detailed investigations and design studies, performed peer reviews and forensic analyses, designed retrofits, provided resident engineering and construction management services, and conducted training seminars and short courses. He has worked as a consultant, designer, resident engineer, independent reviewer, and on the owner's team for every phase of project development from discovery through development to closure. His North American tailings experience includes projects in Newfoundland, British Columbia, and the Yukon; ten projects in the USA; seven in Chile; twelve in Peru; eight in Brazil; and other projects ranging from Indonesia and the Philippines to Saudi Arabia. He also led the post-failure analyses of the five other impacted dams in the aftermath of the Samarco failure and provided remote consulting following the Brumadinho failure.
Appendix:	None

RESPONSE TO PC-49

<table>
<tr><td>ID:</td><td>PC-49</td></tr>
<tr><td>Expert Department or Group:</td><td>Mining Watch Canada/J. Kuipers P.E.</td></tr>
<tr><td>Guideline Reference:</td><td>-</td></tr>
<tr><td>EIS Reference:</td><td>Project Description</td></tr>
<tr><td>Context and Rationale:</td><td>According to the EIS, the embankment has a 3.5H:1V upstream slope and 2.0H:1V downstream slope.</td></tr>
<tr><td>Information Request:</td><td>Why is the downstream slope at 2.0H:1V with no benches, instead of a more preferable 2.5H:1V or 3H:1V slope, with benches, for rehabilitation and closure purposes?</td></tr>
<tr><td>Response:</td><td>The slope as designed meets the Canadian Dam Association (CDA) criteria for dam stability for all cases. The tailings management facility (TMF) dam is founded on ground that slopes down away from the downstream slope of the dam. Decreasing the downstream slope to 2.5:1 or 3:1, with benches will push the toe of the dam out to more steeply sloped section of natural ground that extends to the Victoria River. This will have the following effects:
Increase the potential for lower slope and toe instability in the dam
Adversely affect fish and fish habitat
Increase the tree and vegetation clearing southeast of the TMF to accommodate the additional area occupied by the dam
Increase the complexity of the seepage collection ditch and pumping return to the TMF
Flattening and benching of the slope may be a consideration for closure. However, unless or until it can be confirmed that the TMF can be designated as a “landform” under the CDA Guidelines (used by the Newfoundland and Labrador Department of Environment and Climate Change, Water Resources Division and Mines Branch), the dam will require ongoing Dam Safety Inspections and Dam Safety Reviews and maintenance, which all require the downstream slope to be free of vegetation (i.e., not rehabilitated) for visibility of the dam slopes.</td></tr>
<tr><td>Appendix:</td><td>None</td></tr>
</table>

RESPONSE TO PC-50

ID:	**PC-50**
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	Project Description
Context and Rationale:	According to the EIS, A complete Rehabilitation and Closure Plan has not yet been developed for the Project; however, the following sections outline the rehabilitation and closure philosophies and concepts that will be used in the development of the Project's Rehabilitation and Closure Plan. This plan will be drafted and finalized in consultation with NLDIET upon release from the EA process.
Information Request:	The outlined information provided in the EIS is insufficient to meaningfully inform the impact analysis for the EIS. The EIS provides detailed information with respect to the proposed construction and operations period over the initial 12-year period, but only cursory information is provided on the RCP that will be used to ensure for future generations restoration of lands, protection of water quality, and post-mining land use. As has been noted throughout the history of abandoned mine cleanup in Canada and elsewhere, the environmental as well as many of the societal issues with mining are most typically not associated with its operational period, but rather once mining stops, whether permanently or intermittently. Therefore, it is recognized that if the potential impacts of a mining project are to be assessed, adequate information must be provided and or otherwise developed for the full mine life-cycle, including reclamation, closure, and post-closure. This includes describing the site characteristics at the end of mining with respect to hydrology, geochemistry, and water quality, as well as the reclamation and closure plans for each individual facility, as well as the project site as a whole, that will be carried out to mitigate any impacts. It is widely recognized by industry, regulators, and scientists and engineers involved in mine design and permitting that it is critical that the entire life-cycle of mining, from cradle to grave, be addressed from the beginning of the process, rather than as an afterthought following initial permitting. As a result of the recognition of the need for this information in environmental assessments, when an application is submitted for a major mine permit, in nearly all cases, this project being a notable exception, a detailed stand-alone rehabilitation and closure plan, together with supporting information, is submitted with the application. In some cases, the reclamation and closure plan may also be accompanied by a financial

ID:	**PC-50**
	assurance cost estimate. A detailed RCP is essential to a reasoned choice among the alternatives. The lack of a detailed RCP is a critical data gap in the EIS. Without this information, the EIS does not provide adequate context for assessment of impacts to wetlands, groundwater and surface water, or other impacts, including to wildlife, fish and aquatic resources, subsistence resources, and other human uses and activities, as it fails to provide specific rehabilitation and closure information necessary to develop a science-based finding as to post-mining impacts or mitigation. Given the critical need for this information the applicant should be required to provide a detailed RCP.
Response:	See response to PC-42 and DIET-05.
Appendix:	None

RESPONSE TO PC-51

ID:	**PC-51**
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	Project Description
Context and Rationale:	The Guidelines for the Preparation of an Environmental Impact Statement for the New Prosperity Project in British Columbia3 should be considered. The New Prosperity EIS Guidelines contain a much higher degree of specificity than was provided for the Valentine EIS, where the Federal and Provincial Guidelines require the proponent to outline a preliminary decommissioning and reclamation plan.
Information Request:	The New Prosperity Guidelines required the EIS to include the following information: • Proposed land use end objectives for the various mine site components • Productivity or capability objectives and the general means by which these objectives will be achieved; plans for removal of structures and equipment and remediation of contaminated soils • Plans for reclaiming roads and other linear disturbances • Waste rock dump and stockpile reclamation plans, including final configurations, proposed re-sloping, soil replacement, and revegetation methods • Tailings impoundment reclamation plans, including final impoundment configuration and water levels, re-sloping, soil replacement and revegetation methods • Open pit filling times and final configuration • Site water management plans for all facilities and including re-establishment of post-mine watercourses • Concepts for monitoring and research programs that will assess reclamation success and for meeting overall closure objectives • Conceptual monitoring programs for permanent structures to ensure long-term geotechnical stability • Conceptual long-term monitoring programs for surface and groundwater quality • Management plans for final closure as well as temporary closure and/or early permanent closure
Response:	Comment acknowledged. The Valentine Gold Project EIS has been developed to align with requirements as specified by regulators in the provincial and federal EIS Guidelines. Rehabilitation and closure activities, including philosophies and concepts to be employed in the Project-specific

ID:	PC-51
	Rehabilitation and Closure Plan (RCP), are described in Section 2.6 of the EIS. The detailed RCP will be developed and finalized in consultation with the Newfoundland and Labrador Department of Industry, Energy and Technology upon release from the Environmental Assessment process.
Appendix:	None

RESPONSE TO PC-52

ID:	**PC-52**
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	Project Description
Context and Rationale:	According to the EIS, As the Project design process moves forward, the volume of soils required for all rehabilitation activities will be assessed, and a materials (rock and soils) balance and Soil and Rock Management Plan will be developed for the overall Project to ensure that sufficient soils are available for rehabilitation, while avoiding excavating and stockpiling soils in greater quantities than those required, thereby resulting in increased Project footprint and soils excavation, management and closure impacts.
Information Request:	The EIS should contain a rehabilitation soils mass balance based on the proposed mine plan and conceptual RCP and consistent with the other data in the EIS. The EIS should contain the information necessary to perform this evaluation based on the disturbed area of the proposed facilities that in the future will be covered, and the amount of overburden and topsoil/organic material proposed to be stored (see EIS Table 2.7). However, as a notable exception to this EIS and any other of which this reviewer is aware, in this EIS's Section 2, there are almost no descriptions of the actual area or footprint of the proposed facilities/disturbed areas. Instead of a table containing the area of each facility (e.g., open pit, waste rock pile, overburden pile, topsoil pile, TSF, facilities, roads, man camp), the only area mentioned, apparently inadvertently as otherwise it is conspicuous that this key information is missing from the EIS, is on p. 2.59 where it is mentioned that the polishing pond would have a footprint of approximately 4.1 hectares.
Response:	See the response to PC-53 regarding soils for rehabilitation. The footprints of the proposed facilities are provided in the Table PC-52.1 below.
Appendix:	None

Table PC-52.1 Footprint of the Proposed Facilities

Project Component	Area (hectares)
Marathon Waste Rock Stockpile	142.9
Marathon Pit	69.5
Marathon Topsoil	3.0
Marathon Overburden (OBV) Stockpile	27.2
Marathon Low Grade Ore (LGO) Stockpile	16.5
High Grade Ore Stockpile	9.8
Leprechaun LGO Stockpile	11.0
Leprechaun Topsoil	1.7
Leprechaun Waste Rock Stockpile	161.9
Leprechaun OBV Stockpile	10.5
Leprechaun Pit	52.0
Tailings Management Facility	183.3
Mill and Plant Area	6.3
Ore Stockpile/Crusher Area	3.8
Mine Services Area	2.8
Accommodations Camp Area	3.8
Total	705.8

RESPONSE TO PC-53

ID:	**PC-53**
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	Project Description
Context and Rationale:	EIS Section 2.6.2 suggests the "anticipated" total thickness of the cover is 0.3m over the waste rock.
Information Request:	Typically, an EIS level RCP would identify the total thickness of the cover for each facility, and provide a materials mass balance showing how the required quantity of cover materials would be recovered and stockpiled for future use.
Response:	See response to PC-42. A materials balance showing the required quantity of cover materials, and the quantity of overburden and organics (topsoil / peat) to be stockpiled during development is being prepared for the Rehabilitation and Closure Plan (RCP) submission under the *NL Mining Act*. High-level estimates of the quantities of overburden and organic materials that will be stockpiled and available for progressive and final rehabilitation indicate that 0.5 m or more of cover material will be available. Ongoing engineering assessment and design will further refine these estimates for presentation in the RCP.
Appendix:	None

RESPONSE TO PC-54

ID:	**PC-54**
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	Project Description
Context and Rationale:	According to the EIS, when a bench is finished in one area, the horizontal bench and downhill slope will be covered with overburden / organics (anticipated 0.3 m in total thickness) and revegetated.
Information Request:	A total cover thickness of 0.3m is marginal and technically infeasible in our experience. From a practical standpoint, given the relatively coarse gradation of the underlying waste rock and the proposed overburden cover materials, covered by a thin layer of organics, in order to achieve a minimum 0.3m cover thickness, an average cover thickness of 0.45m or more is required. If the cover material is available, most reclamation experts would prefer to have 0.6m of cover material as this also allows for long-term erosion and minimizes the need for cover replacement. It also should be noted that the idea with reclamation is to mimic the surrounding landforms and vegetation, and not just apply a veneer of cover materials as if the facility is an agricultural field. The EIS does not describe the revegetation process other than to suggest that during this stage the proponent would be Completing revegetation studies and trials. The EIS should provide a description of the intended studies and trials. It should also provide a conceptual or provisional revegetation plan describing the intended revegetation species, their distribution, the planting methods, and to what extent any amendments (compost, fertilizer, other) are intended to be used. This information is not only necessary to evaluate the potential effectiveness of the RCP measures, but additionally, as the proposed life of mine cannot be insured and therefore financial assurance must be required based on that eventuality, this information is needed to establish a cost estimate for that purpose.
Response:	See response to PC-53 regarding soil cover for rehabilitation, and PC-42 with respect to the information provided in the EIS and requirements in this jurisdiction with respect to Rehabilitation and Closure Plans. The Newfoundland and Labrador (NL) *Mining Act* and associated guidelines for mine rehabilitation and closure require that all areas of a mine site be revegetated. The NL Department of Industry, Energy, and Technology, Mines Branch, further requires that a certified agronomist assess and report on revegetation species, planting methods and

ID:	**PC-54**
	distribution, and growth aids (e.g., fertilizers). Marathon has also invited participation in revegetation studies (including field trials) from the Indigenous groups to address plant species with respect to caribou and other wildlife, as well as culturally-significant plants.
Appendix:	None

RESPONSE TO PC-55

ID:	**PC-55**
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	Project Description
Context and Rationale:	According to the EIS, Decommissioning and rehabilitating the TMF while Project operation continues, once tailings deposition moves from the TMF to the Leprechaun open pit in Year 9 of the operation phase (noting that decant water from the TMF will continue to be recycled for process water).
Information Request:	It would be advantageous if this sequence of events were to occur as it would allow for some level of TSF closure to occur while mine operations were still active. However, we would also note that as a result, the highest cost year for future reclamation, will likely occur in Year 9, should the operator for some reason, such as economics, cease the mining operation, and the government become responsible for the implementation of the RCP.
Response:	The Financial Assurance, which is based on the Rehabilitation and Closure Plan estimate, will be updated regularly (on a scheduled basis in agreement with the Newfoundland and Labrador (NL) Department of Industry, Energy and Technology, Mines Branch). The Financial Assurance must be placed for the full rehabilitation and closure costs prior to development and is not reduced for ‘scheduled’ progressive rehabilitation or final rehabilitation activities that occur prior to full mine closure, until full mine closure work is completed. As such, the Financial Assurance that is held in place by the NL government will be adequate to address the closure requirements in the event of a default by Marathon at any point in the Project life.
Appendix:	None

RESPONSE TO PC-56

ID:	**PC-56**
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	Project Description
Context and Rationale:	Natural filling of the pits is forecast to require from 34 to 38 (Marathon pit) and 37 to 42 (Leprechaun pit) years without supplementing inflow. It is also proposed to pump water from Valentine Lake and Victoria Lake Reservoir to further expedite filling of the Marathon pit and Leprechaun pit, respectively, reducing the flooding times to within the closure and anticipated post-closure monitoring periods. Water would be withdrawn from Victoria Lake Reservoir (0.178 m^3/s) and Valentine Lake (0.145 m^3/s) over an eight-year period. Monitoring of water quality within the open pit during filling will be completed to assess the potential discharge water quality and to determine if any water treatment could be required until water quality meets the appropriate criteria.
Information Request:	While the opportunity to more rapidly fill the mined-out open pits over an eight-year period is generally favoured in order to shorten the time-frame of filling during which stability, safety and geochemical concerns are more prevalent, the potential need to conduct additional water treatment, particularly for the Leprechaun Pit after partial backfilling with tailings, should be considered in the RCP and EIS and in the financial assurance estimation.
Response:	See response to PC-42. It is further noted that the water quality in the open pits during filling / closure and post-closure is considered in Chapter 7 of the EIS. Groundwater monitoring will be conducted adjacent to the pit, and water sampling within the pit during filling and post-filling will be considered in the associated management plans and Rehabilitation and Closure Plan.
Appendix:	None

RESPONSE TO PC-57

ID:	**PC-57**
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	Project Description
Context and Rationale:	The EIS contains a single paragraph describing rehabilitation and closure of the waste rock piles.
Information Request:	The description is general and non-specific except for suggestion that the piles will be sloped for final closure at three horizontal to one vertical (3H:1V).
Response:	See response to PC-42. Additional information regarding post-closure, passive water management for runoff and shallow seepage from the waste rock piles is provided in the response to DIET-10.
Appendix:	None

RESPONSE TO PC-58

ID:	**PC-58**
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	Project Description
Context and Rationale:	The EIS description of closure for the TMF is highly non-specific and contradictory. According to the EIS, When the tailings deposition is moved to the Leprechaun open pit in Year 9, the process of closure and rehabilitation of the TMF will commence. It is expected that the water treatment plant and polishing pond components of the TMF will operate for some time, and that water collecting within the TMF (drainage from the tailings, as well as precipitation) will continue to be pumped to the mill as reclaim water. (underline added). Exposed tailings will be covered with overburden and revegetated, and as water quality and flows reach equilibrium within the facility, a larger, closure spillway will be constructed to lower the water level within the tailings impoundment. At this time, the water treatment plant and polishing pond will be removed and water flowing from the tailings impoundment will be channeled to release to the environment. (underline added).
Information Request:	The RCP should be based on a post-closure water balance that estimates how long the water treatment plant and polishing pond components of the TMF will be required to operate, and the time-frame for converting the TMF to either an active or passive closure phase. The EIS does not make it clear as to whether the TMF will be closed as a wet facility. While the EIS does suggest as the Project progresses, Marathon will evaluate the tailings impoundment and consider options to further dewater the stored tailings working towards classifying the TMF as a landform (under the CDA closure guidelines) and therefore alleviating the requirements for maintaining and inspecting the dams post-closure this also suggests that otherwise the TMF will not be closed as a landform. This is reflected in the further statement in the EIS that Marathon will establish a plan for long-term inspection and maintenance of the dams. Given the present public awareness of the potential for catastrophic failures of TMFs the EIS does not even begin to provide adequate information to address this potential from the standpoint of rehabilitation and closure
Response:	The conceptual closure plan considered and assessed in the EIS is a wet closure, and this is the conservative case in terms of potential environmental effects and long-term monitoring for the impoundment post-closure. This is also the conservative assumption with respect to the initial

ID:	**PC-58**
	Rehabilitation and Closure Plan (RCP) and the associated cost estimate to be provided per the Newfoundland and Labrador (NL) *Mining Act*. However, the objective is to achieve landform classification, and this will be considered in the continued advancement of engineering design and closure planning for the tailings management facility (TMF). The engineering design and closure planning for the TMF will be reviewed further by provincial and federal regulators as part of the documents required for NL *Mining Act* permitting, namely the Development Plan, and the RCP.
Appendix:	None

RESPONSE TO PC-59

ID:	**PC-59**
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	Project Description
Context and Rationale:	Experience has shown that the consolidation of tailings is highly variable and site specific, and that final reclamation can require significant additional time than is inferred, since it is not described in detail, in the DEIS. The Mount Polley Independent Expert Review Panel4 identified three principles for Best Available Technology (BAT) for existing TSFs as: no surface water; unsaturated conditions, and achieve dilatant conditions by compaction. The Canadian Dam Association (2014) describes TSF closure in four phases related to the management of risk of TSF's depending on their state of closure.
Information Request:	The EIS should be based on an RCP that identifies what stage of TSF closure is expected to be achieved and when in accordance with CDA recommendations. The EIS should also identify stable landform closure as an alternative for the TSF if it is not clear that the proposed action would result in that condition being achieved within a reasonable time-frame. The EIS should also address mitigation such as using intervention techniques (e.g., wick drains and loading with waste rock or borrow material) to achieve stable landform conditions.
Response:	See responses to PC-42 and PC-58. The Rehabilitation and Closure Plan will address the tailings management facility (TMF) closure in terms of the closure phases described in the Canadian Dam Association guidelines. As described in PC-48, Marathon is committed to following best practices and guidance with respect to TMF design, construction, operation, and closure.
Appendix:	None

RESPONSE TO PC-60

ID:	**PC-60**
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	Project Description
Context and Rationale:	According to the EIS, the post-closure monitoring program will continue after final closure activities are completed for an estimated 6 to 10 years… The post-closure and long-term monitoring plans are yet to be developed. In contrast to the EIS for the proposed Valentine Project, the Donlin Gold Project Final EIS5 (April 2018) Section 2.3.2.5.2 CLOSURE AND POST-CLOSURE contains detailed information on long-term monitoring and maintenance, which should be considered the minimum necessary for the Valentine EIS.
Information Request:	In terms of post-closure management, the proposed Valentine Project will require extensive monitoring and maintenance. Monitoring should include water quantity, water quality, fish, wildlife, aquatic biota, revegetation, erosion, dam stability, and other monitoring to ensure that rehabilitation and closure measures are performing as intended and within acceptable standards. Monitoring would also determine when maintenance and corrective actions are needed to maintain roads, covers, stormwater channels, and other measures to ensure that reclamation remains viable over time. These monitoring and maintenance activities, in addition to operations that will be performed in perpetuity, and should be described in the EIS in detail.
Response:	See responses to PC-42 and PC-43.
Appendix:	None

RESPONSE TO PC-61

ID:	**PC-62**
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	Project Description
Context and Rationale:	According to the EIS, Adaptive management (i.e., learning from monitoring and adjusting mitigation and monitoring accordingly) and post-EA consultation and engagement may also result in refinements during the life of the Project. Marathon will implement contingency measures and adaptive management throughout all Project phases, as applicable.
Information Request:	Rather than just mention adaptive management planning, given the high degree of uncertainty around any major mining project, the project proponent should have provided a preliminary Adaptive Management Plan (AMP) that could be weighed as an additional and critical mitigation measure.
Response:	Please refer to PC-05 for a description of Marathon's approach to, and plans for, incorporating adaptive management throughout all Project phases.
Appendix:	None

RESPONSE TO PC-62

ID:	**PC-62**
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	Project Description
Context and Rationale:	The EIS points out a number of considerations related to the alternative of pit backfilling: • In NL, it is required to make efforts to progressively rehabilitate the exposed waste rock pile. These efforts would be sacrificed and the area beneath the pile would need to be rehabilitated once the life of Project is complete.
Information Request:	The EIS should recognize that this alternative would result in at least partial restoration of the original surface contours and hydrology of the open pit area. The requirement for progressive rehabilitation should not be used as a rationale as there is no question if the proponents were to later propose on their own removal of a waste rock pile, they would be given consideration to do so.
Response:	It is acknowledged that this alternative would result in at least partial restoration of the original surface contours and, to a lesser degree, the hydrology of the open pit area. This does not change the alternatives assessment with respect to pit backfilling as presented in the EIS.
Appendix:	None

RESPONSE TO PC-63

ID:	**PC-63**
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	Project Description
Context and Rationale:	The EIS points out a number of considerations related to the alternative of pit backfilling: • A nearly equal number of years of equipment operation (fuel consumption, vehicle emissions, dust, and employment) to return the waste rock to the same open pit
Information Request:	As the removal of waste rock back to the open pit would involve a downhill haul, versus an uphill haul when the pit was excavated, there would be a significant reduction in time, fuel consumption, and vehicle emissions as well as employment. This suggests the EIS is incorrect. In making statements throughout the EIS as "a nearly equal number of years," the EIS should instead provide an actual estimate based on a scientific study rather than force the reviewer to rely on broad unsupported generalizations.
Response:	See the response to PC-66 regarding the methodology for the alternatives means assessment. While it is acknowledged that the equipment cycle times would be reduced, this reduction would be limited, as the safe speed of a fully loaded haul truck hauling downhill with turns is a limiting factor in the cycle time. It is acknowledged that the time, fuel consumption, emissions, dust and employment associated with backfilling the pits would be less than required to mine those materials from the pits to the waste rock pile, however, these and the associated costs would nevertheless be substantial, as stated in the EIS.
Appendix:	None

RESPONSE TO PC-64

ID:	**PC-64**
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	The EIS is understating the potential benefit of pit backfilling related to highwall stability. Simply put, if the backfilling is complete and results in no exposed highwalls, there is no credible risk of highwall slope failures. Pit backfilling would serve to permanently and completely buttress the highwalls and prevent this from possibly happening.
Response:	There is no intent to understate the benefit of pit backfilling related to highwall stability, and it is agreed that, in terms of potential slope failures, backfilling is the best solution. However, the ability to use pit backfilling to prevent a slope failure is not guaranteed. Compaction of backfill under mechanical compaction and/or self-weight is lowest adjacent to the rock slope and this loose material can permit the rock slope to fail and settle into the less compact backfill, thereby creating differential settlement or voids along the backfill and highwall contact. The highwall contour and associated backfill contouring (how much rock fill is effectively buttressing the highwall) would dictate the risk of this type of failure. It is acknowledged that this would not be a typical or large-scale slope failure, however it may create a hazard (void or uneven ground) at the ground surface.
Appendix:	None

RESPONSE TO PC-65

ID:	**PC-65**
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	The EIS inaccurately describes the settlement due to differential consolidation of the waste materials as “creep” settlement. As noted in Fell et al6 (2000) creep settlement takes place on slopes (e.g., waste rock pile slopes). But if the pit is backfilled such that the waste rock is not significantly sloped, creep will not occur. However, differential settlement of waste rock when not compacted is common and will likely cause the surface of the pile to settle unevenly. However, we would note that this same process will occur on the waste rock piles themselves, as well as the TMF, and must be accounted for in all rehabilitation measures. In rehabilitation plans this is often addressed by mounding the materials so as to achieve positive drainage off the facility even after differential settlement occurs. Additionally, it must be accounted for in long-term monitoring and maintenance plans and if settlement occurs over the long-term that negatively impacts the environment or post-mining land use, repairs must be made.
Response:	Creep of rockfill or waste rock, even where the rockfill is engineered and mechanically compacted, occurs under self-weight. While the effects may be greater in relatively unconfined conditions such as dams, settlement associated with creep or consolidation of waste rock placed without mechanical compaction (as would be the case for pit backfilling with waste rock) can be substantial. While creep settlement in rockfill is not well studied or documented for pit backfill specifically, it is for general geotechnical engineering applications and there are many studies and references on this (e.g., Athanasiuf, 2006, “Elastic and Creep Settlements in Rock Fills”, Proceedings of the 16th International Conference on Soil Mechanics and Geotechnical Engineering). It is acknowledged that mounding materials can aid with creep or consolidation settlements in waste rock, tailings and backfill, however, the degree of settlement (or mounding required) depends on several geotechnical factors including foundation conditions (possibly added settlement if compressible), development timeline, and particle size distribution and compaction effort as the materials are placed or deposited. These factors will be considered in design and for rehabilitation and closure.
Appendix:	None

RESPONSE TO PC-66

ID:	**PC-66**
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	In general terms, the cost associated with the activities outlined above would make the mining Project uneconomical.
Information Request:	Instead of relying on this unsupported statement, the EIS should provide an estimated cost of backfilling, and include an evaluation that conduct a sensitivity analysis showing how the estimated cost would actually impact the project economics in terms of net present value and rate of return.
Response:	As per the Agency's *Operational Policy Statement for Addressing "Purpose of" and "Alternative Means"* (CEA Agency 2015), a qualitative approach may be used to establish which of the alternative means are technically and economically feasible based on evidence and professional judgement. While the Operational Policy indicates that criteria used to establish economic feasibility could include a comparison of cost estimation and forecasted revenues, detailed cost analysis is not required through this Operational Policy or identified as a requirement of the Project-specific Federal or Provincial EIS Guidelines. This is likely in recognition that a detailed quantitative assessment of the economic feasibility of all identified alternative means should be beyond the scope of an environmental assessment. The purpose of the alternatives assessment is to identify preferred alternatives in consideration of the environmental, economic and technical costs and benefits as a collective (i.e., not necessarily the most cost efficient or the alternative with the least environmental effects). Section 2.11 of the EIS describes the methods and criteria for comparing the alternatives and rationale for the selection of the preferred alternative(s) at an appropriate level of detail. Reference: CEA Agency (Canadian Environmental Assessment Agency). 2015. *Operational Policy Statement for Addressing "Purpose of" and "Alternative Means* Available at: https://www.canada.ca/en/impact-assessment-agency/services/policy-guidance/addressing-purpose-alternative-means-under-canadian-environmental-assessment-act-2012.html
Appendix:	None

RESPONSE TO PC-67

ID:	**PC-67**
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	As previously described in the EIS, the Leprechaun open pit is to be exhausted in Year 9, at which time tailings will be deposited in the pit, and the tailings will not be expected to completely fill the pit during the remaining mine life. The EIS should address the alternative for the waste rock produced from the Marathon pit from Year 9 to Year 12 to be included as backfill in the Leprechaun open pit together with tailings. This would result in a more complete pit backfill of the Leprechaun open pit and the corresponding benefits.
Response:	As described in Section 2.5.1 and Table 2.10 of the EIS, mining activities will cease in Year 9 (Leprechaun pit will be exhausted earlier in Year 9 than Marathon pit), and therefore there is little to no waste produced from Marathon pit once Leprechaun is exhausted. Also, as the last several benches of mining in any open pit are small and generally all ore material, the waste rock produced from these final benches would be minimal.
Appendix:	None

RESPONSE TO PC-68

ID:	**PC-68**
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	Given the recommendations of the Mount Polley Independent Expert Review Panel for Best Available Technology (BAT) for new TSFs as filtered or "dry stack" tailings, it is customary for any credible analysis of tailings disposal alternatives to be based on a thorough stand-alone analysis. The requirements are provided in the Guidelines for the assessment of alternatives for mine waste disposal which suggest: "The alternatives assessment should objectively and rigorously consider all available options for mine waste disposal. It should assess all aspects of each mine waste disposal alternative throughout the project life cycle (i.e., from construction through operation, closure and ultimately long-term monitoring and maintenance). The alternatives assessment should also include all aspects of the project, direct or indirect, that may contribute to the predicted impacts associated with each potential alternative. These may include the design of the mine and ore processing system to the extent that they would impact mine waste production, storage options, water management and water treatment. The assessment will consider the predicted quality and quantity of effluent that would be discharged from each alternative assessed, taking into account the effluent quality limits set in the MMER, and the predicted impacts (inclusive of mitigation measures) associated with the proposed TIA, if any, on surface and groundwater water quality and flow. The assessment should address environmental, technical and socio-economic aspects of all of the elements as described above for each alternative throughout the project life cycle. A comprehensive economic assessment of the alternatives is also required and should consider the full costs of each alternative throughout the project life cycle. This economic assessment should also consider all costs associated with any compensation agreements that are to be developed, including the habitat compensation plan associated with using the water body as a TIA."
Information Request:	The alternatives assessment guidelines include an alternatives assessment process that includes the following steps: Step 1: Identify Candidate Alternatives

ID:	**PC-68**
	Step 2: Pre-Screening Assessment Step 3: Alternative Characterization Step 4: Multiple Accounts Ledger Step 5: Value-Based Decision Process Step 6: Sensitivity Analysis Step 7: Document Results Instead of relying on a stand-alone siting study and unsupported opinions as to the viability of tailings disposal alternatives, the EIS needs to be informed by an assessment of alternatives that conforms with the recommended guidelines.
Response:	See responses to PC-46, PC-48 and PC-66.
Appendix:	None

RESPONSE TO PC-69

ID:	**PC-69**
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	Rather than being mentioned in Section 2.6 Rehabilitation and Closure as might be expected, the EIS mentions financial assurance in the context of rehabilitation method alternatives stating, Financial Assurance, which is expected to be in the range of \$45M to \$50M, is insurance held by the provincial government for the purpose of rehabilitating the site in the event that Marathon defaults on the Project (e.g., declares bankruptcy). Financial assurance is an essential element of a proposed mining project. The viability of the reclamation, closure, and post-closure management is a critical factor in evaluating potential long-term indirect, direct, and cumulative impacts and determining whether the proposed project can be considered fully protective of environmental resources. Furthermore, this information is essential for an adequate analysis of the proposed project, because it could make the difference between a project that is adequately managed over the long term by the site operator and an unfunded or under-funded contaminated site that becomes a public liability that must be addressed by the regulators.
Information Request:	Potential additional care and maintenance measures that should be considered and analyzed in the EIS to minimize long-term liability of reclamation uncertainties include long-term settlement of the waste rock piles and TSF, functionality of stormwater drainage channels and sediment ponds, stability of the TSF and other constructed river channels, and effects from climate change. As previously recommended, the EIS should be based on a more detailed RCP, and the RCP should also include a preliminary financial assurance cost estimate.
Response:	See PC-42 regarding the level of detail provided with respect to the Rehabilitation and Closure Plan. Post-closure care and maintenance will be considered alongside post-closure monitoring to address the types of issues outlined above.
Appendix:	None

RESPONSE TO PC-70

ID:	**PC-70**
Expert Department or Group:	Mining Watch Canada/J. Kuipers P.E.
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	The EIS suggests the reduction or elimination of the tailings ponds, and improvement to achieve 'landform" classification are "alternatives." As previously mentioned in these comments, the elimination of water from the surface of the TSF and stabilization to achieve a landform are best practices. As such they should be viewed as objectives if not requirements, and not as alternatives. The statement in the EIS, Landform classification for the TMF would be the preferred option; however, the technical feasibility of this alternative will require operational and even initial closure monitoring while the Project is still operating and sending tailings to the Leprechaun open pit). Achievement of a landform requires a decision at this stage of the project as it must be included in the TSF design. This outcome should not rely on as yet to be determined or decided circumstances or additional post-operational interventions.
Information Request:	Given the location and circumstances, if the project proponent cannot commit to a landform classification for he TSF post-closure, ensuring long-term stability without intervention, then additional consideration should be given to require all tailings to be stored in-pit or filtered.
Response:	See the response to PC-58 regarding the closure concept for the tailings management facility. Storing all tailings in-pit would either require the development of a pit before tailings were generated, which is not possible, or the movement of all the tailings generated in the first 9 years to an exhausted pit (Leprechaun). The filtered tailings option is considered in Section 2.11 of the EIS.
Appendix:	None

RESPONSE TO PC-71

ID:	**PC-71**
Organization or Group:	Mining Watch Canada/J. Kuipers P.E.
Context and Rationale:	According to the EIS, This model approach imposes the highest vertical groundwater gradient from the tailings pond and results in a conservatively high prediction of seepage rates from the TMF over the operation phase of the Project.
Information Request:	While the methods used are an improvement over previous industry practice of suggestion zero-leakage, and acknowledge that liner do have the potential for fail, the methodology itself is not conservative and tends to underpredict liner leakage. Most often this is due to the presence of a more significant failure than used to estimate leakage, such as a seam failure or liner rip, or pipe coupling failure. It can also be due to the presence of multiple failures rather than a single failure. Based on our professional experience, when liners do leak, the discharge rates are typically one to two orders of magnitude (10-100X) more than typically estimated. It should also be noted that when liner leakage is detected, the range of subsequent mitigation can result in complete repair to no significant improvement depending on the nature of the source of leakage. The level of mitigation is largely based on access to the seepage. For these reasons, we strongly recommend that the TMF utilize a liner system to minimize seepage, but the system should include a leak detection and evacuation provision given the inevitability of liner leakage.
Response:	The tailings management facility (TMF) design report, including liner leakage estimates is provided in Appendix 2B of the EIS. The TMF liner system will be designed and operated in a manner consistent with industry best practice. Leakage detection is provided with the seepage collection ditches and sumps that will be instrumented to identify changing flow rates. Routine visual monitoring will provide an opportunity to identify physical damage to the exposed liner on the upstream slope. Tailings deposition from the dam crest will promote a pond away from the liner to reduce seepage rates and provide an opportunity to repair potential damage to the liner above the pond level. If damage to the liner is observed, it will be repaired.
Appendix:	None

RESPONSE TO PC-72

ID:	**PC-72**
Organization or Group:	Mining Watch Canada/J. Kuipers P.E.
Context and Rationale:	According to the EIS, this model approach results in a conservatively high prediction of seepage rates from the waste rock piles over the operation phase of the Project. And, as a result, the loadings represent a conservative estimate under steady-state conditions during operation.
Information Request:	The suggestion of conservatism in the estimates during operations, without mention of post-closure, suggests that the same methods are not conservative in estimating post-closure water quality or quantity. The EIS should clarify, and as mentioned elsewhere in our comments, the EIS should address post-closure with equal emphasis as closure through the discussion.
Response:	The same level of conservatism regarding seepage rates stated during operations has been extended to closure and post-closure. Project details regarding seepage rates during all mine phases can be found in Chapter 6 (Groundwater) and Appendices 7 A and 7B - the Water Balance and Water Quality Modeling Reports in the EIS. An overview of conservatism built into seepage estimates is described in Section 6.3.5.1 of the EIS. Descriptions of conservative model assumptions and inputs are provided throughout Chapter 6 with respect to seepage and demonstrate that conservatism in seepage predictions is carried throughout all mine phases. Similarly, conservative inputs and assumptions for water balance and water quality model inputs are presented throughout the reports in Appendix 7A and 7B.
Appendix:	None

RESPONSE TO PC-73

ID:	**PC-73**
Organization or Group:	Mining Watch Canada/J. Kuipers P.E.
Context and Rationale:	Leprechaun Complex According to the EIS, Overall, the waste rock pile is not expected to generate ARD due to the small amount of PAG material and significant excess of NP. Therefore, it is not anticipated that specific ARD management of waste rock will be required. However, also according to the EIS, Waste rock lithologies show moderate ML potential for aluminum, phosphorous, copper, selenium, and zinc.
Information Request:	This suggests specific ML management of waste rock will be required, or at least should be considered from a contingency and adaptive management standpoint. The EIS should explain why only “high leaching potential” is being addressed and why concentrations that exceed Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life (CWQG-FAL) between the CWQG-FAL and ten times the CWQG-FAL value, were arbitrarily assigned to moderate leaching potential. Further, the EIS should explain why moderate leaching potential is being treated in the EIS as having no impacts or consequences.
Response:	Metal leaching (ML) potentials were qualitatively determined to screen for contaminants of potential concern (COPC). ML potentials, whether classified as high or moderate, were not intended to determine if there would be a requirement for management of ML from mine materials. The initial assessment of ML should be put in the context of the overall water and chemical mass balance of the mining system and receiving environment before addressing ML management. Therefore, the requirement for management of ML was based on the quantitative water quality assessment at discharge points (Appendix 7A and 7B of the EIS) and in the receiving environment (Appendix 7C the EIS). This assessment shows that specific ML management of waste rock is not required as summarized Chapter 7 (Surface Water Resources) of the EIS. Monitoring and potential mitigation of ML from waste rock will be considered as part of an adaptive management process that will be included in the Acid Rock Drainage/Metal Leaching (ARD/ML) Management Plan. The plan will be developed and submitted to regulators as part of the permitting stage of the Project (refer to the response to DIET-07 and Appendix B for further details on the proposed plan).
Appendix:	See Appendix B: ARD/ML Management Approach

RESPONSE TO PC-74

ID:	**PC-74**
Organization or Group:	Mining Watch Canada/J. Kuipers P.E.
Context and Rationale:	Marathon Complex According to the EIS, approximately 14% of the 60 Mm^3 of waste rock is conservatively estimated to be PAG. Blending PAG and non-PAG rock with excess of neutralization potential and/or encapsulation of PAG waste by non-PAG rock will be conducted to neutralize acidity potentially generated in PAG pockets and as a result, the final drainage from waste rock is not expected to be acidic. The waste rock pile will be covered by growth medium / overburden during rehabilitation, further reducing the risk of ARD/ML. There are no exceedances of MDMER limits observed in leachates from the waste rock humidity cells. Overall, waste rock lithologies show moderate ML potential for aluminum, mercury, selenium, and zinc.
Information Request:	Blending and encapsulation of PAG can be effective; however, actual implementation has been shown to require planning and diligence. The EIS should be supported by a conceptual waste rock management plan (WRMP). The conceptual WRMP should be developed based on the geochemical characterization program that has been completed to-date. This conceptual WRMP should be closely integrated with other management plans that have, or will be, developed as part of the Project. The EIS should note that geochemical characterization will continue during the life of mine (LOM) and the results will be used to inform adaptive management and update the WRMP.
Response:	An Acid Rock Drainage / Meal Leaching (ARD/ML) Management Plan will be developed for the Project as described in the response to DIET-07 and Appendix B. This plan will describe the strategy for managing waste rock, including initial plans to address the need for blending and encapsulation. The ARD/ML Management Plan will be based on the existing ARD/ML data, results from ongoing test work, and the ARD/ML Block Model that will be developed for the Marathon pit. The ARD/ML Management Plan will be integrated with the mining and processing plans, and appropriate environmental management plans. ARD/ML testing will continue through construction and operations and results obtained will be used to update the ARD/ML database and block model, and to inform adaptive management and update the ARD/ML Management Plan.
Appendix:	See Appendix B: ARD/ML Management Approach

RESPONSE TO PC-75

ID:	PC-75
Organization or Group:	Mining Watch Canada/J. Kuipers P.E.
Context and Rationale:	Processing Plant and Tailings Management Facility Complex According to the EIS, • Approximately 13% and 67% of ore samples from Leprechaun and Marathon pits, respectively, are conservatively classified as PAG. • Approximately 41 Mt of tailings will be produced from both high-grade ore and low-grade ore with about 38% of the material originating from the Leprechaun pit and the remainder from the Marathon pit. • Composite samples of tailings from both deposits are classified as non-PAG and are not expected to generate ARD.
Information Request:	The information provided in the EIS with respect to acid drainage accounting is confusing and requires additional analysis by the reviewer, as well as additional information, to be comprehensible or meaningful. Based on the information in the EIS, an estimated 46% of the tailings would be PAG, and 54% would be non-PAG. It is unclear in the EIS if the basis of “composite samples” is from a similar mass balance, or from actual composite samples of tailings. Regardless, the relatively small difference between the quantity of PAG and non-PAG in this instance does not demonstrate or suggest that the tailings overall will not be acid drainage generating. The EIS should provide additional information for the tailings that demonstrates if neutralization potential (NP) is in excess of acid potential (AP). Additionally, the EIS should discuss and address the potential for lenses of acid-generating material to occur in the TMF. Finally, the EIS should address as a potential mitigation measure the isolation of acid-generating flotation concentrate material in the tailings stream and location within the TMF. The EIS should also address the possibility of using the mined-out Leprechaun Pit as a submerged repository for flotation concentrate, albeit requiring re-handling of the first 9 years of concentrate stored separately for later deposition.
Response:	Additional information is provided in Tables PC-75.1 and PC-75.2 demonstrating that neutralization potential (NP) is in excess of maximum acid potential (MAP) in tailings during the first nine years, when deposited to the tailings management facility (TMF). After the first nine years of operation, the tailings will be deposited in the Leprechaun pit and submerged during closure. The potential for the formation of lenses of potentially acid generating (PAG) material will be addressed in the Acid Rock Drainage / Metal Leaching (ARD/ML) Management Plan described in Appendix B. The ARD

ID:	**PC-75**
	Block Model, mine plan, and process / TMF plans will be used to maximize blending and avoid the development of lenses or pockets of PAG materials in the TMF. The ARD/ML and TMF management plans will address the need to plan, monitor, and address this potential, and if required, mitigate through non-potentially acid generating (non-PAG) tailings and soil cover, lime addition, and other mitigations to manage drainage water quality in the short and long term. Tailings are predicted to be non-PAG on an annual basis, as noted above, and therefore, isolation of PAG concentrate from tailings is not warranted. Concentrate isolation would require an additional cyanide destruction unit and a separate containment cell, as well as re-handling of concentrate accumulated in the first nine years. These additional measures would result in unnecessary complications in ore processing and water management.
Appendix:	See Appendix B: ARD/ML Management Approach

Table PC-75.1 Acid Base Accounting on Ore Composites from Marathon and Leprechaun Zones and on Tailings

Element	Milling Composites									
	Marathon Comps (tailings CND-1)					Leprechaun Comps (tailings CND-2)				
	MZA	MZB	MZC	MZD	MZE	LZA	LZB	LZC	LZD	LZE
% ore sample in tailings composite	15.7	21.8	21.6	23.6	17.3	27.9	17.3	14.5	20.4	19.9
S (t), %	0.68	0.68	0.79	0.70	0.51	0.30	0.28	0.43	0.34	0.36
$S^{=}$, %	0.68	0.60	0.74	0.64	0.47	0.28	0.25	0.37	0.34	0.33
C(t), %	0.48	0.41	0.38	0.33	0.38	0.80	0.64	1.40	0.93	0.84
C(g), %	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
TOC Leco, %	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
CO_2, %	1.8	1.5	1.5	1.2	1.5	3.0	2.4	5.1	3.5	3.1
MAP, kg $CaCO_3$/t	21.3	21.3	24.7	21.9	15.9	9.4	8.8	13.4	10.6	11.3
NP Carb, kg $CaCO_3$/t	40.0	34.2	31.7	27.5	31.7	66.7	53.3	116.7	77.1	70.0
Carb NPR, unitless	1.9	1.6	1.3	1.3	2.0	7.1	6.1	8.7	7.3	6.2
MAP, kg $CaCO_3$/t	21.2					10.5				
NP Carb, kg $CaCO_3$/t	32.5					74.4				
Carb NPR, unitless	1.53					7.10				

Notes:
MAP (maximum Acid Potential) = S(t) wt, % ×31.25
NP Carb (Carbonate Neutralization Potential) = C(t) wt.% × 83.3
Carb NPR (Carbonate Net Potential Ratio) = NP carb /MAP

Table PC-75.2 Sensitivity Analysis for Acid Base Accounting in Tailings based on Variability in Ore Zone Composites

Year	% of Leprechaun ore in mill feed (LP%)	Average case: MAP and NP Carb inputs from CND1 and CND2			Low probability case: MAP and NP Carb inputs from sample MZC and LZB		
		MAP	NP Carb	NP carb /MAP	MAP	NP Carb	NP carb /MAP
-1	41.0	16.1	49.8	3.09	18.1	40.6	2.23
1	42.2	16.0	50.3	3.15	18.0	40.8	2.27
2	16.7	19.1	39.5	2.07	22.0	35.3	1.60
3	32.4	17.2	46.1	2.68	19.5	38.7	1.98
4	41.7	16.0	50.0	3.12	18.0	40.7	2.26
5	55.9	14.2	56.0	3.93	15.8	43.8	2.78
6	44.4	15.7	51.2	3.26	17.6	41.3	2.34
7	35.7	16.8	47.5	2.83	19.0	39.4	2.07
8	28.6	17.7	44.5	2.52	20.1	37.9	1.88
9	37.5	16.5	48.3	2.92	18.7	39.8	2.13

Notes:
Equation of annual tailings MAP calculation is presented below.
$MAP = MAP_{CND1} \times (1 - LP\%/100) + MAP_{CND2} \times LP\%/100$
NP was calculated the same way using NP Carb inputs instead of MAP.

RESPONSE TO PC-76

ID:	**PC-76**
Organization or Group:	Mining Watch Canada/J. Kuipers P.E.
Context and Rationale:	According to the EIS, the main potential effect to groundwater quality during decommissioning, rehabilitation and closure is the continued seepage from the waste rock piles and TMF through overburden and bedrock. Revegetation of the waste rock piles and TMF during progressive and closure rehabilitation will reduce seepage from operational levels.
Information Request:	While revegetation will reduce seepage from un-revegetated conditions, such as during operations, the amount of reduction may or may not be significant in reducing seepage overall from the waste rock piles or TMF. In a climate like that of the project site the overall benefit in terms of reducing seepage is likely to be minimal in terms of addressing potential water quality impacts. Where impacts are likely to occur, a more sophisticated approach such as an engineered cover might be necessary. The actual amount of reduction is based on numerous factors including precipitation, evaporation, plant evapotranspiration and other climate conditions. The EIS should have included an evaluation of the amount of infiltration that would be expected to occur after revegetation and the estimated benefit overall of revegetation to address seepage should be estimated and stated, including any uncertainties in the estimate.
Response:	The assessment of seepage to groundwater (i.e., basal seepage) related to the waste rock piles and tailings management facility was addressed conservatively in the EIS by excluding the potential reduction in infiltration due to the soil cover when calculating the mass loading rates to surface water receptors through groundwater. The mass loading rates are calculated based on the basal seepage rate (i.e., groundwater recharge) multiplied by the concentration predicted for the respective features by water balance/water quality model (Appendix 7A and 7B of the EIS). The assessment used the same seepage rates for closure and post-closure as those used for the operation period (i.e., without a vegetative cover), and provides a conservatively high estimate of the mass loading rate from these features at closure/post-closure. The actual mass loadings from seepage are expected to be reduced with an established vegetated cover post-closure, and therefore the conclusions presented in the EIS over-estimate water quality effects during rehabilitation, closure and post-closure.
Appendix:	None

RESPONSE TO PC-77

ID:	**PC-77**
Organization or Group:	Mining Watch Canada/J. Kuipers P.E.
Context and Rationale:	According to the EIS, predictions made using the model are based on several conservative assumptions to reduce the influence of uncertainty in the predictions, including the assumption of saturated waste rock piles, no attenuation of water quality along the flow paths, and that all mass of leached parameters from the piles will arrive simultaneously at the receptor. These assumptions result in a conservative prediction of the mass loading in the early phases of the Project (i.e., operation) and provide a better (while still conservative) representation of long-term water quality through closure.
Information Request:	The identification of the limitations that result in model predictive uncertainties with respect to this project are beyond the scope of this review. The EIS models should be independently reviewed, and with respect to the hydrologic model, the following determined: • Was the number of hydraulically tested wells and boreholes adequate? • Are there limitations of the data derived from the completed hydraulic testing related to the scale of the tests? The EIS needs to make clear that there is uncertainty inherent in the model predictions. Ideally, their use would be limited to comparison of alternatives, as there is uncertainty regarding whether current best practices are sufficient to provide confident predictions of actual water quantity or quality decades or centuries in the future (Kempton et al. 2000; Kuipers, et al 2006; Maest et al. 2006; Eary et al. 2009; and NRC 1999). While the predictive water quantity and quality models are useful to understand the general water quality that may be present decades or centuries in the future, they are only estimates, and the level of uncertainty in the model predictions cannot be fully quantified. The EIS needs to address whether predictions made by the models had a level of uncertainty that could bear on the significance of a predicted impact. Uncertainty with respect to long-term predictions in particular needs to be acknowledged and addressed by the EIS. • Were any of the fault zones near the proposed pits hydraulically tested? • Was the model evaluated to predictive sensitivity to various possible degrees of hydraulic transmissivity of fault zones? • Is the spatial distribution of wells with measured groundwater level adequate?

ID:	**PC-77**
Response:	The EIS submission, including the results of the modelling, have been reviewed by the regulatory agencies, including Natural Resources Canada and the Newfoundland and Labrador Department of Environment and Climate Change. Their reviews included comments on model uncertainty and have been addressed in the responses provided to the specific comments throughout the EIS review process. Please refer to the responses to ECC-72 to ECC-74.
Appendix:	None

RESPONSE TO PC-78

ID:	**PC-78**
Organization or Group:	Mining Watch Canada/J. Kuipers P.E.
Context and Rationale:	According to the EIS, during Project development, a detailed groundwater monitoring program will be implemented for main Project components, building on the baseline monitoring program, to confirm potential changes in groundwater associated with Project activities.
Information Request:	At the very least a preliminary groundwater monitoring program showing proposed monitoring wells and procedures should have been developed for and described in the EIS. The preliminary groundwater monitoring program should have been provided to solicit public comment via the EIS that could be addressed and/or incorporated into the detailed groundwater monitoring program to be done in the future. The preliminary groundwater monitoring program would allow the reviewer to assess the likely effectiveness of the program.
Response:	As presented in Section 6.9.2 of the EIS, the type of monitoring equipment, selection of monitoring stations, frequency of sample collection, and duration of the program will be determined based on consultation with the applicable government agencies. In Newfoundland and Labrador, the requirements for groundwater monitoring are defined within the Certificate of Approval (Operations) administered by the Newfoundland and Labrador Department of Environment and Climate Change (NLDECC) – Pollution Prevention Division. Monitoring well locations are defined in the Certificate of Approval in specific locations down-gradient of key project infrastructure where groundwater quality and quantity effects may be realized. The groundwater monitoring plan will include: • The location of the proposed monitoring wells • Procedures for drilling and constructing the monitoring wells • Chemical and physical parameters to be monitored • Frequency of sampling / monitoring • Methodology for groundwater sampling / monitoring • Reporting requirements It is anticipated that the groundwater monitoring program will include quarterly groundwater sampling of the parameters of primary concern listed in Table 6.10 of the EIS. This would include the measurement of in-situ field parameters (dissolved oxygen, pH, conductivity), and submission of water quality samples for laboratory analyses, including but not limited to, general chemistry, trace metals, and cyanide species. As indicated in Section 6.9.2 of the EIS, follow-up monitoring results will be compared with applicable regulatory standards set out in Guidelines for Canadian Drinking Water

ID:	**PC-78**
	Quality, Canadian Water Quality Guidelines for Protection of Freshwater Aquatic Life, and Project-specific regulatory approvals. The groundwater monitoring plan will also include specific actions to be implemented should there be exceedances of a designated threshold criteria.
Appendix:	None

RESPONSE TO PC-79

ID:	**PC-79**
Organization or Group:	Mining Watch Canada/J. Kuipers P.E.
Context and Rationale:	The EIS acknowledges that multiple failure mechanisms have resulted in catastrophic dam failures, including earthquakes, landslides, overtopping, internal erosion or piping, foundation failure, and slope failures. However, without explanation other than to suggest they are “the most common causes of recorded dam failure” the EIS focuses the discussion of the description of the scenario on piping and dam overtopping.
Information Request:	"As previously suggested in these comments, the basis for this section should be an FMEA together with a catastrophic failure scenario consistent with CDA guidance. The present approach of the EIS leaves the suggestion that the project proponent is both not well informed as to TMF management and safety and best practice. The EIS fails to note that none of the three most recent catastrophic dam failures (e.g., Mt. Polley, Samarco, and Fundão) were due to overtopping, or that the Fundão failure was of a supposedly closed TSF. Ultimately, given the uncertainties and their potential as credible failure modes, a worst-case failure involving a foundation failure, resulting in an instantaneous release of a significant amount of the tailings and process water mass, should be identified and considered by the EIS, and the effects evaluated based on a breach inundation analysis and breach effects analysis consistent with CDA guidance."
Response:	It is acknowledged that the most recent, high profile dam breaches were not due to piping or overtopping. Mount Polley was caused by unidentified foundation issues exacerbated by construction on steep slopes. Both the Samarco and Fundão dams were upstream dam raises where liquefaction of the tailings caused failure of the structure. The Marathon dam breach analysis was conducted in accordance with CDA guidelines, which recommend using engineering judgement to determine the worst-case scenario. The guidelines acknowledge that tailings dams may act differently than the water dams used to develop the breach parameters, however, the potential for catastrophic, near instantaneous breaches (such as the Fundão event) need to be assessed “based on geotechnical analysis in consideration of the construction method and materials used, the shape and size of the dam and the tailings facility, the pre-mine topography and the downstream topography, as well as other characteristics deemed relevant for the dam” (CDA 2019). Based on Golder’s geotechnical assessment and engineering judgement, such a catastrophic failure is not a credible failure mode based on the above and was therefore not modelled.

ID:	**PC-79**
	It is also acknowledged that a detailed Failure Modes Effects Analysis was not presented, however, the TMF design report (see Appendix 2B of the EIS) explained that foundation failures were reviewed and rejected as a credible failure mode. For this reason, piping and overtopping were the focus of the failure mode assessment
Appendix:	None

RESPONSE TO PC-80

ID:	**PC-80**
Organization or Group:	Mining Watch Canada/J. Kuipers P.E.
Context and Rationale:	According to the EIS, Marathon's environmental management policy is based on evolving best-practice standards for environmental performance in the mining industry.
Information Request:	The EIS does not appear to be supported or utilize a risk management strategy approach consistent with the recommendation of MAC. Recommend the permittee be required to perform a multi-stakeholder Failure Modes Effects Analysis (FMEA)11 to identify the potential failure modes and effects as well as potential mitigation measures to address this section.
Response:	Risk assessments have been completed for the tailings management facility (TMF) as part of the various design stages. A more formal Failure Modes Effects Analysis for the TMF will be completed at the next stage of study and appropriate mitigation measures will be implemented consistent with industry best practice and Mining Association of Canada guidelines.
Appendix:	None

RESPONSE TO PC-81

ID:	**PC-81**
Organization or Group:	Mining Watch Canada/J. Kuipers P.E.
Context and Rationale:	According to the EIS, the average range of diesel fuel spills was estimated at 12,000 litres spilling into the river within an hour. It was also assumed that 47 kg of sodium cyanide and 108.70 kg of ammonium nitrate spilled into the river within an hour.
Information Request:	The EIS should provide some type of basis for the assumptions used. The use of “the average range” followed by a specific number is not logical. Why wasn’t the worst case of an entire truck load of diesel fuel spilled? Similarly, what is the basis for the relatively small amount of sodium cyanide spilled when shipments will be much larger? The quantities modelled are not consistent with a “worst case scenario.”
Response:	The purpose of the accidental spill assessment and modelling was to estimate the effects of a plausible worst-case scenario spill of hazardous materials as a result of Project activities, as required by the Federal EIS Guidelines. An accidental trucking event at the Victoria River bridge was selected as the location within the Project Area with the highest potential for downstream effects on Red Indian Lake, the Exploits River and associated Atlantic salmon populations. This approach was discussed with both federal and provincial regulators prior to commencing modelling. This assessment has two key outcomes: travel times for a hazardous material spilled at the Victoria River bridge crossing to reach the Exploits River Dam under a range of flow conditions in the river and lake (i.e., from a low to a high flow condition); and concentrations of the hazardous materials at the dam under a plausible worst-case scenario. Travel times provided in the assessment are independent from the total amount of spill since travel times were estimated based on the physical mixing and hydrodynamic characteristics in the river and lake which are affected by flow, water level, winds, and dispersion. However, concentrations of the hazardous material will be affected by the total amount of spill. The study determined a plausible worst-case spill condition based on available literature, the probability of spill at the Victoria River bridge crossing, and methods of transportation. As indicated in Chapter 21 of the EIS and in Appendix 21A, Canadian spill incident statistics are difficult to obtain and not publicly available. Canadian spills are typically tracked by the provinces and by Transport Canada if they occur in transit; records are not readily accessible and are often only made available through freedom of information requests. As such the spill volumes simulated in Chapter 21 and Appendix 21A of the EIS at the Victoria River bridge crossing were

ID:	PC-81
	drawn from published papers and media accounts. To assess the reasonability of the spill volumes simulated by the Project at the Victoria River bridge crossing, US highway spill records for the 11 years covering 2010 to 2020 were accessed for further analysis and as a surrogate for Canadian spill statistics. The US Department of Transportation's (US DOT) Pipeline and Hazardous Material Safety administration maintains incident records of hazardous material releases in the United State in a publicly available and searchable database. The records include releases from a wide range of transportation modes, such as railway, maritime shipping and highway transport. The US DOT reported 18834 highway spillage incidents while materials were in-transit (excluding loading and off-loading) over the last 11 years from 01/01/2010 and 31/12/2020 (US DOT 2021). *Diesel Fuel* Of 18,834 US DOT highway spill incidents reported from 2010 to 2020, 402 were recorded as diesel fuel spills (2.1% of all spills), of which 50 or 12.4% of all diesel spills were reported to have entered either a waterway or sewer (US DOT 2021). The average diesel spill release volume was 1394 US Ga (5423 L) which was 37% of the average total tanker capacity reported for diesel spills. The volume of diesel simulated in the release at the Victoria River was 12,000 L, which represents approximately the 84th percentile of diesel fuel released and 30% of the maximum tanker liquid capacity. Only 15% (61 incidents) of diesel spills reported in the US were of releases larger than simulated at the Victoria River bridge crossing. The modelled scenario also assumes that all spilled diesel fuel enters Victoria River. Based on the diesel fuel spills reported in the US for the past eleven years during transportation, in most scenarios where diesel fuel entered waterways or sewers, this did not represent the full volume of spilled material. Petroleum transport tankers have many integrated safety features such as low center of gravity, internal baffles and bulkheads to limit internal liquid surge, increase the strength of the tank and account for vapour expansion / contraction due to thermal conditions. These tanker engineering safety criteria reduce the likely volume of spilled material in the event of an accident (as diesel is stored within several isolated compartments within the tanker, it reduces the risk that all diesel fuel being transported would spill in the event that a tanker is breached during an accident). Coupled with extensive tanker driver safety training, mine access road speed limit controls and added access road safety precautions regarding the speed at which a bridge can be crossed, the potential for a diesel tanker spill event

ID:	PC-81
	occurring will be further mitigated, including the likelihood of multiple compartments being breached. Considering roadway, driver training and tanker truck design safety controls along with the ranking of the simulated spill using the last 11 years of US DOT diesel spills information, the simulated volume conservatively represents a plausible worst-case spill release. *Ammonium Nitrate* Of the US DOT reported 18834 highway spills incidents, 52 were recorded as ammonium nitrate spills (0.28% of all spills), of which two (2) spills were reported to have entered either a waterway or sewer (US DOT 2021). When the US DOT database was filtered for spills where solid material was shipped in sub-containerization (i.e., bags, drums or IBC-intermediate bulk containers), the material was packaged in sub-containers ranging from 50 - 2000 lbs (22.7 – 909 kgs). The average spilled weight was 118 lb (54 kg) up to three (3) sub-container volumes released (i.e., 3- 50 lb bags), although on most cases a single sub-container was breached. When sub-containerized, the spilled weight ranged from 0.5% - 45% of the total shipped weight. The maximum solid form, sub-containerized ammonium nitrate release was 250 lb (113.6 kg) which closely compares to the 108.7 kg simulated to be released at the Victoria River. Review of the US DOT spills database indicates that when sub-containerized, ammonium nitrate releases volumes are small relative to total shipping capacity and the released volumes are typically a single sub-container. Thus, based on review of the US DOT spills database, the simulated ammonium nitrate release mass of 108.7 kg is a plausible worst-case release. *Sodium Cyanide* Just two (2) sodium cyanide releases were reported in the highway spillage category of the US DOT (2021) database. Of these, one release was of 100 lbs (45.5 kgs) from a 1000 kgs IBC and the other was a release of 1 lbs (0.45 kgs) from a 3000 lbs (1364 kgs) shipment. In neither case was environmental damage or release to a waterbody or sewer reported. Sodium cyanide is commonly shipped in briquette form making it very stable and reducing susceptibility to spill. The mass of sodium cyanide simulated in the accidental release to the Victoria River was 47 kg (103 lbs), which exceeds the maximum spill reported in the US DOT database. *Summary* Based on reasonable and anticipated spill mitigations such as transport truck tanker design (e.g., multiple discrete compartments within tankers), transportation methods such as sub-containerization and anticipated driver

ID:	**PC-81**
	training and mine access road safety controls, the risk of an accidental release of diesel fuel, ammonium nitrate or sodium cyanide at the Victoria River bridge crossing is considered very low. Notwithstanding the very low risk of such an accidental release, based on review of the US DOT highway spills database, the volumes simulated to be released to the Victoria River are conservative and representative of plausible worst-case condition. References: US Department of Transportation (US DOT). Pipeline and Hazardous Materials Safety Administration. 2021. Hazardous Materials Incident Statistic Reports. Accessed at: https://www.phmsa.dot.gov/hazmat-program-management-data-and-statistics/data-operations/incident-statistics
Appendix:	None

RESPONSE TO PC-82

ID:	PC-82
Organization or Group:	Mining Watch Canada/J. Kuipers P.E.
Context and Rationale:	It is notable that in these sections, as well as elsewhere in the EIS, there is no mention of compliance with the International Cyanide Management Code (the Cyanide Code). The International Cyanide Management Institute (ICMI) has developed a program for the gold mining industry to improve the life-cycle management of cyanide used in gold and silver mining, to enhance the protection of human health, and to reduce the potential for environmental impacts. Gold and silver mining companies that are signatories to the Cyanide Code can get certified by meeting Cyanide Code requirements.12 Audit reports and corrective action reports for ICMI certified gold mines are published on the ICMC website under the company name.13
Information Request:	"Consistent with the recommendations of the Initiative for Responsible Mining Assurance, the proponent should indicate in the EIS that they are a signatory to the Cyanide Code and in addition agree to meet the following design criteria: Construction – (a) Impermeable secondary containment for cyanide unloading, storage, mixing and process tanks shall be sized to hold a volume at least 110% of the largest tank within the containment and any piping draining back to the tank, and with additional capacity for the design storm event; and (b) Pipelines containing process solution shall utilize secondary containment in combination with audible alarms, interlock systems, and/or sumps, as spill control measures. Discharges – Discharges to a surface water mixing zone shall not contain cyanide, either alone or in combination with other toxins, that will be lethal to resident aquatic life or interfere with the passage of migratory fish. Monitoring – The operating company shall carry out baseline water quality sampling and monitor discharges to surface waters or groundwaters for weak acid dissociable (WAD) cyanide. If WAD cyanide is detected in discharges to surface waters, then the operating company shall also monitor total cyanide, free cyanide, and thiocyanate levels. Reporting – Cyanide water quality monitoring data shall be published on at least a quarterly basis in tabular format, and graphical format if available, on the mine or the operating company website, or provided to stakeholders upon request."

ID:	**PC-82**
Response:	Marathon is committed to being a signatory to the International Cyanide Management Code and is designing the process facility and process water management system in this context." The Cyanide Code addresses production, transport, storage, and use of cyanide and the decommissioning of cyanide facilities. It also includes requirements related to financial assurance, accident prevention, emergency response, training, public reporting, stakeholder involvement and verification procedures. Mining operations using cyanide, and cyanide producers and transporters are subject to the applicable portions of the Cyanide Code. As a signator to the Code Marathon commits to comply with the Code's Mining Operations: Principles and Standards of Practice (Please refer to https://cyanidecode.org/the-cyanide-code/#1584656516274-a4947e5f-daab) which include, but reach much further, than the items referred to in the comment above.
Appendix:	None

RESPONSE TO PC-83

ID:	**PC-83**
Expert Department or Group:	Mining Watch
Guideline Reference:	
EIS Reference:	2.10 ALTERNATIVES TO THE PROJECT, 2.11.3.1 Waste Rock Management - Approximately 70 to 80% of the waste rock material would fill the pit due to bulking; therefore, 20 to 30% of the waste rock would remain within the waste rock pile location and would need to be covered with overburden and revegetated.
Context and Rationale:	
Information Request:	The descriptions reliance on waste rock alone to support the consideration is incomplete. The EIS needs to explain, and provide a mass balance, showing how this would result including accounting for the material removed from the open pit as ore and after processing stored as tailings. We would have to assume that a bulking factor was used such that theoretically 60% of the material excavated from the pit could be returned to fill the same volume, and that the estimation of 70-80% is based on also accounting for the removal of ore which ends up as tailings.
Response:	See responses to PC-63, 64, 65 and 66.
Appendix:	None

RESPONSE TO PC-84

ID:	**PC-84**
Expert Department or Group:	Mining Watch
Guideline Reference:	-
EIS Reference:	Section 2.11 Alternative Means of Carrying Out the Project, 2.11.13.9 Revegetation Alternatives
Context and Rationale:	As noted in the EIS, *Many of the rehabilitation alternatives discussed above involve the eventual revegetation of the component or area*. However, as previously noted, none of those descriptions include any discussion of the actual revegetation that might be performed, or as might be expected to be described in an outline of an RCP. Instead, the EIS provides a minimal description of potential revegetation approaches and methods in the discussion of alternatives. An example of an alternative approach to revegetation would be to incorporate geomorphic landform reclamation principles. Ayres et al (2006) proposes the following general approach and guidelines for waste rock landform reclamation that can also be applied to TSF reclamation.
Information Request:	"The following generalized approach is proposed for developing a sustainable final landform design for existing waste rock stockpiles: 1. Determine the final land use for the rehabilitated site through consultation with all stakeholders, and an assessment of potential geologic or structural control elements for the landform; 2. Observe and collect data on a nearby natural landscape (a natural analogue) to determine hillslope forms and gradients, soil and vegetation types, drainage density, and watershed characteristics; 3. Determine the long-term eroded profile for the various slopes of the existing stockpile through erosion and landform evolution numerical modelling; 4. Based on the maximum slope length and gradient as determined from Steps 2 and 3, design a methodology for reshaping the existing stockpile to conform to these requirements (a horseshoe-shaped landform, which creates a small well-defined catchment, can be effective in reducing slope length and gradients without changing the footprint of an existing stockpile) 5. Design a surface water management system to safely convey meteoric water off the final landform, and ensure runoff reaches final discharge points in volumes and at velocities that will not cause unacceptable erosion or sedimentation;

ID:	PC-84
	6. Develop a final landform design following completion of Steps 2 to 5 inclusive, taking into consideration the long-term safe storage of reactive or hazardous materials. 7. Develop a revegetation plan suitable for the swales and ridges in the final landform based on data collected in Step 2; and 8. Review the final landform design with key stakeholders for general acceptance prior to implementation." "The following guidelines are proposed to aid in the development of a sustainable final landform design for waste rock stockpiles. • Design the final landform using natural analogues as described in Keys et al. (1995). The reclaimed landscape can be no more stable than the adjacent undisturbed landscape; therefore, the designer can assume that the reclaimed area will be less stable and design accordingly, with gentler slopes, higher density drainage and smaller drainage basins. • Maintain the final landform height and slope angles for stockpiles in areas of low relief as low as possible. Where slopes compatible with the surrounding landscape cannot be achieved, an attempt should be made to visually soften steeper areas by avoiding straight "engineered" ridges and sharp changes of angle, and by careful planting of trees to break up views of the horizon (Environment Australia, 1998). • The preferred reclaimed slope design is a "spur-end" slope plan with a concave or complex (convex-concave) profile. The use of terraces or contour banks should be avoided. It is very difficult in practice, particularly for stockpiles with long slopes, to construct concave slopes with continual curvature on a waste rock stockpile. However, hillslope curvature can be obtained using a series of linear slopes or slope facets as shown in Fig. 3. Hancock et al. (2003) demonstrated through simulations with a landform evolution model that there is minimal difference in sediment loss between a hillslope constructed of linear facets and that constructed from continual curvature. • Erosion and subsequent evolution of the proposed final landform design(s) should be predicted over a period of at least 100 years using state-of-the-art software packages. • The thickness of earthen covers designed to minimize the entry of atmospheric oxygen and/or meteoric water to reactive or hazardous material should not only be based on soil-atmosphere numeric simulations, but should also take into consideration the predicted long-term erosion from the final landform (e.g., see Ayres et al. (2005)). • The design of surface water drainage courses should be based on the discharge and sediment load of the receiving stream(s). Drainage channels used to convey surface water off the top of the landform should

ID:	**PC-84**
	follow the slope gradient of the final landform as much as possible. The use of imported substrate as well as man-made materials such as pipes, gabions, and concrete should be avoided whenever possible. • Design conservatively to account for excessive erosion resulting from extreme climatic events and differential settlement in the reclaimed landform. • Reclamation of large waste storage facilities should include the construction of small lakes and wetlands upstream of final surface water discharge points, provided they are geomorphically compatible and stable. Such features will attenuate surface runoff to reduce peak flows and increase sedimentation prior to reaching receiving streams (Sawatsky, 2004)."
Response:	See responses to PC-42 and PC-54.
Appendix:	None

RESPONSE TO PC-85

ID:	**PC-85**
Expert Department or Group:	Mining Watch
Guideline Reference:	-
EIS Reference:	6.0 GROUNDWATER RESOURCES, 6.3.5.1 Assumptions and the Conservative Approach
Context and Rationale:	According to the EIS, *This approach provides a conservative estimate of groundwater quality discharging to surface water and does not consider physical or chemical attenuation processes along the groundwater flow path.*
Information Request:	In our experience the actual contribution of physical or chemical attenuation processes in groundwater is highly speculative and typically of minimal consequence. Therefore, the approach used for the EIS is not conservative because it does not consider physical or chemical attenuation processes, but simply scientifically credible. The inclusion of unproven or unmeasurable processes in a model would be unscientific, and not less conservative.
Response:	The approach taken in the EIS simulates the worst-case concentrations expected from the source areas, such as the waste rock piles through groundwater, and is a conservative approach that is appropriate for the study objective. This is not, however, the only scientifically credible approach, as academic researchers continue to develop models that couple geochemical processes along groundwater flowpaths (e.g., the PHT3D model (http://www.pht3d.org/)).
Appendix:	None

RESPONSE TO PC-86

ID:	**PC-86**
Expert Department or Group:	Mining Watch
Guideline Reference:	-
EIS Reference:	6.0 GROUNDWATER RESOURCES, 6.3.5.1 Assumptions and the Conservative Approach
Context and Rationale:	According to the EIS, *Based on geochemical testing it has been demonstrated that loading rates will decline over time. As a result, by not including further decreases in loading rates, long-term water quality predictions and loading to the environment are overestimated and provides a conservative approach for the assessment.*
Information Request:	The ability of geochemical testing to accurately predict long-term water quality or quantity is highly uncertain, as are all water predictions. Geochemical testing is carried out under highly idealized conditions and while it is considered useful, it is not conclusive. See further comments re Section 6.7, Prediction Confidence.
Response:	Kinetic geochemical testing was conducted in accordance with standard methods and applicable guidelines. Therefore, the results of testing are considered conclusive at an acceptable level of uncertainty consistent with industry standards for an environmental assessment. Marathon is committed to reducing the current uncertainty related to the kinetic testing by conducting additional work: • Continuing collection of results from on-going laboratory kinetic tests started in 2020. Longer testing will provide more confidence in the long-term behavior of materials. • Initiating additional laboratory testing of potentially acid generating (PAG) materials (waste rock, ore, and low-grade ore) from major lithologies of the Marathon pit and a composite sample of gabbro. This testing increases the number and type of samples to provide a better understanding in the variability of results. • Continuing field kinetic tests that were started in fall 2020. Field tests represent realistic weather conditions and involve larger sample mass compared to laboratory tests. On-going and future Acid Rock Drainage/Metal Leaching (ARD/ML) testing and operations water quality monitoring will refine the water quality predictions that have been produced to date and will help refine or adapt the associated mitigation measures that will be incorporated into the ARD/ML

ID:	**PC-86**
	Management Plan. Refer to DIET-07 and Appendix B for additional information on the ARD/ML Management Plan.
Appendix:	See Appendix B: ARD/ML Management Approach

RESPONSE TO PC-87

ID:	**PC-87**
Organization or Group:	ASF
Context and Rationale:	As a general principal ASF has concerns with any project that involves the removal of large volumes of water from rivers or lakes that support wild Atlantic salmon. We also have general concerns about any project that involves the discharge of any potential deleterious substances into any rivers or lakes which in anyway pose a threat to wild Atlantic Salmon stocks, or to fish and fish habitat in general. This proposal involves the removal of significant volumes of water annually (i.e., hundreds of thousands of gallons) from adjacent lakes that feed several major salmon rivers downstream, such as the Exploits River to the North and White Bear River and Grey River to the South. The withdrawal of such large volumes of water over the thirteen-year life span of this mine would be monumental. Furthermore, the proponent indicates in the EIS that additional exploratory drilling conducted in 2020, showed additional positive results that are on par with previous exploration drilling.
Information Request:	We submit there is a strong likelihood that the life span of this mine will be extended well pass the initial time frame that was proposed, meaning even greater quantities of water will likely be withdrawn than originally planned. We submit that cumulatively, the removal of such large volumes of water during the life span of this mine, will likely have a significant impact on fish and fish habitat in these watersheds. Similarly, ASF submits that the risks associated with the discharge of such huge volumes of water annually from the mine into the adjacent watersheds (even after water treatments that the company plans to undertake) still represents a significant risk to fish and fish habitat since this wastewater is by no means pure. In addition, there are also risks associated with the malfunction of the water treatment systems as well as human error, to consider. Again, ASF submits that cumulatively, the discharge of such deleterious substances in the wastewater over the life span of this mine, and the potential for malfunctions of water treatment equipment, together pose a significant risk to fish and fish habitat in adjacent lakes and to the rivers downstream.
Response:	The EIS addresses the effects of the Project as currently planned. Any changes outside of the existing EIS associated with the proposed Valentine Gold Project (e.g., mine extension) will be assessed under the regulatory framework in place at that time. The Framework for Assessing Ecological Flow Requirements to Support Fisheries in Canada (DFO 2013) which was included in the EIS, provides guidance on the management of flows required to maintain the ecological functions that sustain fisheries in streams and rivers potentially affected by water withdrawals and includes

ID:	**PC-87**
	cumulative water withdrawals. Effects to fish and fish habitat were assessed in Chapter 8 (from routine Project activities) and Chapter 21 (from accidental events) of the EIS. The assessment included effects to fish habitat quantity, fish habitat quality, and fish health and survival from Project activities such as dewatering, habitat loss and discharges into the aquatic environment for the life of the Project. With mitigation and environmental protection measures in place, and following offsetting measures for habitat loss, the residual adverse environmental effects on fish and fish habitat are predicted to be not significant. During all phases of the Project, discharges are anticipated to meet regulatory requirements and/or site-specific guidelines. Follow-up and monitoring are intended to verify the accuracy of predictions made during the Environmental Assessment, to assess the implementation and effectiveness of mitigation and the nature of the residual effects, and to manage adaptively, if required. Compliance monitoring will be conducted to confirm that mitigation measures are properly implemented. As required under the *Metal and Diamond Mining Effluent Regulations*, Marathon will be monitoring potential changes in fish populations, fish tissue, and benthic invertebrate communities, in accordance with methods outlined in the Metal Mining Technical Guidance Document for Environmental Effects Monitoring (Environment Canada 2012). Should an unanticipated adverse effect or greater magnitude of effect than expected be observed as part of follow-up and/or monitoring, Fisheries and Oceans Canada (DFO) will be promptly notified and consulted to determine appropriate intervention mechanisms, which will be implemented efficiently. This may include an investigation of the cause of the effect and determination of augmented existing and/or new mitigation measures to be implemented to address the identified deficiencies. References: DFO (Fisheries and Oceans Canada). 2013. Framework for Assessing Ecological Flow Requirements to Support Fisheries in Canada. Available online at: https://www.conservationgateway.org/ConservationPractices/Freshwater/ EnvironmentalFlows/MethodsandTools/ELOHA/Documents/Fisheries-and-Oceans-Canada-SAR-2013.pdf. Accessed July 2020. 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.
Appendix:	None

RESPONSE TO PC-88

ID:	**PC-88**
Organization or Group:	ASF
Context and Rationale:	As we referenced in our submission in response to the original proposal, this mine represents a major undertaking that brings with it the potential for significant environmental damage both during the life of the mine, and long after the mining operations have ceased. To begin with, this mine is proposed at the height of land in a highly sensitive area bordering three large lakes that drain to major watersheds to the north (i.e., the Exploits River), and to major watersheds to the south (i.e., White Bear River and Grey River). Also, during the last four decades, local stakeholders and both the federal and provincial governments, have invested tens of millions of dollars on the Exploits River to establish one of the largest runs of wild Atlantic salmon on the Island of Newfoundland. This salmon run supports a well-established salmon fishing industry that brings millions of dollars annually into local towns adjacent to the river. Unfortunately, the salmon population on the Exploits River has declined significantly in recent years. Likewise, wild salmon stocks on all South coast rivers (including White Bear River and Grey River) have been designated as 'Threatened' by COSEWIC. In fact, much work is currently on-going to determine the cause of these declines.
Information Request:	ASF believes that the Marathon Gold Project has the potential to have a significant impact on fish and fish habitat. In fact, the proponent acknowledges that 186,705 square meters of pristine fish habitat will be loss in the immediate area of the mine site. What we do not know is what the downstream impacts from the mine will be on the Exploits River and both the Grey River and White Bear River. As such, we were disappointed that the provincial and federal governments did not require the proponent to assess these potential downstream impacts as part of their Environmental Impact Assessment, especially considering wild Atlantic Salmon was identified by them as a Valued Ecosystem Component (VEC) in the TOR for the EIS. ASF submits that one cannot adequately identify and or quantify the potential downstream impacts associated with this undertaking unless they are properly studied and assessed. Nor can appropriate mitigation measurers be developed and implemented without such information. Considering the magnitude and duration of this project, and the potential for significant risks to fish and fish habitat downstream in these watersheds, it is a major oversight that these potential downstream impacts were not assessed, and no mitigation plans developed accordingly. We do acknowledge that the proponent indicated to us during a recent meeting that they expect no downstream effects from water removals, discharges, or accidents. While this may very well be true, we would have felt more comfortable with the project if

ID:	**PC-88**
	potential downstream affects had been formally assessed and any conclusions about the risks to salmon downstream had been supported by an assessment.
Response:	The potential for the Project to have downstream effects on water quality and subsequently fish and fish habitat resulting from routine activities was assessed quantitatively through an assimilative capacity assessment (Appendix 7C of the EIS). An assimilative capacity assessment is an investigation of the change in water quality in a receiving waterbody due to an effluent discharge. In the case of the Project, discharge from a final discharge point (FDP) or multiple FDPs will travel downstream in its local receiving tributary to the edge of the mixing zone in the ultimate receiving large lake or river (i.e., Victoria Lake Reservoir, Valentine Lake or Victoria River) in less than one day. Therefore, the assimilative capacity model only uses water quality assimilation factors effective under short-term conditions, such as dilution and sedimentation, and chemical, optical, thermal and biological reactions that would further improve receiving water quality over longer time periods or seasonally are not considered. The assimilative capacity assessment considered two discharge cases: the first a normal or typical case presenting realistic conditions and the second a regulatory case. In the regulatory case, the assimilative capacity model inputs are built to create a worst-case scenario. For instance, very low flow receiving water and poor receiving water quality conditions are assumed, while the effluent being discharged is modeled at its maximum discharge rate and maximum water quality limits. The regulatory case is particularly conservative or overestimates potential effects in the case of the Project, as water discharges from the mine will be reflective of actual climate conditions. When the mine is experiencing dry climate and low runoff and flow conditions (i.e., late summer or mid-winter), discharge from sedimentation ponds will also reduce or cease. With decreased rate of flow through the sedimentation ponds, water within the ponds has greater residence time, ultimately decreasing sedimentation in the outflow and improving water quality. For these reasons and those mentioned above regarding how the assimilative capacity model considers water quality improvement factors, the regulatory case is highly conservative. The assimilative capacity assessment modeled to the point downstream from the FDPs where receiving water quality will recover to Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life (CWQG-FAL) or baseline water quality (as several parameters are above CWQG-FAL in receiving waters as a baseline condition). This point downstream is referred to as the edge or boundary of the mixing zone and represents the point at which water quality either cannot improve (i.e., it reaches baseline conditions)

ID:	**PC-88**
	or meets regulatory guidelines protective of all freshwater aquatic life (i.e., the CWQG-FAL). For the Project discharges, the edge of the mixing zone under the worst-case regulatory scenario (and considering multiple FDPs discharging into an ultimate receiver) was reached 100 m into the ultimate receiver (i.e., into Victoria Lake Reservoir, Valentine Lake and the Victoria River) for all but two FDPs (LP-FDP-03 and LP-FDP-05), where specific parameters of potential concern (arsenic, copper, lead, zinc and fluoride) required a mixing zone of up to 300 m. Taken cumulatively and considering the conservatism inherent in the worst-case regulatory scenario, the extension of the effluent mixing zone 100 to 300 m into the ultimate receivers represents the long-term, cumulative boundary of water quality effects. Considering the worst-case discharge condition, the water quality effect would be virtually indetectable from baseline conditions downstream in Red Indian Lake or at the outlet of Victoria Lake Reservoir. As a result, no adverse, long-term Project effects or cumulative effects are predicted further downstream in Red Indian Lake discharging to the Exploits River or discharging from Victoria Lake Reservoir through the Bay d'Espoir hydroelectric diversion watershed. Therefore, no measurable effects or cumulative effects on downstream fish and fish habitat, including sensitive Atlantic salmon populations in the Exploits River, are anticipated as a result of operational Project discharges. With respect to the loss of fish habitat within the mine site as a result of the Project, Marathon is required under the *Fisheries Act* to compensate for the harmful alteration, disruption or destruction (HADD) of fish habitat associated with the Project. As part of the *Fisheries Act* Authorization application, a Fish Habitat Offsetting Plan is required and an irrevocable Letter of Credit of sufficient funds to fully cover the cost of implementing the offsetting plan (including development of the offsetting project(s) and associated monitoring). Monitoring of the offset project(s) will be conducted to verify that the offsetting objectives have been achieved. The Fish Habitat Offsetting Plan will be developed in consultation with Fisheries and Oceans Canada (DFO) and submitted to DFO as part of the *Fisheries Act* Authorization process. The offsetting project(s) will be implemented to counterbalance the loss of fish habitat in the Local Assessment Area, such that no significant residual effects to fish habitat are anticipated. The fish habitat offset program, including the offset project(s) and monitoring plan, requires DFO approval. The assessment of accidental events on surface water and fish and fish habitat (Chapter 21 of the EIS) was conducted within a Regional Assessment Area which included Valentine Lake, a portion of Victoria Lake Reservoir, Victoria River and Red Indian Lake, including its discharge at the head of the Exploits River. This area encompasses the potential downstream receivers of

ID:	**PC-88**
	surface water that may flow from the Project Area and that therefore could be affected by an accidental event. Follow-up and monitoring will be conducted to verify the accuracy of predictions made during the Environmental Assessment, to assess the implementation and effectiveness of mitigation and the nature of the residual effects, and to manage adaptively, if required. Compliance monitoring will be conducted to confirm that mitigation measures are properly implemented. Should an unanticipated adverse effect or greater magnitude of effect than expected be observed as part of follow-up and/or monitoring, DFO will be promptly notified and consulted to determine appropriate intervention mechanisms, which will be implemented efficiently. This may include an investigation of the cause of the effect and determination of augmented existing and/or new mitigation measures to be implemented to address the identified deficiencies. In addition, Marathon will be monitoring potential changes in fish populations, fish tissue, and benthic invertebrate communities, as required by *Metal and Diamond Mining Effluent Regulations*. This data will be collected in accordance with methods outlined in the Metal Mining Technical Guidance Document for Environmental Effects Monitoring (Environment Canada 2012). Reference: 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.
Appendix:	None

RESPONSE TO PC-89

ID:	PC-89
Organization or Group:	ASF
Context and Rationale:	As acknowledged in their EIS, this project is proposed for a remote wilderness area that supports many different species of wildlife. In their original proposal the proponent concluded that there was not a major presence of caribou in the area where their mine was proposed and that there was no significant risk to caribou. However, we understand that the Provincial Department of Fisheries and Land Resources, which is responsible for wildlife management (including caribou), upon reviewing the original proposal informed the Department of Environment that this project should not be allowed to proceed because there was a large presence of caribou in the area and that the mine would have a significant impact on them. We also note in the EIS that, further research conducted by the proponent and in partnership with the Wildlife Division, found that there was a major presence of caribou in the area of the proposed mine site, and that the area was being used by at least five separate caribou herds. In fact, several major caribou migration paths are located directly through the proposed mine site.
Information Request:	The proponent has since initiated and held a number of meetings with the wildlife division in hopes of developing a mitigation plan to protect these caribou, that would be satisfactory to the wildlife division. However, there is no indication that such a mutually agreeable mitigation plan was developed to protect these caribou from the impacts of the mine. We do know that the proponent did submit a mitigation plan in their EIS, but the question that remains is, will it be effective?
Response:	Please see Marathon's response to PC-12 for a discussion of mitigation and effectiveness monitoring proposed to address Project effects on caribou.
Appendix:	None

RESPONSE TO PC-90

ID:	**PC-90**
Organization or Group:	ASF
Context and Rationale:	-
Information Request:	While ASF is not an authority when it comes to caribou populations, or caribou management, we do participate regularly in public information sessions and updates presented by the Wildlife Division annually regarding caribou populations on the Island of Newfoundland, and in Labrador. Therefore, we know that most caribou populations throughout NL have been declining in recent years and are currently at very low levels. We also know that there is little scientific information to suggest that these populations are recovering. Rather, at best, evidence suggests that a couple populations may have stabilized or seen a very slight increase in numbers. We also know from the scientific literature that caribou populations are very sensitive to changes to their natural environment, particularly from mining, often with negative consequences. Having looked at the mitigation plan presented by the proponent in their EIS we are not yet confident that this plan will be effective at preventing significant impacts to these caribou herds.
Response:	Please see Marathon's response to PC-12 for a discussion of mitigation and effectiveness monitoring proposed to address Project effects on caribou.
Appendix:	None

RESPONSE TO PC-91

ID:	**PC-91**
Organization or Group:	Salmonid Association
Context and Rationale:	-
Information Request:	The amount of HADD (habitat alteration, disruption or destruction) has not yet been quantified. The amount of HADD for the project site and the road should be established as part of this EIS, otherwise the full extent of the environmental impact(s), including sustainability and productivity of fisheries and fish habitat cannot be established or assessed.
Response:	As described in Section 8.5.1 of the EIS, the Project has been designed to avoid loss of fish habitat through careful planning of the placement of infrastructure and shifting locations of activities away from waterbodies. Where avoidance was not practicable, mitigation will be employed to reduce the potential for effects. Based on the existing Project design, which includes the site and access road, the Project is conservatively anticipated to result in, at most, the direct and indirect loss of 186,705 m^2 of fish habitat within the Local Assessment Area (LAA) over the life of the Project (Table 8.15 in the EIS). Marathon is required under the *Fisheries Act* to compensate for the harmful alteration, disruption or destruction (HADD) of fish habitat associated with the Project. As part of the *Fisheries Act* Authorization application, a Fish Habitat Offsetting Plan is required and an irrevocable Letter of Credit of sufficient funds to fully cover the cost of implementing the offsetting plan (including development of the offsetting project(s) and associated monitoring). Monitoring of the offset project(s) will be conducted to verify that the offsetting objectives have been achieved. The Fish Habitat Offsetting Plan will be developed in consultation with Fisheries and Oceans Canada (DFO) and submitted to DFO as part of the *Fisheries Act* Authorization process. The offsetting project(s) will be implemented to counterbalance the loss of fish habitat in the LAA, such that no significant residual effects to fish habitat are anticipated. The fish habitat offset program, including the offset project(s) and monitoring plan, requires DFO approval.
Appendix:	None

RESPONSE TO PC-92

ID:	**PC-92**
Organization or Group:	Salmonid Association
Context and Rationale:	-
Information Request:	The proponent should clearly state where any water, chemicals or site runoff from all areas of the site will discharge into in the event of any spill, accident or upset event and what remedial procedures will be employed in that event.
Response:	The accidental event scenarios that have the potential to result in water, chemical or site runoff include a tailings management facility malfunction (Section 21.5.1 of the EIS), fuel and hazardous material spill (Section 21.5.3 of the EIS), and an unplanned release of contact water (Section 21.5.4 of the EIS). Any of these scenarios has the potential to release runoff into nearby waterbodies (e.g., Valentine Lake, Victoria Lake Reservoir, Victoria River) within the mine site or outside of the mine site, if not responded to in a timely manner. The following summarizes the pathways of potential discharge and remedial procedures to be employed should a given scenario occur. A *Metal and Diamond Mining Effluent Regulations* (MDMER) tailings / effluent Emergency Response Plan (ERP) will be developed in concert with other environmental response and management plans (e.g., hydrocarbon or hazardous materials spill response) to address the potential for an accidental / unplanned release of effluent from the Project. The MDMER ERP will contain the following information: • Detailed risk assessment of potential effluent releases, including the potential mechanisms and pathways of release, from the Project. • Roles and responsibilities of all individuals with respect to the Plan: employees and contractors, the individual who discovers / observes the release, the Incident Commander, Health and Safety and Environmental personnel, and senior management. This will include training requirements. • Notification and reporting procedures, including communications procedures and emergency contacts, and subsequent notification procedures and protocols for reporting to regulators and other stakeholders. • Release control and initial cleanup procedures, as well as direction to commence evaluation of medium- to long-term assessment and cleanup processes, if required. • Emergency response resources: on-site personnel, equipment, infrastructure and external/off-site resources.

ID:	**PC-92**
	• MDMER document control including distribution, revision logs, and information on plan review and procedure audits. The MDMER ERP will be made available for review by regulators and will be reviewed and updated on a regular schedule, which will be outlined in the document control section of the Plan. <u>Tailings Management Facility (TMF) Malfunction</u> A TMF malfunction resulting in a dam breach could occur in the unlikely event of an earthquake, landslide, overtopping, internal erosion or piping, foundation failure, and slope failures (Golder 2020; BSA.1. Attachment 1-A). As discussed in Section 21.5.1.4 and BSA.1, the majority of the tailings released from the TMF would occur in the event of a breach of the TMF East and South Dams, which would be deposited on the downstream slope and in the Victoria River along the flood wave path, with some tailings settled in the river's floodplain. Some tailings would be introduced into Red Indian Lake in suspension, with higher concentrations during the probable maximum flood event. Please refer to ECC-23 for details on the updated Dam Breach Assessment (DBA) for the latest TMF design. In the event of a TMF dam failure, initial response would include shutting down pumping of tailings to the TMF, notifying authorities, emergency responders and others who are to be notified under the Public (Stakeholder) Safety Plan, and notification to Engineer of Record (EOR). The MDMER ERP will consider an unplanned release of effluent and tailings from the TMF and associated infrastructure (e.g., pipelines, water treatment plant). Marathon, with aid from external experts and the EOR, will subsequently develop a specific remedial action and monitoring plan for the event, and initiate remedial actions, such as deploying earthworks equipment to reduce further damage to the dam and stabilizing escaped tailings to the extent feasible, establishing additional containment as needed around the inundation area, and deploying turbidity curtains and/or other similar mitigation within affected watercourses. In the event of a dam breach, it is anticipated that a risk assessment and investigation will be completed to map the extent and thickness of the tailings runout, and a remediation plan would be developed. This strategy was successfully executed following the Mount Polley dam failure in British Columbia (Golder 2019). It is anticipated that an accidental release of tailings would cause an outwash fan or delta of tailings and dam construction material between the dam and the Victoria River as discussed in BSA 1, Attachment 1-A, but is not predicted to reach the Victoria River. Based on the dam breach analysis as presented in the EIS, tailings suspended in the release of ponded water would reach the Victoria River

ID:	PC-92
	and be deposited in the river and lakebed of Red Indian Lake. It is anticipated that the suspended tailings would fall out (settle) primarily in the initial downstream area of the Victoria River valley (within approximately 2 km), with some finer silt / clay sized tailings particles remaining in suspension eventually reaching Red Indian Lake and being deposited on the lakebed. Excavators would be effective at recovering sand / silt tailings deposited in terrestrial habitats that are sufficiently thick to be recovered by excavator. These deposits would be removed and transported by truck back to a stable area of the TMF for storage. Remediation activities would likely also include bank stabilization and revegetation of riparian areas in Victoria River and other affected headwater streams draining into the Victoria River. Tailings that are thin and impractical to recover would remain in place, scarified and mixed with the native substrate to improve soil fertility. Areas may require additional imported soil and fertilizer to facilitate rehabilitation. Once soil conditions are amenable to seed germination and growth, vegetation will establish through natural ecological succession supported by planting efforts. Within the riverbed, the focus would be on remediating and rehabilitating the habitat within the river channel and stabilizing tailings in place. A two-phase approach would likely be adopted with the first phase focusing on repairing / constructing an erosion-resistant, physically stable channel, followed by a second phase focusing on re-establishing physical in-stream and riparian habitat along the channel to support a return of biological habitat function. A successful example of this approach was employed for the rehabilitation of Hazeltine Creek in BC following the Mount Polley tailings dam failure (Bronso et al. 2016). Tailings that do not pose a physical risk would be left in place and regraded/contoured and remediated as noted above. New channel morphology and habitat would be designed and constructed within the riverbed for each affected reach. Erosion protection would be installed within the channel reaches first, followed by habitat construction (Golder 2019; Bronso et al. 2016). It is likely that a monitored natural recovery approach would be adopted for tailings that reached Red Indian Lake and were deposit on the lakebed, given the disruption that would occur through clean-up options (such as dredging). Monitoring would be required to support the successful implementation of remediation and to verify that remedial objectives had been met. Remediation would be adapted to the data obtained from the post-breach monitoring program.

ID:	PC-92
	Fuel and Hazardous Material Spill As described in Section 21.5.3 of the EIS, a spill of fuel and/or hazardous material could occur as a result of factors such as equipment or vehicle malfunction, human error, or severe weather conditions. A spill could result from equipment leakage / failure, storage tank leak or rupture, or from vehicles on-site and along the access road. As described in Section 21.3 of the EIS, emergency and response plans, including a spill response plan will be developed and implemented by Marathon, and will include measures for emergency response, training, responsibilities, clean-up, and contact and reporting procedures in the event of a spill. Appropriate Project personnel will be trained in fuel handling, equipment maintenance, fire prevention and spill response measures. In the event of a fuel or hazardous material spill, the worst-case scenario as identified in the EIS is a spill of hydrocarbons (i.e., diesel fuel), cyanide, or ammonium nitrate at the bridge crossing of the Victoria River. The bridge crossing of the Victoria River was selected as the worst-case scenario location based on concerns identified through engagement activities regarding potential effects on the Exploits River. Please refer to PC-81 for additional information on the modelling conducted for this spill scenario. In the event of a large spill resulting from a vehicle collision along the access road, Marathon will liaise with local emergency providers so that roles and responsibilities are understood, and that the necessary resources required to respond are in place. Unplanned Release of Contact Water An unplanned release of contact water could result from the malfunction of catchment sumps, ditches and channels, and sedimentation ponds, including embankment / dam failure. Please refer to ECCC-10 for additional information on a potential release of contact water from a sedimentation pond. The water quality monitoring program (Water Management Plan, Appendix 2A) to be implemented during normal operating conditions would detect exceedances of water quality guidelines in the event of an unplanned release of contact water (e.g., through seepage). If exceedances are detected, either through visual observations or results from water quality monitoring, remedial steps will be taken to reduce and eliminate the release through repairs to the drainage ditches and water management systems. As discussed, a release of untreated water would be addressed through requirements under MDMER which identify the need for a tailings / effluent emergency response plan.

ID:	**PC-92**
	References: Bronsro, A., J. Ogilvie, L. Nikl, and M.A. Adams. 2016. River Rehabilitation Following a Tailings Dam Embankment Breach and Debris Flow. Golder Associates Ltd. (Golder). 2019. Remediation Plan for the Mount Polley Mine Perimeter Embankment breach. Golder Associates Ltd. (Golder). 2020. Marathon Gold: Prefeasibility Study for Tailings Disposal at the Valentine Gold Project, Newfoundland. Report prepared for Marathon Gold Corporation, Mississauga, Ontario. March 2020.
Appendix:	None

RESPONSE TO PC-93

ID:	**PC-93**
Organization or Group:	Salmonid Association
Context and Rationale:	-
Information Request:	Follow up monitoring programs to be conducted should include studies on effects of all site discharges on salmonid species.
Response:	To satisfy environmental effects monitoring (EEM) requirements under the *Metal and Diamond Mining Effluent Regulations* (MDMER), Marathon will be required to complete a fish population survey every three years. These surveys will follow the methods prescribed in the Metal Mining Technical Guidance Document for EEM (Environment Canada 2012). The EEM program will be developed with input from Environment and Climate Change Canada's Technical Advisory Panel, which includes representatives from the provincial government. MDMER requires statistical analysis of data to determine differences in growth, reproduction, condition, survival and fish tissue levels between exposure and reference areas. As part of the EEM biological monitoring, length, weight, sex and aging structures will be collected. Additional baseline studies will be undertaken in 2021 to support future EEM under MDMER. It is anticipated that the selection of sentinel species will include salmonids (e.g., brook trout or ouananiche) as they are abundant and present downstream of the final discharge locations. References: 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.
Appendix:	None

RESPONSE TO PC-94

ID:	**PC-94**
Organization or Group:	Salmonid Association
Context and Rationale:	-
Information Request:	Sampling of effluents from all identified discharge points to fish bearing waters should be conducted by dedicated personnel and all samples analyzed by accredited laboratories.
Response:	As required by the *Metals and Diamond Mining Effluent Regulations* (MDMER), monitoring will be conducted at each final discharge point over the life of the Project. Samples will be collected by dedicated environmental technicians using standardized protocols and techniques appropriate for the sampling required. Samples will be analyzed by accredited laboratories for the substances required and will meet the analytical requirements for metal or diamond mining effluent set out in the MDMER. Monitoring results will be reported to regulators and shared with Indigenous groups and stakeholders.
Appendix:	None

RESPONSE TO PC-95

ID:	**PC-95**
Expert Department or Group:	Salmonid Association
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	SAEN is encouraged that the proponent commits to consulting with salmonid conservation groups on fish habitat offsetting proposals and would desire to be included in such consultations.
Response:	Marathon is committed to the sustainable and socially acceptable development of the Valentine Gold Project, based upon its core values of Respect, Accountability, Transparency, Inclusion and Prosperity. As part of its commitment to highest standards of performance excellence Marathon is striving to avoid and reduce adverse effects on the environment and to maximize benefits for the people and communities potentially affected by the Project. Marathon has been actively engaging with representatives of salmonid associations to discuss the Project and potential effects of the Project on fish and fish habitat and associated mitigations, including potential fish habitat offsetting projects. Marathon is committed to continued engagement with salmonid groups including SAEN, Indigenous groups and other relevant stakeholders, regarding fish habitat offsetting to counterbalance Project-related direct and indirect loss of fish habitat.
Appendix:	None

RESPONSE TO PC-96

ID:	**PC-96**
Expert Department or Group:	Salmonid Association
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	SAEN would desire an opportunity to review and comment on pollution prevention plans and accident prevention plans that are required as part of a permitting process given those plans will address the details that are most pertinent to the protection of salmonid species.
Response:	As described in PC-95, Marathon has been actively engaging with representatives of salmonid associations and is committed to continued engagement, and groups are invited to contact Marathon at any time to discuss any aspect of the Project. The Environmental Management Plans that are most pertinent to the protection of salmonid species relate to operations plans regarding potential spills of hydrocarbons and hazardous materials, water management and sediment control, and plans related to the management of the tailings management facility (TMF). Similarly, there are emergency response plans that address these issues, were they to occur. The overall plan that encompasses the non-TMF items is the Project's Environmental Protection Plan for operations. The primary plans related to the TMF are the Operations, Maintenance, and Surveillance Manual, and the *Metals and Diamond Mining Effluent Regulations* Emergency Response Plan. Marathon will work with the Salmonid associations to provide opportunities to review and provide comments on the plans that are pertinent to the protection of salmonid species.
Appendix:	None

RESPONSE TO PC-97

ID:	**PC-97**
Expert Department or Group:	Salmonid Association
Guideline Reference:	-
EIS Reference:	-
Context and Rationale:	-
Information Request:	Given the legacy of abandoned mines in NL and their on-going impact on water resources and salmonid species that inhabit those waters, it is strongly recommended that a Financial Bond is put in place which will cover the critical aspects of mine decommissioning and long-term care of the site tailings management facility.
Response:	Under the Newfoundland and Labrador (NL) *Mining Act*, administered by the NL Department of Industry, Energy, and Technology, Mines Branch, 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.
Appendix:	None

RESPONSE TO PC-98

ID:	**PC-98**
Expert Department or Group:	Resident
Guideline Reference:	-
EIS Reference:	
Context and Rationale:	
Information Request:	Thank you for the opportunity to provide comments on the Valentine Lake project. I am a resident of a neighbouring community to the proposed mine. I have read the entire EIS submitted by Marathon Gold. I believe they have done the due diligence and study to ensure that the project will have minimal impact. I am in favour of this project and look forward to reading the results of the EIS submission.
Response:	Thank you for your comments and for taking the time to read the EIS. Marathon's five guiding values are respect, accountability, transparency, inclusion, and prosperity. Marathon is deeply committed to manifesting these values, and have dedicated the resources necessary to develop the systems, plans and processes to see to it that these values are put into action and remain central throughout the Project. Marathon is committed to continuing meaningful engagement with potentially affected communities, civil society organizations, Indigenous groups, and other interested parties as the Project progresses. Engagement will be guided by a formal Stakeholder Engagement Strategy and a Community Grievance Procedure, both of which are being developed in compliance with Equator Principles 4 and which, when finalized, will be integrated into the Environmental and Social Management System.
Appendix:	None

RESPONSE TO PC-99

ID:	**PC-99**
Expert Department or Group:	Resident
Guideline Reference:	-
EIS Reference:	
Context and Rationale:	
Information Request:	Please do not allow a short-term economic boost to endanger woodland caribou. There will be other mines and sometimes a gold deposit is just in the wrong place. This may be one of those times. Listen to the people who we pay to observe, protect and understand our caribou. Future generations will mourn the loss and curse our shortsightedness if we do not protect the natural world.
Response:	Marathon is committed to the sustainable and socially acceptable development of the Valentine Gold Project, based upon its core values of Respect, Accountability, Transparency, Inclusion and Prosperity. As part of its commitment to highest standards of performance excellence, Marathon is striving to undertake the Project in a way that avoids and reduces adverse effects on the environment and maximizes benefits for the people and communities potentially affected by the Project. Marathon has actively engaged with a wide range of stakeholders, including communities, Indigenous groups, outfitters, salmonid associations and civil society organizations, and is aware of the importance of the natural environment, including caribou, to stakeholders and Indigenous peoples. Marathon has listened to concerns respecting the potential adverse effects of the Project on caribou and has adjusted Project concept, layout and design to reduce potential adverse effects to caribou and their habitat. A series of environmental management plans are being developed by Marathon, including a Caribou Monitoring Plan and Wildlife Management Plan, directed at mitigating adverse effects to caribou as described in Section 6.2 of the Caribou Supplemental Information report (Appendix G). Additional mitigation measures relevant to caribou and caribou habitat may be found in: Chapter 5 – Atmospheric Environment; Chapter 7 – Surface Water Resources; Chapter 9 – Vegetation, Wetlands, Terrain and Soil; Chapter 10 – Avifauna; and Chapter 12 – Other Wildlife. Marathon is committed to working with regulators, Indigenous groups, fish and wildlife organizations, and stakeholders to employ robust monitoring programs and adaptive mitigations respecting caribou migration patterns and populations. Marathon is currently engaging with the Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture-Wildlife

ID:	PC-99
	Division with respect to ongoing baseline monitoring programs, and it is these monitoring programs will continue and adapt as required over the life of the Project (including closure and post-closure monitoring).
Appendix:	See Appendix G: Caribou Supplemental Information Report