Comments Provided By: Canadian Environmental Assessment Agency

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Comment Number	Report Section	Agency Comment and GGM Response	Agency Follow-up Comment and GGM Response
Annex 1 – IRs from the Agency and other government reviewers			
CEAA_1 IR Number: EA(1)-01	Chapter 5; Appendix I, Section 6.0; Appendix N.	***Context and Rationale:*** • *Part 2, Section 3.2 of the EIS Guidelines indicates that, for project activities, "the EIS will include a schedule including time of year, frequency, and duration for all project activities." Some scheduling information is included in various locations in the EIS, but the sequencing of project activities within phases is unclear, particularly in Chapter 5 of the EIS.* • *Appendix I, Section 6.0, Figure 6-1 provides "a final closure schedule" that shows when certain project components will be active, in rehabilitation and in post-closure monitoring. Project activities occurring in decommissioning and abandonment phases should be separated, and clearly indicated.* • *The visual simulation video attached to Appendix N is a useful tool to communicate the evolution of construction, operations and closure work in the project. The information contained in this video should be translated into written form, either as one or several figures similar to Appendix I, Figure 6-1 or as one or several tables. These figures or tables would provide a consolidated schedule of all project activities, from the beginning of the construction phase through abandonment, with a clear indication of timing, duration and sequencing with as much precision as available. This consolidated schedule should also indicate when key mitigation measures will be active, if they are not active throughout the time that the project activity is occurring.* • *A consolidated schedule will provide reviewers with clarity about the timing and locations of emissions that are anticipated during the project.* ***Specific Question/ Request for Information:*** *A. Provide a consolidated schedule of all project activities, from the beginning of the construction phase through abandonment, with a clear indication of timing, duration and sequencing with as much precision as available.*	***N/A***
		Response: The information is clearly presented in Chapter 5 for the purpose of an EA and represents as much precision as available during the EA phase. The schedule presented throughout Chapter 5 is consistent with the schedule provided in Figure 6-1 of Appendix I. Figure 6-1 has been updated with as much information and accuracy as possible (attached "Project Schedule"). The overall Project development schedule is presented in Chapter 5, Figure 5-1 with a description of each phase provided in Sections 5.2.1 through 5.2.3. The text descriptions provided throughout Chapter 5 align with the Project Schedule presented above. Detailed information, (presented by Project phase), on the summary of the tonnages of overburden, waste rock and ore are provided in Table 5-1. Specifications for WRSAs and in-pit disposal are presented in Table 5-2 and the locations of the WRSAs are shown in Figures 5-2 and 5-5. We also note that significant effort was made in producing the Projects visual simulation that clearly shows the Project's development sequence that is described throughout Chapter 5. This provides the information required to address Part 2 Section 3.2 of the EIS Guidelines. As stated in Chapter 5 of the Final EIS/EA, Closure includes the following phases: • Active Closure: Years 16 to 20, corresponding to the period when primary decommissioning and rehabilitation activities are carried out. • Post-Closure: Years 21 to 36, corresponding to a semi-passive period when the Project is monitored and the open pit is allowed to fill with water creating a pit lake. With regard to the timing and locations of emissions that are anticipated during the Project, the EA has taken a conservative "worst-case scenario" approach to assessing effects during each Project phase. The same approach has been applied to the groundwater and surface water quality assessments where for example	***N/A***

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		seepage from the WRSAs is conservatively assumed to commence unmitigated at the start of the storage despite there being a significant wetting up period prior to any seepage occurring. The effluent treatment plant is also assumed to run at full capacity without consideration for a ramp up period. This approach is taken because it is not possible at the conceptual EIS stage to provide a detailed schedule 'of all project activities'. Such a detailed request requires detailed engineering and construction execution planning and is beyond the scope of the EIS. In the absence of the details conservative assumptions have been incorporated throughout the EIS.	
CEAA_2 IR Number: EA(1)-02	Chapter 24.	***Context and Rationale:*** • *Section 6.4 of the EIS Guidelines state that "each [mitigation] measure should be specific, achievable, measurable and verifiable, and described in a manner that avoids ambiguity in intent, interpretation, and implementation."* • *Also, Part 2, Section 7 of the EIS Guidelines state that "in a second table, the EIS will summarize all key mitigation measures and commitments made by the proponent which will more specifically mitigate any significant adverse effects of the project on valued components (i.e., those measures that are essential to ensure that the project will not result in significant adverse environmental effects)."* • *When making her EA decision, the Minister of the Environment and Climate Change (the Minister) must decide if, taking into account the implementation of any mitigation measures that she considers appropriate, the project is likely to cause significant adverse environmental effects. In advising the Minister, the Agency provides a significance analysis on each valued component based on the EIS. As such, the EIS must clearly identify mitigation measures necessary to support the proponent's conclusions for each valued component. In the EIS Guidelines, these mitigation measures are referred to as "key mitigation measures."* • *If the project is allowed to proceed, the Minister's decision will also include legally-enforceable conditions, crafted using any key mitigation measures identified in the Agency's advice to the Minister or that the Minister deems appropriate. GGM would be required to comply to these conditions throughout the life of the Project, should the Project be allowed to proceed.* • *The EIS Table of Concordance (Appendix B1, row 185) refers to Section 24.1 for the summary described in the paragraph above. No indication of key mitigation measures could be found in Section 24.1. However, Section 24.2, Table 24-2 identifies "key commitments", several of which are neither mitigation measures, monitoring nor follow-up programs. It is unclear whether the mitigation measures named in Table 24-2 were selected because they were determined to be necessary to ensure that the project will not result in significant adverse environmental effects.* • *The list of key mitigation measures is expected to be a subset of all mitigation measures described in the EIS. For example, the Agency anticipates that some or all of the mitigation measures identified to reduce changes to air quality are essential to ensure that there will not be significant adverse environmental effects to human health.* ***Specific Question/ Request for Information:*** *A. Review and revise mitigation measures linked to effects described in section 5 of CEAA, 2012 to remove ambiguity and ensure that proposed mitigation measures are specific (including timing, location, circumstances, and measureable outcome or threshold).* *B. Provide a list of all key mitigation measures and commitments which will more specifically mitigate any significant adverse effects of the project on valued components related to section 5 of the Canadian Environmental Assessment Act. 2012 (CEAA, 2012) (i.e., those measures that are essential to ensure that the project will not result in significant adverse environmental effects). The rationale for determining whether a mitigation measure is key should be found in the section of the EIS related to the mitigation measure. The Agency recommends that this summary be included in a new table.*	***N/A***
		Response: The mitigation tables provided in the effects assessment chapters (7-19) provide a clear description of each mitigation measure and what project component they apply to. The tables also identify which phase of the Project (construction, operation, closure) to which each mitigation measure applies. Mitigation measures have been assumed to be in-place at the start of each project phase.	***N/A***

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		The effects assessment Chapters (7-19) provide clear distinctions between mitigation measures and commitments. The mitigation measures identified in the assessment have been considered as part of the significance determination. The commitments that have been identified are in addition to the mitigation measures and have not informed the significance determination.	
CEAA_3 IR Number: EA(1)-03	Section 18.1; Appendix C10, CEAA_5.	***Context and Rationale:*** • *The Agency's comment EA(0)-05 (CEAA_5) on the draft EIS asked to identify "local and Indigenous communities, traditional territories, treaty lands, and Indian reserve lands in Section 2.3 of the EIS." This comment is consistent with the requirements given in Part 2, Section 1.3 of the EIS Guidelines.* • *The response to this comment in Appendix C10 points the reviewer to "Figures 18-1 to 18-4 of the draft EIS/EA". Figures 18-3 and 18-4 are not included in the final EIS. Section 18.1, Figure 18-1 of the final EIS does illustrate local and Indigenous communities, treaty lands and Indian reserve lands, but does not provide traditional territories. A visual representation of the traditional territories is important in understanding how Project activities may affect the current use of lands and resources for traditional purposes.* ***Specific Question/ Request for Information:*** *A. Identify, on a map, traditional territories that have been identified to GGM. Indicate any Indigenous groups for which this information was not provided, or for which this information was asked to be kept confidential.*	***N/A***
		Response: The TLRU studies provided by participating communities typically describe the Project as being within the traditional lands of their community but did not provide maps of traditional territory boundaries, and this information is typically not shared when land claim negotiations are unresolved. However, studies appropriately focused on the area around the Project, some using the EIS spatial boundaries as a basis for defining their study areas. Section 18.1 Identifies the Métis Nation of Ontario Lakehead, Nipigon and the Michipicoten traditional territories and refers to their TKLUS in Appendix J3, which includes a map. Biigtigong Nishnaabeg's published map of *The Ojibways of the Pic River Aboriginal Title Area*, does not overlap with the RAA but is referenced in Section 18.2.2.3. The Project lies within the Matawa First Nations (of which EFN is a member) Homeland and Traditional Territory is published on the internet and referenced in Section 18.2.2.7. Other participating Aboriginal communities chose not to provide a description or map of their traditional territories. AFN and AZA confirmed that their Traditional Knowledge and Land Use studies were considered confidential.	***N/A***
CEAA_4 IR Number: EA(1)-04	Chapters 7 to 19; Chapter 23; Appendices M1 to M14.	***Context and Rationale:*** • *Chapter 23 presents preliminary environmental management and monitoring plans (EMMPs), which are stated to include follow-up and monitoring programs. However, the EMMPs referred to in Chapter 23 and found in appendices M1 to M14 contain limited information about monitoring, which does not constitute a conceptual program as per Part 2, Section 8.2 of the EIS Guidelines. Limited information on follow-up programs, as defined under the Canadian Environmental Assessment Act, 2012 (CEAA, 2012) are found in these appendices.* • *A follow-up program, for the purposes of the EA under CEAA 2012, should determine the accuracy of the conclusions of the environmental assessment and the effectiveness of the mitigation measures. However, Table 23-1 "Conceptual EA Follow-Up Program Elements" lists an overview of "follow-up/Monitoring elements" without making the distinction between the two types of activities. The assessment of potential environmental effects in Chapters 7 to 19, and the summary in Table 23-1 does not identify which uncertainties are verified through each follow-up program. In addition, it does not identify which uncertainties should be verified through studies to be included in a follow-up program. A commitment to develop a plan is not sufficient; detailed measures must be identified.* • *Note that other comments in Annex 1 of this package of information requirements will point out questions or comments on follow-up programs related to specific valued components.* ***Specific Question/ Request for Information:*** *A. In chapters 7 through 19 of the EIS (effects assessment chapters), summarize the follow-up programs that are proposed as per the definition of follow-up program under CEAA 2012. Identify the uncertainties which must be confirmed through each follow-up program.*	***N/A***

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		B. Create a detailed follow-up program as per the EIS Guidelines that includes all the follow-up studies from the effects assessment chapters, and that is separate from the monitoring program.	
		Response: A-B. The information provided in Appendices M1 to M14 contains extensive information about monitoring, especially for an EA. The environmental management and monitoring plans (EMMPs) provide as detailed information as can possibly be provided at the planning and assessment stage of a project, and provide sufficient information to further develop the follow-up programs as detailed design and permitting is undertaken. For example, the Water Management Plan defines proposed effluent criteria, emergency discharge locations and related mitigation, locations where on-site surface water and groundwater will be monitored, monitoring frequencies, reporting details, and a conceptual process for adaptive management. As another example, the Conceptual Aquatic Management and Monitoring Plan includes information on proposed study designs, sampling sites, parameters to be analyzed, timing and frequency of monitoring, and other conceptual details, with details provided by major waterbody in the appendices to that plan. As a final example, the Conceptual Air Quality Management Plan provides details on the types of ambient monitoring that will be conducted, the types of equipment to be used, the parameters to be measured, the monitoring frequency, the number and types of locations that will be monitored, and reporting details. Other plans provide details on various planned follow up and monitoring measures to an appropriate level of detail as is reasonably available at the Project planning stage. These will be refined through detailed design and permitting of the Project. This approach is consistent with the requirements to develop "a preliminary follow-up program in particular for areas where scientific uncertainty exists in the prediction of effects", as outlined in Section 8.1 of the EIS Guidelines. Chapter 23.0 of the Final EIS/EA identifies the planned management and monitoring measures for the Project as conceived at this stage of Project planning. Table 23-1 in that chapter identifies the specific VCs associated with each conceptual plan, and notes where the purpose includes the need to confirm the effectiveness of certain measures (linking them to areas of scientific uncertainty where they exist). This table generally identifies the objectives of the follow-up program and the VCs targeted by the program, lists the elements requiring follow-up, and identifies the follow-up studies planned. The plans themselves (Appendices M1 to M14) provide further details on the planned monitoring and intervention methods. These will be updated with further detail as the Project design and permitting advances. Chapter 23.0 and the environmental management and monitoring plans (EMMPs) refer to "monitoring" as an encompassing term that includes the elements of the follow-up program, regardless of the purpose of monitoring. The Project will be subject to a range of monitoring programs, each with its own scope and objective. These include environmental monitoring carried out under specific permit requirements and more general regulatory compliance, as well as overall operational monitoring that is necessary to confirm performance goals are being achieved. It is acknowledged that some monitoring activities are intended specifically as follow-up measures as defined in CEAA 2012 (i.e., either to verify the environmental effects predictions or to verify the effectiveness of mitigation); however, since a monitoring activity can serve other purposes beyond verifying effects predictions or effectiveness of mitigation, the use of the encompassing term "monitoring" to describe such activities avoids the need to distinguish between whether a measure is intended for follow-up, for compliance monitoring, for operational monitoring, for fulfilling commitments to other parties, or for another purpose. Regardless of the term used to describe them, these activities form part of GGM's commitments in respect of minimizing the environmental effects of the Project, and an important part of the analysis that leads to the overall conclusions of each VC. For clarity, the specific EMMPs that are intended as follow-up measures to confirm the EIS/EA predictions or the effectiveness of mitigation (as defined in CEAA 2012) are the following: • Appendix M10, Conceptual Noise and Vibration Management and Monitoring Plan, to verify the effectiveness of noise and vibration mitigation measures; • Appendix M1, Water Management and Monitoring Plan, to verify the effects predictions and effectiveness of seepage mitigation for surface water (and, in turn, for groundwater and human and ecological health);	***N/A***

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		• Appendix M13, Conceptual Biodiversity Management and Monitoring Plan, to verify the effects predictions and the effectiveness of mitigation for vegetation communities and for wildlife; and • Appendix M7, Conceptual Air Quality Management and Monitoring Plan, to verify the effects predictions for the atmospheric environment and human and ecological health; and • Appendix M12, Conceptual Aquatic Management and Monitoring Plan, to verify the effects predictions for fish and fish habitat as well as for human and ecological health. The objectives of the various programs include both follow-up and monitoring and will be complementary to reduce duplication, used collectively to inform Project planning and implement the long-term environmental management requirements of the Project. Please see the attachment "Overview of Development of Environmental Management and Monitoring Plans (EMMP) for the Hardrock Project" for additional detail on the EMMPS linkage to Project activities that will trigger plan development, timing of plan development and links to regulations, standards and regulating authority.	
CEAA_5 IR Number: FH(1)-01	Section 5.4.3; Section 5.6.7; Section 5.7.1.1; Section 5.7.1.4.	***Context and Rationale:*** • *The timing and operational details provided in Chapter 5 and Appendix M9 about partial relocation of historical tailings into the new tailings management facility (TMF) appear incomplete. The historical MacLeod High and Low tailings and historical Hardrock tailings overlap with the Highway 11 realignment, Overburden Storage Area 1 and the open pit.* • *Section 5.6.7 states that construction of the Highway 11 realignment will commence in "Year -3 through to the end of Year -2". For Overburden Storage Area 1 and the open pit, Section 5.4.3 states that "topsoil and overburden in the open pit area will be removed during construction to expose the bedrock, allowing for mining to commence".* • *The timing proposed for the partial relocation of historical tailings to the new TMF is "Years 2 to 4 of operation", as stated in Section 5.7.1.1. It is further stated in Section 5.7.1.4 that "Excavated tailings will be placed in haul trucks in a controlled manner to prevent spillage losses to the environment during hauling to the new TMF".* • *As the excavation of historical tailings will commence during preconstruction and construction phases of the Project, and hauling to the new TMF is expected during Years 2 to 4 of the operations phase, it is unclear where and how the tailings will be stored between their excavation and their relocation into the new TMF.* • *This information is important to understand as the layers of excavated historical tailings that are exposed to air can undergo oxidation and acid rock drainage or metal leaching, which can result in changes in water quality.* • *Additionally, it is stated in Chapter 9, Section 9.1.2 that "The historical tailings will be placed in the TMF on top of the fresh tailings (minimum thickness of 2m) in the area between the TMF inner dam and southeast dam). It is also stated in Chapter 5, laboratory work is proposed prior to moving the historical tailings to the new (Tailings Management Facility) TMF to confirm geochemical behavior prior to moving material in Year 2."* • *No evidence was found in Chapters 9 and 10 and Appendices F4, F5 and F6 to show how 2 metres of fresh tailings will be an adequate surface for deposition of historical tailings. Additional laboratory work is proposed prior to moving the historical tailings to the new TMF but ideally, this laboratory work should have already been completed in order to inform the assessment of environmental effects of seepage, including loadings of arsenic and other contaminants that can potentially change the quality of surface water. It is also noted that alternatives for the management of excavated historical tailings were not considered in case the geochemical analyses do not support the relocation of historical tailings into the new TMF.* • *It is important that baseline testing be completed so that the groundwater model can accurately predict the changes in water quality and the resulting effects on fish and fish habitat.* ***Specific Question/ Request for Information:*** *A. Provide more details about the location and storage of the historical Macleod and Hardrock tailings between the time they are excavated and the time they are disposed into the new TMF;* *B. Describe mitigation measures to ensure no release of contaminants from the excavated historical MacLeod and Hardrock tailings, in the time that they are stored before being disposed into the new TMF;*	***N/A***

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		C. Describe any monitoring that will be undertaken to ensure that the excavated historical MacLeod and Hardrock tailings are properly stored, with no release of contaminants, in the time that they are stored before being disposed into the new TMF; *D. Evaluate the changes to water quality that could result from exposing layers of excavated MacLeod and Hardrock tailings to air, and inducing oxidation and acid rock drainage/metal leaching;* *E. Provide a rationale for the use of a 2-metre layer of fresh tailings for deposition of historical tailings in the new TMF. Describe how additional laboratory work necessary to simulate storage conditions in the TMF, and to confirm geochemical behavior of historical tailings, will be incorporated into the groundwater model and effects assessment;* *F. Provide a description and an assessment of alternative means for managing historical tailings, in case that geochemical analysis is not supportive of relocating historical tailings to the new TMF.*	
		Response: A-B. The movement of the historical tailings is constrained by the timing of the development of the TMF. Most of the historical tailings to be relocated to the TMF will be moved in Years 2 to 4, as described in Section 5.7.1.4 of the Final EIS/EA, when an adequately thick layer of 2 m of fresh tailings has been deposited. Determining the volume of tailings to be managed in the early phases of construction requires advancing to detailed engineering in relation to the starter pit; however, at a minimum, it is estimated to be approximately 4,000 m^3 of material related to the installation of the new MacLeod high tailings (MHT) seepage collection drain, and potentially a larger quantity in the area of the existing highway depending on the progression of the starter pit. The attached figure titled Historic Tailings Storage Locations identifies two potential temporary storage locations with water management controls. The first, located on top on the existing MHT, could accommodate the relatively small volume of material excavated for the installation of the MHT seepage collection drain. Contact water from this storage area would report to a collection pond within a bermed facility from where it would be transferred into the MHT seepage collection system by pipeline for pumping to the construction water treatment plant. As work advances in association with the MHT reclamation, the material would be permanently capped as part of the MHT enhanced cover. The second potential location for additional material, if required depending on detailed design of the starter pit, includes the construction of a temporary storage pad within the footprint of WRSA C, which is situated such that the natural slope of the ground drains back towards the plant site and is thus within the footprint of the Project where early water management is already planned. Excavated tailings would be stored on a foundation constructed of a compacted till or clay soil layer to mitigate groundwater seepage, and with the pad graded towards a contact water collection sump. Contact water would then be pumped from the sump to the construction effluent treatment plant. In addition to the above measures, should significant volumes of excavated tailings require management prior to the TMF being available with the required 2-m of new tailings as foundation conditions, GGM would have the ability to construct a dedicated engineered cell within the north cell of the TMF to permanently store the material. In the absence of a new tailings base, the foundation of the engineered cell would be prepared in an equivalent mitigative manner using a till or clay base layer to mitigate seepage. Contact water would be collected as part of the TMF reclaim water. The above measures ensure sufficient flexibility exists to accommodate excavated tailings throughout all phases of the Project as may be identified during detailed engineering, while ensuring that any excavated tailings do not result in effects to the receiving environment consistent with the Final EIS/EA. C. Due to the contact water containment approach and short term duration of the storage, monitoring of the temporary storage areas will consist of visual monitoring by an engineer to verify the integrity of the temporary storage facilities and water management infrastructure. Contact water collected from the temporary storage facilities will be pumped to the effluent treatment plant and effluent discharge will be monitored as required by applicable permitting. While the historical tailings are saturated and not expected to be subject to a source of	***N/A***

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		fugitive dust, visual monitoring will also confirm that measures (consistent with those proposed for soil management) put in place to mitigate potential fugitive dust, if required, are effective. D. The contact time of the upper exposed layer of relocated tailings with the atmosphere will be short, up to five years. After that time, tailings temporarily stored are relocated to the TMF and will be covered with fresh tailings, and tailings permanently relocated within the historical MacLeod High tailings will be covered with overburden. It is not expected that this short temporary storage time will impact or change the overall geochemical conditions or oxidation potential for the tailings. In addition, as noted the temporary storage of historical tailings occurs within controlled areas to mitigate effects on the receiving environment and no additional changes to water quality compared to what has already been considered in the Final EIS/EA will occur. E. The 2 m layer of fresh tailings are a seepage mitigation feature because they are comprised of silt grain sizes with a low hydraulic conductivity that will further decrease with the deposition of additional tailings. Geotechnical testing evaluated the hydraulic conductivity of 2 m of new tailings with load and determined that a hydraulic conductivity of $1x10^{-8}$ m/s can be obtained. The hydraulic conductivity of the new tailings with load is of similar order of magnitude as till and/or a geomembrane and therefore will provide sufficient seepage mitigation. The groundwater flow modelling confirms that seepage from the area where the historical tailings are proposed to be deposited in the new TMF will be collected by the TMF seepage collection system providing further mitigation measure of potential seepage. The TMF seepage collection system would continue to operate during closure until the seepage was of an acceptable quality for direct discharge to the environment. Because of the location selection, which avoids groundwater impacts, no further modelling is required. Additional geochemical studies will be conducted prior to relocation of the historical tailings. These studies include evaluating different layering options of the historical tailings placement within the TMF and the resulting effect on water quality. The results of these geochemical studies will guide the need for more detailed deposition and segregation design measures to minimize the need for a constructed wetland at closure. F. A constructed wetland to treat seepage from the TMF storage locations and engineered containment cell with lower permeability cover are contingency options for management of relocated historical tailings in the TMF. The ITRB will also have a role in reviewing the detail engineering plans for historical tailings deposition.	
CEAA_6 IR Number: FH(1)-02	Section 5.2.2; Section 5.4.3; Section 5.7.1.4; Section 9.1.2; Appendix M9, Section 7.2.1.	***Context and Rationale:*** *There are uncertainties about the collected data and the effects assessments regarding the leftover historical tailings. Performing project activities (e.g. excavation) around leftover historical tailings can mobilize previously stable tailings and cause additional loading of contaminants to the surrounding environment.* • *It is stated in Section 5.4.3 that "An estimated 7.24 Mm3 of overburden" and "[…] 2,356 Mm3 of topsoil will be stored at designated locations within the overburden storage areas" and "[…] placement of overburden as described will provide an enhanced cover system to reduce infiltration through the historical MacLeod tailings and will decrease metal loadings to Kenogamisis Lake".* • *It is unclear how the use of overburden and topsoil will reduce the loadings to Kenogamisis Lake, as there is no evaluation in the EIS to assess the performance of covering the leftover historical tailings with overburden or topsoil. In fact, it is noted in Appendix M9, Section 7.2.1 that "[…] topsoil is not suitable for rehabilitation and will be used where appropriate in other areas of the Project".* • *Consideration of loadings for the suite of potential contaminants that could arise from the leftover historical tailings is necessary to verify that the project will lead to improvement in water quality in Kenogamisis Lake, with no potential effects on fish and fish habitat.* ***Specific Question/ Request for Information:*** *A. Provide an evaluation of covering the leftover historical tailings with overburden and topsoil;* *B. Update the water quality assessment, including the potential loading of contaminants from the leftover historical tailings to seepage and/or surface water, taking the response from Question A into consideration;* *C. Provide the effects on fish and fish habitat, if applicable, due to changes in water quality requested in Question B;*	***Context and Information Required for a Complete Response:*** • *The response does not adequately address Part A of the information requirement (IR). Revise the response to provide an evaluation of covering the leftover historical tailings with overburden and topsoil. As noted in the rationale of the original IR, it is unclear whether topsoil stored on site will be suitable for such use.* • *The responses to parts B-G will be reassessed upon revision of the response to Part A.*

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		D. Describe mitigation measures to prevent adverse effects on fish and fish habitat, if necessary; *E. Characterize residual effects, if any, after the mitigation measures have been implemented;* *F. Reassess the significance determination, if necessary, taking responses from Questions A to E into account;* *G. Update the follow-up program for potential effects to fish and fish habitat, including objectives and any monitoring measures that will be implemented to verify the predictions of effects and evaluate the effectiveness of the proposed mitigation measures. If follow-up is not required, provide a rationale.*	
		Response: A: To clarify, there is very little uncertainty with the historical tailings left in place given that feasibility level engineering has been completed to support the Final EIS/EA and extensive baseline studies have been carried out. The approach to long term physical and chemical stability has been described and modelled. The remaining historical MacLeod high tailings will be covered with a layer of coarse rock followed by thick overburden soils designed to promote runoff and reduce infiltration through the underlying historical tailings. One meter (1 m) of coarse rock was incorporated as a cover to provide a capillary break for drainage control. The cover has been modelled using the Hydraulic Evaluation of Landfill Performance (HELP) model to predict infiltration and is detailed in Section 5.3.1.3 of Appendix F4 of the Final EIS/EA. The resulting groundwater recharge rate was predicted at 84 mm/yr and was incorporated into the groundwater flow model for the operation conditions for the overburden storage area. This is a reduction in recharge from the 214 mm/yr that was estimated for the current tailings during model calibration, and as a result represents a reduction in the seepage and loadings to Kenogamisis Lake. B-G: Updates and reassessments are not necessary because covering the remaining historical MacLeod high tailings with overburden was already evaluated as part of the groundwater flow modelling (Appendix F4 of the Final EIS/EA) and as a result was incorporated into the effects assessment for groundwater (Chapter 9 of the Final EIS/EA) and subsequently surface water (Chapter 10 of the Final EIS/EA) and fish and fish habitat (Chapter 11 of the Final EIS/EA). All parameters of concern were included in this assessment and considered the changes in loading from baseline, operation, and closure conditions.	**Response:** The cover performance and reduction in recharge associated with the historical tailings is a function of the overall thickness of the overburden soils. Rather the sloping, grading and the capillary break are the controlling factors with respect to the amount of recharge through the historical tailings. The cover over the historical tailings will be sloped and graded to promote run off and reduce infiltration. The capillary break provides lateral drainage that is directed toward the seepage collection system. The minor variation in hydraulic conductivity of the overburden material (one to two orders of magnitude) will have a minor effect on the proportion of precipitation that runs off versus infiltrates the historical tailings and the majority of which does infiltrate the overburden will be removed via the capillary break. The capillary break will be composed of coarse rock with a hydraulic conductivity on the scale of 10-3 m/s compared to the hydraulic conductivity of the underlying historical MacLeod tailings of 10-7 m/s which promotes lateral drainage toward the seepage collection ditches as opposed to recharge of the historical tailings. Therefore, the cover is predicted to reduce seepage through the historical tailings regardless of overburden thickness and hydraulic conductivity. As indicated in the initial response the cover was modeled using the HELP model. The resulting groundwater recharge rate was predicted at 84 mm/yr and was incorporated into the groundwater flow model for the operation conditions for the overburden storage area. This is a reduction in recharge from the 214 mm/yr that was estimated for the current tailings during model calibration, and as a result represents a reduction in the seepage and loadings to Kenogamisis Lake. As indicated above the cover performance and reduction in recharge is not a function of the overall thickness of overburden soils. B-G: Updates and reassessments are not necessary because covering the remaining historical MacLeod high tailings with overburden was already evaluated as part of the HELP modeling and used as inputs to the groundwater flow modelling (Appendix F4 of the Final EIS/EA) and as a result was incorporated into the effects assessment for groundwater (Chapter 9 of the Final EIS/EA) and subsequently surface water (Chapter 10 of the Final EIS/EA) and fish and fish habitat (Chapter 11 of the Final EIS/EA). All parameters of concern were included in this assessment and considered the changes in loading from baseline, operation, and closure conditions.
CEAA_7 *IR Number: FH(1)-03*	Section 9.1.2; Section 9.1.5.2; Section 9.2.2.6; Section 9.4.3.3.	***Context and Rationale:*** • *Section 9.1.5.2 presents the temporal boundaries for the assessment of groundwater as follows:* *- Construction: Years -3 to -1;* *- Operation: Years 1 to 15* *- Active Closure Years: 16 to 20;* *- Post-closure: Years 21 to 36.* • *It is understood that these temporal boundaries have been used for groundwater modelling. However, it is unclear whether the proposed groundwater model captured the time period during which maximum change in water quality is expected from seepage released from the tailings management facility (TMF), waste rock storage areas (WRSAs) and overburden storage areas, and what measures will be in place to minimize such changes. This information is important to understand as variability in groundwater travel times can take years and decades in some circumstances.*	***N/A***

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		• *Section 9.4.3.3 states that "while the TMF is located adjacent to Kenogamisis Lake, the long travel times are the result of the TMF reclaim pond being maintained over 1.0 km from Kenogamisis Lake. The TMF reclaim pond provides the driving head for groundwater recharge to the underlying aquifer system and will result in deeper groundwater flow paths that bypass the seepage collection system and result in discharge to surface water features." The same section further states: "The deposition of historical tailings in the TMF is simulated at the locations shown on Figure 9-20. Particles originating from where the historical tailings are deposited are captured by the seepage collection system and will not result in additional loading to the Southwest Arm of Kenogamisis Lake during operation."* • *The following concerns are noted from the statements above:* • *- 1) Section 9.4.3.3, Figure 9-20 and Appendix F4, Section 5.3.2.3, Figure 5-19 provide maps showing particle traces during operation phase. The seepage collection system is assumed to collect 100% of these particle traces as it is stated that no "additional loadings to the Southwest Arm of Kenogamisis Lake during operation" are expected. This appears to be an exception to the statement made in Chapter 9, Section 9.1.2 that "seepage collection system is predicted to capture 88% of the total seepage from the TMF"* • *- 2) It appears that only during operation phase is consideration given to the short flow paths that will be intercepted by seepage collection ditches. This assumption discounts the potential loadings from the short flow paths after operation phase. These short flow paths are important as the partially relocated MacLeod and Hardrock tailings appear to be heavily contaminated based on baseline information provided in Table 9-9 of Chapter 9, Section 9.2.2.6, and can release contaminants as they were in their original location after the operation phase.* • *There are not enough details provided in Appendices F4, F5, F6 or Chapters 9 and 10 of the EIS to sufficiently review and validate these assumptions and conclusions regarding the partially relocated tailings in the groundwater model for the operation phase and beyond.* • *Section 9.4.2.1 states that "closure of water management facilities will result in the removal of contact water collection systems that may result in groundwater originating from the WRSAs, TMF, overburden storage, and historical tailings discharging to the natural environment". Without active interception of seepage from the interception ditches after the operation phase, the water quality in the surrounding areas is likely going to be affected in the closure phase and beyond.* • *This information is required because the variability in travel times, seepage interception and ground conditions may postpone the release of contaminants to a later time many years after the operations phase, but it is important that the seepage is captured whenever it moves out to the surrounding waterbodies and before it adversely affects fish and fish habitat.* ***Specific Question/ Request for Information:*** *A. Provide the year(s) during which maximum change in water quality in Kenogamisis Lake is expected from seepage released from the TMF, WRSAs and overburden storage areas;* *B. Provide a revised groundwater modelling run, if necessary, taking into account the year(s) during which maximum changes in water quality is expected, as stated in question* *C. Reassess the time period during which seepage collection ditches would be closed, taking the responses from questions A and B into account;* *D. Taking the response from comment FH(1)-02 into account, explain how 100% of particle traces from the historical tailings deposited into the new TMF are expected to be captured by the seepage collection system;* *E. Provide more details about how partially relocated historical tailings have been incorporated into the groundwater model for operation phase and beyond, including a revised groundwater modelling run with a comparison of changes in water quality in Kenogamisis Lake before and after the inclusion of partially relocated historical tailings into the new TMF;* *F. Describe the predicted changes in water quality in Kenogamisis Lake after revisions to groundwater model are made as per Questions A to D;* *G. Provide the effects on fish and fish habitat, if applicable, taking responses from Questions A to E into account;* *H. Describe mitigation measures to prevent adverse effects on fish and fish habitat, if necessary;*	

Comment Number	Report Section	Agency Comment and GGM Response	Agency Follow-up Comment and GGM Response
		I. Characterize residual effects, if any, after the mitigation measures have been implemented; *J. Reassess the significance determination, if necessary, taking responses from Questions A to H into account;* *K. Update the follow-up program for potential effects to fish and fish habitat, including objectives and any monitoring measures that will be implemented to verify the predictions of effects and evaluate the effectiveness of the proposed mitigation measures. If follow-up is not required, provide a rationale.*	
		Response: A. It is important to recall the conservative approach carried forward in the Final EIS/EA. The loading predictions to downstream receptors do not consider groundwater travel times and are based on the steady state discharge rates at the end of each model phase (i.e., operation and closure once the open pit is filled to its final water elevation). This approach conservatively assumes all mass will arrive at a given receptor at the same time and therefore represents the maximum change in water quality in Kenogamisis Lake for each phase of the Project that was assessed. B. An additional groundwater modelling run is not required to simulate the "maximum" changes to water quality, as the steady-state model of groundwater flows (and therefore concentration inputs) are already simulated at maximum and included in the Final EIS/EA. C. WRSA seepage collection was not accounted for in the assessment, and therefore the timing of the closure of the seepage collection system is not dependent on the very conservative groundwater modelling and will be based on field observations. Further, for the TMF, the Final EIS/EA is clear in that water will not be discharged to the environment from the collection ponds if it does not meet the applicable criteria. Monitoring during operation and closure will be completed to confirm the results of the effects assessment. Both groundwater and surface water from the WRSAs and TMF will be monitored to characterize actual water quality and compared with both model predictions and trigger parameters. This monitoring approach allows the development and implementation of contingency measures if trigger parameters are exceeded. The WRSAs will be developed sequentially allowing time to understand actual water quality from the initial piles. This together with the groundwater travel times provides sufficient time to monitor and address mitigation measures. D. The fate of seepage from the TMF was assessed using the groundwater flow model. As stated in Section 9.1.2 of the Final EIS/EA, the seepage collection system is predicted to capture 88% of the total seepage from the TMF. The seepage that is predicted to bypass the seepage collection system and discharge to Goldfield Creek Tributary and/or Kenogamisis Lake originates from the TMF reclaim pond where the vertical hydraulic gradients simulated by the groundwater flow model result in deeper flow paths for these particles. As shown on Figures 9-20 and 9-22 of the Final EIS/EA, all particles released from the footprint of the historical tailings relocated to the TMF are captured by the seepage collection system installed around the perimeter of the TMF. E. As described in the response to Part D above, only particles that are located beneath the tailings pond had enough vertical hydraulic gradient to force particles from the TMF into deeper travel paths below the capture of the seepage collection ditches. Therefore, the simulation of particles at an earlier stage of TMF development, when the vertical hydraulic gradients imposed by a shallower pond would be lower, would not result in additional seepage from the TMF bypassing the seepage collection system than already characterized in the simulations presented in the Final EIS/EA. F. Since there are no revisions to the groundwater flow model in the responses to Parts A through E above, there are no changes required to the conservative predictions of water quality in Kenogamisis Lake. G-K. Since there are no revisions to the groundwater flow model in the responses to Parts A through F above, There are no changes required to the assessment of effects as presented in the Final EIS/EA.	***N/A***
CEAA_8	*Section 5.3.*	***Context and Rationale:*** • *Section 5.3, Figure 5-2 indicates that the proposed Overburden Storage Area 3 west of the tailings management facility (TMF) and Overburden Storage Area 2 adjacent to waste rock storage area (WRSA) D (Contingency) do not appear to have means to collect contact water.*	***N/A***

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IR Number: FH(1)-04		• *It is important to identify all effluent collection systems, as surface drainage and seepage from the overburden storage areas can change the water quality of the surrounding waterbodies and result in effects to fish and fish habitat.* ***Specific Question/ Request for Information:*** *A. Provide details on how contact water from Overburden Storage Areas 2 and 3 will be collected, including a revised Figure 5-2 that contains this information;* *B. Describe the changes in water quality if contact water from the Overburden Storage Areas 2 and 3 is not collected;* *C. Provide the effects on fish and fish habitat, if applicable, due to changes in water quality as described in Question B;* *D. Describe mitigation measures to prevent adverse effects on fish and fish habitat, if necessary;* *E. Characterize residual effects, if any, after the mitigation measures have been implemented;* *F. Reassess the significance determination, if necessary, taking responses from Questions A to E into account;* *G. Update the follow-up program for potential effects to fish and fish habitat, including objectives and any monitoring measures that will be implemented to verify the predictions of effects and evaluate the effectiveness of the proposed mitigation measures. If follow-up is not required, provide a rationale.*	
		Response: A. These overburden storage areas (2 and 3) are dedicated for material excavated from the perimeter of the TMF and are to be used during progressive and final reclamation of the TMF. The material will be excavated from un-impacted (greenfield) areas and will therefore be clean. Thus, they will not require water management, except for standard/well-proven erosion and sedimentation controls including silt fences to ensure sediment does not enter local watercourses. B. Overburden Storage Area 2 and 3 will comprise of clean fill from un-impacted areas and the only water quality parameter of concern is TSS, which will be mitigated via standard erosion and sedimentation controls. C. – G. Standard mitigation practices for clean overburden storage to mitigation erosion and sedimentation will be implemented. There will be no effects to the receiving environment water quality or fish habitat from the storage activities	***N/A***
CEAA_9 *IR Number: FH(1)-05*	*Section 5.3.*	***Context and Rationale:*** • *Section 5.3 states that "project components have been sited outside the 120 m surface rights reservation area for Kenogamisis Lake on claim to lease lands […] and outside a 30 m setback from the high water mark for patent lands. […] Limited exceptions include:* *- the water-related intake and treated effluent discharge pipeline to Kenogamisis Lake* *- eastern extension of the open pit (to be confirmed with ongoing Project planning and engineering design)* *- southern lobe of WRSA B* *- contact water collection ponds B2 and D2".* • *In this section, high water berms are proposed as mitigation measures for the last three of these four exceptions. It is unclear if any mitigation measures are proposed to reduce changes in water quality from construction, operation and decommissioning activities related to the water-related intake and treated effluent discharge pipelines to Kenogamisis Lake, and whether the effects assessment took any mitigation measures into account.* • *This information is important to understand potential changes in water quality and effects to fish and fish habitat from an activity being undertaken within the 30 m setback.* ***Specific Question/ Request for Information:***	***N/A***

Comment Number	Report Section	Agency Comment and GGM Response	Agency Follow-up Comment and GGM Response
		A. Provides changes in water quality (e.g. sedimentation) caused by construction, operation and decommissioning activities related to water-related intake and treated effluent discharge pipelines to Kenogamisis Lake; *B. Provide the effects on fish and fish habitat from changes in water quality as discussed in question A;* *C. Describe mitigation measures to reduce the effects on fish and fish habitat from changes in water quality described in question A;* *D. Characterize residual effects, if any, after the mitigation measures have been implemented;* *E. Reassess the significance determination for fish and fish habitat and, if necessary, taking response from questions A to D into account;* *F. Update the follow-up program for potential effects to fish and fish habitat, including objectives and any monitoring measures that will be implemented to verify the predictions of effects and evaluate the effectiveness of the proposed mitigation measures. If follow-up is not required, provide a rationale.*	
		Response: A-F: This information request has already been considered in the EIS in accordance with federal guidance. Please refer to Chapter 11 of the Final EIS/EA, which provides an assessment of changes in water quality related to water intake and treated effluent discharge to Kenogamisis Lake for all project phases. Proposed mitigation measures to address potential changes in water quality from construction, operation and decommissioning activities related to water intake and treated effluent discharge waterlines to Kenogamisis Lake are provided in Final EIS/EA, Section 11.4.2.1. This section identifies mitigation for use of heavy equipment to construct and decommission waterlines and mitigation for mine effluent discharge during operations. Proposed mitigation measures for activities that will occur during all phases of the project are summarized in Final EIS/EA Table 11-9. These mitigation measures were identified based on the DFO Pathways of Effects (POE) method, which identifies standard mitigation for the protection of fish and fish habitat (http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/measures-mesures-eng.html). A specific assessment of predicted changes in water quality (sedimentation) due to temporary construction, operation and decommissioning activities related to water-related intake and treated effluent discharge pipelines to Kenogamisis Lake is not required because the assessment is based on project activities (e.g., use of heavy equipment), not on individual project components (i.e., construction of a specific pipeline). Based on the DFO method, standard mitigation is sufficient to address potential effects on fish and fish habitat. Updates to predicted effects, mitigation, significance, and monitoring are therefore not required.	***N/A***
CEAA_10 *IR Number: FH(1)-06*	*Section 10.1.7.2.*	***Context and Rationale:*** • *Section 10.1.7.2 indicates that a significant environmental effect to surface water quality is when "treated effluent discharge water quality consistently exceeds MMER […] or […] consistently exceeds regulatory criteria".* • *Any exceedance of MMER (Schedule 4) would be considered non- compliance with this regulation, according to Environment and Climate Change Canada (ECCC).* • *In addition, the term "consistently" is not defined in this context. Without this clarity, there is uncertainty about what threshold is being proposed for comparison.* • *This definition is important for the evaluation of the magnitude criteria of the significance assessment for surface water quality and fish and fish habitat.* ***Specific Question/ Request for Information:*** *A. Clarify the use of the term "consistently" in the definition provided for significant environmental effect to surface water quality;* *B. Revise the magnitude for significance assessment of Surface Water Quality, if necessary, taking the response from Question A into account.*	***N/A***

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		Response: A. The term "consistently" in the definition provided for significant environmental effects to surface water quality and fish and fish habitat means a second sample that exceeds maximum allowable grab (as defined by Column 4 of Schedule 4 MMER), daily (Column 3 of Schedule 1 O.Reg. 560/94) or monthly mean (Column 2 of Schedule 4 MMER or Column 3 of Schedule 1 O.Reg. 560/94) concentrations of a substance after an initial sample also exceeded the maximum allowable concentrations of the same substance, for samples taken at the same location. B. No changes in definition of magnitude for significance are required. As described in Section 10.5 of the Final EIS/EA, the changes in water quality associated with the Project are considered not significant if they do not result in water quality that exceeds MMER/O.Reg. 560/94 effluent criteria, occur only at the local subwatershed scale, and do not exist at the LAA boundary.	***N/A***
CEAA_11 *IR Number: FH(1)-07*	*Section 4.2.5; Section 22.4.5.1; Appendix F10, Section 9.2.5.*	***Context and Rationale:*** • *Section 22.4.5.1 states that "the Goldfield Creek diversion channel will be sized to convey the 100 year 24-hour rainfall event (which would have the greatest peak flow), and to safely release the peak flow from the regulatory storm event and the Inflow Design Flood corresponding to the PMF [Probable Maximum Flood] without overtopping the diversion dam located north of the TMF [Tailings Management Facility]."* • *It is also indicated that the design of the diversion channel accounts for both upstream flows (from the diverted part of the Goldfield Creek watershed) and contributing flows from the TMF emergency spillway. In Appendix F10, Section 9.2.5 it is further stated that: "The hydrology of the existing and proposed Goldfield Creek diversion and Southwest Arm Tributary has been assessed using the Hydrologic Modelling System (HEC-HMS)"* • *While the diversion channel design criteria appear reasonable, no specific details have been found on the model and the results. For example, there is no information provided on the flow rate, depth, velocity and flood extent that are expected along the Southwest Arm Tributary, as well as the hydrometeorological parameters (such as the 100-year 24 hours rainfall value) used to calculate these quantities in the model. The only result shown is the high flow mapping provided in Appendix F10, Figure 9-1derived from the modelling effort. In the EIS's selection of alternatives (Chapter 4, Section 4.2.5) and Appendix G3, it is stated: "Final channel design and location details will be determined based on site-specific information to be collected during the permitting period (e.g., geotechnical data) and considering ongoing consultation."* • *It is understood that this high flow mapping may be intended to support determinations of effects on fish and fish habitat. However, in order to understand potential changes on water quality due to the potential mixing of contact waters with noncontact waters on the project site, a clear understanding is needed in terms of how the model results were derived and what assumptions were included in its creation.* ***Specific Question/ Request for Information:*** *A. Provide details on the flow rate, depth, velocity and flood extent that are expected along the Southwest Arm Tributary;* *B. Provide the hydrometeorological parameters (such as the 100-year 24 hour rainfall value) that were used in the model to calculate the values mentioned in Question A.*	***Context and Information Required for a Complete Response:*** • *The response does not adequately address Parts A and B of the information requirement (IR). Although a reference was made to Appendix F10, Figure 9-1 of the EIS for flood extent in Goldfield Creek Diversion and Southwest Arm Tributary, details on the flow rate, depth and velocity were not provided. Revise the response to provide the information required, along with the hydrometeorological parameters required in part B.*
		Response: A. & B. The realigned portions of the new Goldfield Creek channel have been designed to emulate both the low flow channel and the floodplain cross-section of the existing Goldfield Creek. Despite having a smaller existing drainage area, the Southwest Arm Tributary has a similar sized (if not larger) floodplain cross-section compared to the existing Goldfield Creek valley. As such, the realigned channel and the existing Southwest Arm Tributary valley will accommodate storm event flows with comparable hydraulic conditions and capacity. The extent of flooding presented in Figure 9-1 of Appendix F10 is based on 24 hr rainfall values for the 2 yr, 10 yr and 100 yr storms of 46.4 mm, 73.2 mm, and 106.7 mm, respectively.	**Response:** A. Data has been extracted from the model and provided in Tables 1 to 5 in the attached document "Data Response to IR FH(1)-07 / CEAA_11". The flow rate, depth and velocity are shown in Tables 2, 3, 4 and 5 for the low flow (base flow); 2 yr, 10 year and 100 year flood events respectively, and correspond to the flood extents shown in Figure 9-1 of Appendix F10, for the "After Goldfield Creek Diversion image". The transect locations (green lines) used in the analysis are shown in the attached Figure 1 of the attached document "Data Response to IR FH(1)-07 / CEAA_11". With respect to request B, the rainfall data used are provided in Table 1 in the attached document, "Data Response to IR FH(1)-07 / CEAA_11". Flow volume and flow depth are provided in Tables 2 to 5.

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CEAA_12 *IR Number: FH(1)-08*	*Section 5.3; Appendix I, Sections 6.1; Appendix M9, Section 7.3*	***Context and Rationale:*** • *Appendix M9, Section 7.3 states that "The MacLeod low tailings on the south side of Highway 11 will be removed and relocated. The Macleod low tailings located to the north of the MacLeod high tailings adjacent to Barton Bay will remain in place with the exception of small areas immediately adjacent to the MacLeod high tailings. These may need to be removed during placement of the buttressing that is proposed for the Highway 11 realignment. The historical MacLeod low tailings between Barton Bay and the Highway 11 realignment will be rehabilitated as required".* • *It is unclear under what conditions would rehabilitation of the historical MacLeod low tailings between Barton Bay and the Highway 11 realignment be considered necessary or required.* • *The site plan included in Section 5.3, Figure 5-2 shows subsurface seepage collection system for MacLeod high tailings which is meant to limit contaminants loadings into the surrounding surface water bodies. `No such subsurface seepage collection system is presented for the MacLeod low tailings. This is concerning as there are uncertainties associated with the performance of covering the historical tailings with topsoil and overburden (see comment FH(1)-02). Also, no information was provided in the EIS regarding possible effects on metal leaching from maintenance and snow/ice control measures taken for Highway 11.* • *This information is important to understand the changes in water quality at Barton Bay and the effects on fish and fish habitat.* ***Specific Question/ Request for Information:*** *A. Describe the conditions under which the rehabilitation of the historical MacLeod low tailings between Barton Bay and Highway 11 realignment will become necessary or required, and describe what this rehabilitation will entail. Include a consideration of how maintenance and snow/ice control measures for Highway 11 may affect metal leaching in the surrounding historical MacLeod high and low tailings;* *B. Describe the changes in water quality in Barton Bay based on response to Question A;* *C. Provide the effects on fish and fish habitat taking response from Questions B into account;* *D. Provide a rationale for not including a subsurface seepage collection system for MacLeod low tailings between Barton Bay and Highway 11 realignment, while also describing the potential risks to water quality from not including it;* *E. Describe additional mitigation measures to minimize effects on fish and fish habitat, if necessary,* *F. Characterize residual effects, if any, after the mitigation measures have been implemented;* *G. Reassess the significance determination, if necessary, taking responses from Questions A to F into account;* *H. Update the follow-up program for potential effects to fish and fish habitat, including objectives and any monitoring measures that will be implemented to verify the predictions of effects and evaluate the effectiveness of the proposed mitigation measures. If follow-up is not required, provide a rationale.*	***N/A***
		Response: A. The proposed Project design reduces loadings of PoPC to Barton Bay and limits disturbance to near-shore areas. The historical MacLeod low tailings located between Barton Bay and the Highway 11 realignment were incorporated into the Final EIS/EA as is, with no further rehabilitation anticipated. The majority of the mass loading to Barton Bay from the historical MacLeod tailings under baseline conditions originates from the MacLeod high tailings, which were shown to have higher concentrations of PoPCs than the MacLeod low tailings (see Figure 3-4 of Appendix L). The MacLeod high tailings contribute more seepage to Barton Bay from recharge than the MacLeod low tailings. The results of the effects assessment show a substantive improvement in water quality of Barton Bay as a result of the partial removal of the historical MacLeod high tailings and MacLeod low tailings located within the open pit footprint. This mitigation, together with the covering of the remaining MacLeod high tailings to reduce infiltration and open pit dewatering, results in a reduction in loading to Barton Bay from the historical MacLeod tailings of 99% during operations and 57% during long term closure, as presented in Table 9-23 of Chapter 9 of the Final EIS/EA. Furthermore, the sub-surface seepage collection system to be installed along the perimeter of the MacLeod high tailings will also have an effect on the downgradient MacLeod Low tailings by capturing a portion of recharge from these tailings and, as a result, further decreasing the loadings from the	***N/A***

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		remaining historical MacLeod High and Low tailings. The benefit of the sub-surface collection system was evaluated in the Final EIS/EA, but the effects of the seepage collection and reduction in loadings was not considered in the effects assessment, to be conservative. From the Final EIS/EA, it is predicted that this sub-surface seepage collection system is most effective during closure, and would reduce the seepage rates and loadings to Kenogamisis Lake by an additional 17%. The existing Highway 11 is currently constructed over portions of the historical MacLeod low tailings and as a result, maintenance activities for snow/ice control measures are not expected to change with the realignment. In fact, with the current design mitigation measures and efforts to reduce infiltration and direct highway runoff away from the tailings, there is the potential for a further improvement or reduction in loadings due to the Highway 11 reconstruction. This effect or benefit has not been included in the effects assessment to maintain a conservative approach. The effects assessment was completed with a number of conservative approaches and therefore, it is anticipated that water quality as a result of the Project will be better than predicted; therefore, no further rehabilitation of the historical MacLeod low tailings located between Barton Bay and the Highway 11 realignment is anticipated. B-H. Based on confirmation in the response to A above, no further evaluation is required for the Final EIS/EA. D. The groundwater flow modelling did not account for the presence of the MacLeod high tailings seepage collection system, and therefore the effects assessment was completed assuming the at-source seepage quality was discharging directly to the receiving waters, to be conservative. Even with this conservative assumption, water quality in Barton Bay is anticipated to improve significantly as a result of the operation of the Project compared to baseline conditions.	
CEAA_13 *IR Number: FH(1)-09*	*Section 11.2.2; Appendix M1, Section 8.1.2.2.*	***Context and Rationale:*** • *Appendix M1, Section 8.1.2.2 indicates there will be "water quality monitoring (quarterly) of Barton Bay, the Central Basin, Outflow Basin, and downstream of Kenogamisis Lake […] streams and lakes in the LAA [Local Assessment Area] including the Goldfield Creek Tributary, Goldfield Creek diversion channel, Southwest Arm Tributary inflow to the Southwest Arm of Kenogamisis Lake and Mosher Lake".* • *Some other fish-bearing watercourses and waterbodies in the LAA which could be affected by the Project such as Lake A-322, GFP-4, WC-Z, WC-O, and WC-C have not been considered for water quality monitoring. These watercourses and waterbodies are comprised of fish according to Chapter 11, Section 11.2.2.2, Table 11-6. These could be impacted by the project due to their proximity to project components and also form important connections between waterbodies that allow fish passage. For example, Chapter 11, Section 11.2.2.1 states that "Fish can pass through the Goldfield Creek Tributary from Kenogamisis Lake upstream to Lake A-322 under most flow conditions".* • *There is no rationale provided for why monitoring is not proposed at these smaller watercourses and waterbodies to confirm predicted effects on fish and fish habitat.* ***Specific Question/ Request for Information:*** *A. Update the monitoring plan with details (location, frequency, parameters, etc.) of water quality sampling at Lake A-322, GFP-4, WC-Z, WC-O, and WC-C, or provide a rationale for not doing so.*	***N/A***
		Response: Lake A-322 is located on the Goldfield Creek Tributary. Water quality station #20a is proposed downstream of Lake-322. This station will thus capture changes in water quality in the Goldfield Creek Tributary as well as Lake A-322 during operation. GFP-4 will be located upstream of the diversion channel which connects Goldfield Lake and the Southwest Arm tributary. Station #39 is proposed on the Goldfield Creek diversion channel downstream of GFP-4. This station will capture the changes in water quality from GFP-4 as well as other ponds located upstream of the diversion channel.	***N/A***

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		WC-Z is an ephemeral watercourse with a low gradient undefined channel. Approximately 91% of the drainage area of WC-Z will be within the footprint of the TMF. No flow is expected in WC-Z during mine operation. Therefore, no water quality monitoring station is proposed on WC-Z. WC-O is a poorly defined watercourse with no defined channel, its flow diffusely spreads out across treed wetlands. Only non-contact water (natural drainage) will be directed towards the upper drainage area of watercourse O during early TMF development. Most of the catchment area will be overprinted by WRSA-D. No flow is expected in the remaining WC-O. Therefore, no water quality monitoring station is proposed on WC-O. WC-C is an intermittent stream. About 85% of its catchment area will be infilled and graded due to the Highway 11 realignment, removal of a portion of historical MacLeod tailings and overburden storage. The remaining part of WC-C will be a dry ditch, most of the time. Therefore, no water quality monitoring station is proposed on WC-C. Quarterly water quality monitoring for stations #39 and 20a is proposed (see attachments "Proposed Groundwater Sampling Locations During Mine Operation" and "Proposed Surface Water Monitoring Stations During Mine Operation"). The frequency of monitoring and the need for additional sampling will be assessed through adaptive management. Monitoring parameters will include general chemistry (pH, acidity, alkalinity, hardness, color, conductivity, TSS, turbidity), dissolved and total metals, nutrients (ammonia, nitrate, nitrite, phosphorus, TKN).	
CEAA_14 *IR Number: FH(1)-10*	*Chapter 9, Section 9.2.2.7.*	***Context and Rationale:*** • *Section 9.2.2.7 states that "The groundwater mass loading is estimated based on the mean baseline concentrations from historical Little Long Lac, MacLeod and Hardrock tailings […]". There are the following uncertainties with this approach:* • *1) It is unclear whether baseline concentrations for historical tailings were measured at different depths. This is an important factor because concentrations of contaminants likely vary across depth. Concentration values from shallow tailings would be biased conservatively due to dilution of contaminants from recharge. Concentration values from deeper tailings would more accurately reflect concentrations in long-term tailings porewater.* • *2) It appears that the mean concentration across the entire tailings depth profile was used to derive groundwater mass loadings. The Agency is unsure about why the mean concentrations were considered more appropriate to use than the concentrations in the deeper portions of the tailings.* • *It is important to understand the geochemistry of the historical tailings in order to evaluate the changes in water quality and effects on fish and fish habitat.* ***Specific Question/ Request for Information:*** *A. Clarify whether the baseline concentrations from historical Little Long Lac, MacLeod and Hardrock tailings were measured at different depths;* *B. Provide a rationale for why the mean concentrations across the entire tailings depth profile is considered more appropriate to use than the concentrations in the deeper portion of the tailings.*	***N/A***
		Response: A. The monitoring network at the historical Little Long Lac, MacLeod, and Hardrock tailings comprise nested monitoring wells that were completed at various depths within the tailings. The Little Long Lac tailings were sampled by Geocon (1996) and those data were referenced in the Final EIS/EA (Chapter 9 – Groundwater). The historical MacLeod and Hardrock tailings were sampled as part of the Project. The following table is a summary of the minimum and maximum sampling intervals at each of the historical tailings relative to the maximum observed depth of tailings. The concentration of mean arsenic within the historical tailings varied spatially with an overall trend of increasing concentration with depth. For example, within the MacLeod historical tailings the mean concentration of arsenic ranged from 177 µg/L to 29,980 µg/L at a sample interval that extends to 5 m below ground surface (BGS) compared to a range of 6,742 µg/L to 40,350 µg/L at a sample interval of about 10 m BGS.	***N/A***

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Historical Tailings Location	Shallowest Sampling Interval	Deepest Sampling Interval	Maximum Observed Depth of Tailings*
Little Long Lac**	0.3 m to 1.3 m BGS	3.1 m to 3.4 m BGS	3.4 m BGS
MacLeod	0.4 m to 2.0 m BGS	8.2 m to 11.3 m BGS	12.9 m BGS
Hardrock	0.4 m to 1.8 m BGS	3.3 m to 4.5 m BGS	4.7 m BGS

Notes:
*: based on available monitoring well logs
**: the Little Long Lac tailings were not sampled as part of the Project. Data are summarized from Geocon (1996) report.
BGS: below ground surface

Reference

Geocon, Division of SNC-Lavalin Environmental Inc. (Geocon). 1996. Lac Properties Rehabilitation Project Geraldton Area, Tailings Area Preliminary Investigations Report (Draft). July 1996

B. The use of mean concentrations for comparison of groundwater quality data to the PWQO, APV, and ODWQS, was discussed with agency and stakeholder groups in Fall 2016 and Spring 2017. These discussions focused around the use of the median versus the mean in the analysis. Groundwater quality was found to vary both horizontally and vertically within the tailings, with higher concentrations for most parameters typically found at depth within the tailings. This variability is evident when comparing the mean and median concentrations for the PoPC within each historical tailings source. A thorough review of the data determined that the mean concentrations of the parameters analyzed were predominantly higher than the median concentrations. Therefore, the mean was used as the more conservative existing condition and predictive value.

The following table highlights the mean, median, and 75th percentile of groundwater quality data for arsenic associated with the historical tailings.

Concentration of Arsenic (µg/L)

Historical Tailings	Number of Wells	Mean	Median	75th Percentile
MacLeod	25	10,523	5,180	18,750
Hardrock	13	11,207	3,430	25,600

A good fit to the observed mass loading within Kenogamisis Lake based on the mean groundwater concentrations was observed in the mass balance modelling presented in Chapter 10.0 (surface water) and in the STELLA mass balance modelling (Appendix F13) of the Final EIS/EA. The results of the statistical analysis are that the model predictions tend to be slightly conservative through most of the prediction range, which was a specific objective during the model calibration process (i.e., to satisfy requirements of the EIS and Human Health and Ecological Risk Assessment processes, the model predictions should be reasonable, with a tendency to be conservative).

A sensitivity analysis of the total loadings to Kenogamisis Lake on the prediction of total arsenic concentration in water was also completed to address MOECC comments. A conclusion of the sensitivity analysis was that the use of alternative values that result in higher total arsenic concentrations in the water, such as the 75th percentile are overly-conservative. Further discussion regarding the sensitivity analysis of the STELLA mass balance modelling and the fit with the use of mean concentrations is provided in the attached memo "Response to Key Information Requests regarding Water Hardrock Project, Greenstone Gold Mines".

The use of the mean concentrations provides a reasonable and reliable estimation of the overall mass loading in groundwater that is actually discharging to the lake.

<table>
<tr><th>Comment Number</th><th>Report Section</th><th>Agency Comment and GGM Response</th><th>Agency Follow-up Comment and GGM Response</th></tr>
<tr><td rowspan="2">CEAA_15

IR Number: FH(1)-11</td><td rowspan="2">Section 9.2.2.3; Section 9.2.2.7; Appendix F4, Section 3.2.6.</td><td>Context and Rationale:
• Section 9.2.2.3 provides the hydraulic conductivity values (“K values”) for shallow bedrock. These K values were measured at “depth intervals of 2.5 to 40 m”. However, Appendix F4, Section 3.2.6 identified shallow bedrock to be “approximately 10 m thick”.
• It is unclear if the K values assigned to shallow bedrock are based on those measured to a depth of 10 metres or deeper. K values at depths greater than 10 metres should not be included in this shallow bedrock dataset as these would be more representative of deeper bedrock and could result in an underestimation of the appropriate K value.
• This information is important to understand, as K values are used to estimate travel times that it may take for the effluent to reach surface water bodies and potentially affect fish and fish habitat.

Specific Question/ Request for Information:
A. Clarify the depth at which K values were measured for shallow bedrock;

B. Provide K values up to a depth of 10 m and discuss how these K values compare to those used as initial and calibrated values for the groundwater model;</td><td>N/A</td></tr>
<tr><td>Response:

Hydraulic conductivity was measured at bedrock monitoring wells and exploration holes that extended from 1.7 m to 720 m below ground surface (Table 7.1 of Appendix E3.2 and Table 5-1 of Appendix E3.1 of the Final EIS/EA).

A summary of existing conditions for groundwater is provided in Section 9.2 of the Final EIS/EA. In the summary of existing conditions, bedrock was described and categorized as shallow (i.e., less than 40 m thick) or deep (i.e., greater than 40 m thick), and associated ranges of hydraulic conductivity were provided.

For the purpose of the groundwater flow model (Appendix F4 of the Final EIS/EA), the bedrock was divided into four categories, as it is recognized that the hydraulic conductivity of bedrock can vary over several orders of magnitude and a refined level of detail is required to construct a representative groundwater flow model. Bedrock in the groundwater flow model was defined as presented in the table below, along with the range of hydraulic conductivity and calibrated hydraulic conductivity:

<table>
<tr><th>Bedrock Unit</th><th>Depth</th><th>Expected K Range (m/s)</th><th>Calibrated K (m/s)</th></tr>
<tr><td>Shallow Bedrock</td><td><10 m</td><td>3×10^{-7} to 1×10^{-2}</td><td>6.3×10^{-5}</td></tr>
<tr><td>Upper Bedrock</td><td>10 m to 50 m</td><td>6×10^{-9} to 2×10^{-5}</td><td>6.0×10^{-9}</td></tr>
<tr><td>Intermediate Bedrock</td><td>50 m to 200 m</td><td>6×10^{-9} to 6×10^{-6}</td><td>6.0×10^{-9}</td></tr>
<tr><td>Deep Bedrock</td><td>>200 m</td><td>$<7\times10^{-9}$ to 2×10^{-7}</td><td>1.0×10^{-9}</td></tr>
</table>
Note: K=hydraulic conductivity</td><td>N/A</td></tr>
<tr><td>CEAA_16

IR Number: FH(1)-12</td><td>Section 9.2.2.6.</td><td>Context and Rationale:
• There may be changes to water quality and effects on fish and fish habitat from deposition and resuspension of sediments in various project components.
• Section 9.2.2.6 describes the reduction in concentration of parameters of potential concern (PoPCs) in groundwater seepage coming out of historical MacLeod high tailings. It states that “these data support the natural attenuation of these redox sensitive PoPCs as groundwater discharges to surface water receivers and geochemical controls result in precipitation and removal of parameters that are only mobile in reducing environments”.
• As groundwater discharges to surface water features, some contaminants can precipitate to sediment. This contaminated sediment can then become problematic for biota in the water. Additionally, they are also a source for sediment-water interactions, as the precipitated contaminants can re-dissolve or be re-suspended in the water column. This information was not found in Chapter 9, 10 or Appendix F4, F6 and E14. The sediment</td><td>N/A</td></tr>
</table>

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		water interactions should be considered to ensure that the loading of contaminants in water are not underestimated and the effects to fish and fish habitat are minimized. ***Specific Question/ Request for Information:*** *A. Identify the contaminants with potential to precipitate to sediment as groundwater discharges to surface water receivers, and contaminants that can re-dissolve or re-suspend in the water column;* *B. Describe the changes in water quality and sediment from precipitation, re-dissolving or re-suspending each contaminant identified in Question A;* *C. Provide the effects on fish and fish habitat, if applicable, due to changes in water quality as described in Question B;* *D. Describe mitigation measures to prevent adverse effects on fish and fish habitat, if necessary;* *E. Characterize residual effects, if any, after the mitigation measures have been implemented;* *F. Reassess the significance determination, if necessary, taking responses from Questions A to E into account;* *G. Update the follow-up program for potential effects to fish and fish habitat, including objectives and any monitoring measures that will be implemented to verify the predictions of effects and evaluate the effectiveness of the proposed mitigation measures. If follow-up is not required, provide a rationale.*	
		Response: A. Groundwater passing through mine tailings may contain a number of trace elements including metals (e.g., iron, manganese, copper) and metalloids (e.g., arsenic) at concentrations that are above what might be considered background. Of these, iron and manganese are notably sensitive to changes in oxidation/reduction potential (redox), transitioning from water-soluble species at low redox potential, to precipitate at higher redox potential. The precipitation of amorphous iron oxides under changing redox conditions creates a rusty "floc" that can also bind or co-precipitate other trace elements, including heavy metals and arsenic. Precipitation of iron and manganese oxides is a reversible process, with release of soluble species occurring should the redox potential fall below certain thresholds. For a full explanation of the exchange of dissolved substances between lake sediments and water, the reader is referred to the foundational studies of Mortimer (1941, 1942). Classical hydrological theory states that lakes and streams represent the surface expression of the water table, and that most of the groundwater flow and flow paths from upland areas should terminate at watercourses, or near the shorelines of lakes (although deeper flow paths would extend farther into the lake). Kenogamisis Lake is of sufficient size that this would reasonably hold true. Therefore, in the absence of confining layers, most of the groundwater flow passing through mine tailings and waste rock deposits should terminate close to the shorelines of Kenogamisis Lake. If the groundwater undergoes a positive shift in redox potential as it transitions through the lake bed and enters the lake, this may result in the local accumulation of iron, manganese, and other trace elements in the near-shore areas of Kenogamisis Lake. However, this is not an instantaneous or perfectly efficient process, and it is likely that most of the trace metal loading will pass into the lake, and be mixed throughout the waters of the lake (i.e., only a fraction of the overall loading will be deposited locally). From a water quality perspective, Parks Environmental Inc. (2011) identified arsenic, iron and phosphorus as the elements having the greatest number of Provincial Water Quality Objective exceedances (note that treated municipal sewage effluent discharged to Barton Bay East represents a substantial source of phosphorus loading to the lake). Measurement of trace metal concentrations in certain surface sediment grab samples taken from Kenogamisis Lake in 2011 (Parks Environmental Inc., 2012; Appendix E14 of the Final EIS/EA) shows much higher concentrations of iron (>50,000 mg/kg) in sediments collected from Barton Bay East close to the former MacLeod Tailings (i.e., samples 13, 14, 16, 17 and 18), than elsewhere in Kenogamisis Lake (where values in the Southwest Arm and Outflow Basin ranged from 4,030 to 26,600 mg/kg) or Mosher Lake (where values ranged from 6,200 to 11,300 mg/kg). B. Using arsenic as an example, as it is the element that shows the strongest enrichment in the lake water that can be attributed to the historical mining activities, a detailed modelling effort was carried out to understand how arsenic concentrations will change in future as a result of the Project. This modelling effort (Stantec 2018) showed	***N/A***

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		that only a small fraction of the overall arsenic loading to the individual sub-basins of Kenogamisis Lake is attributable to either the release of arsenic from sediment to water, or the re-suspension of arsenic with sediment solids, from the sediment to the water. Particulate arsenic (including arsenic that has been recently accumulated by phytoplankton or zooplankton, as well as re-suspended bed sediments) typically makes up less than 10% of the total arsenic in the lake water (Parks Environmental Inc., 2011). For each sub-basin of the lake, the predominant sources of arsenic to the lake water are direct loadings from upstream areas (including tributary streams, groundwater, or upstream lake sub-basins). Release of arsenic from sediments to the overlying water represents only a small fraction of the overall arsenic budget of the lake. The same conclusion can be expected to apply to iron, chromium and copper. For the sediments, the principal source of arsenic is deposition from lake water to sediment as a result of the binding of arsenic to particulate matter in the water column, and sedimentation of the particulate matter. In Barton Bay East, where the MacLeod tailings introduce a substantial groundwater source to the lake bed (raising the possibility of direct precipitation of iron, arsenic, and other trace elements to the sediments at or near the area of groundwater seepage), total surface sediment arsenic concentrations measured by Parks Environmental Inc. (2012, Appendix E14 of the Final EIS/EA) ranged from 262 to 1,020 mg/kg, with the highest values being recorded close to the MacLeod tailings, and the lowest value (Station 15) being recorded near the mouth of Hardrock Creek (draining the Geraldton townsite, and where the municipal sewage outfall discharges). The sediment at Station 15 also contained the lowest iron concentration of reported sediment samples from Barton Bay East, as well as traces of boron, an indicator chemical for many household detergent products. Sediments will always show variation in trace element concentrations as a consequence of variation in local depositional patterns, local sources, and post-depositional mobility. In Barton Bay East, there is an area of enrichment in proximity to the toe of the MacLeod tailings. However, this enrichment is less than a factor of two relative to the average sediment arsenic concentration in this sub-basin, and the situation for iron, chromium and copper is even less pronounced. Therefore, changes in sediment quality from precipitation, re-dissolving or resuspension of contaminants are modest. It is important to note, however, that the environmental effects described above are part of the existing environment for the Project. They originate as a consequence of historical mining activity, and are unrelated to the Project, which will result in a net improvement of water and sediment quality during operation and into closure. The significant net positive effect that is predicted can be attributed to Project design measures addressing historical tailings in the Project Development Area, thereby meeting the intent of the MOECC Policy 2 designation for Kenogamisis Lake. C. The Project will result in a net improvement of water and sediment quality in Kenogamisis Lake during operation and into closure. Stantec (2018) provides a detailed analysis for arsenic concentrations in lake water and sediment between the start of Project activities, and the year 2100 (well into the post-closure period). With the exception of Barton Bay West (which lies upstream from the Project area, will not be affected by Project activities, and is assumed to continue in a condition similar to present-day conditions), substantial overall reductions in total arsenic concentrations are predicted for Barton Bay East, the Central Basin, and the Outflow Basin. In Southwest Arm there will be a very small, and temporary increase in total arsenic concentrations in the lake water (due to the discharge of treated mine effluent during mine operations), which will be more than offset by decreases in total arsenic concentrations elsewhere in the lake. Arsenic concentrations in the Southwest Arm will revert to concentrations similar to present-day when mine operations cease, and the mine enters closure and post-closure phases. For lake sediment, a combination of reduced external loadings and continued internal cycling of arsenic from sediment to water will result in gradual reductions of the sediment arsenic concentrations in Barton Bay East, Central Basin, Outflow Basin and Southwest Arm. The effects described here (and in more detail in Stantec 2018) represent significant net positive effects that can be attributed to Project design measures addressing historical tailings in the Project development area. D. As described above, the Project by design includes measures to address historical tailings in the Project Development Area, and will result in a net improvement of lake water and sediment quality. Additional mitigation measures are not necessary. E. As described above, the residual environmental effects of the Project on lake water and sediment quality are considered to be not significant and positive.	

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		F. The Summary of Residual Environmental Effects on Fish and Fish Habitat, and the Determination of Significance, can be found in Sections 11.4.5 and 11.5 of the Final EIS/EA. The environmental effects described are those that are expected to occur within a small area of Kenogamisis Lake, effectively the mixing zone where treated mine effluent will be released into the Southwest Arm. The assessment of environmental effects takes little or no credit for environmental benefits that will accrue in Barton Bay East, the Central Basin, and the Outflow Basin, as a result of Project design measures addressing historical tailings in the Project Development Area. On this basis, no changes are required to the significance determination. G. Follow-up monitoring plans for the aquatic environment are described in Section 8 of the document: "Conceptual Management and Monitoring Plan" report (Appendix M12 of the Final EIS/EA). Associated with this Section are Appendices A through G, describing key aspects of the aquatic monitoring program as follows: • Appendix A: Kenogamisis Lake fish community monitoring • Appendix B: Fish tissue sampling • Appendix C: Benthic community monitoring • Appendix D: Sediment monitoring • Appendix E: 2016 Aquatic vegetation monitoring • Appendix F: 2016 Plankton and periphyton monitoring • Appendix G: 2016 toxicity monitoring. No changes are required to the proposed follow-up monitoring program. **References** Mortimer, C.H. 1941. The exchange of dissolved substances between mud and water in lakes, Sections I and II. Journal of Ecology 29: 280-329. Mortimer, C.H. 1942. The exchange of dissolved substances between mud and water in lakes, Sections III and IV. Journal of Ecology 30: 147-201. Parks Environmental Inc. 2011. Hardrock Project – Kenogamisis Lake Water Quality Report. Report prepared for Premier Gold Mines Ltd., October, 2011. Stantec. 2018. Update to: Mass Balance Modelling of Arsenic Concentrations in Water and Sediment of Kenogamisis Lake, Geraldton, Ontario. Report prepared for Greenstone Gold Mines GP Inc., February 1, 2018.	
CEAA_17 *IR Number: FH(1)-13*	*Section 5.9.3.2; Section 9.4.3.3.*	***Context and Rationale:*** • *Section 9.4.3.3 states that "once the pit lake has filled and begins to discharge (Year 33), 23% of the groundwater recharge from WRSAs [waste rock storage areas] A to C will continue to discharge to the open pit, with the balance discharging to surface water features."* • *It is noted in Section 5.9.3.2 that once the pit lake has filled, it will be connected with Southwest Arm of Kenogamisis Lake "through a channel", thereby making the open pit a "surface water feature". Thus, all groundwater recharge from these WRSA A and C will be discharged to a surface water feature and could potentially contribute additional loadings of contaminants to Southwest Arm of Kenogamisis Lake.* • *It is important to ensure that the EIS clearly reflects all contaminant loadings to surface water features and assesses potential changes to water quality adequately in order to assess the effects on fish and fish habitat.* ***Specific Question/ Request for Information:*** *A. Revise the water quality analysis to reflect that after year 33, all drainage and associated loadings from WRSAs A and C and the pit lake will ultimately discharge into the Southwest Arm of Kenogamisis Lake;* *B. Describe the changes in water quality at Southwest Arm of Kenogamisis Lake after consideration of loadings from WRSAs A and C and pit lake;* *C. Provide the effects on fish and fish habitat, if applicable, due to changes in water quality as described in Question B;* *D. Describe mitigation measures to prevent adverse effects on fish and fish habitat, if necessary;*	***N/A***

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		E. Characterize residual effects, if any, after the mitigation measures have been implemented; *F. Reassess the significance determination, if necessary, taking responses from Questions A to E into account;* *G. Update the follow-up program for potential effects to fish and fish habitat, including objectives and any monitoring measures that will be implemented to verify the predictions of effects and evaluate the effectiveness of the proposed mitigation measures. If follow-up is not required, provide a rationale.*	
		Response: A - B: Chapter 10 of the Final EIS/EA describes water quality in the Southwest Arm and open pit in post closure. Loadings to the Southwest Arm are provided in Table 10-42 for each phase of the Project and are broken down into line items (sources of loadings), including "Open Pit Lake Discharge Loadings" during post closure. When the open pit reaches its design water level (elevation 331 m), surface water discharge to the Southwest Arm will commence from the upper freshwater layer via an outlet channel /spillway and is expected to meet acceptable discharge criteria as defined in O. Reg. 240/00. Water collected from the WRSAs will be released overland to the environment, subject to meeting permit requirements, or routed through constructed wetlands, if required. The water quality assessment has also incorporated acid rock drainage/metal leaching (ARD/ML) predicted loadings and parameter concentration estimates in local receivers in the closure phase. Predicted loading from the WRSAs, ore stockpiles, pit lake discharge in post-closure are presented in Table 10-42 of the Final EIS/EA. Thus, no revision is required. C – G: Reassessment and updates are not required because the drainage of the pit lake to the Southwest Arm has been accounted for in the Final EIS/EA.	***N/A***
CEAA_18 *IR Number: FH(1)-14*	*Section 9.4.1.1; Appendix C10; Appendix E6.2, Section 3.2.*	***Context and Rationale:*** • The timing and the use of data obtained from the field kinetic testing program is unclear. Appendix E6.2 Section 3.2 states that "The field kinetic testing program initiated in 2013 will continue through 2017". Appendix C10, response to Agency comment • *FH(0)-46 (CEAA_56) further states that "after a review of the 2016 and 2017 results, modification to the testing program will be completed as required". It is unclear whether the field kinetic testing program will cease in 2017. Also, it is unclear under what conditions that modifications be considered required or necessary, and what these modifications would entail.* • *Section 9.4.1.1 indicates that "no reduction in loading due to precipitation reactions or reduction in oxidation kinetics are applied for the historical tailings, WRSAs [waste rock storage areas], ore stockpile, and tailings management facility (TMF) beyond those estimated from the 2015 geochemical testing program and field data. 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". The extent of conservatism built into this approach is unclear, as it appears that decreases in loadings have been applied using two years of data available up to 2015. This does not appear to encompass a possible scenario of metal leaching unexpectedly increasing over time.* • *Geochemical investigations, including field kinetic testing programs, should continue to be undertaken to gain a better understanding of the long-term geochemistry over the life of the mine operations and as closure activities are undertaken. Ongoing monitoring of the geochemistry will help to inform final closure objectives and strategies.* • *This information is important to understand changes in water quality that may be caused due to metal leaching and the corresponding effects on fish and fish habitat.* ***Specific Question/ Request for Information:*** *A. Provide a timeline for the field kinetic testing program and include a rationale for the proposed timeline;*	***Context and Information Required for a Complete Response:*** • *The response does not adequately address Parts B and C of the information requirement (IR). Revise the response to describe the conditions under which the modifications to the field kinetic testing program will be considered, and the measures that will be taken if the results of testing programs show an unexpected increase in metal leaching over time.*

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		B. Describe the conditions under which the modifications to the field kinetic testing program will be considered required or necessary and explain what these modifications will involve; *C. Describe what measures will be taken if the results of ongoing field kinetic testing program show an unexpected increase in metal leaching over time.*	
		Response: A. – C. Currently, there are 28 field tests running at the site. 2016-2017 results continue to show declining trends in metal leaching. Testing of these samples will continue in 2018 to monitor the declining trend, and some of tests may be discontinued in 2019 where the bins stabilize at lower metal leaching rates. Testing will likely be replaced with a new program under the waste rock management plan once waste rock extraction commences for the Project.	**Response:** B. The conditions under which the modifications to the existing field kinetic testing program may be considered are: • if field tests show a declining or stabilizing trend for sulphate and metal leaching rates • when existing field tests are replaced with larger scale operational testing and monitoring as WRSAs are constructed and operation monitoring is initiated. C. If the results of field kinetic testing program show an unexpected increase in metal leaching over time, the cause of this increase will be investigated and its effect on water quality will be evaluated using the water quality model. If the results of the water quality model show a significant adverse effect on the receiving environment, adaptive management measures will be evaluated, selected and implemented. Examples of these measures include water treatment (active and/or passive) and/or the potential for segregation of waste rock with high metal leaching potential and management to reduce metal leaching. This could include preferential use for backfill of the eastern portion of the open pit where drainage is capture and treated until filling of the open pit reduces oxygen exposure, or placement within the new tailings facility as an internal berm. These measures will reduce oxidation reactions and metal leaching potential.
CEAA_19 *IR Number: FH(1)-15*	*Section 5.4.15.1; Appendix M1, Section 3.2.*	***Context and Rationale:*** • *Section 5.4.15.1 states that "the proposed treatment process will include addition of ferric sulphate (Fe2(SO4)3) and recycled sludge from a clarifier to form a floc of ferric hydroxide (Fe(OH)3) which acts to tie colloidal particles together and as an active surface which forms surface complexes with many metals, such as arsenic. Sulphuric acid or sodium and potassium hydroxide can also be added to optimize the pH for arsenic removal (the optimum pH for arsenic removal depends on the arsenic speciation)."* • *Arsenic precipitation is a complex process that has the potential to build-up a large volume of contaminated sludge. Moreover, this process is strongly dependent on pH and on the oxidation state of the iron, as only ferric iron (Fe3+) can complex with arsenic. It can then become difficult to control the treatment of large volumes of effluent and achieve efficient arsenic removal to meet the discharge requirements.* • *More information is needed about the volume and quality of sludge that will be generated. Insufficient details are provided in Chapter 5 or Appendix M1 regarding the arsenic precipitation and sludge recirculation process. This information is required to ensure that the effluent meets the discharge criteria and adverse effects on fish and fish habitat can be minimized.* ***Specific Question/ Request for Information:*** *A. Describe what measures will be taken to control the arsenic precipitation and sludge recirculation process in order to ensure that the volume and quality of built-up sludge will not hinder the treatment plant's ability to meet the effluent discharge requirements.*	***N/A***
		Response: A. The question is odd from an EA perspective because GGM will be required through permits to meet the effluent discharge limits and a well- established proven technology has been presented in the EIS/EA and supported by MOECC. It is also important to note that the EIS/EA conservatively gives little credit to having a treatment plant in place. For example, Pond M1 water quality (pre-treatment) is not substantially different than the concentrations used to assessment effects on the receiving environment, and therefore the ETP is expected to provide more environmental benefit than what's accounted for in the Final EIS/EA.	***N/A***

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		The selected treatment process will be subject to detailed engineering and the competitive bidding process. However, GGM is proposing to use the coagulation / filtration method, which is comprised of three principal unit processes for the permanent water treatment plant: • Metal precipitation – A 'reactor" with the addition of ferric sulphate and recycled sludge to form a "floc" of ferric hydroxide to enhance arsenic adsorption; • Clarification – The clarification process contains two compartments, a mixing area with flocculant and sand addition, and a settling tank (lamella) which provides the rapid and effective removal of the microsand/sludge flocculant; and • Polishing - Combination of an inter-coagulation tank (which can include minor addition of reagents to remove additional suspended solids) and a disc filter using filter cloth on panels. Reduction efficiencies for arsenic treatment are proven and the selected treatment plant will meet applicable discharge requirements, as will be specified in contractual performance requirements for the selected vendor. The arsenic precipitation and sludge recirculation will be controlled by the following: • GGM is currently considering a number of suppliers for the effluent treatment plant (ETP); all those being considered are reputable suppliers with a proven track history of performance in mining applications. • An additional processing step will be added, if necessary, to oxidize the arsenic in the feed solution (arsenite to arsenate) to increase arsenic precipitation effectiveness. • The ETP facilities will be highly automated with continuous data collection including: flow, pH, and turbidity during the effluent treatment process, and pH and turbidity prior to discharge. The facilities will have automatic sludge recycle capabilities to the metal precipitation area (reactor). • The ETP will be monitored and controlled by the process control room operator 24 hours a day, 7 days a week in the plant site main control room via programmable logic controllers (PLCs) with a series of alarms and shutdown systems to indicate when an upset condition exists within the ETP. To ensure the ETP is operating as per design, the following actions will be taken: • A training program will be developed to certify operators and maintenance personnel. • Expert assistance from the vendor will be utilized for commissioning and start-up assistance to ensure a smooth start-up. • The plant will be highly automated to enable stable continuous operation. • In the event that the plant deviates from normal control parameters. pre-established alarms levels will be set-up for critical control items such as pH and turbidity to ensure a timely response and adjustment. In terms of volume, estimates from vendors of the preferred treatment system indicate that approximately 2% of the treated volume of water would be produced as a waste stream and consist of process water with a low to moderate solids content (referred to as sludge). At this time, thickening of this waste stream to create a higher solids content sludge has not been confirmed in the design and it is assumed that this waste stream will be directed to the tailings distribution box within the process plant and directed to the TMF through the tailings slurry pipeline. At expected flow rates and arsenic removal efficiencies, the ETP is expected to generate total arsenic concentrations in sludge of approximately 1 kg/day in the form of a ferric sulphate/hydroxide precipitate. In comparison to the arsenopyrite concentration within the new tailings to be deposited within the TMF, the arsenic in sludge from the ETP represents a very small amount at less than 0.004% and will not have an effect on tailings seepage quality. The other source of sludge to the TMF is from the cyanide detoxification process, which will result in the precipitation of metals and arsenic removal, primarily as an iron hydroxide precipitate. Based on metallurgical testing results, it is estimated that the cyanide detoxification process will result in the removal of approximately 37 kg/day of arsenic in the form of iron hydroxide precipitates and is the primary source of arsenic in sludge to be deposited in the TMF. The geochemical testing program has considered the effect of this oxidized form of arsenic during the subaqueous column tests that were used to predict the quality of leachate from the tailings in the TMF. The samples for the subaqueous column tests were obtained from the metallurgical testing program following cyanide detoxification and include the volume of sludge generated from the process within the tailings volume. From the testing program, an arsenic concentration in leachate from the columns of 66 µg/L was reported and is	

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		reflective of accelerated leaching under an anaerobic condition. This concentration was used in the estimates of seepage quality from the TMF and in the effects assessment for predicting loading from the TMF to Kenogamisis Lake, which resulted in the conclusion that the seepage from the TMF did not represent a significant adverse environmental effect on water quality within the lake and was a very small percentage of the loading to Kenogamisis Lake.	
CEAA_20 *IR Number: FH(1)-16*	*Appendix F5, Section 5.1.1; Appendix F5, Section 5.1.3.7.*	***Context and Rationale:*** • *Appendix F5, Section 5.1.1 states that "as groundwater from the historical tailings is predicted to discharge to the open pit and the subsurface seepage collection system, precipitation of ferrous iron as iron hydroxides will result due to oxidizing conditions. The precipitation of iron hydroxides will adsorb other trace elements, such as arsenic, resulting in reduced concentrations of these elements in surface water."* • *It is unclear how ferrous iron (Fe^{2+}) will adsorb arsenic and form ferric hydroxide. To substantiate this claim, a speciation modelling of iron oxidation and arsenic adsorption in groundwater from historical tailings discharging to the open pit is required.* • *In addition, Appendix F5, Section 5.1.3.7 states that "at closure the open pit will be filled with water to form a permanently stratified pit lake with the lower portion of the lake chemically and physically disconnected from the upper portion". No contingency measures are identified in the EIS in case a permanently stratified pit lake cannot be achieved through the proposed open pit filling.* • *This information is important to understand as the pit lake is proposed to ultimately be connected with Southwest Arm of Kenogamisis Lake, where it can cause degradation of water quality and affect the fish and fish habitat.* ***Specific Question/ Request for Information:*** *A. Provide a speciation modelling of iron oxidation and arsenic adsorption in groundwater from the historical tailings discharging to the open pit;* *B. Describe contingency measures for a situation where the pen pit cannot be permanently stratified and the lower portion of the pit lake cannot be chemically disconnected from the upper portion.*	***N/A***
		Response: A. The sentence "*as groundwater from the historical tailings is predicted to discharge to the open pit and the subsurface seepage collection system, precipitation of ferrous iron as iron hydroxides will result due to oxidizing conditions. The precipitation of iron hydroxides will adsorb other trace elements, such as arsenic, resulting in reduced concentrations of these elements in surface water.*" can be clarified by the following reaction showing speciation of iron and arsenic: $Fe^{2+} + As(V) + 2.5H_2O + 0.25O_2 \rightarrow Fe(OH)_3 \times As_{(Ferrihydrite\ with\ adsorbed\ As\ V)} + 2H^+$ This reaction was quantified by geochemical modeling performed in Geochemists Workbench software. The inputs and results of the modeling including element speciation can be found in Appendix B2 of the Water Balance and Water Quality Report (Appendix F5 of the Final EIS/EA). B. The pit lake will be stratified artificially by creating layers with significantly different chemistry and therefore densities. The thickness and densities of these layers are able to withstand destratification under extended extreme wind, which is most common reason for natural mixing of pit lakes. The pit lake will maintain stability at hourly wind speeds as high (72 km/h). Wind speeds of this magnitude have not been observed for prolonged periods in weather records at the Geraldton airport (1971-2010). In addition, the surface of pit lake will be sheltered from wind by waste rock piles surrounding the open pit. Literature indicate that permanent stratification is re-established by next spring after artificial mixing on meromictic lake (Pieters and Lawrence, 2013). Concentrations of POPCs in the pit lake are low (e.g. Arsenic 42 µg/L) and include the conservative assumptions incorporated throughout the EA and therefore are not expected to be a concern. Monitoring will take throughout the LOM and the pit lake model will be updated periodically as part of the MNDM closure planning process. Contingency measures to further treat pit lake discharge water quality if required were included in the EIS including routing discharge through a constructed wetland meet closure discharge criteria. Ultimately GGM	***N/A***

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		will be required to meet closure discharge criteria and the Project includes an ETP, which will remain in place until no longer required. **References** R. Pieters and G. Lawrence, 2013. Circulation of Zone 2 Pit-Lake, Colomac NWT. Report prepared for Contaminants and Remediation Directorate of AANDC.	
CEAA_21 *IR Number: FH(1)-17*	*Appendix E6.3, Section 3.2.*	***Context and Rationale:*** • *Appendix E6.3, Section 3.2 states that "Total concentrations of trace elements were measured in 264 samples. This testing involved aqua-regia digestion of pulverized samples followed by Inductively Couples Plasma Mass Spectrometry (ICP-MS) analysis".* • *Aqua regia provides a partial and incomplete digestion, and this method is weaker than alternative wet acid digestion methods because it would not be able to digest a number of contaminants of concern. This may result in an underestimation of contaminant concentrations.* • *This information is important to ensure that concentrations of contaminants are sufficiently considered in the effects assessment for water quality and fish and fish habitat.* ***Specific Question/ Request for Information:*** *A. Provide a rationale for using aqua regia to conduct a partial digestion of samples, instead of a total digestion method.*	***Context and Information Required for a Complete Response:*** • *The response does not adequately address the information requirement (IR). Revise the response to provide a rationale for conducting partial digestion instead of total digestion.*
		Response: A. Aqua regia was selected to be consistent with the exploration methods. Total concentrations of trace elements were used for initial screening and correlation with leachable metals. Potential parameters of concern were more accurately determined by kinetic tests and water quality modeling, as discussed in detail in the Geochemistry Baseline Report (Appendix E6.1) and the Water Balance and Water Quality Report (Appendix F5).	**Response:** Aqua regia is a method discussed in the *Prediction Manual for Drainage Chemistry (Manual) from Sulphidic Geologic Materials* (Price 2009) and is widely used by geochemists in recent mining EAs in Ontario (e.g., Rainy River Gold Mining Project). Based on page 10-6 of the manual, "Aqua regia is effective solvent for most base metal sulfates, sulfides, oxides and carbonates…". These forms of base metal and metalloids are of the key minerals for the Project and the ARD/ML study. The additional advantage of this method is to reduce the risk of volatilizing of Arsenic, Antimony and Sulphur which can be an issue for fusion (for XRF detection) or acid digestion methods, which are methods considered to be closer to "total digestion". **Reference:** Price, W.A. 2009: Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials, Report prepared for MEND. Report 1.20.1, p. 1-579.
CEAA_22 *IR Number: FH(1)-18*	*Appendix E6.3, Section 4.4.1.*	***Context and Rationale:*** • *Appendix E6.3, Section 4.4.1 states that "linear regression between measured and calculated results show that calculated sulphur is 26% higher than measured sulphide sulphur, indicating uncertainty in sulphide sulphur measurement. […] Since calculated sulphide sulphur is higher than measured sulphide sulphur (Figure 4-1), Acid Potential of the tailings was derived from calculated sulphide sulphur (Equation 3-1) as a measure of conservatism".* • *This conservatism in the estimate of acid rock drainage (ARD) potential may result in a higher-than-necessary volume of non-potentially acid generating (NPAG) material directed to the tailings management facility (TMF), for neutralization, increasing the total volume of material in the TMF.* • *It is unclear whether the TMF is designed to handle the potentially overestimated volume of materials that may be required in the TMF to neutralize the PAG materials. If not, it is unclear whether efforts have been made to reduce the uncertainty in the sulphide sulphur measurements followed by a re-evaluation of management of PAG material.* • *This information is important to understand the changes in water quality that may be caused by handling of PAG and NPAG material and the corresponding effects on fish and fish habitat.* ***Specific Question/ Request for Information:***	***Context and Information Required for a Complete Response:*** • *The response does not adequately address Part A of the information requirement (IR). Revise the response with a direct response to whether the TMF has the capacity to handle resulting higher portions of non-PAG material directed to the TMF.* • *The responses to part B will be reassessed upon revision of the response to Part A.*

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		A. Describe whether the TMF has the capacity to handle the volume of materials that may be required to neutralize the potentially overestimated PAG materials. *B. If necessary, describe how the uncertainty associated with sulphide sulphur measurements could be reduced, and how this reduction could change the management approach of PAG and NPAG materials in the TMF.*	
		Response: A./B. The discussion is related to the earlier ARD classification of tailings presented in Appendix E6.3 of the Final EIS/EA and based on several composite samples of tailings generated from metallurgical testing. The Supplemental 2015 Geochemistry Data Report (Appendix E6.2 of the Final EIS/EA, Section 5.4.1) presents current estimates based on block model for total sulfur measured in a few thousand samples of ore. The use of total sulfur results is more conservative for ARD classification and eliminates uncertainty associated with sulfide sulphur measurement. The estimated percentage of PAG tailings is ranges between 7.2 and 9.7%, which indicates that over 90% of tailings in TMF will have excessive neutralization capacity to buffer PAG materials. This range is considered in the proposed tailings management and closure plan.	**Response:** A. The TMF has been designed to manage all of the tailings to be generated by the Project, regardless of whether the tailings are classified as PAG or bon-PAG tailings. From a closure perspective, the greater volume of non-PAG tailing is of benefit in closure as it reduces the potential for ARD conditions and simplifies the closure process. The small volume of PAG tailings (7.2 to 9.7%) can easily be managed within the TMF and there is more than sufficient neutralization potential. No change in the TMF design is required and the entire volume of tailings can safely be managed during operations and closure.
CEAA_23 *IR Number: FH(1)-19*	*Appendix M2, Section 5.0.*	***Context and Rationale:*** • *Appendix M2, Section 5.0 states that "Construction of project components, such as roads or pads for the process plant area, may use non-potentially acid generating (non-PAG) rock with low metal leaching (ML) potential". It is unclear what threshold is used to define "low" metal leaching (ML) potential.* • *It is further noted in the same section that "to develop criteria for identifying mine rock that would be appropriate for construction of Project components, the results from humidity cell tests and concentrations for parameters of potential concern (PoPC) in the solid from waste rock […] were used. The average concentrations in the humidity cell leachate were compared to the PWQO to identify waste rock lithologies and grades that have the potential to result in runoff with concentrations of PoPCs above the PWQO".* • *Understanding what criteria or thresholds have been set to define "low" potential for ML is important to understand any effects on water quality and fish and fish habitat that can result from the use of waste rock in construction of project components.* ***Specific Question/ Request for Information:*** *A. Explain the criteria or thresholds used to define "low ML potential" to protect water quality and fish and fish habitat from the use of waste rock in construction of project components;* *B. Describe an alternative plan for construction of project components in a scenario where insufficient non-PAG material rock with low ML potential is found to carry out construction of project components.*	***N/A***
		Response: A. Preliminary leaching criterion for construction materials is 40 ppm of total arsenic based on 2016 results from field bin tests. This criterion could change depending on 2017 and 2018 results from ongoing field bin tests. Other trace elements do not have criteria due to lower leachability from waste rock. The final criteria will be presented in the Final Waste Rock Management Plan during the permitting phase of the Project. B. The block model for total arsenic indicates that the Project will produce enough non-PAG material with less than 40 ppm of total arsenic to fulfill construction demands. An alternate source is therefore not required, and would have to come from a source outside the mineralized zone.	***N/A***
CEAA_24 *IR Number: FH(1)-20*	*Section 10.4.3.3.*	***Context and Rationale:*** • Section 10.4.3.3 states that "during construction and operation phases of the Project, surface water runoff from Project components and contact water will be collected in perimeter collection ditches and collection ponds, which provide primary settling for TSS". The same section further states that "during closure […] the seepage collection ponds and ditches for the TMF [tailings management facility] will be decommissioned and runoff will be directed overland to natural drainage features". Table 10-48 of the same section provides the final discharge locations for contact water and seepage collection ponds.	***N/A***

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		• It is reasonable to assume that as the seepage collection ponds are decommissioned and connected with the natural environment, sediments that were allowed to settle in these ponds during construction and operation phases of the Project could reappear and mobilize into surface waterbodies. It is unclear whether this has been factored into the effects assessment for water quality and fish and fish habitat. ***Specific Question/ Request for Information:*** *A. Describe appropriate measures that will be taken to ensure that sediments that settle in the collection ponds during construction and operation phases of the Project do not enter the surface water features after decommissioning.*	
		Response: The sediments will be removed regularly during operations and as part of decommissioning. The pond will be in-filled and contoured to blend with natural topography. Section 6.4.2 of the Conceptual Closure Plan (Appendix I of the Final EIS/EA) describes decommissioning of the contact water collection ponds as follows: 1. The collection ponds will be pumped dry and sediment in the bottom of the collection pond will be tested in accordance with O. Reg. 153/04. If the sediment quality complies with the regulatory requirements, sediment can be mixed with soil/topsoil from construction and use for rehabilitation. Otherwise, it is assumed that the removed sediment will be deposited in the TMF or to an offsite approved landfill based on the classification under O. Reg. 153/04. 2. Pumps and piping will be removed. 3. The perimeter berm around the ponds will be graded to match surrounding topography and the bottom of the pond will be filled to grade with clean fill (such as overburden or excess material from the perimeter berm). 4. Riprap will be placed, where necessary, at the end of the seepage collections system ditches to prevent scour and allow water to safely flow overland to the nearest receiver. 5. Disturbed areas adjacent to the ditches will be covered with topsoil and revegetated.	***N/A***
CEAA_25 *IR Number: FH(1)-21*	*Section 11.1.2; Section 23.5; Appendix F7, Section 3.6.2.2.1; Appendix M12, Appendix B, Section B.2.*	***Context and Rationale:*** • *Chapter 11, Section 11.1.2 states that "Additional preconstruction fish collections are planned to obtain data on species Aboriginal communities have identified as being traditionally important (e.g., White Sucker). This will include whole body fish analysis to reflect the ways some Aboriginal people prepare and consume fish."* • *Appendix M12, Appendix B, Section B.2 mentions that "Additional fish tissue data for smaller lakes was collected in 2016" but it is noted in Chapter 11, Table 11-3 that the "lab results for tissues collected in 2016 were not yet available at time of report production". Whole walleye samples could not be found in Table 11-3 of the same Chapter. This information is required to understand effects of the project on the health of Aboriginal peoples, and is further considered in comment HE(1)-01.* • *In addition, Chapter 23, Section23.5 states that "Based on comment from consultation, fish sampling programs will be expanded to obtain data on species Aboriginal communities have identified as being traditionally important". The timeline for when this data will be collected and whether and how it is intended to be incorporated into the relevant parts of the EIS is not mentioned in the EIS.* • *Further, Biinjitiwaabik Zaaging Anishinaabek (BZA) and Bingwi Neyaashi Anishinaabek (BNA) noted that "Methylmercury concentrations ranged from 0.015 to 0.89 mg/kg wwt across the three lakes" (Appendix F7, Section 3.6.2.2.1). A number of walleye samples in this data set contained methylmercury above the partial (0.25 mg/kg) and total (0.52 mg/kg) restrictions for consumption by women of childbearing age and children under 15. BZA and BNA would like further details regarding the methods and amount of monitoring that will be conducted to assess changes in mercury and other metals in fish tissues.* • *BZA, BNA, Animbiigoo Zaagi'igan Anishinaabek (AZA), Aroland First Nation (AFN) and Ginoogaming First Nation (GFN) also raised concerns related to monitoring of methylmercury in the Goldfield Creek Diversion Pond and Southwest Arm Tributary due to potential flooding of organic soils. BZA and BNA propose that this monitoring should be harmonized with other monitoring programs as part of the Aquatic Monitoring and Management Plan. They also propose conducting wetland surveys to identify vulnerable areas with organic soils in advance, which can then be stripped prior to realignment to prevent methylmercury formation.*	***N/A***

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		• *This information is important to understand the potential effects on fish and fish habitat and on the health of Indigenous peoples from its consumption.* ***Specific Question/ Request for Information:*** *A. Provide the fish data collected in 2016, including whole-body data for walleye, white sucker and other fish identified as traditionally important by Indigenous groups;* *B. Provide a timeline for the collection of additional fish tissue baseline data in Kenogamisis Lake;* *C. Explain how the additional fish tissue baseline data will be incorporated into the relevant sections of the EIS, including the HHERA.* *D. Re-evaluate the frequency of follow-up monitoring for fish tissue sampling at 2-year intervals as suggested by BZA and BNA;* *E. Provide further details regarding the methods and amount of follow-up monitoring required to assess changes in mercury and other metals in fish tissues;* *F. Explain how potential effects on the health of Indigenous peoples from consumption of fish with methylmercury concentrations will be evaluated and reported in the follow-up monitoring reports.* *G. Assess the risk of potential flooding of organic soils near Goldfield Creek Diversion Pond and Southwest Arm Tributary and formation of methylmercury.* *H. Include follow-up monitoring of surface water and fish in Goldfield Creek Diversion Pond and Southwest Arm Tributary for potential formation of methylmercury.*	
		Response: A & C. Data collected prior to 2016 were used to inform the Final EIS/EA. This includes data collected by GGM in 2013, 2014 and 2015 and data obtained from historical MOECC records. Fifty-five (55) Walleye fish tissues samples from Kenogamisis Lake (41 fillet and 14 liver) were used to establish the exposure point concentrations metal concentrations in fish tissue. This sample size surpasses the minimum eight to ten samples required to calculate a 95% upper confidence limit on the mean (95% UCLM) exposure point concentrations using the US EPA's ProUCL statistical software, as recommended by regulatory agencies such as Health Canada and the Ontario Ministry of the Environment and Climate Change. Combining the fillet and liver data provides 95% UCLMs that are representative of whole body metal concentrations in large fish. The 55 baseline walleye tissue samples are more than sufficient to calculate a robust 95% UCLMs concentrations for metals (including mercury) in fish tissue for human consumption for use in the baseline risk assessment. B. GGM is working with MNRF to collect additional fish tissue data from Kenogamisis Lake prior to construction (currently planned for summer 2018). During operations, GGM plans to collect fish tissue samples every three years, as required for environmental effects monitoring (EEM) under the MMER. The frequency of monitoring will be based on regulatory requirements and a scientifically defensible sampling design. GGM further plans to sample additional species, tissues (e.g., whole body) and parameters (e.g., methyl mercury and other metals) to address concerns voiced by Aboriginal communities. D. Monitoring fish tissue every two years would conflict with the required EEM monitoring frequency of every three years. Given that these are lethal sampling methods, sampling at a greater frequency should be discouraged to avoid undue stress on fish populations. GGM prefers to harmonize any new or non-regulated sampling with existing regulatory requirements. E. GGM has collected, and will continue to collect, comprehensive pre-construction fish tissue data for comparison to post-construction conditions. Baseline data have been collected from areas with greatest effect potential (i.e., near the proposed discharge location) and from areas farther removed from the PDA. Post construction monitoring will focus on areas with the greatest effect potential (e.g., effluent plume) and on areas where Aboriginal communities have raised specific concerns (i.e., Goldfield Creek Diversion). Post construction sampling in areas further removed from the PDA would not be conducted unless there was a confirmed effect on	***N/A***

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		fish tissue in the 'near-field' areas, or if water quality monitoring showed a significant increase POPCs. By example, fish tissue monitoring would not be conducted in the Outlet Basin unless the concentrations of POPC in fish tissue were found to increase closer to PDA, or if there was a mine related decline in water quality. Details regarding the methods and amount of monitoring required to assess changes in mercury and other metals will be informed by permitting outcomes. The Conceptual Plan is provided in Final EIS/EA Appendix M12. The Project is not predicted to be a significant source of methylmercury. F. The Project is not expected to alter mercury or methylmercury concentrations in Kenogamisis Lake and, by extension, is not expected to alter the concentrations in tissues of fish harvested from the lake. Therefore, the Project is anticipated to make a negligible contribution to mercury-related human health risks for Indigenous and non-Indigenous people who consume fish from Kenogamisis Lake. Results from the monitoring program will be reviewed to confirm that Project-related increases in mercury and methylmercury are not occurring. If Project-related increases in mercury and/or methylmercury concentrations are identified, the results will be reviewed to determine if the mercury/methylmercury concentrations continue to represent a negligible human health risk. The results will be communicated to Indigenous and non-Indigenous communities. G. Methylmercury was assessed as part of the Goldfield Creek Diversion plan, on pages 10.184 and 11.102 of the Final EIS/EA. Further clarification of potential methylmercury release associated with the diversion of Goldfield Creek to the Southwest Arm Tributary is found in the attached Memorandum: "GGM Hardrock Project - Mercury in Surface Water, Fish Tissue and associated Human Health and Ecological Risk Assessment". Methylmercury is not an issue for the Project and monitoring is provided to confirm the EA findings. H. The Conceptual Management and Monitoring plans presented in Appendix M of the Final EIS/EA will be updated through adaptive management as the Project advances. The attached memorandum "GGM Hardrock Project - Mercury in Surface Water, Fish Tissue and associated Human Health and Ecological Risk Assessment" demonstrates the conservative approach to predicting mercury concentrations in the aquatic environment and that Project related effects on mercury concentrations are not anticipated. Proposed methylmercury surface water monitoring locations along the Goldfield Creek diversion route and in the Southwest Arm Tributary include: Station 52 at GFP2 upstream of the diversion pond; Station 39 near the end of the diversion channel; Station 25 at the mouth of the Southwest Arm Tributary; and Station 46 in the Southwest Arm. These locations are well suited for monitoring this watercourse because they are upstream and downstream of the areas being assessed. The Goldfield Creek Diversion Pond will have a relatively low retention time and water quality there is expected to be the same as the water entering SWP3. Therefore, water quality monitoring is proposed in SWP3, which is downstream of the new channel section. Water quality monitoring will continue at Station 25, which is downstream of the flow control structures in the Southwest Arm Tributary, where the newly diverted channel will flow into Kenogamisis Lake. Methylmercury can be analyzed in Yellow Perch from SWP3, which is downstream of the proposed diversion, and from fish collected in Kenogamisis Lake, which is downstream of proposed flow control structures. A reference area will also be sampled. Sampling methods will follow MOECC guidance and target a sample size of 10 to 20 fish in each sampling area, including young-of-the-year fish, if present. These sampling locations, species and methods are preferred because fish are expected to be present in sufficient numbers to achieve the required sample sizes and because the fish are considered representative of local conditions. The monitoring will be re-assessed and discontinued once the Final EIS/EA predictions are confirmed following the creek diversion.	
CEAA_26 *IR Number: FH(1)-22*	*Section 5.3; Appendix F6, Section 4.2.2.*	***Context and Rationale:*** • *Section 5.3, Figure 5-2 shows that the Goldfield Creek Diversion channel will connect with Southwest Arm Tributary before discharging into Southwest Arm of Kenogamisis Lake.* • *Red Sky Métis Independent Nation (RSMIN) notes that the point where Southwest Arm Tributary connects with Southwest Arm of Kenogamisis Lake is in vicinity of the Treated Effluent Discharge Location. In Appendix F6, Section 4.2.2, Figure 4-2, water near the Treated Effluent Discharge Location in Southwest Arm of Kenogamisis Lake appears to move northeast of the discharge point, where it is likely to come in contact with water entering from Southwest Arm Tributary, within the mixing zone of arsenic.* • *This is concerning to RSMIN as the proposed flow pathway in the draft Fisheries Offset Plan will lead to fish passing through Southwest Arm Tributary and into the Southwest Arm of Kenogamisis Lake. These fish would be*	***N/A***

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		exposed to more arsenic than they would be presently if they took the existing pathway in Goldfield Creek. Exposure to arsenic could cause detrimental effects to fish and fish habitat as well as to people who consume such fish. ***Specific Question/ Request for Information:*** *A. Describe the additional exposure to arsenic by fish that would migrate from the proposed habitat in the draft Fisheries Offset Plan through the Southwest Arm Tributary into the Southwest Arm of Kenogamisis Lake, in comparison to existing fish pathways in Goldfield Creek;* *B. Describe mitigation measures for exposure of fish migrating through the proposed fish habitat offset into Southwest Arm Tributary to increased concentration of arsenic at the Southwest Arm of Kenogamisis Lake;* *C. Characterize residual effects after the mitigation measures have been implemented;* *D. Reassess the significance determination, if necessary, taking responses from questions A to C into account;* *E. Update the follow-up program for potential effects to fish and fish habitat, including objectives and any monitoring measures that will be implemented to verify the predictions of effects and evaluate the effectiveness of the proposed mitigation measures. If follow-up is not required, provide a rationale.*	
		Response: A. Predicted changes in arsenic concentrations are provide throughout Chapter 10 of the Final EIS/EA (Table 10.33 for Goldfield Creek, Table 10-35 for the Southwest Arm Tributary and Table 10.43 for the Southwest Arm of Kenogamisis Lake) and potential effects on fish are assessed in Chapter 11 of the Final EIS/EA (Section 11.4.2.3). • A fish moving from Goldfield Creek into the Southwest Arm of Kenogamisis Lake during baseline would be exposed to arsenic concentrations of 3.40 µg/L in Goldfield Creek and 1.75 µg/L in the Southwest Arm of Kenogamisis Lake. • A fish moving from the Southwest Arm Tributary into the Southwest Arm of Kenogamisis Lake during Operation would be exposed to arsenic concentrations of 7.47 µg/L in the Southwest Arm Tributary and 2.24 µg/L in the Southwest Arm of Kenogamisis Lake. • A fish moving from the Southwest Arm Tributary into the Southwest Arm of Kenogamisis Lake during post closure would be exposed to arsenic concentrations of 13.42 µg/L in the Southwest Arm Tributary and 2.21 µg/L in the Southwest Arm of Kenogamisis Lake. The comparison above was provided at the request of the reviewer, but does not consider the overall improvements to water quality that are predicted. For instance, baseline arsenic concentration in the Southwest Arm Tributary is 19.42 µg/L, which is predicted to decrease to 7.47 µg/L and 8.62 µg/L during operation and closure, respectively. Fish in Kenogamisis Lake, on average, will be exposed to lower concentrations of arsenic during operation and closure than during baseline. Furthermore, known toxicity values and the results of site specific bioavailability studies (Final EIS/EA, Appendix F07) need to be considered, as was done in the Final EIS/EA. Treated mine effluent will not be toxic to fish. Under conservative estimations, the concentration of arsenic in the Southwest Arm will decrease from less than 100 µg/L to 20 µg/L within 30 m of the final treated effluent discharge location, which is well below the minimum toxicity values used to establish the Canadian Water Quality Guidelines for the Protection of Aquatic Life, which range from 500 µg/L to 970 µg/L for freshwater fish (CCME 2001). The results of the Bioavailability Study provided in Final EIS/EA Appendix F07 also support the conclusion that effluent discharge and the Project overall will not have adverse effects on fish. Final EIS/EA Section 11.4.2.3 provides an assessment of potential impact on fish due to arsenic exposure. This assessment was made on very conservative estimations of future arsenic concentrations. Based on vendor data from other mines, the effluent treatment plant is anticipated to reduce arsenic by up to 95%. Therefore, arsenic concentrations in the effluent and mixing zone are expected to be lower than what was predicted conservatively in the Final EIS/EA. B. See response to A above. Overall, fish exposure to arsenic is predicted to decrease as a result of the Project, not increase, as suggested in the review comment. This is a result of mitigation measures including effluent treatment, movement of historic tailings into the TMF, TMF design and overall Project planning/design (e.g., the Goldfield Creek diversion is predicted to improve water quality in the Southwest Arm Tributary and the treated	***N/A***

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		effluent discharge has been located and designed to mitigate potential effects on fish and fish habitat). These mitigation measures were identified in the Final EIS/EA. C. The Final EIS/EA has considered predicted changes in water quality and habitat use by fish to characterize and evaluate residual effects (Table 11-12). D. The assessment of significance is unchanged because residual effects on the productivity and sustainability of CRA fisheries are not anticipated. E. A conceptual aquatic monitoring program is provided in Appendix M12 of the Final EIS/EA. With respect to fish exposure to arsenic in the diversion channel and in Kenogamisis Lake, GGM will monitor water quality and fish communities to confirm the predictions of the Final EIS/EA. Specific details of the monitoring program will be confirmed as an outcome of permitting. No update is required for the EA. **Reference:** Canadian Council of Ministers of the Environment. 2001. Canadian water quality guidelines for the protection of aquatic life: Arsenic. Updated. In: Canadian environmental quality guidelines, 1999, Canadian Council of Ministers of the Environment, Winnipeg	
CEAA_27 *IR Number: FH(1)-23*	*Appendix M12, Section 8.1; Appendix M12, Appendix B, Section B.6.*	***Context and Rationale:*** • *Appendix M12, Appendix B, Section B.6 states that "postconstruction fish tissue monitoring schedule will be determined through adaptive management, whereby detailed fish tissue studies will only be conducted if there is a confirmed effect in close proximity to the Project, or if there is a confirmed change in water quality in a particular lake or lake basin". It is unclear what is meant by "confirmed effect" and "confirmed change", and how that will be measured. Part 2, Section 8.2 of the EIS Guidelines requires a "description of the characteristics of the monitoring program where foreseeable".* • *It is further mentioned in Appendix M12, Section 8.1, Table 8-1that for fish tissue sampling, "No set frequency for follow-up monitoring but may be harmonized with EEM program on a three-year cycle". Figure 8-1 of the same Appendix shows that Annual Monitoring Reports Review will be conducted for Aquatic (Fish and Fish Habitat) to determine if a response plan is required or monitoring will continue. There appears to be uncertainty in the information presented about monitoring frequency for fish and fish habitat, and the specific conditions under which the monitoring program will be modified. ·This information is needed to ensure that appropriate measures and controls are in place in order to decrease the potential for adverse effects on fish and fish habitat.* ***Specific Question/ Request for Information:*** *A. Provide measurable thresholds, including a rationale for the chosen thresholds, for "confirmed effect" and "confirmed change" in the quoted statement, and explain how these changes and effects will be measured;* *B. Provide details of the frequency of the monitoring program for fish and fish habitat, and describe specific circumstances under which the monitoring program will require modification.*	***N/A***
		Response: GGM has provided detailed mitigation measures in the Final EIS/EA for Fish and Fish Habitat. The specific information requested above with regard to the monitoring plan does not affect the conclusions of the Final EIS/EA. GGM is committed to implementing robust monitoring programs for the Project. Various aquatic monitoring requirements (e.g., EEM, DFO Authorization, ECA, LRIA, Follow-Up monitoring) are interdependent and need to be finalized in consultation with relevant agencies. A. Environmental effects monitoring (EEM) is a nationally accepted, standardized, regulated and scientifically defensible method for evaluating potential effects on fish and fish habitat. MMER guidance requires sampling in an area with the greatest effect potential (i.e., near-field area) during the Cycle 1 EEM program. Sampling areas further away is not required unless there is a confirmed effect observed in the near-field area. The presence or absence of an effect is considered "confirmed" when a similar type of effect or the absence of an effect has been observed in two consecutive studies. Effects are well defined in EEM guidance documents, and the	***N/A***

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		terminology used (e.g., confirmed effect) is well understood by EEM practitioners. This approach is proposed, as required by MMER, for monitoring potential effects of mine effluent. In other areas where potential effects are not anticipated, GGM does not intend to implement an intensive and comprehensive biological sampling program and it is important to focus monitoring efforts where they are warranted. For instance, potential effects on fish and fish habitat are not anticipated in Lake A-322. There will be no physical disturbance to habitat and potential effects on water quality are not anticipated (due to the natural direction of groundwater flow and proposed mitigation). Water quality monitoring will be conducted in this watershed to confirm the predictions of the Final EIS/EA. If there is a significant change in water quality because of the Project, more intensive sampling may be required to either identify the cause of observed effects or to assess effects on biota. In this example, the triggers for additional monitoring would be a significant increase in POPC over baseline. Specific triggers for additional monitoring will be developed through consultation with relevant agencies, as applicable and reflect outcomes of permit authorizations and associated limits. RE: Figure 8-1: As a minimum, water quality monitoring will occur monthly at key locations, with biological sampling occurring at a frequency driven by regulation. Some level of monitoring will occur every year and one or more monitoring reports will be produced annually. Figure 8-1 of EIS/EA Appendix M12 is referring to a review of routine water quality monitoring data or other monitoring components to determine if a response action is required. This is a standard adaptive management mechanism. B. The frequency of the monitoring program for fish and fish habitat will be driven by regulatory requirements. EEM will be the primary method of assessing potential effects on fish and fish habitat in Kenogamisis Lake. EEM monitoring to meet MMER requirements occurs on a three-year cycle. The frequency for monitoring physical habitat and fish communities where offsetting occurs will be developed in consultation with DFO and MNRF, as required through the Fisheries Act Authorization Process. Monitoring requirements associated with other permits and approvals (e.g., LRIA and ECA) will be harmonized with EEM and DFO monitoring requirements where possible so that programs can be delivered efficiently and with minimal disturbance to fish communities. GGM recognizes that additional monitoring will be required to monitor potential effects not associated with effluent discharge or offsetting measures. Regulatory agencies will need to be consulted regarding specific monitoring locations, frequencies, and methods prior to finalizing monitoring plans.	
CEAA_28 *IR Number: FH(1)-24*	*Appendix F7, Executive Summary; Appendix F7, Section 3.6.1.1.*	***Context and Rationale:*** • *Biinjitiwaabik Zaaging Anishinaabek (BZA) and Bingwi Neyaashi Anishinaabek (BNA) raised a concern regarding walleye sampling data at Wildgoose and Kenogamisis Lakes.* • *Appendix F7, Executive Summary states that "although walleye from Kenogamisis Lake bioaccumulated significantly more arsenic and mercury than Wildgoose Lake walleye, levels observed did not have an adverse biological effect on this species. Age and growth rates did not differ significantly between areas, nor did condition or relative gonad and liver sizes".* • *Appendix F7, Section 3.6.1.1 states that "Wildgoose Lake fish were significantly longer than fish from Goldfield Lake and Kenogamisis Lake ($p<0.05$)" and "Total length and weight for Wildgoose Lake walleye were significantly larger than those from Kenogamisis Lake and Goldfield Lake ($p<0.05$)".* • *As there are statistically-significant variations in total length and weight between walleye at Wildgoose and Kenogamisis Lake, it is plausible that these differences are due to bioaccumulation of arsenic, mercury and other parameters of concern. Further rationale is needed for why these variations are not considered an adverse biological effect on this species.* • *This information is important as walleye are a locally abundant species, and used for traditional purposes by Indigenous peoples.* ***Specific Question/ Request for Information:*** *A. Clarify whether the statistically-significant variations in total length and weight for walleye at Wildgoose and Kenogamisis Lakes are due to bioaccumulation of arsenic, mercury and other parameters of concern;* *B. Provide a rationale for why variations in total length and weight between walleye found in Wildgoose and Kenogamisis Lakes would not be considered an adverse biological effect;*	***N/A***

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		C. Reassess the significance determination for fish and fish habitat and health of Aboriginal peoples consuming walleye, if necessary, taking response from questions A and B into account; *D. Update the follow-up program for potential effects to fish and fish habitat, including objectives and any monitoring measures that will be implemented to verify the predictions of effects and evaluate the effectiveness of the proposed mitigation measures. If follow-up is not required, provide a rationale.*	
		Response: A. The Final EIS/EA acknowledges differences in Walleye size and provides clarification on this matter in Section 11.2.2.5 (pages 11.78 through 11.81). Whether statistically-significant differences in Walleye size are attributed to natural lake factors, bioaccumulation of arsenic, mercury or other parameters of concern cannot be definitively stated. This is a basic scientific principle of hypothesis testing. B. Variations in total length and weight between Walleye captured in Wildgoose Lake and Walleye captured in Kenogamisis Lake are not considered adverse biological effects because the difference can not be definitively attributed to one cause. See response to part A above. Rationale for the conclusions of the Bioavailability Study (Final EIS/EA Appendix F07) are based on a weight of evidence approach, as documented in that report. Multiple biological end-points were examined, and most showed no significant differences. C. Health risks were assessed for Aboriginal people consuming fish (including walleye) from the various Basins of Kenogamisis Lake, where the existing concentrations of metals are generally higher than in Wildgoose Lake. Water quality in the various basins of Kenogamisis Lake is anticipated to be affected more by the Project than water quality in Wildgoose Lake. This is a conservative approach. The results of the HHERA carried out on this basis indicated that Project related health risks associated with the Aboriginal person's consumption of fish from the various basins of Kenogamisis Lake are considered negligible. Rehabilitation of historical tailings is anticipated to decrease the concentration of arsenic in Kenogamisis Lake thereby decreasing the concentration in fish tissue. The Project is not a significant source of mercury to the natural environment, therefore Project-related increases in fish tissue concentration of mercury are not expected. D. A conceptual monitoring plan is provided in Appendix M12 of the Final EIS/EA. In addition to regulatory monitoring requirements (e.g., permit requirements, EEM), GGM has committed to monitoring POPCs in fish tissue. Monitoring plans (including follow-up measures) will be updated in consultation with relevant agencies.	***N/A***
CEAA_29 *IR Number: FH(1)-25*	*Section 23.5.*	***Context and Rationale:*** • *Section 23.5 states that "GGM has facilitated the participation of local Aboriginal communities in baseline monitoring for the Project and will work with communities to provide the opportunity to form a joint Aboriginal Environment Committee as the Project progresses. If parties are not open to forming a committee, GGM will work with local Aboriginal communities individually throughout the Project."* • *Animbiigoo Zaagi'igan Anishinaabek (AZA), Aroland First Nation (AFN) and Ginoogaming First Nation (GFN) have raised questions related to how specifically will they be involved in the groundwater and surface water monitoring. These communities have also raised a concern regarding the lack of surface water quality monitoring in Begooch Zaagaigan (Lake A-322) as this lake was identified as a fish spawning area by AZA, AFN and GFN.* ***Specific Question/ Request for Information:*** *A. Describe how AZA, AFN, GFN will be involved in the groundwater and surface water monitoring;* *B. Describe the feasibility of including a surface water monitoring station at Lake A-322.*	***N/A***
		Response: A. GGM has provided funding over the past several years to AFN and GFN, and more recently to AZA, to employ a full-time Environmental Monitor to participate in the Project's environmental monitoring program. GGM remains committed to funding Environmental Monitors (EM) for each of AFN, AZA and GFN and maintaining environmental committee(s) which the EM's would be members of. The Environmental Monitors may continue to participate directly in the field work as they have throughout baseline studies.	***N/A***

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		B. GGM has collected extensive baseline water quality in Lake A-322 to document pre-construction conditions. GGM has also collected sediment quality, benthic community, fish community, fish habitat, and fish tissue data from Lake A-322. The extensive baseline data set for Lake A-322 allows GGM to monitor potential changes and confirm the predictions of the Final EIS/EA. Quarterly surface water quality monitoring is proposed at Station #20a located in Goldfield Creek Tributary downstream of Lake A-322. This station will effectively capture changes in water quality in Goldfield Creek Tributary, including Lake-322. There will be no physical disturbance to A-322 and potential effects on water quality are not anticipated (due to the natural direction of groundwater flow and proposed mitigation). The Project includes an extensive water quality monitoring network as proposed, and it is important to focus the monitoring effort based on the results of the EIS/EA and where changes are anticipated	
CEAA_30 *IR Number: TW(1)-01*	*Section 13.4.2.3; Chapter 23.*	***Context and Rationale:*** • *Section 13.4.2.3 states that "the Project will result in the direct loss of barn swallow nesting habitat; two buildings that support 15 active nests will be removed."* • *This contradicts the information in Table 13-10 which lists the maximum direct and indirect loss of barn swallow breeding habitat as 0 ha. Table 13-11 also includes no information on barn swallows with the justification in footnote A that "there is no measurable effect on barn swallow nesting habitat".* • *In addition, Section 13.4.2.3 states that "the implementation of mitigation measures such as the creation of replacement habitat for the damage or destruction of existing structures that provide nesting habitat will reduce adverse effects to barn swallow habitat and result in no measurable change to barn swallow nesting habitat availability in the Local Assessment Area (LAA)."* • *This is used as a justification for a low magnitude and low duration for the loss of barn swallow habitat within the residual effects assessment (Table 13-14).* • *However, Chapters 13 and 23 contain very little information on the nature of these "replacement habitats" or how effective they will be in replacing the barn swallow nesting habitat within the Project Development Area (PDA). In order to assess the effectiveness of these replacement habitats, the proponent must provide further information on the breeding habits of the barn swallow.* • *This information is necessary to understand a residual effect on a species that is a migratory bird and a species at risk.* ***Specific Question/ Request for Information:*** *A. Provide further information on the density of barn swallows throughout the Project Development Area;* *B. Describe how the replacement habitats would be similar to the habitat that will be removed during construction and sufficient to mitigate the removal of 15 active nests within the PDA;* *C. Describe any additional mitigation measures to be applied in order to reduce the effect of breeding habitat loss on barn swallows (if applicable);* *D. Include a complete assessment of residual effects on barn swallow habitat after the mitigation measures have been implemented;* *E. Describe the follow-up program for potential effects to barn swallows, including objectives and any monitoring measures that will be implemented to verify the predictions of effects and evaluate the effectiveness of the proposed mitigation measures. If follow-up is not required, provide a rationale.*	***N/A***
		Response: The Project will result in the direct loss of barn swallow nesting habitat via two buildings that support 15 active nests will be removed. Table 13-10 provides an assessment of the predicated change in wildlife habitat *after mitigation*. Considering that the mitigation involves replacing habitat in an amount more than was removed, the assessment of the amount of wildlife habitat (i.e., Barn Swallow breeding habitat) after mitigation is that there will be no net loss of habitat; in fact, some habitat will be gained. Table 13-11 does not include Barn Swallow as this table is intended to characterize the residual effects after closure and since there was no measurable effect to Barn Swallow (as per Table 13.10), there was not considered to be a residual effect to characterize.	***N/A***

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		A. Fifteen Barn Swallow nests occurred in the PDA as stated above. Two (2) active nests in the MTO building were recorded, as well as approximately 13 active nests in the dome building. No Barn Swallow or their nesting sites were observed in the Hardrock or MacLeod townsites. Conservatively, assuming one pair per nest, approximately 30 adult Barn Swallows were breeding in the PDA in 2016. One additional nesting location was confirmed in the LAA. One active nest was present in the Manitoulin Shed in 2016. One adult was observed flying into the Manitoulin shed. B. The habitat to be removed consists of anthropogenic buildings and will be replaced with anthropogenic buildings or structures. The detailed design of the replacement habitat will occur at the detailed design/permitting stage of the Project; however, it will be designed in accordance with the following parameters; • Will either consist of newly built structure(s), or the modification of existing structure(s) to provide suitable conditions to support Barn Swallow nesting based on best available science (i.e. spacing of nests, predator guards, overhangs and rough surfaces where Barn Swallows can attach nests) • Will be designed to provide more habitat than is removed; will include the installation more nesting cups than nests removed (i.e. more than 15 nest cups). It will also be similar to the habitat that will be removed in that the replacement habitat will be sited within close proximity (i.e. within 1 km) of the location of the lost habitat and within 200 m of suitable foraging habitat. Given that anthropogenic habitats are being replaced by the provision of anthropogenic habitats, that more habitat will be provided than is removed, that nesting habitat will be designed in accordance with best available science and placed within proximity to the removed structure, this is considered more than sufficient to mitigate the removal of the 15 nests. C. In addition to the commitment for habitat replacement, timing window mitigation has been applied to minimize the effects on Barn Swallow breeding. The existing habitat will be removed outside of the breeding season and the replacement habitat will be in place before the next breeding season begins so that there will not be a breeding season where there is a loss of breeding habitat for Barn Swallow. D. After mitigation measures have been applied, the residual environmental effect is unchanged and considered low magnitude, short-term (i.e. less than one breeding season) and reversible. With the implementation of the mitigation measures, no residual effect on barn swallow breeding habitat is anticipated. E. The replacement habitat will be managed and monitored for at least three years after it is installed. Annual reports will be produced that document nesting activity and use of the replacement habitat.	
CEAA_31 *IR Number: TW(1)-02*	*Section 13.5.*	***Context and Rationale:*** • *Section 13.5 states "Canada warbler (SAR) [is] ranked S4B (apparently secure -uncommon, not rare) in Ontario (Table 13-6) and suitable breeding habitat is common within the RAA [Regional Assessment Area]. Birds displaced by the Project are likely to find breeding habitat elsewhere within the LAA [Local Assessment Area] or RAA."* • *This reasoning is used to justify a determination of non-significance for the loss of breeding habitat for Canada Warblers in the significance assessment. However, it fails to consider that other suitable habitats in LAA and RAA may be already at carrying capacity with similar birds. This could mean that a large portion of the habitat outside the Project Development Area (PDA), while considered suitable in theory, is not able to sustain the Canada warbler.* • *This information is necessary to understand a residual effect on a species that is a migratory bird and a species at risk.* ***Specific Question/ Request for Information:*** *A. Revise the determination of significance of the residual effects on Canada warblers caused by project activities while taking into account the potential for exceeding the carrying capacity of suitable warbler breeding habitat in the LAA and RAA;* *B. If suitable habitat is at carrying capacity in the LAA and RAA, describe additional mitigation measures to be applied in order to reduce the effect of habitat loss on Canada warbler habitat;*	***N/A***

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		C. Revise the assessment of residual effects taking into account the additional mitigation measures identified in B above; *D. Describe the follow-up program for potential effects to Canada warblers, including objectives and any monitoring measures that will be implemented to verify the predictions of effects and evaluate the effectiveness of the proposed mitigation measures. If follow-up is not required, provide a rationale.*	
		Response: A. A revision to the determination of significance of the Project on Canada warbler presented in the Final EIS/EA is not required. The Final EIS/EA characterized the residual environmental effect on Canada warbler habitat as adverse, moderate in magnitude (i.e., a measurable change relative to baseline conditions that is unlikely to affect long-term persistence or viability within the RAA), applicable to the LAA, affected by seasonal aspects, continuous, and long term. Given this characterization, and considering the conservative approach taken in the habitat mapping (i.e., the broad identification of potential habitat), Canada warbler occurrence within the PDA, LAA and RAA, and the Recovery Strategy's threat assessment (Environment Canada 2016), the Final EIS/EA determined that residual environmental effect of the Project on Canada warbler was not significant. As described below, the Project-specific field data shows that Canada warbler occurs at a low density within the LAA and RAA (i.e., confirmed occurrence at three of 259 locations that were surveyed in forest and swamp habitats), and that the habitat loss for Canada Warbler resulting from the Project is small relative to what is available within the RAA, and conservatively determined. The Recovery Strategy for Canada warbler (Environment Canada 2016) identifies the loss of overwintering habitat in South America as being the leading cause of declines in the population. There is no critical habitat identified in the Recovery Strategy for Canada warbler. While further stresses on the population are undesirable, the loss of habitat associated with the Project is small compared to the amount available in the RAA, particularly in light of the fact that Canada warbler was confirmed at only a small number of locations in the LAA. The following provides additional details on factors considered in the determination of significance, specifically, habitat mapping, species occurrence, magnitude of effect, and threats. Canada warbler habitat was categorized in the Final EIS/EA as 'confirmed' habitat and 'potential" habitat. Potential habitat was identified broadly using all mapped forest and swamp ecosites (i.e., deciduous, mixed, and coniferous forests and swamps), based on the general description of Canada warbler vegetation community preferences provided in Environment Canada (2016). This approach was used because fine-scale habitat mapping that represents some of the habitat attributes associated with Canada warbler habitat suitability (e.g., damp, dense, deciduous shrub layer; complex and well-developed understory; availability of perch trees [Environment Canada 2016]) was not available. Given the conservative (broad) approach used to identify potential habitat, it is likely that the area of potential habitat contains some habitat that is not suitable for Canada Warbler, an inference which is supported by the field survey results. The identification of confirmed habitat was based on the ecosite polygons within which Canada warbler was detected. From 2013 to 2016, 335 locations within the RAA were surveyed at least once for breeding birds using point counts surveys or acoustic recorders. Of these 335 survey locations, 259 were within forest and swamp ecosite polygons, and Canada warbler was detected at three (1.2%) of these survey locations. Canada warbler was not detected in other ecosite types. In 2014 two individuals were detected from two survey locations, and in 2015 two individuals were detected from a third survey location. Two of the three confirmed locations are within the PDA, and the third confirmed location is outside the PDA and the LAA but within the RAA. The assessment of potential Project effects on Canada warbler includes direct (i.e., vegetation clearing) and indirect (i.e., sensory disturbance) loss of habitat. Within the LAA, 139 ha of confirmed habitat, and 2,876 ha of potential habitat, was identified. Of this, 111 ha of confirmed habitat, and 1,742 ha of potential habitat, was predicted to be lost to direct effects. The percent loss of Canada warbler habitat (potential and confirmed) to direct and indirect effects during construction and operation of the Project is 1.9% of what is available within the RAA. This assessment assumes full build-out, and that habitat within sensory disturbance zones has no value during construction, operation, and active closure. The loss of habitat will be partially reversed at closure through	***N/A***

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		revegetation and cessation of operations. After closure, the residual effect of change of in habitat (potential and confirmed) for Canada warbler is predicted to be 0.8% within the RAA. The Project-related loss of Canada warbler habitat was also considered in the context of the Recovery Strategy, which identifies habitat loss or degradation resulting from energy and mining development as having a medium level of concern, moderate severity, and low causal certainty (Environment Canada 2016). B. No additional mitigation measures are proposed. Mitigation measures identified in the Final EIS/EA that are applicable to Canada warbler and its habitat are: Mitigation measures related to vegetation described in Chapter 12.0 Implementation of the Closure Plan, including the revegetation plan. Addressing incidental take of migratory birds. Greenstone Gold Mines GP Inc. recognizes that scheduling vegetation clearing and site preparation activities outside of the breeding period for migratory birds is the best way to reduce the risk of incidental take. If activities that could result in incidental take cannot be avoided, Greenstone Gold Mines GP Inc. will prepare a Bird Nest Mitigation Plan that outlines how risk of incidental take will be managed in accordance with Environment and Climate Change Canada guidance. Additionally, during Project planning and layout design, efforts were made to reduce the size of the PDA and the area of vegetation clearing required. Existing disturbed areas were incorporated into the PDA to accommodate Project components and, where possible, to reduce direct effects on vegetation communities, including habitats with the potential to support Canada warbler. C. Because no additional mitigation measures are proposed (see response to CEAA_32, Part B.), no revision to the assessment of residual effects is considered necessary. D. A specific monitoring program is not proposed for Canada warbler because the Project is not predicted to result in a significant adverse residual effect on Canada warbler and its habitat, and based on the extensive remaining habitat discussed above, this is not expected to be a key focus area. However, breeding bird surveys were included as part of the Biodiversity Management and Monitoring Plan, and observations in the PDA will be recorded during these surveys. **Reference:** Environment Canada. 2016. Recovery Strategy for Canada warbler (*Cardellina canadensis*) in Canada. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. vii + 56 pp.	
CEAA_32 *IR Number: TW(1)-03*	*Section 13.4.2.3; Appendix E8.1, Section 3.2.3.3.*	***Context and Rationale:*** • *Appendix E8.1, Section 3.2.3.3 states that "the remaining old mine shaft feature, Bat ID#4 was not surveyed as it was located on private property, outside the PDA [Project Development Area], where permission was not granted for access (see Figure 3-3.) Further assessment of Bat ID#4 will be discussed with MNRF."* • *This quote suggests that Greenstone Gold Mines is working closely with MNRF to determine more specifically how the bat species at risk are using habitats within the Local Assessment Area (LAA). However, it is unclear as to what is being discussed or investigated, or when results or findings will be made available.* • *Appendix E8.1 was issued in January 2016, and further information does not appear to be included in the Final EIS. This information is required to consider whether the bat habitat evaluation is complete, and inform the effects assessment on a species at risk.* ***Specific Question/ Request for Information:*** *A. Provide updated information regarding on ID#4. If work continues to be done and new information is not available, perform a precautionary assessment (i.e. assume the information is complete) using conservative assumptions.* *B. Describe how this information changes the baseline bat habitat presented in the EIS, and revise the assessment of the effects of the project on potential habitat loss for SARA-listed bats.*	***N/A***

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		C. Based on the information identified in A and B, describe new or enhanced mitigation measures to reduce the effect of habitat loss on SARA-listed bats (if applicable). *D. Revise the assessment of residual effects taking into account the mitigation measures identified in C.* *E. Describe the follow-up program for potential effects to SARA-listed bats, including objectives and any monitoring measures that will be implemented to verify the predictions of effects and evaluate the effectiveness of the proposed mitigation measures. If follow-up is not required, provide a rationale.*	
		Response: Appendix E8.1 is the Supplemental 2015 Terrestrial Data Report, which provided the methods and results for terrestrial surveys undertaken in 2015. Assessment of Bat ID#4 was completed in 2016. Methods and results of 2016 field surveys, including for bats, is included in the Final EIS/EA in Tables 13-3 and Table 13-6 respectively. Existing conditions for bat habitat that is based on data collected from 2013- 2016 (inclusive) is provided in Figure 13-9. A. Bat ID#4 was visually assessed in June 2016. The visual assessment indicated that the feature has low potential to support bat overwintering as the only visible opening was a very small crack in the cap, located directly on the ground with vegetation growing up around. This would be difficult for bats to enter/exit. However, as an extra precautionary measure, this location was monitored during the fall swarming season (fall 2016) to assess bat activity at Bat ID#4. No bats were observed entering or exiting the Bat ID#4 location. No swarming activity was observed at the Bat ID#4 location. B. This information does not change the baseline habitat presented in the Final EIS/EA; it was considered in the development of the Existing Conditions for Bat Habitat (Figure 13-9) and for the assessment of effects to bats and bat habitat that is included in the Final EIS/EA. C-E. The Final EIS/EA includes consideration of this information in the identification of existing conditions for species at risk bat habitat, the assessment of effects, the mitigation measures recommended and the assessment of residual effects. Overwintering habitat for bats was considered absent from the LAA. Surveys did not confirm the presence of maternity roosts (either in natural or anthropogenic habitats), however a conservative approach was applied to identify potential maternity roosting habitat and include it in the assessment of effects. No critical habitat for bats will be lost as a result of the Project. The residual environmental effects for the potential bat maternity roost habitat concluded that the amount of irreversible loss is not expected to affect the long-term persistence or viability of wildlife species within the RAA.	***N/A***
CEAA_33 *IR Number: TW(1)-04*	*Section 13.1.3; Section 13.4.*	***Context and Rationale:*** • *Section 13.4 states that "The TMF [tailings management facility] reclaim pond was excluded as aquatic habitat because it would not provide the vegetation required to support breeding nor would it provide a food source for resident or migratory waterfowl. Waterfowl exposures are expected to be limited to direct contact with the tailings pond water." However, while the TMF reclaim pond may be of limited use for breeding and foraging, it may be used as a staging area for waterfowl, particularly in conditions of high winds, low temperatures or precipitation.* • *Migrating waterfowl that choose the TMF pond for staging may not use other habitual staging grounds traditionally used for hunting by Indigenous groups. According to the unnumbered table in section 13.1.3, four Indigenous groups have identified waterfowl and geese as species of interest.* ***Specific Question/ Request for Information:*** *A. Discuss how the use of the TMF reclaim pond by staging waterfowl and migratory bird populations would affect their pattern of behavior and use of habitat, and therefore potentially affect hunting activities by Indigenous groups. This should also be considered when assessing effects of the Project on current use of lands and resources for traditional purposes (see comments HE(1)-05 and HE(1)-08).*	***N/A***

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		Response: Field studies support that Kenogamisis Lake is an area for waterfowl stopover and staging. In addition to Kenogamisis Lake, a number of natural inland lakes occur within the vicinity of the PDA. Research supports that the availability of natural waterbodies may minimize the dependence of waterfowl on tailings ponds during migration (Ronconi 2006) and the Project avoids overprinting waterbodies used by waterfowl. While it is possible that waterfowl may use Project-related ponds opportunistically for short periods of time, it is expected that waterfowl will continue to use Kenogamisis Lake for staging and stopovers during migration, preferentially over tailings ponds because of lesser human activity and the presence of food sources in natural lakes. Waterfowl use and water quality of the TMF, open aquatic areas and other key Project locations will be monitored and adaptive management measures (e.g., deterrents) implemented as required.	***N/A***
CEAA_34 *IR Number: TW(1)-05*	*Section 13.4.3; Chapter 24.*	***Context and Rationale:*** • *Section 13.4.3.2, Table 13-12 states, as a mitigation measure for a change in mortality risk: "Report wildlife-vehicle collisions, near misses or observations of a wildlife road mortality on Project roads to the Environmental Department, Implement adaptive management measures where high frequency locations of wildlife-vehicle interactions are identified."* • *Section 6.4 of the EIS Guidelines states that "adaptive management is not considered as a mitigation measure, but if the follow-up program […] indicates that corrective action is required, the proposed approach for managing the action should be identified."* • *The statement from the EIS does not describe any specific measure that would reduce collisions. There is no indication of how a "high frequency location" would be determined, or what measures would be implemented.* • *There is also no indication how, once measures have been identified at high frequency locations, monitoring will be established to ensure measures are working as intended, and that follow-up plans are in place to verify effects predictions and mitigation measures…* ***Specific Question/ Request for Information:*** *A. Provide information about the identification of high frequency locations of wildlife-vehicle interactions (e.g. which metrics will be used, what thresholds will be applied, how often will an assessment/determination be made).* *B. Provide information about the incorporation of wildlife vehicle collision reporting in environment management plans, including frequency of reporting (e.g. location of collision, species involved).* *C. Provide details on potential mitigation measures to be applied at high-frequency collision locations.* *D. Describe the follow-up program to evaluate the effectiveness of the proposed mitigation measure*	***N/A***
		Response: A. While mitigation measures such as speed limits, signage and yielding the right-of-way to wildlife will be applied to all roads, it is expected that this targeted mitigation will be applied on the TMF haul road as this road passes through stretches of natural habitats. High frequency locations will be identified based on the site-specific data that is collected, as described in the response to Part B below. B. Details on wildlife-vehicle interactions, including frequency and reporting will be included in the Biodiversity Management and Monitoring Plan that will be progressed during the permitting stage of the Project. As outlined in Section 8.1.2 of the Conceptual Biodiversity Management and Monitoring Plan, in order to confirm the effectiveness of mitigation and to verify the conclusions of the EIS/EA monitoring will be conducted, and will include recording Project-related wildlife-vehicle collisions or near misses. Drivers of Project-related vehicles will be required to report wildlife-vehicle collisions, near misses or observations of a wildlife road mortality including details such as the circumstances of collision (date, time, road conditions, lighting, weather); characteristics of the animal(s) struck by the vehicle (species, number, injury severity); and location (detailed description of the location of incident, the surrounding habitat, UTM if possible).	***N/A***

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		C. Mitigation measures related to minimizing the potential for vehicle collisions on Project roads and facilitating wildlife movement across roads that were included in Section 13.4.3.2 and 13.4.4. 2 of the Final EIS/EA: • Implement road safety measures (e.g., speed limits and signage) and yield the right of way to wildlife on Project roads to reduce wildlife road mortality. • Where Project site roads occur through forest or treed wetland communities, a regular vegetation cutting regime will occur along the edges of project site roads both to increase driver visibility and to reduce the attractiveness of the area for moose to browse • When designing water crossings include consideration of design features that promote wildlife (e.g. amphibian, turtle, furbearers) movement. • Provide low areas in the ploughed snow banks of access and haul roads if excessive snow buildup is encountered. These low areas will facilitate wildlife movements across and out of road corridors. In addition, Project-related wildlife-vehicle collisions will be recorded and will be used to inform adaptive management as required. The details of the monitoring program and adaptive management measures will be developed as part of the BMMP. D. The form and frequency of follow-up reporting will be determined as the Project progresses through permitting, however, it is anticipated that those elements relevant to the Conceptual Biodiversity Management and Monitoring Plan will be assembled into a summary report and provided to interested parties on an annual basis during construction and operation and during closure in years when monitoring is carried out. The reporting will be used to inform adaptive management reviews. Receiving, documenting and responding to communication from external interested parties, including complaints, will also form part of reporting under this Plan.	
CEAA_35 *IR Number: TW(1)-06*	*Section 12.4.3; Appendix M13, Section 7.1.2*	***Context and Rationale:*** • *Animbiigoo Zaagi'igan Anishinabek, Aroland First Nation and Ginoogaming First Nation have concerns regarding the potential introduction or spread of terrestrial invasive species with the Project Development Area (PDA) and surrounding area, due to movements across the PDA. These could be caused by contractors coming on and off site, as well as materials and equipment coming from other regions. The concern regarding invasive species is that they could create an imbalance in the plant diversity of the PDA and Local Assessment Area (LAA) as they spread and thereby reduce the availability of the plant species of interest that the Indigenous groups harvest.* • *These Indigenous groups recommend implementing the "Clean Equipment Protocol for Industry", developed by the Ontario Invasive Plant Council for the Canada-Ontario Invasive Species Centre and the Ontario Ministry of Natural Resources in 2013, to mitigate this risk.* • *In addition, the Conceptual Biodiversity Management and Monitoring Program proposes a mitigation measure to "assess presence of invasive species and target removal through manual, mechanical and/or chemical methods and proper disposal." When describing mitigation measures, clearly identify them with sufficient detail, not simply the intention of developing a plan or program, to support analysis of the sufficiency of those measures, and to determine whether follow-up is required to verify these measures. If there is uncertainty with those measures, develop a follow-up program with clear measures, in sufficient detail.* ***Specific Question/ Request for Information:*** *A. Describe mitigation measures to avoid the introduction or spreading of terrestrial invasive species in the PDA due to Project activities. In particular, considering implementing the "Clean Equipment Protocol for Industry", or provide a rational for not implementing it for this project.* *B. Provide additional information on the monitoring and management of invasive species, including which metrics will be used to determine when to apply an abatement/removal technique (e.g. selection of target species, minimum density or spread) consideration of various non-chemical techniques as well as application of chemicals, and proper disposal.*	***N/A***
		Response: A: This response requires important context regarding the current conditions of the site. The site is already host to a range of invasive species as a result of past land uses and the landscape setting. While every reasonable effort will be made to avoid making the invasive species problem worse, it should be recognized that the majority of	***N/A***

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		the Project site has a long history of disturbance from mining, forestry and residential uses and potential introduction of invasive species has been, and will continue to be, a function of activities that are not related to the Project such as widespread recreational uses and long distance traffic along Highway 11. The clean equipment protocol is not directly applicable to the scale of heavy equipment at the mine site and considering the majority of the Project equipment will be new and operate on compacted sites roads which will avoid the equipment collecting visible dirt clods and plant material. It is also standard practice that previously used equipment that may be brought to the site, particularly early construction for tree clearing, arrive at the Project site in a clean condition. Based on the results of planned visual monitoring during Project activities, where required, invasive species control can include mechanical cutting (mowing), selective hand removal, and over seeding with fast germinating native species that will compete with invasive species. As the Project development area already hosts invasive and non-native species, mitigation is focussed on reducing the spread of these invasive species by: • using clean, coarse fill material for grading to reduce the potential for introducing or spreading non-native, or invasive plant species • selecting native species for revegetation and assess presence of invasive species and target removal through manual, mechanical methods, and proper disposal. B: Management of invasive species must be case-specific because it depends on species, growth form (herbaceous vs. woody), and the availability of known/recommended control protocols for species using various non-chemical techniques (such as manual picking, mowing, tilling, burning). Visual monitoring by the Project's environment department will determine if a potential issue exists that threatens adjacent vegetation communities and need for action will be discussed with MNRF. Mechanical control if required will be seasonally timed to avoid the need to dispose of seed-bearing portions of cut plants. Where this cannot be accommodated, plant material with the potential to re-establish will be collected, to the extent possible, and burned.	
CEAA_36 *IR Number: TW(1)-07*	*Chapter 13; Appendix I, Section 7.3.2; Appendix M13*	***Context and Rationale:*** • *Chapter 13 of the EIS indicates that terrestrial and wildlife residual effects are mitigated by progressive reclamation and reclamation at closure. However, there are very few details on the terrestrial monitoring program that should be undertaken as part of the Conceptual Closure Plan and used to document the overall success of closure and rehabilitation plans and to verify if they will effectively mitigate the wildlife impacts (e.g. vegetation diversity/cover, wildlife habitat, wildlife movement).* • *Also, the Closure Plan (Appendix I) and the Biodiversity Management and Monitoring Plan (Appendix M13) refer to each other for additional information on mitigation and monitoring activities; however, neither conceptual document contains sufficient information to have confidence that the terrestrial and wildlife impact predictions will be validated and verified. When describing mitigation measures, clearly identify them with sufficient detail, not simply the intention of developing a plan or program, to support analysis of the sufficiency of those measures, and to determine whether follow-up is required to verify these measures. If there is uncertainty with those measures, develop a follow-up program with clear measures, in sufficient detail.* • *Animbiigoo Zaagi'igan Anishinabek, Aroland First Nation and Ginoogaming First Nation are concerned that changes in wildlife habitat and wildlife movement may impact their ability to hunt affected species.* ***Specific Question/ Request for Information:*** *A. Provide additional information on progressive reclamation and reclamation at closure activities, including details in the Closure Plan, about mitigation measures to reduce the impact of the Project on wildlife (e.g. decrease in vegetation diversity and cover, loss or alteration of wildlife habitat, disruption of wildlife movement patterns).* *B. Provide additional details in the Conceptual Biodiversity Management and Monitoring Plan to ensure that the effectiveness of the reclamation of terrestrial environment and its effect on the impact predictions for wildlife habitat and wildlife movement will be verified.*	***N/A***
		Response: A. As areas within the PDA reach the end of their operational life, they will be successively reclaimed through progressive rehabilitation. The areas that will undergo progressive rehabilitation (i.e., reclamation works during operation) include the temporary construction camp area, TMF North Cell, WRSAs A, B, and C, and Aggregate	***N/A***

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		Pits S1 and S4, as shown on Figure 6-1 and discussed in Section 5.0 of the Conceptual Closure Plan (Appendix I of the Final EIS/EA). Rehabilitation for these areas will include regrading where necessary and revegetation. The benefits of rehabilitating these areas (as could be realized during operation) is generally limited to providing ground cover and developing early successional growth due to the limited mine life compared to the time required for vegetation to mature as potential habitat. As described in Section 8.5 of the Conceptual Closure Plan, following the completion of the closure plan, it is anticipated that wildlife will gradually return to the site as human activity decreases and as habitat re-establishes naturally. The key elements of rehabilitation as it pertains to re-establishing potential habitat are reductions in noise due to less human activity (a potential deterrent), revegetation of the majority of the site (providing ground cover and initiating long term vegetation growth), and removal of fences and closure (or narrowing) of site access roads and lay down areas (which may impede wildlife movement). As the vegetation on the site matures, wildlife is anticipated to return once the site conditions become more amenable to each species. Moose and ground-nesting birds are anticipated to be some of the earliest species to return to the site when brush and shrub cover is developed. Species that rely on mature forest (e.g., martens, woodpeckers, and bats) are not anticipated to return to some parts of the site for several decades until vegetation matures. Some areas, such as the TMF and WRSAs, are not anticipated to become high quality habitat for non-bird terrestrial species due to the perimeter slopes acting as a physical impediment to movement. The rehabilitation measures that are to be implemented to support vegetation and terrestrial wildlife will be further developed as the closure objectives continue to be refined through the MNDM closure planning process. This has been discussed with MNDM. The closure plan also notes that revegetation trials will take place during operations for progressive reclamation, and with the Project design and sequencing, there is good opportunity to refine the approach and the closure plan as the Project matures so that final closure plan execution is successful. B. The loss of wildlife habitats throughout the life of mine is predicted to partially reversed at closure through revegetation activities. Wildlife movement was predicted to be adversely affected, however large mammals are expected to change movement patterns locally. Following closure, it is anticipated that new local movement patterns will be established as sensory disturbance abates and revegetation of the PDA progresses. Closure objectives are included in Section 1.2 of the Conceptual Closure Plan and include promoting vegetation communities that support wildlife habitats. The key to verifying the effects prediction for wildlife habitat is through progressive reclamation and revegetation trials during operation and the commitment to refining and proofing the final closure measures based on the results of these trials. This is provided in the context of closure planning in Ontario where end land use goals will be further defined through ongoing consultation on the Closure Plan through the MNDM process. Closure planning is an iterative process. Ongoing consultation will continue throughout the Project life as closure and rehabilitation activities and objectives (including wildlife and biodiversity objectives) are refined and informed by as built conditions and operational data. Closure planning is an iterative process that will allow for the effects predictions for wildlife habitat to be reviewed, verified and optimized. The current predictions for residual environmental effects from the Project on wildlife and wildlife habitat are determined to be not significant because they do not threaten the long-term persistence or viability of a wildlife species (including SAR, SOCC, and species of interest to Aboriginal communities) within the RAA. Evidence to support this determination is provided in detail in Chapter 13 of the Final EIS/EA. Deviations from these effects predictions, if any, can be managed as needed through the iterative and adaptive management process, which is described in Section 8 of the Conceptual Biodiversity Management and Monitoring Plan. In keeping with standard practices, the closure plan and any wildlife and wildlife habitat mitigation measures that are required to be incorporated into the closure plan, will be refined throughout the MNDM process with financial assurance provided.	
CEAA_37 *IR Number: TW(1)-08*	*Section 13.2.2.1 Appendix M13, Section 7.1.3*	***Context and Rationale:*** • *Eagles are identified as a species of cultural significance to Animbiigoo Zaagi'igan Anishinabek, Aroland First Nation and Ginoogaming First Nation. Field surveys described in Section 13.2.2.1, and illustrated in Figure 13-5, confirmed the presence of a bald eagle nesting site approximately 200 m outside the Project Development Area (PDA), and within the Local Assessment Area (LAA).* • *The Conceptual Biodiversity and Monitoring Plan Management (section 7.1.3) and Table 13-9 state that "if an active bald eagle nest occurs within 800 m of Project construction of operation activities, develop protection*	***Context and Information Required for a Complete Response:*** • *The response does not adequately address Part B of the information requirement (IR). It is unclear that the presence of the bald eagle nesting site, any proposed mitigation measures (protection plans) and residual effects are considered in the responses to IRs HE(1)-01, HE(1)-04 and HE(1)-09. Revise the response to indicate how this information was included in the responses to the other three*

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		measures". No information is provided about these protection measures, and therefore it is not possible to assess the efficacy of these measures. ***Specific Question/ Request for Information:*** *A. Describe, in detail, the measures that protect and preserve the identified eagle nesting site. Discuss if those measures will also have potential impacts to traditional knowledge and cultural heritage.* *B. As eagles are identified as culturally significant, ensure that the presence of the bald eagle nesting site, any mitigation measures and residual effects are considered in responding to comments HE(1)-01, HE(1)-04 and HE(1)-09.*	*IRs. If it was not, also revise IRs HE(1)-01, HE(1)-04 and HE(1)-09 to include this information as per the original IR.*
		Response: The identified Bald Eagle site was a previously known nest location provided by MNRF. MNRF could not confirm whether the nest was still present or whether it was active. Prior to construction, the location and activity of the nest will be confirmed with appropriate mitigation measures applied as outlined in the Final EIS/EA including development of a protection plan for active Bald Eagle nests that occur within 800 m of Project construction or operation activities on a case-by-case basis. Bald Eagle nesting sites may change location from the existing conditions over the course of the mine operation. In addition, the level of disturbance to active nesting birds may vary depending on the type of activity, duration, frequency, and time of day. As a result, GGM has made a commitment to address active nests on a case by case basis based (protection plan noted above) on the specific location(s) and activities that are occurring. Mitigation measures that will be considered include timing window restrictions, minimizing human presence in proximity to the nest during the nesting season, maintaining perches and sight lines to the extent feasible, retaining as much forest cover as possible around the nest, maintaining a vegetated buffer along the lake, among others to be considered. In these circumstances where effects on eagles are avoided, there is no anticipated effect to culture.	**Response:** Revisions have been made to Updated Appendix O Sections, 4.4.1.1, 4.4.1.2, 5.7 and Table 6-1. Updated Appendix O, Sections 4.4.1.1 discusses bald eagles by Animbiigoo Zaagi'igan Anishinaabek. In Chapter 13 of the Final EIS/EA (Wildlife and Wildlife Habitat), bald eagle is identified as a species of cultural importance to Aboriginal communities and was included as a species directly assessed the Wildlife and Wildlife habitat assessment. Further, in response to information requests from Animbiigoo Zaagi'igan Anishinabek, Aroland First Nation and Ginoogaming First Nation (AZA-AFN-GFN_19) GGM acknowledged that that bald eagles are a species of cultural importance to these Aboriginal communities. With specific reference to CEAA IRs HE(1)-01, HE(1)-04 and HE(1)-09, potential effects to wildlife and wildlife habitat of culturally important species such as bald eagles or bald eagle nests have been considered in Appendix O as they related to Aboriginal health conditions, Aboriginal physical and cultural heritage and current use. With respect to the specific bald eagle nest mentioned in Section 13.2.2.1, this nest was identified through correspondence with MNRF (MNRF e-mail message to Stantec, November 15, 2016). This particular nest was not identified by Aboriginal communities through Aboriginal consultation program for the Project or in project-specific TK/TLU studies submitted by Aboriginal communities. It would be inappropriate for GGM to ascribe TK or TLU value to environmental features, including the nest identified by MNRF, but as noted it is acknowledged that bald eagles are a species of cultural importance to Aboriginal communities. As noted in the original response to CEAA IR TW(1)-08, it could not be confirmed whether the nest identified was still present or whether it was active. Therefore, GGM has committed to address active nests on a case by case basis. Mitigation measures for active bald eagle's nests are described in Chapter 13 of the Final EIS/EA, Appendix O and the original response to CEAA IR TW(1)-08. (*Mitigation measures that will be considered include timing window restrictions, minimizing human presence in proximity to the nest during the nesting season, maintaining perches and sight lines to the extent feasible, retaining as much forest cover as possible around the nest, maintaining a vegetated buffer along the lake, among others to be considered. In these circumstances where effects on eagles are avoided*). In addition to mitigating effects on eagles these measures are also expected to address potential Project effects on community well being, Aboriginal physical and cultural heritage, and cultural or spiritual, practices related to eagles. These mitigation measures have been included in Table 6-1 of Updated Appendix O. Based on the TLRU information available through the Aboriginal consultation program for the Project and Project-specific TK/TLU studies, as well as the conclusions of the Wildlife and Wildlife Habitat VC, residual environmental effects on bald eagles and bald eagle habitat have been determined not to threaten the long-term persistence or viability of bald eagles in the RAA. Therefore, Project effects on community well being, Aboriginal physical and cultural heritage, and cultural or spiritual as we as the exercise of Aboriginal and treaty rights are not expected as a result of effect on bald eagles or eagle habitat in the PDA.

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			GGM remains committed to funding environmental monitors (EMs) for each of the five local Aboriginal communities and maintaining environmental advisory committee(s) which have the EMs as members. GGM will apply appropriate mitigations as outlined in the Final EIS/EA in collaboration with EMs.
CEAA_38 *IR Number: TW(1)-09*	*Section 13.4.3; Chapter 24*	***Context and Rationale:*** • *Section 13.4.3.2, Table 13-12 states, as a mitigation measure for a change in mortality risk: "Monitor wildlife use (primarily targeting waterfowl but also species such as moose and bear) and water quality of the TMF [tailing management facility], open aquatic areas and other key Project locations and implement adaptive management measures (e.g., deterrents and/or exclusionary measures) as required".* • *Section 6.4 of the EIS Guidelines states that "adaptive management is not considered as a mitigation measure, but if the follow-up program […] indicates that corrective action is required, the proposed approach for managing the action should be identified."* • *Further information should be provided, as part of a follow-up program, as to how wildlife use and water quality will be monitored, the locations where monitoring will occur, which mitigation measures are being verified for efficacy, and some details on the additional mitigation measures and follow-up studies and the circumstances in which they would be implemented.* ***Specific Question/ Request for Information:*** *A. Describe deterrent / exclusionary measures to be applied to mitigate wildlife mortality risk at the TMF, open aquatic areas and other key Project locations. If no mitigation measures are applied, provide a rationale.* *B. Provide more specific information about the proposed monitoring of wildlife use at the TMF, open aquatic areas and other key Project locations.* *C. Describe the follow-up program(s) to evaluate the effectiveness of the proposed mitigation measures.*	***Context and Information Required for a Complete Response:*** • *The response does not adequately address Part A of the information requirement (IR). Revise the response to specify deterrents to be implemented during the Project. Note that the response provided discusses an adaptive management approach, which is not considered a mitigation measure as per Part 2, Section 6.4 of the EIS Guidelines.* • *The response does not adequately address Parts B and C of the IR. The response suggests that the "known effectiveness" of the deterrents precludes the need for a follow-up program; however, the response also names deterrents that can be implemented after "visual monitoring" of the TMF pond. Conceptual details that should be provided include locations, frequency, duration of program, and what would trigger the application of further mitigation measures.*
		Response: A-C. Measures have been developed to deter waterfowl interactions with the TMF in the Conceptual Biodiversity Management and Monitoring Plan (Appendix M13 of the Final EIS/EA) and notably that no vegetation will be planted on the embankments of the TMF or the water management collection ponds during operation. Vegetation that naturally regenerates around these areas will be removed as required. It is also unlikely that the tailings management facility (TMF) pond would support populations of benthic invertebrates, aquatic plants or fish suitable for foraging and consequently, waterfowl receptors inhabiting the area around the Project development area (PDA) are expected to forage for food elsewhere and limit their presence in the TMF collection ponds. They may land on Project-related ponds for short periods of time, but due to sensory disturbance arising from mining activity as well as the lack of a food source in the ponds, and since there are numerous natural lakes in the area that would likely be preferred by waterfowl, it is not likely that the Project-related ponds would be frequently used or used for long periods of time by waterfowl. Regardless, the Biodiversity Management and Monitoring Plan provides that the TMF pond will be visually monitored for waterfowl use, and deterrents such as predator and human decoys and random visual and noise disturbances (e.g., reflectors and bangers) can be implemented. Because the use of deterrents is a standard practice and known to be effective, there is no expected need for a follow up program.	**Response:** To mitigate wildlife mortality risk during mine operation, mitigation measures to avoid or reduce wildlife attraction to the TMF will be implemented. The primary mitigation will be to control the establishment and development of vegetation along the perimeter embankments that could function as forage, shelter, or nesting habitat. The embankments will be constructed of till and rock, and once per month during the growing season (May to September) they will be visually inspected for evidence of revegetation. If revegetation is observed, prevention of continued growth will be controlled using manual methods (e.g., pulling, cutting, tarping). Wildlife use of the TMF, including the TMF reclaim pond, will be monitored during mine operation as follows: • Twice a week, starting at spring break-up and continuing until the start of freeze up (approximately April to October), environment staff will survey the TMF reclaim pond and the adjacent tailings beach for waterfowl. The surveyor will use binoculars, and if waterfowl are present, will document their species, age class, behaviour (e.g., resting, feeding, flying over), abundance, and specific location (to be marked on a large-scale site map). The survey will be completed from a single survey station that will be selected based on accessibility, safety, repeatability, and a suitable field of view of the pond surface. Observations of other wildlife will also be recorded. • Project personnel and contractors will be instructed to report sightings of wildlife near or within the TMF boundaries directly to the Environment Manager, by radio or in person. These sightings will be recorded in the wildlife observation log maintained by GGM. Measures to deter wildlife from the TMF will be directed by the Environment Manager as needed. Specific adaptive management triggers will need to be refined prior to TMF operation but may include consistent observations of waterfowl use over a one-month period. If identified to be required through adaptive management, wildlife deterrents may include: • Use of air horns, bangers • Use of automated auditory deterrents (e.g., propane bangers) at certain times of the year (e.g., spring) and for certain durations (e.g., one month), based on observations at the TMF reclaim pond

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			• Installation of site-specific visual deterrents (e.g., posts with predator decoys, reflectors strung along or over sections of the pond). Additionally, if there are localized incidents (more than one) of large mammals (e.g., moose) entering the TMF, strategic placement of fences or barriers along sections of the TMF will be considered. GGM will conduct annual reporting on wildlife use of the TMF and the effectiveness of mitigation measures (i.e., vegetation control on embankments and any additional measures [e.g., use of wildlife deterrents] applied over time) for each year of mine operation.
CEAA_39 *IR Number: TW(1)-10*	*Section 12.4.2.3.*	***Context and Rationale:*** • *According to Section 12.4.2.3, the anticipated loss of swamp due to the project is approximately 90% in the Project Development Area (PDA). This is a significant loss of habitat for plant species such as cranberry and wild rice, which are traditionally important for Biinjitiwaabik Zaaging Anishinaabek and Bingwi Neyaashi Anishinaabek.* ***Specific Question/ Request for Information:*** *A. Discuss how the anticipated loss of wetland may affect significant plant species such as cranberry and wild rice habitat.* *B. Describe any mitigation and/or wetland compensation measures that will be applied to counter the loss of wetland.* *C. Discuss the impact on use of land and resources by Indigenous groups with and without mitigation/wetland compensation. Provide information regarding how each Indigenous group may be impacted, the mitigation measures proposed for each Indigenous group, and details of any follow-up programs that would be required.*	***N/A***
		Response: A. The vegetation communities that support these plant species are commonly found within the regional assessment area (RAA). The assessment of change in abundance of plant species of interest (Section 12.4.4 of the Final EIS/EA) determined that removal of habitat that supports plant species of interest to Aboriginal communities, such as wild rice and cranberry, from the PDA is not anticipated to affect the viability of populations of these species in the LAA and RAA given that the species are relatively common in the RAA. Within the PDA, the traditional harvest of species associated with wetlands will be reduced, however, in the RAA, the reduction in harvestable species will be in proportion to the reduction of wetland area (less than 1%). Given that the vegetation communities that support wild rice and cranberry are widely available in the RAA, a reduction of less than 1% is not considered to be a significant residual adverse effect. The Final EIS/EA also notes that GGM will provide opportunities to local Aboriginal communities for harvesting of plants for traditional purposes prior to construction. B. Chapter 12.0 of the Final EIS/EA concludes that based on the abundance of wetlands in the RAA that compensation would not be required. Nonetheless GGM has considered areas where there may be an opportunity for wetland establishment in the PDA. The Goldfield Creek Diversion Channel offers a number of opportunities for wetland development to occur. The new realignment corridor between the Goldfield Creek Diversion Pond and the existing Southwest Arm Tributary Pond 2, will consist of a variable constructed floodplain between 38 and 68 m wide. Within the floodplain, offline wetland pockets can enhance the diversity of the floodplain wetland habitats. The grade controls proposed along the existing Southwest Arm Tributary are designed to result in ponded areas that will transition the existing floodplain habitats into more of an open water marsh environment. The Goldfield Creek diversion design provides a robust plan for aquatic habitats that is highly reliable for success. C. AFN, LLFN, BZA and MNO report that harvesting wild rice is a traditional practice and LLFN, GFN and MNO report cranberries as a traditional food. GFN commented on swamplands near Geraldton, but these are outside the LAA. Residual environmental effects on plant species and plant harvesting sites and activities are considered adverse because of the removal of habitat, including wetlands affecting availability of resources. However, these plant species are not limited to the habitat in the PDA or LAA and the vegetation communities that support these plant species are common throughout the RAA. Further, it has been documented in TK studies that many	***N/A***

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		Aboriginal people avoid the PDA because of historical mining activity. The removal of plant species of interest to Aboriginal communities that are located within the PDA are not anticipated to affect the viability of these species occurring in the RAA. The Final EIS/EA also notes that GGM will provide opportunities to local Aboriginal communities for harvesting of plants for traditional purposes prior to construction.	
CEAA_40 *IR Number: TW(1)-11*	*Appendix M13.*	***Context and Rationale:*** • *Animbiigoo Zaagi igan Anishinaabek, Aroland First Nation, and Ginoogaming First Nation noted that GGM has committed to monitoring waterfowl and large mammal use of the tailings management facility (TMF) and open aquatic areas in the Conceptual Biodiversity Management and Monitoring Plan (Appendix M13). They recommend that this monitoring should be extended to include other traditionally important, wetland-dependent flora and fauna (as identified by these groups) and also focus on the lost wetlands.* ***Specific Question/ Request for Information:*** *A. Specify the specific flora and fauna of importance to be monitored at the TMF and open aquatic areas as identified by Indigenous groups.* *B. Describe how monitoring as part of the Conceptual Biodiversity Management and Monitoring Plan include traditionally important wetland flora and fauna for Animbiigoo Zaagi igan Anishinaabek, Ginoogaming First Nation and Aroland First Nation.*	***N/A***
		Response: A. Information on flora and fauna of importance to Aboriginal groups obtained through the Aboriginal consultation activities, Project-specific TLU reports, and a review of relevant secondary sources is provided in Sections 18.2.2.1 through 18.2.2.12 of the Final EIS/EA. Where there is interest, GGM will continue to work with local Aboriginal communities to harvest plant species prior to construction. As noted previously, mitigation to minimize waterfowl interaction with the TMF and other open water ponds includes vegetation removal, and therefore flora will not be present at these locations. While waterfowl will be the main focus, all other observations of wildlife interactions with the Project will be recorded and reported to the Project's environment department. B. The Project design undertook to minimize the overall footprint of the development area and avoid wetlands where feasible in a northern Ontario landscape context, which contains abundant wetland areas. The wetland community types that will be removed for the Project are common and widespread in the RAA. Swamp wetlands are in fact the most common wetland type identified in the RAA. To address the noted concern for wetlands, a systematic approach to monitoring has been included in the Biodiversity Management and Monitoring Plan. The plan includes programs to monitor surface water and groundwater during operation of the site (detailed in Water Management and Monitoring Plan). This program will confirm predicted effects of the Project with respect to groundwater and surface water quality, as well as changes in drainage patterns and surface water flow which are relevant to wetlands. GGM remains committed to funding, Environmental Monitors (EM) for each of the local Aboriginal communities and maintaining environmental committee(s) which the EM's would be members of. Over the life of the project, the committee(s) will review and recommend changes to the EMMPs, including modifications, additions or deletions in accordance with the Adaptive Management Framework outlined in the EMMPs.	***N/A***
CEAA_41 *IR Number: TW(1)-12*	*Section 12.1.2.*	***Context and Rationale:*** • *Additional information is required regarding GGM's efforts to recreate wetland habitat along the Goldfield Creek diversion channel and aggregate pits S1, S4 and T2, as outlined in Section 12.1.2.* • *Any efforts to compensate for wetland habitat loss (and the loss of traditionally harvested species, such as wild rice and cranberry) should be undertaken in close consultation with Indigenous groups. Loss of these harvests may have effects to current use of lands and resources for traditional purposes, or lead to a socioeconomic effect to the community.* ***Specific Question/ Request for Information:***	***N/A***

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		A. Provide additional detail about the re-creation of wetland habitat, identifying the project phases and activities proposed in each phase. *B. Describe a follow-up plan to verify the long-term establishment of the re-created wetlands.* *C. Describe how consultation with Indigenous groups will be included in the re-creation of wetlands.*	
		Response: A. The Final EIS/EA makes the conservative assumption that all wetlands within the PDA will be lost and, except of the compensation required for fish habitat along the Goldfield Creek restoration, no replacement wetlands will be created. The potential creation of wetlands in rehabilitated aggregate pits would be an enhancement beyond the assumptions of the Final EIS/EA, and is not required to support the Final EIS/EA conclusions. However, GGM is committed to taking all reasonable steps to support development of additional wetlands where feasible. The development of Aggregate Pits S1 and S4, as well as the Goldfield Creek realignment, will be very early in the project, such that any associated wetland restoration or development can be undertaken concurrently with mine development and initially monitored during the life of mine. Aggregate pit T2 is a till source that will be used regularly during the life of the mine, and as such will not be naturalized until the end of mine life. B. While the above provides potential opportunities to incorporate wetland features into the closure designs, additional engineering is required to solidify the plans. However, where they are planned to be incorporated, monitoring will focus on the visual observation of germination of planted or seeded wetland species and the natural propagation of hydrophytic species. C. GGM is planning for more consultation with local Aboriginal communities on the details of the Goldfield Creek re-alignment/Offsetting plan and Closure Plan as part of permitting. GGM remains committed to funding, Environmental Monitors (EM) for each of the local Aboriginal communities and maintaining environmental committee(s) which the EM's would be members of. Over the life of the project, the committee(s) will review and recommend changes to the EMMPs, including modifications, additions or deletions in accordance with the Adaptive Management Framework outlined in the EMMPs.	***N/A***
CEAA_42 *IR Number: TW(1)-13*	*Section 13.1.3.*	***Context and Rationale:*** • *Section 13.1.3 lists wildlife species identified as having traditional value or interest to Aboriginal communities, while Section 13.1.4, Table 13-1 summarizes the potential environmental effects of the Project on wildlife and wildlife habitat, the measurable parameters, and the rationale for their selection.* • *Section 13.1.3 states that "the effects to [rabbit (i.e., snowshoe hare), ruffed grouse, great grey owl, beaver, marten, black bear, lynx, and wolf] are addressed through habitat assessments of similar species because they occupy similar habitat." However, in the case of mammals, only moose, caribou and bats were retained as measurable parameters. Large mammals such as moose and bear have large home ranges, however, these species behave quite differently within those ranges and within an annual timespan. The other animals have insufficient similarities in terms of biology and life habits for large mammals to be an adequate surrogate species. Small mammals and other categories of wildlife should be assessed separately.* • *Indigenous hunting activities are not limited to large mammals, and therefore assessment of effects on only those species is not representative of the current use of lands and resources by Indigenous peoples.* ***Specific Question/ Request for Information:*** *A. Provide an assessment of the potential environmental effects on wildlife and wildlife habitat of traditional value or interest to Aboriginal communities, including rabbit (i.e., snowshoe hare), ruffed grouse, great grey owl, beaver, marten, black bear, lynx, and wolf. Select appropriate representative organisms of wildlife based not only on common habitat but also on biological cycle and life habits.* *B. In responding to comments HE(1)-01, HE(1)-03, HE(1)-05 and HE(1)-09, consider how the potential environmental effects assessed above would cause effects to socio-economic conditions and the current use of lands and resources for traditional purposes, particularly with regards to hunting, as well as potential impacts to Aboriginal and Treaty rights.*	***N/A***

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		Response: A. The wildlife assessment appropriately focused on wildlife groups and habitats known to occur in the PDA and/or LAA. Measurable parameters were selected to include species at risk, species of conservation concern, and species that Aboriginal groups and agencies requested to be included (please see Table 13-8 in the Final EIS/EA for the list of measurable parameters and the species and lifecycle habitats they represent). Habitat requirements overlap, such that the direct and indirect effects of the Project on a change in habitat, change in mortality risk, and change in movement will apply to the species identified as measurable parameters as well as to other species using that same habitat. The effects to snowshoe hare, ruffed grouse, great grey owl, beaver, marten, black bear, lynx, and wolf can be inferred by the effects on the species identified as measurable parameters that are associated with the same general habitat associations. Because the measurable parameters chosen (typically focused on some of the most sensitive species) represent the range of vegetation communities, wildlife species, and habitats that are present within the LAA, inferring effects from the measurable parameters to other species using those same habitats provides a comprehensive and conservative approach without being repetitive, and is a widely accepted best practice. There were no population limiting life cycle habitat requirements for any of these species identified in the PDA that are not addressed in Table 13-8 of the Final EIS/EA. When finalizing the wildlife chapter (Chapter 13.0 of the Final EIS/EA), the species identified by Aboriginal communities were reviewed to confirm that these species were considered by the assessment, or encompassed by the assessment. B. Traditional Land and Resource Use is assessed in Chapter 18 of the Final EIS/EA. Adverse residual effects, primarily due to habitat loss and sensory disturbance, on hunted species are anticipated for TLRU locations in the PDA. Patterns of access to the Southwest Arm of Kenogamisis Lake may be altered by access restrictions to the PDA as well, thereby potentially increasing effort expended or distance traveled to harvest. To address this, a commitment has been made by GGM to maintain alternate access to the Southwest Arm of Kenogamisis Lake. Table 3-10 in the Final EIS/EA provides a summary of the percentage of habitats in the RAA that will be removed. The percentages are consistently low for the species of interest (e.g., 1.9% of potential moose foraging habitat, and 1.9 % of potential bald eagle nesting habitat), leaving large habitat areas undisturbed and readily accessible for TLRU. The effects of the Project are not anticipated to result in the long-term loss of availability of traditional use resources or access to lands relied on for traditional use practices or the permanent loss of current sites and areas in the Traditional Land and Resource Use LAA and RAA and have been characterized as not significant. Effects on the ability to exercise Aboriginal or treaty rights are not expected from the Project.	***N/A***
CEAA_43 *IR Number: HE(1)-01*	*Section 3.6.2; Section 3.6.4; Chapter 16; Section 17.2; Section 18.2.2; Appendix O.*	***Context and Rationale:*** • *Appendix O provides some information relating to effects of changes to the environment on Indigenous people. However, Appendix O and related chapters of the EIS do not clearly provide a complete assessment of effects of changes to the environment on Indigenous peoples. For each assessment, there are references to multiple locations within the EIS and it is not clear what GGM's conclusions are.* • *Specific examples are:* ○ *Appendix O, Sections 4 to 7 do not link to predictions made on effects to health conditions for Aboriginal peoples described in Chapter 19;* ○ *Chapter 16 does not link to Appendix O, Section 4.4, where information was added with respect to effects of changes to the environment on the current use of lands and resources for traditional purposes;* ○ *Chapters 17 and 18 do not link to Appendix O, Section 4.3, where information was added with respect to physical and cultural heritage.* • *With respect to the assessment of impacts to potential or established Aboriginal and Treaty rights there is no separate assessment.* • *Sections 6.1.8 and 6.3.4 of the EIS Guidelines requires for each of the effects of the changes to the environment on Aboriginal peoples: health and socio-economic conditions; physical and cultural heritage; current use of lands and resources for traditional purposes; and any structure, site or thing that is of historical, archaeological, paleontological or architectural significance. The assessments need to be completed for each Indigenous group and include the following:* ○ *baseline information collected and incorporated into the assessment;* ○ *articulation of effects of changes to the environment* ○ *methodology including significance criteria and rationale;*	***Context and Information Required for a Complete Response:*** • *The response to Part A of HE(1)-01 will be reassessed upon revision of the responses to HE(1)-05, HE(1)-06, HE(1)-09, and HE(1)-10.*

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		○ *mitigation measures;* ○ *clear articulation of residual effects and validation of effects by Indigenous groups; and - cumulative effects assessment.* • *Section 5 of the EIS Guidelines requires a separate assessment of potential adverse impacts of the project on potential or established Aboriginal or Treaty rights the Agency which includes:* • *baseline information collected and incorporated into the assessment;* • *methodology and rationale;* ○ *clear articulation of impacts and mitigation measures; and* ○ *validation of conclusions on impact by Indigenous groups.* • *The Agency requests that GGM submit a revised Appendix O that incorporates the information listed above, in order to have one complete and clean document that provides a complete assessment of effects of changes to the environment on Indigenous peoples.* ***Specific Question/ Request for Information:*** *A. For responses to comments HE(1)-02 to HE(1)-11, revise Appendix O to contain separate complete assessments for Aboriginal peoples with respect to:* *a. health and socio-economic conditions;* *b. physical and cultural heritage;* *c. current use of lands and resources for traditional purposes;* *d. any structure, site or thing that is of historical, archaeological, paleontological or architectural significance; and* *e. potential severity of impacts on Aboriginal and Treaty rights.* *B. In revising Appendix O with separate complete assessments for each of the above, the Agency expects that relevant information contained in other chapters of the EIS will be consolidated into each assessment.*	
		Response: A. Appendix O has been updated to provide standalone assessment of effects of change to the environment on Aboriginal peoples (see attached "Requirements Under CEAA 2012 Section 5(1)(c) – In Accordance with Section 6.3.4 of the EIS Guidelines issued by the CEA Agency – February 2018 Update"). This includes assessments for each of the Section 5(1)(c) Factors, namely Aboriginal health conditions, Aboriginal socio-economic conditions, Aboriginal physical and cultural heritage (including any structure, site or thing of historical, archaeological, paleontological, or architectural significance), and current use of land and resources for traditional purposes by Aboriginal persons. In addition, an assessment of changes to the ability to exercise Aboriginal and treaty rights has been incorporated where relevant. Updated Appendix O Sections 2, 3, 5, 6 and Section 9 provide information which is applicable to all Section 5(1)(c) Factors. The discussions within Sections 4,7 and 8 of updated Appendix O have been developed to address each of the Section 5(1)(c) Factors separately. Please see the Appendix O Update Memo as it summarizes the revisions made to Appendix O since the final EIS/EA was submitted and has been developed to assist in CEAA's review. a) The assessment of the Project environmental effects on "health and socio-economic conditions" is divided into two separate subsections: "Aboriginal health conditions" and "Aboriginal socio-economic conditions", due to the difference in the nature of these environmental effects. In addition to sub-sections which provide general content, Aboriginal health conditions are addressed in Sections 4.1, 7.1 and 8.2.1 of the updated Appendix O and Aboriginal socio-economic conditions are addressed in Sections 4.2, 7.2 and 8.2.2. b and d) The assessment of the Project environmental effects on "physical and cultural heritage" and "any structure, site or thing of historical, archaeological, paleontological or architectural significance" is contained in a single subsection because of similar subject matter between these requirements. Structures, sites, or things of historical, archaeological, paleontological, or architectural importance are a part of Aboriginal communities' physical heritage. Therefore, this subsection reflecting both Section 5(1)(c) Factors is referred to as "Aboriginal physical and cultural heritage". In addition to sub-sections which provide general content, Aboriginal physical and cultural heritage is addressed in Sections 4.3, 7.3 and 8.2.3.	**Response:** Comment noted. In addressing HE(1)-05, HE(1)-06, HE(1)-09, and HE(1)-10 there are no changes to the conclusions of the assessment.

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		c)The assessment of current use of lands and resources for traditional purposes is referred to simply as "current use" for brevity. In addition to sub-sections which provide general content, current use is addressed in Sections 4.4, 7.4 and 8.2.4. e) In addition to the assessment of Section 5(1)(c) Factors, information about Aboriginal or treaty rights including; regulatory context, background information, assessment methodology and an assessment of effects of the Project on the ability to exercise Aboriginal or treaty rights has been included Sections 2.2.2, 2.3, and 7.4.5 of the updated Appendix O. B. Relevant information contained in other chapters of the Final EIS/EA has been consolidated into several subsections within the updated Appendix O. The pathways through which changes to the environment may take place in the absence of mitigation, as identified in related VC chapters of the Final EIS/EA, are summarized. Mitigations relevant to Section 5(1)(c) Factors are presented and the characterization of residual effects as determined by related VC chapters of the Final EIS/EA are also presented. This information has been incorporated into the assessment of effects on each of the Section 5(1)(c) Factors.	
CEAA_44 *IR Number: HE(1)-02*	*Chapter 17; Appendix O.*	***Context and Rationale:*** • *As stated above in comment HE(1)-01, the Agency requires the inclusion of baseline information with respect to the assessments of effects of changes to environment on Aboriginal peoples and impacts to potential or established Aboriginal or Treaty rights.* • *Therefore any information provided in written comments submitted to the Agency by Indigenous groups should be incorporated, to the extent possible, to update baseline information and the assessment of effects of changes to the environment on* • *a. Aboriginal peoples' health and socio-economic conditions;* • *b. physical and cultural heritage;* • *c. current use of lands and resources for traditional purposes;* • *d. any structure, site or thing that is of historical, archaeological, paleontological or architectural significance;* • *e. potential severity of impacts of the project on Aboriginal and Treaty rights.* • *The Agency understands that Red Sky Métis Independent Nation (RSMIN) and Animbiigoo Zaagi igan Anishinaabek (AZA) have provided additional traditional knowledge and baseline information to Greenstone Gold Mines (GGM) since the final EIS was submitted in July 2017.* • *Also, comments from AZA, Aroland First Nation and Ginoogaming First Nation state that Chapter 17 does not discuss any cultural heritage sites identified by AZA, and that the EIS does not articulate the value of the Project Development Area (PDA) and Kenogamisis Lake from a knowledge transmission and teaching perspective.* • *Also, the Métis Nation of Ontario provided information in their written comments on the EIS with respect to wildlife and plant species that they indicate were not considered in the EIS.* ***Specific Question/ Request for Information:*** *A. In responding to comments HE(1)-01 to HE(1)-09, incorporate to the extent possible and demonstrate how the information (including additional information provided in comments on the EIS) provided by Indigenous groups was incorporated into the updated assessments for:* *a. Aboriginal peoples' health and socio-economic conditions;* *b. physical and cultural heritage;* *c. current use of lands and resources for traditional purposes;* *d. any structure, site or thing that is of historical, archaeological, paleontological or architectural significance; and* *e. potential impacts of the project on Aboriginal and Treaty rights.*	***N/A***
		Response: A. As noted in the response to CEAA_43 (IR Number HE(1)-01) above, Appendix O has been updated to provide standalone assessments for each of the Section 5(1)(c) Factors, and an assessment of effects on the ability to	***N/A***

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		exercise Aboriginal and treaty rights. Key comments and information received from each Aboriginal community is presented separately (where such information exists), rather than in aggregate as had been done previously, see Section 4 of updated Appendix O. The information provided by Aboriginal communities on this topic was not conducive to a separation of residual effects discussions for each Aboriginal community. This approach was applied to Section 5(1)(c) Factors, see Sections 7.1.3, 7.2.3, 7.3.3, and 7.4.3. TK sharing will occur throughout the life of the Project. Where new TK information, or information about Aboriginal or treaty rights is received, GGM will review the results of the Final EIS/EA, including related to key EA milestones such as baseline studies, alternatives assessment, environmental effects assessment including mitigation and monitoring, and other conclusions or commitments to confirm if refinements are required.	
CEAA_45 *IR Number: HE(1)-03*	*Chapter 16; Chapter 18; Appendix J; Appendix O.*	***Context and Rationale:*** • *Appendix O does not provide a clear assessment of potential effects of changes to the environment on Aboriginal peoples' socio-economic conditions. It is unclear how the assessment of socio-economic effects was carried out. The information presented in Appendix O in relation to socio-economic effects does not include a methodology or identify residual effects clearly, which would include significance criteria (i.e. geographic extent, magnitude, duration, frequency, and reversibility), the application of mitigation measures, or reference to a cumulative effects assessment.* • *Additionally, when reviewing the traditional knowledge information provided by Indigenous groups in Appendix J, there is information collected in these assessments that appear to have not been carried into the assessment of effects of changes to the environment on socio-economic conditions. For example, the Ginoogaming First Nation Social Impact Assessment (Appendix J8) raises the potential socio-economic effect of having to purchase meat from the grocery store to compensate for the inability to harvest moose and fish.* • *Animbiigoo Zaagi igan Anishinaabek, Aroland First Nation and Ginoogaming First Nation raise concerns of how socio-economic effects caused by loss of wild foods will be mitigated.* ***Specific Question/ Request for Information:*** *A. In a revised Appendix O, provide a revised assessment for effects of changes to the environment on Aboriginal peoples' socio-economic conditions that includes:* • *use of site specific baseline information of Indigenous groups' socio-economic conditions;* • *a methodology with significance criteria and rationale;* • *specific and measurable mitigation measures;* • *a rationale and analysis of conclusions for residual effects;* • *a follow-up program for potential effects to Indigenous peoples' socio-economic conditions, including objectives and any monitoring measures that will be implemented to verify the predictions of effects and evaluate the effectiveness of the proposed mitigation measures;* • *input from Indigenous groups on the methodology (including significance criteria), analysis (including information used), mitigation measures, follow-up programs and conclusions for residual effects; and* • *specifically answer how socio-economic effects caused by loss of wild foods for Animbiigoo Zaagi igan Anishinaabek, Ginoogaming First Nation and Aroland First Nation will be mitigated.* *B. Consider the effects of changes to the environment on socioeconomic conditions as part of the cumulative effects assessment.* *C. Incorporate to the extent possible information provided by Indigenous groups, including traditional knowledge, in the assessment (see comment HE(1)-02).*	***N/A***
		Response: A. As noted in the response to CEAA_43 (IR Number HE(1)-01) above, Appendix O has been updated to provide standalone assessments for Aboriginal socio-economic conditions. This includes a discussion of assessment methodology, background information, potential effects, mitigation, residual effects characterisation and GGM's plans for ongoing discussion with Aboriginal communities. In addition to sub-sections which provide general content, Aboriginal socio-economic conditions are addressed in Sections 4.2, 7.2 and 8.2.2 of the updated	***N/A***

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		Appendix O. Concern about the economic costs of purchased foods and travel arising from decreased quality and quantity of country foods is addressed in Section 7.2.3.5 of the updated Appendix O. B. Cumulative effects of changes to the environment on Aboriginal socioeconomic conditions are addressed in Section 8.2.2 of the updated Appendix O. C. As noted in the response to CEAA_44 (IR Number HE(1)-02) above, key comments and information received from each Aboriginal community is presented separately (where such information exists), rather than in aggregate as had been done previously, see Section 4 of updated Appendix O. Where information from Aboriginal communities allowed for separation of residual effects, separate residual effects discussions have been provided for individual Aboriginal communities. This approach was applied to assessment of Aboriginal socio-economic conditions see Sections 7.2.3. TK sharing will occur throughout the life of the Project.	
CEAA_46 *IR Number: HE(1)-04*	*Chapter 17; Appendix E13; Appendix J; Appendix O.*	***Context and Rationale:*** • *Appendix O does not provide a clear assessment of potential effects of changes to the environment on physical and cultural heritage, and on any structure, site or thing of historical, archaeological, paleontological or architectural significance by Aboriginal peoples.* • *Baseline information with respect to Aboriginal peoples physical and cultural heritage and any structure site or thing that is of historical, archaeological, paleontological, architectural significance is presented in several sections of the EIS; however, it is unclear where an effects assessment is located and potential residual effects are identified.* • *The assessment also does not consider the effects of changes to the environment on the overall quality of experience of the use of physical and cultural heritage, or any structures, sites or things of historical, archaeological, paleontological or architectural significance, where appropriate. Any change in the environment such as air quality, noise or visual aesthetics could result in an effect to the overall quality of experience and should be considered. An example of this is effects from noise, dust and visual aesthetics of the mine on the experience of an Indigenous person conducting certain practices at a burial or sacred site* • *The assessment also does not capture effects of changes to the environment on intangible aspects of physical and cultural heritage, such as cultural, language, and knowledge transmission that is associated with particular place such as a burial or sacred site.* • *The determination of significance of residual effects in Section 17.5 is not organized by Indigenous group. The information provided in Appendix O in relation to Aboriginal peoples physical and cultural heritage, and any structure, site, or thing that is of historical, archaeological, paleontological, architectural significance does not include a methodology or a conclusion for residual effects, including significance criteria (i.e. geographic extent, magnitude, duration, frequency, and reversibility), the application of mitigation measures, or reference to a cumulative effects assessment.* • *Currently, the definition for magnitude described in Section 17.1.6, Table 17-2 refers to loss or change in access, and to change in cultural heritage value or interest. The quality of experience, or the value of the location, should also be incorporated into the significance criteria.* ***Specific Question/ Request for Information:*** *A. In a revised Appendix O, provide a revised assessment of effects of changes to the environment on the physical and cultural heritage, and on any structure, site or thing of historical, archaeological, paleontological or architectural significance by Aboriginal peoples that includes the following:* • *use of site specific baseline information of Indigenous groups' use of physical and cultural heritage and any structure site or thing of historical, archaeological, paleontological or architectural significance including seasonality/timing;* • *a methodology with significance criteria and a rationale (including spatial boundaries, and consideration of quality of experience and value of location);* • *inclusion of effects of changes to the environment on overall quality of experience and intangible aspects of the use of physical and cultural heritage or structures, sites or things of historical, archaeological, paleontological or architectural significance;* • *specific and measurable mitigation measures;* • *a rationale, analysis and conclusions for residual effects for each Indigenous group;*	***N/A***

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		• *a follow-up program, including objectives and any monitoring measures that will be implemented to verify the predictions of effects and evaluate the effectiveness of the proposed mitigation measures; and* • *input from Indigenous groups on the methodology (including significance criteria), mitigation measures, follow-up programs and conclusions for residual effects.* *B. Consider effects of changes to the environment on the physical and cultural heritage, and any structure, site or thing of historical, archaeological, paleontological or architectural significance by Aboriginal peoples as part of the cumulative effects assessment.* *C. Incorporate to the extent possible information provided by Indigenous groups, including traditional knowledge, in the assessment (see comment HE(1)-02).*	
		Response: A. As noted in the response to CEAA_43 (IR Number HE(1)-01) above, Appendix O has been updated to provide a standalone assessment for Aboriginal physical and cultural heritage. This includes a discussion of assessment methodology, background information, potential effects, mitigation, residual effects characterisation and GGM's plans for ongoing discussion with Aboriginal communities. In addition to sub-sections which provide general content, Aboriginal physical and cultural heritage is addressed in Sections 4.3, 7.3 and 8.2.3 of the updated Appendix O. The assessment of changes to Aboriginal physical and cultural heritage incorporates information about potential changes to physical and cultural heritage sites, sensory disturbances such as changes to atmospheric and acoustic environments and visual quality as well as changes to the cultural value or importance of Aboriginal physical and cultural heritage. B. Cumulative effects of changes to the environment on Aboriginal physical and cultural heritage are addressed in Section 8.2.3 of the updated Appendix O. C. As noted in the response to CEAA_44 (IR Number HE(1)-02) above. Key comments and information received from each Aboriginal community is presented separately (where such information exists), rather than in aggregate as had been done previously, see Section 4 of updated Appendix O. The information provided by Aboriginal communities on this topic was not conducive to a separation of residual effects discussions for each Aboriginal community. This approach was applied to assessment of Aboriginal physical and cultural heritage see Sections 7.3.3. TK sharing will occur throughout the life of the Project.	**N/A**
CEAA_47 *IR Number: HE* *+(1)-05*	*Chapter 18; Appendix J; Appendix O.*	***Context and Rationale:*** • *Appendix O does not provide a clear assessment of potential effects of changes to the environment on the current use of lands and resources for traditional purposes by Aboriginal peoples.* • *Chapter 18 and Appendix O of the EIS provide baseline information with respect to Aboriginal peoples' current use of lands and resources for traditional purposes. Chapter 18 also provides an assessment and some conclusions of effects of changes to the environment on the current use of lands and resources for traditional purposes. However, the assessment does not look at the effects of changes to the environment on the overall quality of experience of the current use. Any change in the environment such as air quality, noise or visual aesthetics could result in an effect to the overall quality of experience and should be considered. An example of this is effects from noise, dust and visual aesthetics of the mine on the experience of fishing in nearby waterbodies. The assessment also does not capture effects of changes to the environment on intangible aspects of current use, such as cultural, language, and knowledge transmission from traditional use practices such as hunting, fishing and trapping.* • *Currently, the definition for magnitude provided in Section 18.1.7, Table 18-3 only speaks to ability to undertake TLRU activities, but does not consider the quality of experience or value of the location of a use in the significance criteria. In Section 18.6, there are not determinations of significance for each indicator; this information is only found in Chapter 24, the final summary table, which was not referenced in the Table of Concordance. There is no clear rationale of what is a significant effect, in terms of the weighting or value is given to each of the significance criteria.* • *The Métis Nation of Ontario have raised concerns that the assessment does not explore indirect sensory disturbances, or how changes in biophysical conditions can cause sensory disturbances.* • *The Métis Nation of Ontario also raised the concern that a Local Assessment Area (LAA) based on biophysical VCs is too large, and therefore dilutes potential effects. The Métis Nation of Ontario recommends that spatial*	***Context and Information Required for a Complete Response:*** • *The response to Part A of the information requirement (IR) does not provide enough information to allow for the Agency to proceed to a technical review for the following reasons:* ○ *The updated Appendix O provides an analysis of effects of changes to the environment on the current use of lands and resources for traditional purposes. For the consideration of the quality of experience and value of location, the sections of the updated Appendix O referenced in the response to Part A (4.4, 7.4 and 8.2.4) only provide a description of the biophysical indicators (noise, light, air quality). These biophysical indicators are not linked to the quality of experience of the current use (if it occurs within areas impacted by these biophysical changes), such as an Indigenous group's potential avoidance of a particular area for hunting or fishing due to the predicted levels of noise, light or air quality. An example of this issue being raised by Indigenous groups is fishing in Kenogamisis Lake and effects from noise and dust from blasting. Provide an analysis that links the biophysical indicators to the quality of experience of the current use, if there is such an interaction; otherwise, provide a rationale for there not being an interaction.* ○ *The section responding to the request for the inclusion of effects to intangible aspects of the current use of lands and resources for traditional purposes (Section 7.4.3.3 of the updated Appendix O) provides a description of several cultural values, but does not provide enough information with respect to the potential effects and mitigation. For example, section 7.4.3.3 states that "AFN noted that land use is important to the traditional and cultural life and provides a social fabric to relationships with other AFN members". In order to understand the potential effects, information regarding the seasonality, interconnectedness of the use to their cultural well-being, and the meaning of the loss of land use to AFN is required. A description of the proposed specific measures to ensure land use can be maintained is also required. The rationale provided*

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		boundaries for the LAA should be developed considering the current use of lands and resources for traditional purposes for Indigenous groups. ***Specific Question/ Request for Information:*** *A. In a revised Appendix O, provide a revised assessment of effects of changes to the environment on the current use of lands and resources for traditional purposes by Aboriginal peoples that includes the following:* • *use of site specific baseline information of Indigenous groups' current use of lands and resources for traditional purposes including preferred locations and seasonality/timing;* • *a methodology with significance criteria and a rationale (including spatial boundaries, and consideration of quality of experience and value of location);* • *inclusion of effects of changes to the environment on overall quality of experience and intangible aspects of the current use of lands and resources for traditional purposes;* • *specific and measurable mitigation measures;* • *a rationale, analysis and conclusions for residual effects for each Indigenous group;* • *a follow-up program, including objectives and any monitoring measures that will be implemented to verify the predictions of effects and evaluate the effectiveness of the proposed mitigation measures; and* • *input from Indigenous groups on the methodology (including significance criteria), analysis, mitigation measures, follow-up programs and conclusions for residual effects.* *B. Consider effects of changes to the environment on the current use of lands and resources for traditional purposes by Aboriginal peoples as part of the cumulative effects assessment.* *C. Incorporate to the extent possible information provided by Indigenous groups, including traditional knowledge, in the assessment (see comment HE(1)-02).*	*that states effects on tangible values are "primarily addressed through project design and siting", and that the Project site is a brownfield site, does not provide specifics on mitigation, given that the available information indicates that Indigenous groups currently use the area of the Project site.* • *Revise the response to Part A of the IR to address these points. The response to Part B will be reassessed upon revision of Part A and of HE(1)-06.*
		Response: A. As noted in the response to CEAA_43 (IR Number HE(1)-01) above, Appendix O has been updated to provide a standalone assessment of current use, and an assessment of effects on the ability to exercise Aboriginal and treaty rights. This includes a discussion of assessment methodology, background information, potential effects, mitigation, residual effects characterisation and GGM's plans for ongoing discussion with Aboriginal communities. In addition to sub-sections which provide general content, current use is addressed in Sections 4.4, 7.4 and 8.2.4 of the updated Appendix O. The assessment of changes to current use incorporates information about potential changes to current use sites, sensory disturbances such as changes to atmospheric and acoustic environments and visual quality as well as changes to the cultural value or importance of current use. B. Cumulative effects of changes to the environment on current use are addressed in Section 8.2.4 of the updated Appendix O. C. As noted in the response to CEAA_44 (IR Number HE(1)-02) above, key comments and information received from each Aboriginal community is presented separately (where such information exists), rather than in aggregate as had been done previously, see Section 4 of updated Appendix O. The information provided by Aboriginal communities on this topic was not conducive to a separation of residual effects discussions for each Aboriginal community. This approach was applied to assessment of Aboriginal current use see Sections 7.4.3. TK sharing will occur throughout the life of the Project.	**Response:** GGM has revised Appendix O to provide additional clarification that links biophysical indicators to the quality of experience of current use and analysis of predicted interactions. See revised Section 7.4.3.2.2 of Appendix O. Available information regarding the seasonality, interconnectedness of the use to their cultural well-being, and the meaning of the loss of land has been provided in a revised Section 7.4.4.3 of Appendix O. Section 6.0 and Table 6-1 of Appendix O lists the mitigation measures that are applicable to Current Use. They include those mitigations for the Land and Resource Use VC which are also described in Table 6-1.
CEAA_48 *IR Number: HE(1)-06*	*Appendix O, Section 2.2; Appendix O, Section 3.1.*	***Context and Rationale:*** • *Appendix O, Section 2.2 names the requirements listed in Part 2, Section 6.3.4 of the EIS Guidelines, stating that "with respect to Aboriginal peoples, a description and analysis of how changes to the environment caused by the project will affect the current uses of land and resources for traditional purposes, including, but not limited to:* • *a. any effects on resources (fish, wildlife, birds, plants or other natural resources) used for traditional uses (e.g. hunting, fishing, trapping, collection of medicinal plants, use of sacred sites);* • *b. any effects of alterations to access into the areas used for traditional uses, including development of new roads, deactivation or reclamation of access roads and changes to waterways that affect navigation;*	***Context and Information Required for a Complete Response:*** • *The response to the information requirement (IR) does not provide enough information to allow for the Agency to proceed to a technical review, as your response does not integrate the following:* o *the regional value of traditional use of the project area and the anticipated effects to traditional practice of the Aboriginal group, including alienation of lands from Aboriginal traditional use; and* o *indirect effects such as avoidance of the area by Aboriginal peoples due to increased disturbance (e.g. noise, presence of workers).* • *Ensure that the revised response to HE(1)-05 incorporates these points.*

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		• *c. any effects on cultural value or importance associated with traditional uses or areas affected by the project (e.g. intergenerational teaching of language or traditional practices, communal gatherings);* • *d. how project construction timing correlates to the timing of traditional practices, and any potential impacts resulting from overlapping periods;* • *e. the regional value of traditional use of the project area and the anticipated effects to traditional practice of the Aboriginal group, including alienation of lands from Aboriginal traditional use;* • *f. indirect effects such as avoidance of the area by Aboriginal peoples due to increased disturbance (e.g. noise, presence of workers); and* • *g. an assessment of the potential to return affected areas to pre-disturbance conditions to support traditional practices."* • *Appendix O, Section 3.1, Table 3-1 identifies, as rationale for inclusion for "Current use of lands and resources for traditional purposes", elements (a) to (d) named above. No rationale is provided for excluding elements (e) to (g). It is unclear whether elements (e) to (g) were considered in Appendix O.* ***Specific Question/ Request for Information:*** *A. In responding to comments HE(1)-01, HE(1)-05 and HE(1)-09, include in the description and analysis of how changes to the environment caused by the project will affect the current uses of land and resources for traditional purposes the following elements:* • the regional value of traditional use of the project area and the anticipated effects to traditional practice of the Aboriginal group, including alienation of lands from Aboriginal traditional use; • indirect effects such as avoidance of the area by Aboriginal peoples due to increased disturbance (e.g. noise, presence of workers); and an assessment of the potential to return affected areas to pre-disturbance conditions to support traditional practices.	
		Response: A. As noted in the response to CEAA_43 (IR Number HE(1)-01) above has been updated to provide a standalone assessment of current use, and an assessment of effects on the ability to exercise Aboriginal and treaty rights. Information about traditional use of the Project area and the value of these areas has been incorporated where information was made available by Aboriginal communities. Information about sensory disturbances such as changes to atmospheric and acoustic environments and visual quality have been included in the current use assessment, see Sections 7.4.2.2, 7.4.2.3, 7.4.2.4 and 7.4.3.2 of the updated Appendix O. Indirect effects related to avoidance of sensory disturbances and human activity are identified where such information was shared by Aboriginal communities. The reversibility of residual effects on traditional land and resources used in the PDA following closure was discussed in Chapter 18.0 of the Final EIS/EA and incorporated into Section 7.4 of the updated Appendix O.	**Response:** Additional information regarding the cultural value and importance for Indigenous people of harvesting and use activities (especially with regard to the Project area), the connection between Current Use and cultural wellbeing, and the meaning of the loss of land use, and seasonal patterns of that harvesting and use is provided in Section 7.4.3.3 of the revised version of Appendix O. Additional discussion of indirect effects is provided in Section 7.4.3.2 of the revised version of Appendix O.
CEAA_49 *IR Number: HE(1)-07*	*Appendix O, Section 3.2*	***Context and Rationale:*** • *Appendix O, Section 3.2, Table 3-2 summarizes which interactions between Valued Component and effects of changes to the environment on Aboriginal peoples are considered. The only Valued Component listed as interacting with current use of lands and resources for traditional purposes is "Traditional Land and Resource Use".* • *As section 5(1)(c)(iii) of CEAA, 2012 looks at changes to the environment on current use of lands and resources for traditional purposes by Aboriginal peoples, interactions with relevant biophysical valued components should be included. Any change to a biophysical valued component, even if it does not cause an exceedance of a federal or provincial guideline or objective, could have an effect on the current use of lands and resources for traditional purposes, and must be considered.* ***Specific Question/ Request for Information:*** *A. In responding to comments HE(1)-01, HE(1)-05 and HE(1)-09, incorporate, at a minimum, interactions of atmospheric environment, acoustic environment, surface water, fish and fish habitat, vegetation and wildlife into the assessment of effects of changes to the environment on the current use of lands and resources for traditional purposes by Aboriginal peoples.*	***N/A***

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		Response: Appendix O has been updated to provide a standalone assessment of current use and now incorporates summary-level information from the following VC's: Atmospheric Environment, Acoustic Environment, Land and Resource Use, and Traditional Land and Resource Use. The Traditional Land and Resource Use VC incorporates information from several other related 'source VC's which are identified in Section 3.1.2 of the updated Appendix O. The assessment of change in current use presented in the updated Appendix O relies on information considered in the Traditional Land and Resource Use VC and also incorporates the findings of source VC's where appropriate, see Table 3-2 Valued Components Related to Section 5 (1)(c) Factors in the updated Appendix O..	***N/A***
CEAA_50 *IR Number: HE(1)-08*	*Appendix O,* *Section 7.1.2.1.*	***Context and Rationale:*** • *In assessing the effects to current use of lands and resources for traditional purposes resulting from the removal or alteration of habitat, the "regional value of traditional use of the project area" must be considered, as indicated in Section 6.3.4 of the EIS Guidelines.* • *For example, Appendix O, Section 7.1.2.1 states that "the removal of habitat that supports plant species of interest to Aboriginal communities from the Project Development Area (PDA) is not anticipated to affect the viability of populations of these species in the vegetation communities in the LAA [Local Assessment Area] and RAA [Regional Assessment Area]". It is not indicated whether this particular habitat is a preferred location.* ***Specific Question/ Request for Information:*** *A. In responding to comments HE(1)-01, HE(1)-05 and HE(1)-09, demonstrate the consideration of preferred habitat or sites for plant harvesting, hunting, trapping, fishing and other current use or practice of Aboriginal and Treaty rights sites in your assessment of effects of changes to the environment on the current use of lands and resources for traditional purposes and impacts to Aboriginal and Treaty rights.*	***N/A***
		Response: Please refer to the updated Appendix O Section 7.4 (Current Use). Where such information was shared by Aboriginal communities, the updated Appendix O considers preferred habitat or sites for carrying out TLRU activities.	***N/A***
CEAA_51 *IR Number: HE(1)-09*	*Section 3.6.2; Section 3.6.4; Section 18.1.3.4; Appendix B1; Appendix O.*	***Context and Rationale:*** • *Section 5 of the EIS guidelines requires that the proponent "engage with Aboriginal groups that may be affected by the project, to obtain their views on potential adverse impacts of the project on potential or established Aboriginal or Treaty rights." Additionally, it states that "the EIS will document: […]* ○ *each group's potential or established rights (including geographical extent, nature, frequency, timing), including maps and data sets (e.g. fish catch numbers) when this information is provided by the group to the proponent;* ○ *based on its own perspective, the potential adverse impacts of each of the project components and physical activities, in all phases, on potential or established Aboriginal or Treaty rights. This assessment is to be based on a comparison of the exercise of identified rights between the predicted future conditions with the project and the predicted conditions without the project".* • *The EIS must provide a separate assessment of potential impacts of project components and physical activities, in all phases, on potential or established Aboriginal or Treaty Rights. Section 18.1.3.4 provides some baseline information on the Indigenous groups' Aboriginal and Treaty rights. However, in reference to the EIS Guidelines requirements quoted above, the Table of Concordance (App* • *endix B1, Rows 86 and 87) directs the reader to the assessments of current use of lands and resources for traditional purposes and physical and cultural heritage and any structure, site or thing that is of archaeological, paleontological or architectural significance. While these assessments can inform an assessment of impacts to Aboriginal and Treaty rights, they are not proxies for an assessment of impacts to Aboriginal and Treaty rights.*	***Context and Information Required for a Complete Response:*** • *Revise the response to Part A to take into consideration any changes made to the responses to HE(1)-05 and HE(1)-06.*

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		• *Should an Indigenous group express concerns regarding confidentiality of the information they provide with respect to the nature and practice of asserted or established Aboriginal or Treaty rights, GGM should respect the confidentiality and find alternative means to incorporate this information.* ***Specific Question/ Request for Information:*** *A. In a revised Appendix O, provide an assessment of impacts of the Project on Aboriginal and Treaty rights which includes:* • *baseline information regarding the practice of Aboriginal and Treaty rights including information provided by Indigenous groups such as preferred sites and seasonality or timing;* • *·methodology and rationale used to assess impacts of the Project on Aboriginal and Treaty rights;* • *mitigation and/or accommodation measures proposed specifically to address any potential impacts of the Project on Aboriginal and Treaty rights; ·conclusions for any potential impacts of the Project on Aboriginal and Treaty rights;* • *input from Indigenous groups on the methodology (including significance criteria), analysis, and conclusions relating to the assessment of potential impacts of the Project on Aboriginal and Treaty rights.* *B. Incorporate to the extent possible information provided by Indigenous groups, including traditional knowledge, in the assessment (see comment HE(1)-02).*	
		Response: It is important to note that GGM entered into an extensive consultation process with Aboriginal communities (and the CEA Agency) on the Draft EIS/EA and feedback help inform the Final EIS/EA. GGM provided capacity funding for communities review the material and provide their comments to the CEA Agency from their perspectives. A. As noted in the response to CEAA_43 (IR Number HE(1)-01) above, information about Aboriginal or treaty rights including regulatory context, background information, assessment methodology and an assessment of effects of the Project on the ability to exercise Aboriginal or treaty rights has been included Sections 2.2.2, 2.3, and 7.4.5 of the updated Appendix O. The updated Appendix O assesses the degree to which the Project will affect the use of land and resources upon which the exercise of Aboriginal or treaty rights depends. This approach recognizes a correspondence between practice-based rights and the TLRU. B. Where available information from Aboriginal communities has been incorporated to the assessment of changes to current use and the assessment of effects on the ability to exercise Aboriginal and treaty rights, see updated Appendix O Sections 7.4.3 and 7.4.5.	**Response:** Traditional land and resource use (TLRU) includes various traditional activities, practices, sites, areas and resources. Effects on the exercise of Aboriginal and treaty rights may be considered to occur to the extent that the Project has adverse residual effects on traditional harvesting (i.e., hunting, trapping, fishing, plant or materials gathering) or on physical activities associated with traditional use (i.e., travel and navigation, use of habitation, cultural and spiritual areas). This approach recognizes a correspondence between practice-based rights and the TLRU. Potential effects on the quality of experience of current use and the cultural value or importance associated with current use have been captured under the consideration of effects on tangible and intangible values related to TRLU. Consequently, additional information regarding the quality of experience of current use provided Section 7.4.3.2 of Appendix O and available information regarding the seasonality, interconnectedness of the use to cultural well-being, and the meaning of the loss of land has been provided in Section 7.4.4.3 Appendix O do not necessitate any revision to the conclusions regarding the effects on potential or established Aboriginal or treaty rights provided in Section 7.4.5 of Appendix O.
CEAA_52 *IR Number: HE(1)-10*	*Chapter 24; Appendix O, Section 6.0.*	***Context and Rationale:*** • *Appendix O, Section 6.0 states that the full list of mitigation measures contained in Chapter 24 would not be repeated in Appendix O. However, Appendix O, Section 6.0 also states that "mitigation and follow-up [that] has been recommended as a result of specific interactions with Aboriginal peoples, or because of input received through Aboriginal consultation" are provided in Appendix O, Section 6.0, Table 6-1. The mitigation measures in Table 6-1 are not included in the full list of mitigation measures in Chapter 24.* • The mitigation measures proposed in both Chapter 24 and in Appendix O do not clearly articulate which effect of changes to the environment on: • *a. Aboriginal peoples' health and socio-economic conditions;* • *b. physical and cultural heritage;* • *c. current use of lands and resources for traditional purposes;* • *d. any structure, site or thing that is of historical, archaeological, paleontological or architectural significance;* • *e. potential severity of impacts of the project on Aboriginal and Treaty rights;* • *that the mitigation measure is expected to reduce, and how the proposed effect will be reduced.* ***Specific Question/ Request for Information:*** *In responding to comments HE(1)-01, HE(1)-03, HE(1)-04, HE(1)-05 and HE(1)-09:*	***Context and Information Required for a Complete Response:*** • *The response does not adequately address Part B of the information requirement (IR). Revise the response to identify which mitigation measures were proposed by Indigenous groups.* • *The response does not adequately address Part C of the IR. Table 6-1 in the updated Appendix O does not identify the specific effects that each proposed mitigation measure is expected to reduce. Revise the response to provide the information required in the original IR.*

Comment Number	Report Section	Agency Comment and GGM Response	Agency Follow-up Comment and GGM Response
		A. Provide a list of all mitigation measures for effects of changes to the environment on: *a. Aboriginal peoples' health and socio-economic conditions;* *b. physical and cultural heritage;* *c. current use of lands and resources for traditional purposes;* *d. any structure, site or thing that is of historical, archaeological, paleontological or architectural significance;* *e. and on potential impacts of the Project on Aboriginal and Treaty rights.* *B. Identify which mitigation measures were proposed by Indigenous groups.* *C. Explain which effect that each proposed mitigation measure is expected to reduce, and how the proposed effect will be reduced.*	
		Response: A-C - Table 6-1 in Appendix O has been updated to include a full list of mitigation measures for effects of changes to the environment on each of the Section 5(1)(c) Factors, as well as the ability to exercise Aboriginal and treaty rights that were identified in the relevant VCs. Some mitigation measures are applicable to more than one Section 5(1)(c) Factor and that is also identified in Table 6-1. These mitigation measures will act in combination to alleviate or reduce effects on Section 5(1)(c) Factors. Residual effects following mitigation are discussed and characterised within Section 7 of the updated Appendix O. B. GGM has and will continue to discuss proposed mitigation measures with Aboriginal communities. Proposed mitigation has been modified based on information received by Aboriginal communities during the extensive Draft EIS/EA review process. In addition to the mitigation measures identified in Table 6-1, GGM has developed additional mitigation to support local Aboriginal communities' participation in the Project and to address Project-related effects, see Section 6.1 of the updated Appendix O. These commitments include: • GGM is working to support the capacity of Aboriginal business to participate in mine procurement. • GGM is taking steps to maximize hiring of local and Aboriginal people. • GGM will support training of Aboriginal people through agreements with communities, seeking joint funding of programming, preparedness training, and providing on-the-job training. • GGM will provide opportunities to affected Aboriginal communities to review and comment on permits, the Closure Plan, Environmental Management Plans, and monitoring. • GGM will consult with interested Aboriginal communities prior to engaging an archaeologist for any further archaeology work that may be required. • GGM will consult with Aboriginal communities regarding disposition and treatment of heritage resources that may be found. • GGM will meet regularly (or at least annually) with affected Aboriginal communities to share information about the Project. • GGM has supported, and will continue to support, the use of Aboriginal environmental monitors and/or technicians. GGM commits to supporting Aboriginal cultural practices through community driven initiatives.	**Response:** Consultation with Indigenous groups and their review of the VC-specific effects assessments included the identification of mitigation measures and conclusions on residual effects. Comments received from Aboriginal communities on the Draft EIS/EA, and throughout the entire EA process, helped to refine the location of Project components (a key mitigation of potential Project effects) and improved the development of mitigation measures to avoid or reduce potential environmental effects. This means generally that GGM listened to comments and concerns brought forward by Indigenous communities regarding potential impacts and identified ways to address those, which were then reviewed and discussed as part of the EA consultation. Comments related to the effectiveness of mitigation measures and areas of concern that informed mitigation measures were addressed through direct responses to explain the approach taken, or through refinements to the identified mitigation measures to address the additional input or concern where provided. For example, GGM proposed the establishment of an ITRB to address concerns related to the proximity of the TMF to Kenogamisis Lake. This measure was accepted and GGM then worked with the local Aboriginal communities (AZA, AFN, GFN, LLFN and MNO) to obtain additional input on the details. Updates to mitigation measures also resulted in revisiting the residual effects conclusions to confirm if updates were appropriate. Thus, mitigation measures integrate the advice and concerns raised by Indigenous groups, and primarily include AFN, AZA, GFN, LLFN and MNO who had areas of overlapping comments. In addition, mitigation measures developed in large part to address the comments from the five local Aboriginal communities include: • Establishing the ITRB to provide independent review on the design, operation and closure of the TMF • Maintain alternate access within the PDA to the Southwest Arm of Kenogamisis Lake • Provide funding for Environmental Monitors (EM) and maintaining environmental committee(s) which the EMs would be members of. • Provide opportunities for harvesting of plants for traditional purposes prior to construction. • Incorporate plant species of interest into the Closure Plan as feasible • Hold a Pipe Ceremony prior to construction, and for the establishment of the Goldfield Creek diversion • Provide opportunities going-forward related to the advancement of the Closure Plan, fish habitat offsetting, Environmental Management and Monitoring Plans, and reasonable support for cultural practices through community driven initiatives • Participate is a potential moose tissue sampling study Table 6-1 of Appendix O has been updated to further clarify the specific effects that each proposed mitigation measure is expected to reduce.

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CEAA_53 *IR Number: HE(1)-11*	*Section 18.1.4.1.*	***Context and Rationale:*** • *Section 18.1.4.1 states that "GGM is committed to maintaining alternate access within the PDA [Project Development Area] to the Southwest Arm of Kenogamisis Lake during construction and operation". The Métis Nation of Ontario raised concerns with respect to consultation on alternate access, particularly in relation to the proximity of an MNO cultural gathering site to the Project. It is unclear if the Métis Nation of Ontario, or any other Indigenous group that could experience an effect to access within the PDA was consulted on the alternate access.* ***Specific Question/ Request for Information:*** *A. In responding to comments HE(1)-01, HE(1)-03, HE(1)-04, HE(1)-05, and HE(1)-09, describe how Indigenous groups were consulted with respect to effects to accessing current use, and physical and cultural heritage or any structure site or thing of historical, archaeological or paleontological significance for Indigenous peoples.*	***N/A***
		Response: Consultation with Aboriginal communities was accomplished with open houses, site visits, targeted meetings, newsletters, questionnaires, presentations, and capacity funding for technical reviews and community-based and community driven studies including but limited to Traditional Knowledge and Land Use Studies. Chapter 3.0 of the Final EIS/EA provides a discussion of how each Aboriginal community was consulted at each stage of EA development. In addition, the Record of Consultation in Appendix C of the Final EIS/EA presents comments, organized by community, received during the development of the Final EIS/EA. Project-specific information was provided by several of the Aboriginal communities in the form of TK and TLRU studies and other forms of information sharing. Categories of information learned through consultation include current use of lands and resources and access to lands. Specific information regarding current use, physical and cultural heritage as well as structures and sites of historical importance were shared through TLU studies.	***N/A***
CEAA_54 *IR Number: HE(1)-12*	*Chapter 24; Appendix O, Section 8.0.*	***Context and Rationale:*** • *With regards to mental, social, and spiritual well-being, Appendix O, Section 8 states that "GGM has held and will continue active discussions with local Aboriginal communities to identify potential issues and ways to address them throughout the life of the Project as outlined in the Record of Consultation".* • *Animbiigoo Zaagi igan Anishinaabek, Aroland First Nation and Ginoogaming First Nation note the strong reliance of Indigenous communities on lands and resources make community members more susceptible to potential, and possibly unexpected, project impacts. Adverse effects to the local environment could result in the inability of Indigenous communities to use lands for hunting, fishing, gathering, as well as recreational and cultural/traditional activities. Existing and new chemophobia may result in Indigenous community members avoiding areas perceived to be impacted by the Project. The Indigenous communities have raised the concern that the resulting impact to the overall well-being of these communities could be devastating in terms of impacts to health (mental and physical) and nutrition. This must be considered when developing and implementing monitoring programs, adaptive management strategies, communication plans and compensation packages.* • *It is unclear, from the mitigation measures listed in Chapter 24 or in Appendix O, Section 6.0, if the proponent has developed the "ways to address" these potential issues. All potential effects need to be assessed and addressed during the environmental assessment, and appropriate mitigation measures and follow-up programs to be designed.* ***Specific Question/ Request for Information:*** *A. In responding to comments HE(1)-01, HE(1)-03, HE(1)-04, HE(1)-05, and HE(1)-09, any effects should be carried forward into an assessment on mental, social and spiritual well-being that identifies, assesses, addresses and /or mitigates any potential effects.* *B. Describe any mitigation measures proposed to address potential future effects to mental, social and spiritual wellbeing, any follow-up programs that are proposed, and how Indigenous groups will be involved.*	***N/A***

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		Response: A. The discussion of changes to well-being has been revised and incorporated within the characterization of residual effects on Section 5(1)(c) Factors; specifically, Sections 7.1.3.5 (Change in Well-being), 7.3.3.4 (Change in cultural value or importance of Aboriginal physical and cultural heritage), and 7.4.3.3 (Change in cultural value or importance of current use) of the updated Appendix O are intended to address well-being. B. Mitigation measures and follow-up are discussed in Section 6 and Section 9 of updated Appendix O, respectively.	***N/A***
CEAA_55 *IR Number: HE(1)-13*	*Appendix F1, Section 4.1.7; Appendix F1, Appendix B.*	***Context and Rationale:*** • *In air emission estimate calculations detailed in Appendix F1, Appendix B, for TSP, PM_{10} and $PM_{2.5}$ (in fugitive emissions), a silt content of 5.8% is assumed, based on the US Environmental Protection Agency (US EPA) AP-42 (Compilation of Air Emission Factors), for taconite mining haul roads. US EPA AP-42 Table 13.2.2-1 provides silt contents ranging from 2.4 to 16% with a mean value of 10%. The Centre for Excellence in Mining Innovation (CEMI, August 2010), suggests a mean silt content of 9.14% for Ontario mining sites.* • As indicated in Appendix F1, Section 4.1.7, Table 4-1, calculations also assume a control efficiency of 90% in summer and 95% in winter for unpaved roads with the implementation of the mitigation measure (watering roads). These control efficiencies are high based on available data, thus a more conservative approach is appropriate. For example, the Australian government NPI Manual for Mining indicates control efficiencies for watering on haul roads of 50-75%, depending on watering rates. • *These assumptions influence the air emission dispersion modelling results. If these assumptions are not reasonably conservative, the predicted concentrations could underestimate the project's potential changes to air quality. This could lead to underestimated effects on human health, and to underestimated effects to current use of lands and resources for traditional purposes in areas where air quality would change.* ***Specific Question/ Request for Information:*** *A. Revise the air emission estimates based on more conservative assumptions for silt content and control efficiency, or provide a technical rationale that the assumptions for slit content and control efficiency are conservative enough to not underestimate effects on human health and current use of lands and resources for traditional purposes;* *B. Describe any changes to the assessment of effects on human health, resulting from any changes described in questions A above;* *C. Discuss appropriate mitigation and follow-up measures to address any changes to air quality in the assessment of effects on human health identified in question B above.* *D. If the air quality assessment model is not updated in question A, describe a follow-up program to verify that air emission estimates are reasonably conservative and predict potential effects on human health. Describe whether there will be periodic sampling of haul roads to establish a consistent silt loading.*	***N/A***
		Response: A. As noted in the responses to the MOECC comments on the Draft EIS/EA, Stantec's review of the CEMI document's suggested silt content was that it is has little reliability compared to the thoroughly peer reviewed US EPA data set, from which the silt content of 5.8% was chosen. This value was used in the assessment as it was consistent with that used in other Northern Ontario mining EAs that were reviewed and accepted by the MOECC, and therefore was an acceptable value. It is acknowledged that silt content can vary, and the preferred course of action to refine the assessment will be to implement a road sampling program for silt content and update the required mitigation measures in the best management plan as required. The haul road control efficiency assumed by Stantec was based on assuming a combination of water (with use of a surfactant as a contingency); sheltering of roads from wind by vegetation, storage areas/stockpiles or wind breaks; and limiting maximum vehicle speeds on unpaved roads/haul routes (see Section 4.1.7 of Appendix F1 of the Final EIS/EA). All of these measures have been documented in the literature to reduce road dust resuspension	***N/A***

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		and contribute to controlling fugitive dust emissions relative to uncontrolled levels. To aid in control, a 10-20 m buffer of existing vegetation will be maintained on each side of internal unpaved haul roads where feasible. The majority of the lengths of the haul roads are surrounded by WRSAs or the ore stockpile, which create natural wind breaks and shelter the haul routes, thus lowering the suspension and transport of dust offsite from these routes. The expected control efficiency used in the assessment due to water/surfactant use on the haul roads in summertime was 85.7 - 87.5% (which is consistent with literature values for frequent watering and/or surfactant application), with the remaining contribution to the overall haul road 90% control efficiency due to either stockpile or vegetation wind sheltering. The effect of limiting vehicle speed and precipitation days was conservatively excluded from the assessment. It is therefore expected that the control efficiencies used in the assessment are representative and no re-assessment is required. B. No changes to the HHRA are required to address the issues raised in comments in Part A above. C. Additional information on mitigation measures is provided in Chapter 7 of the Final EIS/EA. Dust suppression methods may include the following methods as required: • Speed limits will be enforced on all on-site unpaved roads. • A 10-20 m buffer of existing vegetation shall be maintained on each side of internal unpaved haul roads where feasible. • Wind sheltering (wind screens or vegetation buffers) may be employed along selected haul routes as required. • Unpaved road surfaces will be watered as required (depending on weather conditions). • Watering may be supplemented with the use of MOECC approved chemical dust suppressants. • Sprinkler systems may be considered / employed on areas of high traffic. • Binding agents or hardening of road surfaces may be utilized as required. D. An ambient monitoring program will be conducted to verify the environmental effects predictions in the EA and inform adaptive management measures, as well as to monitor compliance with ambient air quality objectives. This monitoring will also be used to proactively manage emissions and ambient air quality (see the conceptual ambient air quality monitoring program included in Appendix A of Appendix M7) by setting action levels that will trigger operator review and additional mitigation measures if necessary. Road dust sampling will be included in the best management plan for fugitive dust.	
CEAA_56 *IR Number: HE(1)-14*	*Appendix C10, CEAA_86; Appendix F1, Section 4.1.4; Appendix F1, Section 4.1.8; Appendix F1, Section 4.2.3*	***Context and Rationale:*** • *There are several instances (examples described below) where activities, particular air contaminants emitted from activities, or mitigation measures are excluded from the air quality assessment, due to guidelines from the Ontario Ministry of the Environment and Climate Change (MOECC). The Agency and federal departments defer to MOECC reviewers to determine whether MOECC guidelines have been correctly interpreted and applied for their purposes. However, the exclusion of certain activities and contaminants from the air quality assessment does not allow for a full understanding of changes to air quality that could affect the health of Aboriginal peoples and current use of lands and resources for traditional purposes, which are reviewed under the federal EA.* • *Appendix F1, Section 4.1.8 indicates that "appropriate mitigation will be applied to the power plant to reduce NOx and NMHC [nonmethane hydrocarbons] emission levels" to meet MOECC Guideline limits, "if the Project is connected to the grid". Given that NOx is a non-threshold contaminant and may have health effects below criteria, mitigation measures should be implemented regardless of whether the power plant is connected to the grid.* • *In Appendix F1, Sections 4.1.4 (for operations phase) and 4.2.3 (for construction phase), it is indicated that potential sources of air emissions "were assessed for their significance following the requirements presented in the MOECC Guideline A-10 and the significant sources were included in this assessment." The rationale relied on qualitative assumptions rather than quantitative supporting data such as expected vehicle frequency usage and emissions comparisons.* • *According to the response to Agency comment HE(0)-21 (CEAA_86) in Appendix C10, an MOECC document which "indicates that the significant contaminants emitted to the air from an emergency generator (diesel-fired) are nitrogen oxides" is the rationale to only assess NOx emissions. However, a diesel fired emergency generator can also emit contaminants other than nitrogen oxides (NOx), such as particulate matter (PM) and*	***N/A***

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		polycyclic aromatic hydrocarbons (PAHs). The generating capacity of the emergency generators is not provided in Chapter 5 or in Appendix F1. ***Specific Question/ Request for Information:*** *A. Describe the generating capacity of the emergency generators that are to be kept for the project.* *B. Describe the considerations that will determine whether the power plant will be connected to the power grid. Describe the difference in air emissions that would be caused by not applying mitigation to the power plant, in a case where the project is not connected to the grid.* *C. Revise the air quality emission assessment to include all project activities for all phases that could emit air contaminants, and all contaminants that could be emitted from those activities, or provide quantitative rationales for any exclusions with a discussion of how these exclusions may affect the assessments of effects on valued components including human health and current use of lands and resources for traditional purposes.* *D. Revise the human health risk assessment and the assessment of effects on traditional use with the updated assessment. Where an activity or a contaminant is excluded, describe how its exclusion could affect the assessment.*	
		Response: A. Emergency diesel generators will only be utilized for safety in the event of a power failure. These are short term emergency situations that are not planned and not intended to power the full operation of the site, but rather basic functions and lighting for safety. Such a short-term emergency event would have no consequence on air quality relative to operations scenarios that were assessed, and specifics of the specific capacity can only be determined once the basic needs are determined through the plant site design stage. However, as stated this has no effect on the air quality assessment. B. As explained in the alternatives assessment the existing grid does not have sufficient capacity to support the Project and therefore GGM is planning for the Project to be off-grid. The selection of a natural gas power plant for the Project's operational energy requirements provides an efficient low emissions energy source with respect to GHG mitigation where a grid connection is unavailable. If the Project were connected to the grid, then the MOECC Guidance Document – "Emission limits and operating conditions for emergency generator sets in non-emergency situations" which sets out emission limits for internal combustion engine generator sets, might apply to the Project. As the Project is not expected to be connected to the grid, emissions mitigation measures that would potentially lower emissions of NOx, particulate and hydrocarbons were conservatively not included in the assessment - see Table 4.3 of Appendix F1 for an emissions comparison. Therefore, the air quality modelling provides a conservative assessment of power plant emissions and related effects. C. Rationales for exclusion of negligible sources for Project operation and construction are provided in Appendices B and F of Appendix F1 of the Final EIS/EA. Quantitative rationales provided in these appendices include: excluding PM emissions from wet processing operations (as no emissions would occur), excluding VOC emissions from sources with low vapour pressures (negligible emissions), no emissions from sealed tanks, and negligible emissions from standby equipment which is only operated infrequently. These rationales have been reviewed and accepted by the MOECC Air Compliance Engineer during their review of the Final EIS/EA (Memorandum dated October 4, 2017). The basis for the MOECC guideline for allowing exclusion of negligible sources is based on past experience that shows that these sources do not have a significant effect on air quality predictions. For both construction and operations, operation of emergency generators will only occur for routine maintenance and testing (normally one hour per month) or during a power outage. Therefore, emissions from emergency generators will be infrequent. Inclusion of negligible sources in the air quality assessment would not affect the dispersion model predictions and revising the air quality assessment is therefore not warranted. The particulate air quality assessment included in the Final EIS/EA was conducted as agreed upon for the Final EIS/EA (see Section 5.4.5, Appendix F1). In consideration of comments received on the review of the Draft EIS/EA, a sensitivity analysis that considered residual particulate matter predictions including emissions from haul roads and stockpiles for varying control efficiencies was included in the Final EIS/EA in Section 6.6 of Appendix F1. Research has demonstrated that air quality models typically over-predict ambient air quality from these sources and that, in reality, air quality effects generally only extend a few hundred metres from these types of sources.	***N/A***

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		Therefore, the model results presented in this section are expected to provide a conservative prediction (i.e., over-estimate) of ambient TSP levels with varying haul road control efficiency and including these predictions in the human health and ecological risk assessment would likewise result in overly conservative estimates. ***D. No changes to the HHRA are required to address the issues raised in comments A, B and C above.***	
CEAA_57 *IR Number: HE(1)-15*	*Appendix F1, Section 3.1.4; Appendix F1, Section 3.1.4.8*	***Context and Rationale:*** • *The use of urban National Air Pollution Surveillance (NAPS) stations in Winnipeg to estimate background concentrations (Appendix F1, Section 3.1.4, Table 3-5) results in an overestimation of background concentrations of benzene and benzo(a)pyrene.* • *Appendix F1, Section 3.1.4.8 states that "background levels of annual average benzene and 24-hour and annual average benzo(a)pyrene exceed the MOECC criteria for these PoPCs [parameters of potential concern]. However […] the background levels are expected to be conservative and over-estimate actual background levels in the LAA [Local Assessment Area]." Although the selected background levels may overestimate the actual background levels in the Local Assessment Area (LAA), it may result in a less-conservative assessment, as PoPCs may not be dismissed based on the selected elevated background values.* ***Specific Question/ Request for Information:*** *A. Provide the rationale for using the urban station in Winnipeg as the location for estimating background air concentrations, as opposed to a NAPS station closer to Geraldton.* *B. Describe the uncertainty introduced into the air quality assessment and how the human health assessment accounts for the likely overestimation of background concentrations such as benzene and benzo(a)pyrene.*	***N/A***
		Response: A. Not all of the NAPS stations listed in Table 3-5 of the Appendix F1 measure all the parameters included in the assessment. The NAPS station in Winnipeg was used to estimate background benzene and benzo(a)pyrene concentrations as it is the closest NAPS station to the LAA that measures these contaminants. Because it is located in a larger city it is reasonably expected to overestimate the background in Geraldton and incorporates a level of conservatism in the Project assessment work. B. Use of benzene and benzo(a)pyrene background concentrations from a more urbanized area than Geraldton is expected to provide a conservative assessment. The effects assessment is based on evaluating both the Project alone and Project plus background concentrations in comparison to their relevant regulatory criteria. The sensitive health endpoint for inhalation of benzene and/or benzo(a)pyrene is cancer. Potential carcinogenic exposures were evaluated by estimating the incremental increase in lifetime cancer risk (IILCR) as a result of the project alone. This cancer risk is based on the change of benzene and benzo(a)pyrene as a result of the Project. Therefore, adopting a conservative baseline concentration for each chemical would not have an effect on the estimate of IILCR.	***N/A***
CEAA_58 *IR Number: HE(1)-16*	*Appendix F1, Section 9.2; Appendix M7, Appendix A.*	***Context and Rationale:*** • *In Appendix F1, Section 9.2, it is indicated that "an ambient monitoring program will be developed to monitor selected PoPCs [parameters of potential concern] including dust (TSP and/or $PM_{2.5}$) levels at selected offsite locations during operation." The Conceptual Ambient Monitoring Plan, provided in Appendix M7, Appendix A, Section 2.1, identifies $PM_{2.5}$ as a contaminant to monitor in some areas, but does not include it as a contaminant to be measured. Further, while GGM acknowledges that Project related dust (PM_{10}, $PM_{2.5}$ and TSP) contains numerous trace metal compounds, Appendix M7 does not describe how trace metals will be monitored during the Project.* • *The final details for monitoring plan such as duration, frequency and location of the sampling has not been finalized in the Conceptual Air Quality Management and Monitoring Plan. It is important that the ambient air quality monitoring is consistent and that the follow-up monitoring plan for air quality is well designed in order to ensure that appropriate mitigation measures are applied to address adverse air quality effects. It is also*	***Context and Information Required for a Complete Response:*** • *The response to Part B appears to contradict the information that it references in the EIS. The response indicates that "Appendix A (Ambient Monitoring Plan) of Appendix M7 - Conceptual Air Quality Management and Monitoring Plan includes measuring metals concentrations in total suspended particulate." While that appendix acknowledges that "dust may contain metals such as arsenic, cadmium, cobalt, lead, manganese, nickel, vanadium, zinc etc.", it does not indicate that metals will be monitored, and Page A-3 states that "the monitoring program will be conducted to measure off property ambient air concentrations at locations around the Project site of the following contaminants: TSP, PM10, dustfall."*

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		unclear how the proponent would communicate any exceedances to Indigenous groups or the general public in a timely manner. • *Environment and Climate Change Canada recommends that $PM_{2.5}$ should be measured as part of the monitoring and follow-up program, given the proximity of the project to receptors and concentrations predicted were approaching the limit or exceeded in some cases (it may be higher if a more conservative approach in assessment was used as requested in comment HE(1)-13).* • *Animbiigoo Zaagi'igan Anishinaabek (AZA), Aroland First Nation (AFN) and Ginoogaming First Nation (GFN) members want to be involved in monitoring air quality during construction, operation and closure phases of the Project. These communities asked that GGM make real-time air quality monitoring results available publicly using a web-based system that First Nations and municipal residents can view to ensure that air quality near the Project site is safe. Without real-time monitoring results being made available publicly, AZA, AFN and GFN members will have no method of alerting people using nearby areas for traditional purposes whether particulate levels are within compliance levels and are safe to breathe. A website could include all parameters of potential concern, including PM10, PM2.5, nitrogen oxides, benzene and hydrogen cyanide.* ***Specific Question/ Request for Information:*** *A. Describe the feasibility of including monitoring for $PM_{2.5}$, nitrogen oxides, benzene and hydrogen cyanide for all phases of the project in the air monitoring plan. Describe the feasibility of monitoring these substances and PM_{10} in realtime.* *B. Describe the feasibility of including monitoring of trace metals from Project-related dust, or provide a rationale for excluding it.* *C. Provide details of monitoring parameters, methods, sampling locations, applicable standards, duration, and frequencies for the Conceptual Air Quality Management and Monitoring Plan, and describe how the plan will ensure that appropriate mitigation measures are applied to address adverse air quality effects.* *D. Describe specifically how GGM will inform Indigenous groups and the public of air quality near the project site, in a manner that will allow for quick communication of exceedances and reinforcement of safety.* *E. Describe actions that GGM would undertake if concentrations of parameters of particular concern are found to exceed predicted concentrations in the EA, while not exceeding provincial regulated thresholds.*	• *The response to Part C to the IR needs to be resubmitted, as information on the monitoring of metals, as the information required related to monitoring of metals is not included in Appendix A of Appendix M7.* • *The response does not adequately address Part E of the IR. Revise the response to describe mitigation measures that could be adjusted, and proposed additional mitigation measures that would be implemented, if required.*
		Response: A. Nitrogen dioxide, benzene and hydrogen cyanide were not included in the ambient air monitoring plan as the maximum predicted concentrations due to the Project alone were well below their applicable regulatory criteria, primarily because of the "trace" nature of these emissions from the Project (i.e., low emission rate). The conceptual ambient air quality monitoring program in the Conceptual Air Quality Management and Monitoring Plan (Appendix A of Appendix M7 of the Final EIS/EA) proposes real time monitoring of PM_{10} as there is a 24-hour average guideline level for PM_{10} which can readily be incorporated into action levels for triggering mitigation measures. The air quality criteria for $PM_{2.5}$ is based on a 98^{th} percentile value averaged over 3-years and is therefore not readily applied to an action or trigger level. The final ambient monitoring program will be developed in consultation with the MOECC during Project permitting. B. Appendix A (Ambient Monitoring Plan) of Appendix M7 - Conceptual Air Quality Management and Monitoring Plan includes measuring metals concentrations in total suspended particulate. C. The requested details of the ambient monitoring program are provided in the Appendix M7 of the Final EIS/EA, in Appendix A (Ambient Monitoring Plan) of that document. Details of mitigation measures and continuous improvement are provided in Sections 7 and 8.1 of Appendix M7. D. The general approach to communication of exceedances will be developed as the Project advances in discussions with each Aboriginal community depending on their preferences. However GGM's community relations office will handle communications with the public on environmental performance through its established communication lines within the community and GGM remains committed to funding, Environmental Monitors (EM) for each of the local Aboriginal communities and maintaining environmental committee(s) which the EM's would be members of. Over the life of the project, the committee(s) will review and recommend changes to the	**Revised Response:** A. Nitrogen dioxide, benzene and hydrogen cyanide were not included in the ambient air monitoring plan as the maximum predicted concentrations due to the Project alone were well below their applicable regulatory criteria, primarily because of the "trace" nature of these emissions from the Project (i.e., low emission rate). The conceptual ambient air quality monitoring program in the Conceptual Air Quality Management and Monitoring Plan (Appendix A of Appendix M7 of the Final EIS/EA) proposes real time monitoring of PM_{10} as there is a 24-hour average guideline level for PM_{10} which can readily be incorporated into action levels for triggering mitigation measures. The air quality criteria for $PM_{2.5}$ is based on a 98^{th} percentile value averaged over 3-years and is therefore not readily applied to an action or trigger level. The final ambient monitoring program will be developed in consultation with the MOECC during Project permitting. B. The Conceptual Air Quality Management and Monitoring Plan included in Appendix A (Ambient Monitoring Plan) of Appendix M7 will be updated in Project permitting to include measuring metals concentrations in total suspended particulate. C. Details of the ambient monitoring program are provided in the Appendix M7 of the Final EIS/EA, in Appendix A (Ambient Monitoring Plan) of that document. Details of mitigation measures and continuous improvement are provided in Sections 7 and 8.1 of Appendix M7. To determine ambient metals concentrations, the filters used to measure TSP with high volume air samplers (at Locations A to C described in the Ambient Monitoring Plan) will be analysed using the Atomic Emission Spectroscopy / Inductively Coupled Plasma (AES/ICP) technique to determine metals content. The results of the metals

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		EMMPs, including modifications, additions or deletions in accordance with the Adaptive Management Framework outlined in the EMMPs. E. A review of the measurement data versus the EA predictions will be undertaken once a sufficiently large data set has been collected to ensure statistically representative results – typically a minimum of one to two years of data. Based on the review, mitigation measures may be adjusted or additional measures implemented as required in accordance with the adaptive management framework. If exceedances of the EA model predictions are measured, their potential effects on the conclusions of the HHERA (based on the magnitude of the measurements as well as their frequency) will be reviewed and communicated to applicable stakeholders. However because of the conservative assumptions in the assessment effects are not expected.	analysis will be compared to applicable ambient air quality criteria. Metals sampling will be conducted for the first year of Project operation and the need for continued metals sampling will be evaluated at the end of the one-year period. D. The general approach to communication of exceedances will be developed as the Project advances in discussions with each Aboriginal community depending on their preferences. However GGM's community relations office will handle communications with the public on environmental performance through its established communication lines within the community and GGM has provided for Environmental Monitors (EM) for each of the local Aboriginal communities and maintaining environmental advisory committee(s) which the EM's would be members of. Over the life of the project, the committee(s) will review and recommend changes to the EMMPs, including modifications, additions or deletions in accordance with the Adaptive Management Framework outlined in the EMMPs. E. A review of the measurement data versus the EA predictions will be undertaken once a sufficiently large data set has been collected to ensure statistically representative results – typically a minimum of one to two years of data. Based on the review, mitigation measures may be adjusted or additional measures implemented as required in accordance with the adaptive management framework. Mitigation measures that may be adjusted or additionally implemented are described in detail in Section 7.1.2.2 of the Conceptual Air Quality Management and Monitoring Plan (Appendix A of Appendix M7 of the Final EIS/EA) and may include: • increased amounts or frequencies of water spraying or road watering • addition of chemical suppression • additional wind sheltering (wind screens or berms) • dust sweeping • application of gravel on haul roads • installation of truck wheel wash stations • enclosure of dust sources. If exceedances of the EA model predictions are measured, their potential effects on the conclusions of the HHERA (based on the magnitude of the measurements as well as their frequency) will be reviewed and communicated to applicable stakeholders. However, because of the conservative assumptions in the assessment effects are not expected.
CEAA_59 *IR Number: HE(1)-17*	*Section 5.2.1; Section 5.6.1; Section 5.6.3; Appendix F1, Section1.4.1; Appendix F1, Section 4.2.4.1; Appendix F2, Section 2.8.4*	***Context and Rationale:*** • *Sections 5.2.1 and 5.6.1, and Appendix F1, Section 1.4.1, indicate that blasting will occur during the construction phase "if required". Section 5.6.3 and Appendix F1, Section 4.2.4.1 mention blasting that would occur at the open pit in preproduction, while Appendix F2, Section 2.8.4 states that during the construction phase, "there will be some blasting and stockpiling associated with the land preparation and ore extraction. The duration, magnitude and frequency of these detailed events are not yet defined at the EA stage; however, they are expected to be less in intensity than those planned for Project operation phase."* • *It is unclear what construction activities other than stripping waste rock for the open pit may require blasting; how GGM will determine whether blasting is required; and how excluding these potential blasts may underestimate changes to air quality, noise and vibration in the construction phase. Effects on human health and current use of lands and resources for traditional purposes may be underestimated in locations away from the open pit where blasting may occur. In locations where blasting would only occur during the construction phase, changes to the environment due to blasting in that phase should be assessed, or monitoring for noise and vibration from blasting activities in the construction phase should be undertaken, even if not required by MOECC regulations (Appendix F2, Section 4.4).* ***Specific Question/ Request for Information:*** *A. Describe all blasting activities that may occur during construction, including those that are being considered but have not been determined to be required yet. Provide information on the potential locations for these blasts. Describe how GGM will determine whether blasting will be required for each activity;*	***N/A***

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		B. Revise air quality, noise and vibration assessments to include any potential blasting activities in the construction activities. If necessary, provide details of monitoring of noise and vibration during blasting activities in the construction phase; *C. Describe any changes to the assessment of effects to valued components including human health and current use of lands and resources for traditional purposes that may result from blasting activities in the construction phase;* *D. Discuss appropriate mitigation and follow-up measures to address any changes to the assessment of effects on valued components identified in question C above.*	
		Response: A. Currently, and in the absence of detailed engineering, blasting outside of the starter pit is limited to the highway and truckshop for yard levelling in order to properly manage surface water. Depending on the rock profile at the plant site, there may be minor blasting to accommodate building foundations. These are all minor blasts and blast mats will be used as required as per standard practice which are highly effective in mitigating fly-rock, emissions and noise. Blasting needs will be confirmed in detailed engineering and based on the final optimization of the plant site. B. Blasting emissions were included in the air quality assessment for the construction phase. See Section 4.1.5.1 and Appendix F of Appendix F1. Blasting was included for the open pit during construction because the other sources would be minor compared to open pit blasting and standard construction protocols will apply including the use of blast mats as required. Blasting was also assessed in the noise assessment. Since blasting is impulsive in nature, it was evaluated separately from other noise sources. A single blasting scenario that is expected to be conservative for blasting during both construction and operation was evaluated. See Section 2.9.3.1 of Appendix F2 for further details. Further, starter pit blasting was conservatively assumed to occur at the surface while the actual noise and vibration caused by the blasting will take place generally well below ground level where noise and vibration effects would be less than surface blasting. Blasting only lasts for seconds and as such will have little to no effect on individuals practicing TLRU activities. C-D. Considering A and B no changes to the assessment, mitigation or monitoring are required.	***N/A***
CEAA_60 *IR Number: HE(1)-18*	*Appendix F2, Section 2.8.4; Appendix M11, Section 7.3*	***Context and Rationale:*** • *Appendix M11, Section 7.3 states that "the Project is closed to public access for mine safety and it can be assumed that the public would not be present in this area. It would therefore not be necessary to provide advance notice [of blasting]." However, the same section notes various means to inform staff of upcoming blasts, including "[…] signage at standard locations around the site, mine radio announcements, and electronic means." It is unclear why the public and Indigenous groups couldn't be provided similar advance notice.* • *Animbiigoo Zaagi'igan Anishinaabek, Aroland First Nation and Ginoogaming First Nation indicate that many of its members use the land and water near the site for traditional land and resource use activities. Blasting has the potential to disrupt these activities, and degrade the quality of experience in areas impacted by noise and vibration associated with blasting. While it is indicated in the EIS that blasting will occur approximately five times per week (Appendix F2, Section 2.8.4), mainly during lunchtime (Appendix M11, Section 7.3), the same advance notification of blasting activities should be provided to Indigenous groups and the public, in order to alert potential users who plan to carry out traditional activities near the site, or accordingly stay away from the Project Development Area (PDA). ·Blasting activities may also have the potential to affect the natural cycles of traditionally important wildlife species such as walleye or moose. It is unclear how blasting activities may be limited during key time periods such as fish spawning season and moose hunting season, to limit the disruption to traditional land and resource use activities and to traditionally important species.* ***Specific Question/ Request for Information:*** *A. Describe how advance notice of blasting will be provided to Indigenous groups and the public. Describe the frequency and how far in advance these alerts will be provided.*	***N/A***

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		B. Describe mitigation measures to minimize effects to fish and fish habitat and wildlife, such as timing of blasting activities through the year to take into account key time periods for traditional land and resource use activities such as fish spawning season and moose hunting season, to limit the disruption of traditional activities and traditionally important species.	
		Response: A. Options for notification include via the Environmental Monitors, email, GGM website, and telephone calls. However, as communicated to the CEA Agency and local residents, blasting, while potentially audible, is not expected to be a significant issue as standard controls on blast quantities and mitigation including use of blast mats are available. B. An assessment of potential effects of blasting to fish and fish habitat and wildlife is included in the Final EIS/EA, on pages 11.103 and 11.104 for fish and fish habitat and on pages 13.76 and 13.77 for wildlife. For the protection of wildlife, fish and fish habitat, mitigation measures related to blasting are included in Final EIS/EA Table 11-9 (mitigation item #21 and #36) and Table 13-12, and include: • Avoid using explosives in or near water where possible • Follow DFO guidelines for the use of explosives • Develop and implement a Blasting Plan to reduce risk of lethal or sub-lethal effects on fish. Part of the blasting plan is to follow appropriate timing windows (EIS Table 11-9, mitigation items #5 and #6). Calculations of blasting charges and setbacks are also required as part of the blasting plan. • Implement mitigation measures in the Blasting Management Plan • Clear area of wildlife before blasting. The scope of the fish and fish habitat VC (Chapter 11) focuses on the assessment of effects on permanent alteration of fish habitat, loss of fish habitat, and lethal and sub-lethal effects on fish. The scope of the wildlife VC (Chapter 13) focuses on the assessment of effects on change in habitat, change in mortality risk, and change in movement. Both VC assessments determined that there will be no significant adverse residual effects. Chapter 18 addresses effects on Aboriginal peoples' current use of lands and resources for traditional purposes. Specifically, section 18.2 acknowledges key time periods for traditional land and resource use activities, including fish spawning, moose hunting, and other harvesting activities. Project designs and mitigation measures result in a determination of the residual environmental effects from the Project on TLRU to be not significant.	***N/A***
CEAA_61 *IR Number: HE(1)-19*	*Appendix F1, Section 7.3.2; Appendix F1, Appendix O; Appendix M6, Section 6.1.2.2.*	***Context and Rationale:*** • *The summary of annual greenhouse gas (GHG) emissions during operation provided in Appendix F1, Section 7.3.2, Table 7-3 is not consistent with the estimated emissions reported in Appendix F1, Appendix O and Appendix M6, Section 6.1.2.2, Table 6-2.* • *It appears that the GHG estimates given in Appendix F1, Section 7.3.2, Table 7-3 for mining equipment was based on the assumption that equipment had no GHG emissions reduction controls or mitigation applied. A description of mitigation measures to reduce GHG emissions should be provided, to mitigate some of the potential impacts of the Project to climate change.* • *Animbiigoo Zaagi'igan Anishinaabek, Aroland First Nation and Ginoogaming First Nation propose working with GGM on initiatives that help to offset the Project's GHG emissions, such as tree planting, wetland restoration, and carbon offsets.* ***Specific Question/ Request for Information:*** *A. Explain the inconsistencies in GHG emission estimates and revise the tables accordingly;* *B. Provide additional information and estimation for GHGs based on mitigation controls and measures. Apply these factors in calculations and provide GHG estimates to be compared with existing estimates.* *C. Describe mitigation and/or carbon reduction measures that are planned to reduce GHG emissions.*	***N/A***
		Response: A. Appendix O of the Air Quality Technical Data Report (Appendix F1 of the Final EIS/EA) provided was not the correct version as it included emissions from operations that are no longer considered applicable to the Project	***N/A***

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		(LNG facilities and associated equipment). The values provided in Table 7-3 of Appendix F1 and Table 6-2 of Appendix M6 of the Final EIS/EA are the correct greenhouse gas (GHG) estimates for the Project. B. The mitigation measures for greenhouse gas emissions that were considered in the effects prediction are summarized in Section 7.4.3.2 of the Final EIS/EA and are summarized in the response to comment C below. An estimation of GHG emissions including these measures is not possible but this does not mean they are not helpful in highlighting the range of reduction options available for the Project. The net effect of inclusion of these mitigation measures will be to reduce GHG emissions from the Project, therefore the assessment provided in the Final EIS/EA is expected to be conservative. C. Mitigation measures for GHGs are provided in Section 7.4.2 of Appendix F1 and may include: • An equipment maintenance schedule to maximize fuel efficiency. • No-idling policies to avoid the unnecessary release of GHG emissions when equipment is not used. • Limit vehicle speeds. • Where possible, reduce haul routes. • Utilize appropriately sized trucks. • Fuel use tracking on a daily/weekly/monthly basis to identify anomalies in fuel use. • Use of high efficiency electrical motors throughout the Project. • Use of variable speed drive pumps with high-efficiency linings. • Regular monitoring of the compressed air circuit so that leaks are repaired in a timely manner, as this increases the operating efficiency of the compressor. • Installing light-sensitive switches on road lights so that lights do not operate during the day. • Low emission/cleaner fuel alternatives to conventional fuels where practical, such as use of LNG in equipment and vehicles. During operation, the selection of a natural gas power plant for the Project's operational energy requirements provides an efficient low emissions energy source with respect to GHG mitigation where a grid connection is unavailable.	
CEAA_62 *IR Number: HE(1)-20*	*Appendix F8, Section 3.5.8.*	***Context and Rationale:*** • *The arsenic biotransfer factor for cattle cannot be located in the reference noted in Appendix F8, Section 3.5.8, Table 3-35 (U.S. EPA, 2005a, entitled "Methodology for Predicting Cattle Biotransfer Factors"). That document focuses only on lipophilic contaminants, and the analysis in the study appears to establish biotransfer factors based on the fat content of the animals and the Log Kow of the lipophilic chemical. In addition, the arsenic uptake value, as well as the uptake values of other metals, could not be located from that reference.* • *It is also unclear from Appendix F8 how metal bioaccumulation into moose meat is accounted for in the estimation of metal uptake into beef cattle by this study.* • *The scientific information related to the derivation of the uptake factors for cobalt, copper, vanadium, and zinc could not be located within the provided reference of Baes et al., 1984.* • *Moose and deer liver are typically consumed as traditional foods. Organs have been observed to have higher levels of metals than in meats (Chan et al., 2014). However, information on how the potential differences in uptake into and storage by game organs were not discussed.* • *The values in Appendix F8, Table 3-38 are identified only as Fish Tissue (fillet) Exposure-Point Concentrations (mg/kg wet weight) and human receptors were assumed to consume whole fish. In the absence of this walleye whole-body data, it is unclear on how whole-body-fillet, liver and gonad samples were evaluated in Appendix F8, Table 3-38. This is considered further in comment FH(1)-21.* • *Uptake factors that account for bioaccumulation and biomagnification up the food chain do not appear to have been considered.* • *This information is required to understand potential effects of the project on the health of Aboriginal peoples.* ***Specific Question/ Request for Information:*** *A. Confirm the primary literature source for the arsenic biotransfer factor, and provide a scientific rationale to support the use of the selected arsenic biotransfer factors into beef cattle as proxies for moose transfer factors.*	***N/A***

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		B. Describe how metal bioaccumulation is accounted for with the use of the biotransfer factor. *C. Provide scientific rationale for the selection of uptake factors used for cobalt, copper, vanadium and zinc. Include appropriate citations of the primary literature to support the selection of these uptake factors.* *D. Provide additional information on how the potential differences in uptake into and storage by game organs were considered.* *E. Clarify how or whether the walleye fillet, liver and gonad samples were evaluated, and how or whether they were considered as part of the total exposure evaluation.* *F. Clarify whether the uptake factors used account for bioaccumulation and biomagnification up the food chain. If not, discuss how bioaccumulation and biomagnification can be incorporated into the evaluation.* *G. Describe any changes to the assessment of effects on human health, resulting from any changes described in questions A to F above;* *H. Discuss appropriate mitigation and follow-up measures to address any changes to the assessment of effects on human health identified in question G above.*	
		Response: A. The reference for the arsenic biotransfer factor is correct in the report (i.e., U.S. EPA (2005)- HHRAP). The biotransfer factor can be found in the Access database file here: https://archive.epa.gov/epawaste/hazard/tsd/td/web/html/riskvol.html#volume2 The biotransfer values for the other metals for which U.S. EPA (2005) was the source can also be found in the Access Database. The U.S. EPA's biotransfer values from cattle are considered applicable for the following reasons: • They were derived for estimating uptake due to deposition resulting from emissions, which is comparable to the scenario assessed in the EIS/EA. • Like moose, cattle are large terrestrial mammals that consume vegetation. Therefore, adjusted biotransfer factors for cattle are considered applicable to moose. • The digestive systems of moose are similar to those of cattle, therefore biotransfer factors for cattle are considered applicable to moose. Biotransfer factors not obtained from U.S. EPA (2005) were obtained from Baes et al. (1984). U.S. EPA (2005) recommends Baes et al. (1984) for multiple species, including cattle, swine and chicken. As such, the use of Baes et al. (1984) values for species other than cattle is consistent with U.S. EPA guidance. B. Bioaccumulation accounts for how metals enter the food chain, and is essentially uptake of COPC into tissue. In terms of moose, bioaccumulation of metals was accounted for in both terrestrial and aquatic plants, which were food sources used to estimate metal loading in moose. Terrestrial and aquatic plants are considered the first link of the food chain for moose. Terrestrial plants were assumed to uptake metals from surface soil, while aquatic plants were assumed to uptake metals from surface water. Moose consuming these plants would then be exposed to the metal concentrations present in plant tissues under baseline conditions as well as changes in metal concentrations from the Project. It is noted that many of the uptake factors for aquatic plants (Appendix E) are greater than 1.0, suggesting that these uptake factors account for biomagnification as well as bioaccumulation. C. The source of the biotransfer values (also referred to as ingestion-to-beef transfer coefficients) for cobalt, copper, vanadium, uranium, and zinc was Figure 2.25 in Baes et al. (1984). As described in Baes et al. (1984): "*these ingestion-to-beef parameters are representative of the fraction of the daily elemental intake in feed which is transferred to and remains in a kilogram of beef until slaughter*" Based on these descriptions these values are appropriate for predicting future concentrations in moose tissue. They were adjusted for the fat content of moose in comparison to beef. Adjusting for fat content may introduce	***N/A***

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		some limited uncertainty; however, changes in moose tissue concentrations due to the Project are expected to be overestimated based on conservative exposure assumptions. D. The exposure point concentrations in wild meat (i.e., moose tissue) under baseline conditions were based on the whole-body analysis of small mammals, which included flesh, organs and bones. Small mammals were collected and analyzed rather than moose because the sacrifice of large animals for small samples of muscle and/or organ meat is difficult to justify ethically. In addition, the problems associated with controlling sampling protocol and ensuring consistent sampling methodologies make collecting samples from hunters and trappers difficult. The small mammal data is site-specific and therefore provides a more relevant estimate of larger herbivorous mammal tissue concentrations than modelling based on concentrations in soil, vegetation and water. The use of the small mammal data to inform concentrations in moose tissue was also requested by stakeholders. When estimating risk, there was no distinction made between exposure to organs or flesh; rather, the Aboriginal consumption rate for the Aboriginal/High-use receptor was assumed to be the sum of the consumption rates for flesh and organs, and the overall exposure point concentration was based on the whole body analysis of small mammals, which included organs and flesh. Only one set of uptake factors was used to estimate changes in moose tissue concentration. While the concentrations of some metals may be higher in organs than in flesh, overall the approach in the HHERA is not expected to underestimate risk for the following reasons: In many cases (e.g., including for arsenic), the measured concentrations in small mammals from the LAA are higher or comparable to concentrations in moose flesh or moose organs reported in two studies of Ontario moose: • First Nations Food, Nutrition and Environment Study (FNFNES): Results from Ontario (2011/2012) (Chan 2014) (referred to as the FNFNES study) - Moose tissue and organ samples were submitted by First Nation communities across Ontario • Nokiiwin Tribal Council Country Foods Study (referred to as the NTC study) (CanNorth, 2016)- Moose tissue and organ samples submitted by 4 First Nation communities near Lake Nipigon The majority of people are expected to eat a much higher proportion of flesh than organ tissues, therefore the use of whole body concentrations to assess exposure to combined flesh and organs should account for any difference in concentrations and uptake between the two. • In Ontario, MNRF is responsible for the management of moose and manages moose populations by Wildlife Management Units (WMUs). These programs are well beyond GGM's purview as a private proponent and are not recommended for the Project given the effects assessment outcomes. The results of these monitoring plans including the concentrations in flesh and organs can be used to determine if actual concentrations are in line with predicted concentrations based on the small mammal data, and therefore if actual risks are consistent with predicted risks. E. Walleye fillet and liver samples from the various basins of Kenogamisis Lake were included in the estimate of whole body tissue concentration of metals in Walleye. Gonad samples were not included in the analysis, because they are less likely to be consumed in comparison to the fish fillet and liver. The 95% UCLM concentrations of metals in walleye fillet and liver samples were used as exposure point concentrations in fish tissue for human consumption. F. Uptake factors used in the HHERA are provided in Appendix E of Appendix F8 of the Final EIS/EA. Uptake factors were used to predict the change in concentrations of COPCs various media including soil invertebrates, vegetation, fish and terrestrial mammals and animal tissue. Bioaccumulation accounts for how contaminants enter the food chain, and the uptake factors were used to predict this uptake. Biomagnification is the increase in concentration of a COPC in animal tissue in comparison to its food. Biomagnification occurs for some metals (e.g., mercury) but not for others. Uptake factors greater than 1.0 indicate biomagnification in a given medium. There are numerous uptake factors (in Appendix E) that are greater than one. These uptake factors were used in the HHERA and therefore would have accounted for biomagnification. The concentration of mercury in surface water is not expected to increase as a result of the Project, therefore no biomagnification in fish tissue (e.g., walleye tissue) is expected.	

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		G. The issues raised in A to F are addressed in the current HHERA. Therefore, the assessment of potential human health effects and the conclusion that the Project will have a negligible effect on human health risk remains unchanged. H. No changes to the HHRA are required to address the issues raised in comments A and B above. Therefore, no additional mitigation or follow-up measures are required. **References** Baes III, C.F., R.D. Sharp, A.L. Sjoreen, and R.W. Shor. 1984. A Review and Analysis of Parameters for Assessing Transport of Environmentally Released Radionuclides Through Agriculture. Oak Ridge National Laboratory, ORNL-5786. Oak Ridge, TN. Canada North Environmental Services Limited Partnership (CanNorth). Nokiiwin Tribal Council Country Foods Study. June 2006. Available online at: http://www.nokiiwin.com/upload/documents/1807-ntc-country-foods-study-revised-fin.pdf Chan, L., O. Receveur, M. Batal, W. David, H. Schwartz, A. Ing, K. Fediuk, A. Black, and C. Tikhonov. 2014. First Nations Food, Nutrition and Environment Study (FNFNES): Results from Ontario (2011/2012). Ottawa: University of Ottawa, Université de Montréal, Assembly of First Nation. Available online: http://www.fnfnes.ca/docs/FNFNES_Ontario_Regional_Report_2014_final.pdf United States Environmental Protection Agency (U.S. EPA). 2005. Methodology for Predicting Cattle Biotransfer Factors. Research Triangle Institute. EPA Contract Number 68-W-03-042, September 23, 2005.	
CEAA_63 *IR Number: HE(1)-21*	*Appendix C10; Appendix F8, Section 3.5.2*	***Context and Rationale:*** • *The response to Agency comment HE(0)-33 (CEAA_98) in Appendix C10 indicates that "total dust deposition was based on the maximum annual dust deposition rate", however, Appendix F8, Section 3.5.2 states that "dust deposition rates were obtained on a site-specific basis as annual average values from the air deposition model". The purpose of the screening is to compile a conservative list of chemicals for further evaluation using different methods. The maximum observed concentrations of chemicals for each media should be used for the identification of contaminants of potential concern (COPCs). If these assumptions are not reasonably conservative, the predicted concentrations could underestimate the project's potential effects on human health, and to underestimated effects to current use of lands and resources for traditional purposes where country foods are obtained and consumed.* • *Appendix F8, Section 3.5.2 states that in the top 10 cm soil horizon, "no loss of metal due to wind erosion, soil mixing or leaching was assumed to occur ". Site activities such as earthworks and stripping can contribute to the "mixing" of contaminants in soil and thus should be considered and/or assessed.* ***Specific Question/ Request for Information:*** *A. Provide a rationale to support the use of the annual average deposition rates versus maximum averages, and include a discussion of the uncertainty associated with the assumptions.* *B. Clarify whether site activities such as earthworks and stripping were considered in the assumption of no mixing in top 10 cm mixing zone in soil, and describe the uncertainty that may be introduced by assuming that no soil mixing would occur.*	***N/A***
		Response: A. Section 3.5.2 of Appendix F8 of the Final EIS/EA describes how the exposure point concentrations (EPCs) in soil were determined for Baseline Case and Future Case (i.e., Project + Baseline) conditions. The COPC list was not limited to screening of contaminant concentrations in environmental media, as is the case for contaminated sites. COPCs were identified based on concentrations in the ore and deposited material (dustfall). There are no guidelines for screening COPCs in depositional material. The COPC list was supplemented by including additional COPCs if existing Baseline concentrations were already above guidelines. Future Case metals concentrations in soil were calculated on a site-specific basis using the maximum annual average deposition rate value predicted for each receptor location. At each receptor location, the range of annual average deposition rates predicted by the Air Quality assessment over the life of the Project were reviewed, and the maximum annual average	***N/A***

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		deposition rate over the modelling period was selected at each location. This maximum annual average deposition rate at each location was then assumed to occur at that location for each year over the entire operational life of the Project. This approach provides a highly conservative estimate of the potential metal accumulation in soil at each receptor location. B. The amount of metal deposited to a given square meter of soil is dependent on the dust deposition rate and not on the soil mixing depth. The total accumulation of metal in a square meter of soil over the operational life of the Project is a direct function of the assumed soil mixing depth. Thus, the predicted increase in metal concentrations in soil using a 20-cm mixing depth would be ½ the predicted increase predicted using a 10 cm mixing horizon. Thus, activities such as earthworks and stripping would mix the soil over a much larger horizon than 10 cm, meaning that in locations where these activities occur, the deposition-related increases in metal concentrations in soil would be much lower than those predicted in the HHERA. Consequently, at these locations, the potential health risks for Indigenous and non-Indigenous people who harvest food or spend time at these locations would be lower than those currently predicted by the HHERA. Thus, the assumption that no soil mixing occurs over-estimates potential exposures and the associated risks—a conservative approach.	
CEAA_64 *IR Number: HE(1)-22*	*Appendix F8, Section 4.1.1*	***Context and Rationale:*** • *Given that the EIS has established that there is an ingestion pathway, to support a community-specific estimate of risks from the ingestion of traditional foods by the Indigenous communities, a survey to collect area-specific information from different age groups on consumption patterns should be considered. It is unclear whether the consumption patterns and dietary habits of each Indigenous group, and different age groups within each Indigenous group, were incorporated into the HHRA and validated with each Indigenous group. Health Canada recommends referring to the "First Nations Food, Nutrition and Environment Study" (FNFNES) from Health Canada (Chan et al, 2014) for additional comment regarding the use of select ingestion rates.* ***Specific Question/ Request for Information:*** *A. Describe how community-specific information was used to determine consumption patterns and dietary habits for each Indigenous group.* *B. Describe how information from different age groups within each community was used. If this was not done in the HHRA, discuss applying an approach where the most vulnerable population is applied to represent the whole community.* *C. Describe any changes to the assessment of effects on human health, resulting from any changes described in questions A and B above;* *D. Discuss appropriate mitigation and follow-up measures to address any changes to the assessment of effects on human health identified in question C above.*	***N/A***
		Response: A. Consideration of Aboriginal information and traditional knowledge in the HHRA is discussed in Section 19.1.3 of the Final EIS/EA. The information in these reports was used to identify the types of country foods (e.g., meat, fish and vegetation) used by Indigenous communities in the area of the Project. These studies do not contain information specific to country food consumption rates that could be used to develop quantitative estimates of exposures to Project-related chemicals under Baseline Case or Future Case conditions. In the absence of quantitative information on community-specific country food consumption rates, the HHRA relied on country food consumption rate data contained in the First Nations Food, Nutrition, and Environment Study of Ontario Indigenous peoples (Chan et al. 2014). Data for the adult heavy consumer from Ecozone 2 was used to represent country food consumption rates for Indigenous people who live and/or harvest country foods from within the LAA. For the Final EIS/EA, the ingestion rate of local fish for the Aboriginal/High Use receptor was increased 10-fold from the rate used in the Draft EIS/EA based on comments from regulators and stakeholders. This increase reflects the change in the assumption that Aboriginal/High Use receptors obtain 100% of their fish intake from Kenogamisis Lake, rather than the 10% assumed in the Draft EIS/EA. This is likely a conservative assumption based on interviews and responses to questionnaires from local indigenous communities, which indicated some members of the	***N/A***

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		community do not fish from Kenogamisis Lake due to concerns about contamination from historical mining activities. B. Intake estimates for other age groups (i.e., toddlers, children, and teens) were based on the adult consumption rates. Country food consumption rates for other age groups were derived from the adult consumption rates by applying the ratios between adult and other age group country food consumption rates noted by Health Canada. The identification of age-specific country food consumption rates for toddlers, children and teen receptors is discussed in detail in Table 4.1 of Appendix F8 of the Final EIS/EA. Human health risks were estimated for each receptor age group using the age-specific country food consumption rates shown in Table 4.1 of Appendix F8 and the toxicological reference values (TRVs) for the contaminants of concern (listed in Section 4.2 of Appendix F8). The TRVs listed in Section 4.2 of Appendix F8 were developed by regulatory agencies such as the MOECC, Health Canada, and the US EPA. The TRVs set by these agencies are developed to be protective of the population, including sensitive members of the population such as toddlers, pregnant and nursing mothers, and the elderly. Thus, the HHRA already incorporates considerations for sensitive or vulnerable members of Indigenous and non-Indigenous members of the population. C. The HHRA used country food consumption rates specific to Indigenous people in the region of the Project and TRVs that are protective of vulnerable members of the population. Therefore, modifications to the HHRA are not necessary. D. No changes to the HHRA are required to address the issues raised in comments A and B. Therefore, no additional mitigation or follow-up measures are required. **Reference:** Chan, L., O. Receveur, M. Batal, W. David, H. Schwartz, A. Ing, K. Fediuk, A. Black, and C. Tikhonov. 2014. First Nations Food, Nutrition and Environment Study (FNFNES): Results from Ontario (2011/2012). Ottawa: University of Ottawa, Université de Montréal, Assembly of First Nation. Available online: http://www.fnfnes.ca/docs/FNFNES_Ontario_Regional_Report_2014_final.pdf	
CEAA_65 *IR Number: HE(1)-23*	*Appendix F8, Section 3.5.8.*	***Context and Rationale:*** • *Appendix F8, Section 3.5.8 indicates that baseline tissue concentrations from small mammals "were used directly without any allometric scaling to account for possible difference between small mammal tissue and moose tissue." Data with concentrations of chemicals of potential concern (COPCs) from the actual country foods that are consumed from the impacted area are preferred.* • *As an alternative to collecting empirical data for concentrations of COPCs in large mammals that are consumed by humans in the project area, results for concentrations of COPCs in large mammal tissues reported in the First Nations Food, Nutrition and Environment Study (FNFNES) from the same geographical location could be used to represent baseline concentrations. As an additional option, results for COPCs in environmental media (water, soil, sediment, etc.) could be employed in models to derive concentration estimates in country foods.* • *This information is required to understand potential effects of the project on the health of Aboriginal peoples.* ***Specific Question/ Request for Information:*** *A. Provide a rationale to support how metal concentrations in moose (particularly moose liver which is often harvested by Indigenous people for consumption) are derived from the small mammal tissue data, and provide a discussion of uncertainties associated with the use of surrogate species.* *B. Provide a discussion of how the uncertainties would be influenced by using other sources of information (FNFNES, or modelled results to obtain concentration estimates based on the results of the COPCs in environmental media) and provide the rationale for not using these other additional sources of information.* *C. Describe any changes to the assessment of effects on human health, resulting from any changes described in questions A and B above;* *D. Discuss appropriate mitigation and follow-up measures to address any changes to the assessment of effects on human health identified in question C above.*	***Context and Information Required for a Complete Response:*** • *The response does not address Part A of the information requirement (IR). Revise the response to provide a discussion of uncertainties associated with the use of surrogate species.*

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		Response: A. Metal concentrations in moose tissue vary between flesh and organs (including liver) based on the results reported in Table 6.5-1 the Nokiiwin Tribal Council (NTC) country food study (CanNorth 2016). The concentrations of some metals (e.g., arsenic) are higher in liver than in flesh, while concentrations of other metals (e.g., lead) are lower in liver than in flesh. Overall, the concentrations in whole body small mammal tissue from the site were comparable to the concentrations in flesh and organs provided in the NTC study. Using the whole body small mammal data results in a blending of concentrations in flesh and organs, with greater weighting being attributed to concentrations in flesh than in liver. Moose livers account for approximately 2% of the total body weight of the moose, based on liver weights of 4.5-9.0 lb and a total body weight of 435 kg (assumed bodyweight in the HHERA). The livers of small mammals (i.e., rats) also account for approximately 2% of their overall bodyweight (Piao et al. 2013), and the liver to bodyweight ratios of moose and small mammals appear to be reasonably comparable. B. Flesh and organ tissue concentrations in moose were available in the First Nations Food, Nutrition and Environment Study (FNFNES) and the NTC country food studies. However, these data were not used for the following reasons: • In both studies, samples of moose tissue were donated by local hunters. There does not appear to have been a standardized technique for harvesting moose tissue in either study. Activities such as the use of metal cutting tools to harvest flesh and use of flesh near the bullet impact could have an effect on the metal concentrations in the tissues; however, it is not clear that these activities were accounted for in the sample collection program. Therefore, the results of these studies could not reliably be used to estimate metal exposures for people that consume moose. It is noted that overall, whole body concentrations in small mammals were comparable to those reported in flesh and organs in the FNFNES and NTC studies. • the data from the FNFNES and NTC studies were not specific to the LAA, which is located in an area that is enriched with metals. • the studies did not report concentrations for the full suite of metal COPCs. Modelling was used to predict tissue concentrations in the draft HHERA, however there were multiple comments challenging that approach. In fact, in many cases (e.g., for arsenic) the concentrations predicted from modelling were significantly lower than those from the small mammal tissue analysis or the country food studies. Use of modelling results could result in an underestimation of risk. Therefore, modelling data were not used to predict baseline moose tissue concentrations in the Final EIS/EA. C. The comments raised in A and B are addressed in the current HHRA. Therefore, the assessment of potential human health effects and the conclusion that the Project will have a negligible effect on human health risk remains unchanged. D. No changes to the HHRA are required to address the issues raised in comments A and B. Therefore, no additional mitigation or follow-up measures are required. **References** Canada North Environmental Services Limited Partnership (CanNorth). Nokiiwin Tribal Council Country Foods Study. June 2006. Available online at: http://www.nokiiwin.com/upload/documents/1807-ntc-country-foods-study-revised-fin.pdf Piao et al. 2013. Change Trends of Organ Weight Background Data in Sprague Dawley Rats at Different Ages. J Toxicol Pathol. 2013 Mar; 26(1): 29–34. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3620211/	**Response:** A. It is possible that there may be small differences in the tissue concentrations in small mammals and moose tissue; however, this is not expected to change the conclusions of the risk assessment given that the changes in tissue concentration are predicted to be small or in some cases, for example arsenic, are anticipated to decrease due to net improvement for Kenogamisis Lake. Using actual tissue concentrations, albeit that of surrogate species, is expected to decrease the uncertainty in comparison to using purely modelled concentrations, which was the approach in the HHERA in the Draft EIS/EA. In addition, using small mammal data collected from the areas in or near the PDA provides a better indication of local conditions in comparison to moose tissue that is likely more reflective of the conditions of the moose's wider home range.
CEAA_66 *IR Number: HE(1)-24*	*Appendix F8, Section 1.2; Appendix*	***Context and Rationale:*** • *Given that the EIS has established that there is an ingestion pathway, in Appendix F8, Section 4.1.1, Table 4-1, it is unclear why the Aboriginal/High Use receptor consumption rates used for fish (73.97 g/day), game meat and organs (total of 135.45 g/day), are based on intake rates for heavy consumers, while consumption rate for plants and vegetation (20.4 g/day) is based on intake rates for an Aboriginal person.*	***N/A***

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	F8, Section 4.1.1.	• *In Appendix F8, Section 1.2, it is indicated that the EIS was updated by "[increasing] the proportion of fish ingestion accounted for by local fish from 10% to 100% for the Aboriginal/High Use receptor..." However, it appears from Appendix F8, Section 4.1.1, Table 4-1 that 10% of fish consumption for the Aboriginal receptor is assumed to be from local fish. It is unclear whether the assumption of 100% local fish was actually used in the HHRA, and that Table 4-1 is in error.* • *This information is required to understand potential effects of the project on the health of Aboriginal peoples.* ***Specific Question/ Request for Information:*** *A. Provide a rationale for the use of high-end consumption rates for select foods and average consumption rates for others. Consider inclusion of a sensitivity analysis to identify specific contaminants and exposure pathways/foods that impact and drive risk estimates.* *B. Confirm whether the HHRA used an assumption of 100% fish consumption from the local area for the Aboriginal/High Use Receptor. If not, update the HHRA using this assumption.* *C. Discuss appropriate mitigation and follow-up measures to address any changes to the assessment of effects on human health identified in question C above.*	
		Response: A. The HHRA assumes that 100% of the country foods consumed by Indigenous people are collected from within the LAA. There is ample evidence of wild meat (moose) and fish within the LAA and it is reasonable to assume that Indigenous people could harvest a large portion of these country foods from the LAA. To provide conservative estimates of possible exposures to Project-related metals, high-end consumption rates were used to estimate exposures to COPCs in moose tissue and fish tissue. This is a conservative approach. In contrast, it is unlikely that Indigenous people harvest their yearly intake of traditional plants from the LAA. While the majority of respondents to the Long Lake #58 First Nation Traditional Land Use Survey indicated that they obtain berries or medicinal plants from the Regional Study Area (RSA) provided in the survey, this RSA is considerably larger than the LAA. It was assumed that Indigenous people would collect some plants within the LAA and others in the areas of the RSAs outside the LAA. COPC concentrations in plants outside of the LAA are not expected to be affected by the Project, therefore intake of plants collected outside of the LAA was not considered in the HHRA. As a result, an average consumption rate was used to estimate exposures to COPCs in plants. The daily intake of plants for the Indigenous adult was 20.4 g/day based on recommendations in Chan et al. (2014) for an Aboriginal person in Ecozone 2. The is value is 29% higher than the average intake of traditional plants (15.8 g/day) reported for participants in the Nokiiwin Tribal Councils (NTC) country foods study in the Lake Nipigon area (CanNorth 2006). Four Indigenous groups were included in the NTC study, and the study area was also located in Ecozone 2. The average consumption rates in Chan et al. (2014) provide a more conservative estimate of potential exposures to Project-related metals and therefore, was used to provide reasonable upper-bound estimates of potential exposures through the consumption of traditional plants. B. The HHRA risk calculations assumed that 100% of fish consumed by the Aboriginal/High Use receptor came from the various basins of Kenogamisis Lake (Section 4.1.1 of Appendix F8 – Aboriginal/High Use receptor description). The text associated with Table 4-1 correctly notes that the risk calculations were completed assuming that 100% of the fish consumed by the Aboriginal/High Use receptor was assumed to come from Kenogamisis Lake. However, Table 4-1 incorrectly lists the fish consumption rate as 10% coming from Kenogamisis Lake. The fish consumption rates presented in Table 4-1 should be shown as 100%, to reflect what was used in the calculations, not 10%. The 10% rate shown in Table 4-1 is a typographical error. C. No changes to the HHRA are required to address the issues raised in A or B above. **References:** Chan, L., O. Receveur, M. Batal, W. David, H. Schwartz, A. Ing, K. Fediuk, A. Black, and C. Tikhonov. 2014. First Nations Food, Nutrition and Environment Study (FNFNES): Results from Ontario (2011/2012). Ottawa: University of Ottawa, Université de Montréal, Assembly of First Nation. Available online: http://www.fnfnes.ca/docs/FNFNES_Ontario_Regional_Report_2014_final.pdf	***N/A***

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		Canada North Environmental Services Limited Partnership (CanNorth). Nokiiwin Tribal Council Country Foods Study. June 2006. Available online at: http://www.nokiiwin.com/upload/documents/1807-ntc-country-foods-study-revised-fin.pdf	
CEAA_67 *IR Number: HE(1)-25*	*Chapter 19; Appendix O.*	***Context and Rationale:*** • *Section 6.3.4 of the EIS Guidelines requires the proponent to describe and analyze how changes to the environment caused by the project will affect "human health, considering, but not limited to […] quality and availability of country foods"* • *Animbiigoo Zaagi igan Anishinaabek, Aroland First Nation and Ginoogaming First Nation raised concerns that the assessment of effects on human health described in Chapter 19 and in Appendix O, does not consider effects to the health of Indigenous peoples due to a decrease in availability of traditional foods caused by the Project, which would result in a potential change in diet.* ***Specific Question/ Request for Information:*** *A. Describe how changes to the availability of traditional foods could cause effects to the health of Indigenous peoples who rely on these foods as an important part of their regular diet.* *B. Describe any changes to the assessment of effects on human health, resulting from any changes described in question A above;* *C. Discuss appropriate mitigation and follow-up measures to address any changes to the assessment of effects on human health identified in question B above.*	***N/A***
		Response: A-C. As noted in the response to CEAA_43 (IR Number HE(1)-01) above, Appendix O has been updated to provide a standalone assessment for Aboriginal health conditions. The HHERA evaluated changes to the quality of country foods by evaluating changes in ingestion-related health risks, see Section 19.4.1.2 of the Final EIS/EA and Section 7.1.2.2.b of updated Appendix O. A summary of changes in the distribution and abundance of species harvested as food is included in Section 7.1.2.2.b of updated Appendix O. Mitigation measures which will reduce or alleviate these effects are identified in Table 6-1 of Appendix O. A discussion of the residual effect on availability of country foods as related to Aboriginal health conditions is included in Section 7.1.3.2 b) of update Appendix O. These information sources and others are incorporated in the Overall Summary and Determination of Significance for Aboriginal and Health Conditions in Section 7.1.5 of Appendix O.	***N/A***
CEAA_68 *IR Number: HE(1)-26*	*Appendix M13, Section 7.1.1*	***Context and Rationale:*** • *Given that the EIS has established that there is an ingestion pathway, Red Sky Métis Independent Nation (RSMIN) raised concerns about the potential impacts to their ability gather wild berries and other edible plant species, including wild rice, blueberries, Saskatoon berries, raspberries and high bush cranberry as a result of on-going forestry and mining operations in the region. RSMIN also gather plants used for medicinal and ceremonial purposes such as cedar boughs and bark, red willow bark (may be red osier dogwood), inner bark of birch, mullein, clover, milk thistle, dandelion leaf, wintergreen, peppermint, balsam fir gum, fireweed/willowherb, sage, and "rabbit berries".* • *RSMIN recommended that the loss of these plant species of importance be mitigated by planting species of importance to their citizens upon the closure of the mine.* • *RSMIN also raises concerns about their ability to gathering edible and medicinal plants in areas where no herbicides/pesticides have been applied. Appendix M13, Section 7.1.1 indicates that chemical application methods may be used if needed. RSMIN agrees with GGM's measure to use mechanical or manual methods for vegetation control where possible. If the use of chemical applications is necessary, RSMIN recommends that herbicides/pesticides be avoided in areas that are known to have plant species of interest, so that the Project Development Area can be utilized for medicinal plant gathering post closure.* • *Indigenous groups should also be informed of the dates and locations of the applications, and the compounds used, so that community members may be informed of the applications.* ***Specific Question/ Request for Information:***	***N/A***

Comment Number	Report Section	Agency Comment and GGM Response	Agency Follow-up Comment and GGM Response
		A. Considering baseline information provided by RSMIN (see comment HE(1)-02), discuss how the Project may affect the ability of RSMIN citizens to gather and use plant species of importance to their community. *B. Describe potential circumstances where chemical application methods may be used, and how Indigenous groups will be notified about chemical applications. Discuss the residence time of the pesticide after application (e.g., when plants could be expected to return).* *C. Describe any mitigation and/or compensation measures that will be applied to counter the loss of these plant species of importance.* *D. Discuss the impact on use of land and resources by Indigenous groups with and without mitigation/compensation.*	
		Response: A. The RSMIN TLU study states "results of the interviews conducted by RSMIN staff have indicated that RSMIN citizens continue to actively engage in a range of traditional land use practices as well as contemporary adaptations of traditional land use practices, and continue to occupy and use land for these purposes across the Robinson Superior Treaty area and RSMIN traditional territory." The RSMIN website publishes a map of their traditional territory that does not include Treaty 9, and therefore does not overlap the RAA for the Project. RSMIN reports fishing in Kenogamisis Lake, however, and it is therefore assumed that other traditional practices may occur in the RAA, including plant harvesting. RSMIN expressed concern regarding the cumulative effect of forestry and mining on abundance of important food species and recommended that GGM replant these species at mine closure. B. The potential spread of invasive species will be managed with mechanical control over chemical control as noted in the Biodiversity Management and Monitoring Plan. If mechanical control has been determined to be ineffective and invasive species are noted to be expanding, chemical control will be considered, however it will be applied using Spot-control methods rather than broad based spraying to minimize adverse effects to surrounding environments. Aboriginal communities will be notified about chemical applications via GGM's community relations office and GGM's Manager of Aboriginal Affairs C. The loss of wild berries and other edible plant species (as listed), resulting from project development and operation, will only occur in the Project Development Area. GGM has also committed to undertake revegetation test plots during mine operations. The Project design approach of minimizing the Project footprint and maximizing the use of the existing brownfield site conditions mitigates effects on vegetation and wildlife related to country foods. D. As noted in Section 18.4.2.3 of the Final EIS/EA, the plant species noted are not limited to the habitat in the PDA or LAA and the vegetation communities that support these plant species are common throughout the RAA. The removal of plant species of interest to Aboriginal communities that are located within the PDA is not anticipated to affect the viability of these species occurring in the RAA. Rehabilitation of Project components will provide opportunities for regrowth of plant species of interest to Aboriginal communities. The residual environmental effects from the Project on TLRU are determined to be not significant because they do not result in the long-term loss of availability of traditional use resources or access to lands relied on for traditional use practices or the permanent loss of traditional use sites and areas in the LAA and RAA. The ability of Aboriginal communities to maintain TLRU outside of the PDA will be maintained. GGM is committed to maintaining alternate access within the PDA to the Southwest Arm of Kenogamisis Lake during construction and operation. Even without mitigation, potential Project effects are not expected to occur beyond the LAA or result in additional access restrictions, and ability of Aboriginal communities to maintain TLRU outside of the PDA will be maintained with some access changes. Therefore, even without mitigation residual environmental effects from the Project on TLRU would be not significant.	***N/A***

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CEAA_69 *IR Number: HE(1)-27*	*Appendix F8, Section 4.2.2; Appendix F8, Appendix E*	***Context and Rationale:*** • *In Appendix F8, Section 4.2.2, and Appendix F8, Appendix E, no rationale is provided for cases where selected toxicology reference values (TRVs) deviate from Health Canada's guidance.* • *According to Appendix F8, Section 4.2.2.2, "if chromium is released to the environment, it will likely be in the form of chromite FeCr2O4. The stable oxide contains Cr3+, which is not considered carcinogenic. As such, chromium will not be evaluated for potential inhalation health concerns." Given that the EIS has established that there are inhalation and ingestion pathways, it would still be expected that there could be exposure to hexavalent chromium (Cr6+) in some concentration. More discussion is needed as to the potential risk of exposure to hexavalent chromium, which is a recognized carcinogen.* • *The dermal relative absorption factors (RAFs) for lead and manganese provided in Appendix E references the MOECC document "Rationale for the Development of Soil and Ground Water Standards for Use at Contaminated Sites in Ontario, April 15, 2011." However, no dermal RAFs were found in the referenced document.* • *This information is required to understand potential effects of the project on the health of Aboriginal peoples.* ***Specific Question/ Request for Information:*** *A. Provide rationales for where TRVs were adopted that were different from Health Canada's guidance.* *B. Discuss the potential risk of exposure to hexavalent chromium, particularly with regards to carcinogenicity.* *C. Confirm the reference from which dermal RAFs for lead and manganese were obtained.* *D. Describe any changes to the assessment of effects on human health, resulting from any changes described in questions A and B above;* *E. Discuss appropriate mitigation and follow-up measures to address any changes to the assessment of effects on human health identified in question D above.*	***N/A***
		Response: A. Section 4.2 of Appendix F8 of the Final EIS/EA outlines the process used to select TRVs for use in the Human Health Risk Assessment (HHRA). As noted in that section, because the Project is in Ontario, preference was given to inhalation and oral/dermal TRVs developed or recommended by the Ontario Ministry of the Environment and Climate Change (MOECC). Where TRVs were not available from the MOECC, TRVs from other agencies, including Health Canada, were used. In general, where MOECC TRVs were not available, preference was given to TRVs listed in Health Canada guidance (Part II, Health Canada Toxicological Reference Values (TRVs) and Chemical-Specific Factors, Version 2.0, Health Canada 2012). Where TRVs were not available from MOECC or Health Canada, TRVs from other agencies such as the US EPA and the BC MOECC were selected. The source agency of each TRV selected for use in the HHRA is listed in the TRV summary tables in Section 4.2 of Appendix F8. B. As noted in Section 4.2.2.2 of Appendix F8, the Project geochemical data indicates that chromium is present in the form of chromite which contains trivalent chromium (Cr^{+3}) and not hexavalent chromium (Cr^{+6}). While Cr^{+6} is considered to be carcinogenic when inhaled, it is not carcinogenic when ingested, and Cr^{+3} is not considered to be carcinogenic when inhaled or ingested. Further, Cr^{+6} is unstable under typical environmental conditions and it is rapidly converted to Cr^{+3}, which suggests that Project-related exposures to Cr^{+6} are not expected. Thus, the assessment of potential health risks associated with chromium were based on potential exposures to the non-carcinogenic Cr^{+3}. C. The MOECC does not list specific relative absorption factor (RAF) values for lead or manganese in the 2011 guidance document (Table 2.24 of MOE, 2011). The dermal absorption factors for lead and manganese were derived following guidance provided in Section 2.6.2.1 of the 2011 MOECC Rationale document, which states that for inorganic substances where there are insufficient data to determine substance-specific RAFs a default value of 1% (0.01) is to be used. A RAF value of 0.01 was used to assess dermal exposures to lead and manganese in the HHRA. D. The responses to points A and B do not require changes to HHRA.	***N/A***

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		E. Changes to the HHRA are not required therefore, there are no mitigation or follow-up measures that are required to address changes to the HHRA. **References** Health Canada. 2012. Federal Contaminated Site Risk Assessment in Canada, Part I: Guidance on Human Health Preliminary Quantitative Risk Assessment (PQRA), Version 2.0. Ministry of the Environment (MOE). 2011. Rationale for the Development of Soil and Ground Water Standards for Use at Contaminated Sites in Ontario, April 15, 2011. Standards Development Branch. PIBS 7386e01.	
CEAA_70 *IR Number: HE(1)-28*	*Appendix F8, Appendix E*	***Context and Rationale:*** • *Given that the EIS has established that there is an ingestion pathway through fish consumption, it is important to understand potential uptake from surface water to fish.* • *Appendix F8, Appendix E indicates that a basin weighting approach was used to obtain an average baseline arsenic concentration for Kenogamisis Lake. Given that traditional users will be exposed at specific locations rather than evenly throughout the lake, it is not appropriate to derive a weighted average of a COPC concentration in each basin of Kenogamisis Lake for the purpose of screening or establishing a baseline for the HHRA.* • *No rationale was provided in Appendix F8 for the surface water to fish uptake approach (shown in a table in Appendix F8, Appendix E). It is also unclear whether the modeling considered uptake by fish of metals in sediment.* • *The predicted future case arsenic concentration in fish tissue appears to use a proportioning approach, which introduces uncertainty in the assessment.* ***Specific Question/ Request for Information:*** *A. Revise the HHRA to incorporate either location-specific COPC concentrations or maximum COPC concentrations for all locations in Kenogamisis Lake.* *B. Provide a rationale for using the surface water to fish uptake approach mentioned in Appendix F8, Appendix E.* *C. Describe how uptake by fish of metals from sediment is considered in the modeling of fish tissue concentrations, and whether benthic and pelagic fish were considered differently.* *D. Clarify why a proportioning approach was considered for the predictions of fish tissue concentration for the future case. Describe how the proportioning approach can be validated in the country foods follow-up program described in comment HE(1)-32.* *E. Describe any changes to the assessment of effects on human health, resulting from any changes described in questions A to D above;* *F. Discuss appropriate mitigation and follow-up measures to address any changes to the assessment of effects on hu* *man health identified in question E above.*	***N/A***
		Response: A. As noted by the reviewer, it is reasonable to assume that people harvest fish from a limited number of preferred locations on Kenogamisis Lake. However, the fish caught at these locations will have swam around the entire lake and will not have spent their entire lives at the precise locations where they are caught. The use of an area-weighted average is reasonably based on the assumptions that fish move freely around the lake, as they do, and that the length of time a fish spends in any one basin is a function of the size of the basin. Therefore, the use of an area-weighted mean metal concentration in surface water provides the best overall representation of the likely accumulation of metals in fish tissue. The use of location-specific or maximum surface water metal concentrations to predict potential metal concentrations in fish tissue do not reflect the metal exposures that fish are likely to experience.	***N/A***

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		The use of location-specific data relies on the assumption that the fish caught at a given location spend their entire lives at that location. This assumption does not reflect typical behavior of sport fish and thus, would not provide a reliable estimate of potential metal concentrations in tissue from a typical sport fish in Kenogamisis Lake. Predicting metal uptake in fish tissue based on a single maximum surface water concentration does not reflect the metal exposures that fish living in Kenogamisis Lake would experience. Moreover, a single location likely does not provide 100% of a receptor's annual fish consumption. Combining these two considerations (100% of fish consumption based on fish that are only exposed to highest surface water concentrations) would provide completely unreasonable estimates of potential exposures and health risks that would not properly inform the determination of the significance of Project residual effects on human health. B. The target fish species in this HHRA, including walleye, trout and perch, are not bottom feeders and therefore their metal tissue concentrations are driven primarily by surface water concentrations rather than sediment concentrations. Future case concentrations of metals in fish tissue were determined using the modelled future weighted mean concentrations of metals in surface water across the various basins and literature-based uptake factors for surface water to fish tissue. Using uptake factors to predict changes in fish tissue concentration due to changes in surface water is a standard accepted approach. It is noted that the proportioning approach was also incorporated to predict the changes in fish tissue concentrations from surface water because these Baseline concentrations account for total exposures and therefore, this approach reduces uncertainty that would result in comparing measured Baseline Case concentrations to purely modelled Future Case concentrations. C. Uptake from sediment directly into to fish tissue was not considered reasonable for the HHERA. Target fish species including walleye are not bottom feeders and are therefore not in direct contact with sediment for an appreciable amount of their lives. As a result, exposures of walleye to metals in surface water are reasonably expected to be far greater than those in sediment. Uptake of metals into benthic invertebrates was completed as part of the ERA. Concentrations in benthic invertebrates were estimated using the predicted change in metal concentrations in sediment and sediment to benthic invertebrate uptake factors. The results of the risk assessment indicated that changes in benthic invertebrate tissue concentrations due to the Project are considered negligible. D. As discussed in the HHERA, the proportional increase approach was used to predict changes in fish tissue concentration due to changes in surface water. The goal of this approach was to allow for a proper comparison of predicted future concentrations to measured baseline concentrations in a way that reconciles the differences between measured and model-estimated values. The proposed fish tissue monitoring program would provide measured metal concentrations in fish tissue that can be directly compared to the fish tissue metal concentrations predicted in the HHRA. E. The responses to comments A and D above do not require changes to the HHRA. F. Changes to the HHRA are not required therefore, there are no mitigation or follow-up measures that are required to address changes to the HHRA.	
CEAA_71 *IR Number: HE(1)-29*	*Appendix F8, Section 4.4.1; Appendix F8, Appendix E.*	***Context and Rationale:*** • *The concentration ratio (CR) approach is typically used when measured data of on-site air concentrations is available. According to Appendix F8, Section 4.4.1, the predicted future case concentrations appear to be based on modeling that incorporated a combination of limited on-site ambient baseline monitoring data, data from the National Air Pollution Surveillance system and EA data on background ambient levels from two other mines located in northern Ontario.* • *Worked examples in Appendix F8, Appendix E were only provided for the future case scenario. It is not clear how the CR estimates were calculated for the other exposure scenarios, and if the equations used in those calculations accounted for background air concentrations.* • *This information is required to understand potential effects of the project on the health of Aboriginal peoples.* ***Specific Question/ Request for Information:***	***N/A***

Comment Number	Report Section	Agency Comment and GGM Response	Agency Follow-up Comment and GGM Response
		A. Include a discussion of the uncertainties introduced in the HHRA by incorporating limited on-site ambient baseline monitoring data, and the consequent level of accuracy in predicting future case exposure point concentrations (EPCs) of COPCs in air. *B. Clarify how the future case modeling accounts for background air concentrations for non-carcinogens.*	
		A. Concentration Ratios (CRs) are commonly used in the characterization of the health risks associated with inhalation exposures where the exposure estimates and toxicological reference values are expressed as chemical concentrations in air (typically as µg/m^3 or mg/m^3). The assessment of inhalation health risks (section 4.4.3.1 of Appendix F8 of the Final EIS/EA) provided CRs for each of the COPCs considered in the HHRA. These values were calculated by dividing the predicted chemical concentrations in air at a given receptor location by the inhalation TRV for that chemical. The air quality assessment provided Baseline Case data for CACs, metals and other COPCs compiled from the information sources available including the National Air Pollution Surveillance (NAPS) system and air quality monitoring completed within the Project area. These data were augmented with baseline air quality data from two other mine projects under development in Northern Ontario. The 1-hour concentrations for NO_2 (41 µg/m^3) and SO_2 (3 µg/m^3) selected to represent baseline concentrations in the HHRA come from 5 years of NAPS data from stations east and west of the Project area. In both cases, the selected concentrations were higher than the On-Site Ambient Air monitoring data (on-site NO_2 = 11.6 µg/m^3, SO_2 = 2.2 µg/m^3). This was also the case for the 24-hour and annual average concentrations. Thus, using the NAPS data as opposed to on-site ambient air monitoring data over-predicts Baseline Case concentrations of NO_2 and SO_2. Because Future Case NO_2 and SO_2 concentrations incorporate Baseline NO_2 and SO_2 concentrations, the use of these data results in an over-prediction of Future Case concentrations and the inhalation risks associated with these compounds. For metals, the use of NAPS data, on-site ambient air monitoring data, and data from other mine projects provides baseline metal concentrations that are 10-fold to 100-fold higher than the Project-related metal concentrations in air predicted by the air quality assessment. The use of these data results in over-predictions of both Baseline Case and Future Case health risks associated with the inhalation of particulate-bound metals. For VOCs, the baseline air concentrations were based on 7 years of 24-hour and annual average data from NAPS from the only location for which these data are reported. The data, which originate in Winnipeg, represent VOC concentrations in an urban setting that can reasonably be expected to over-predict VOC concentrations in ambient air in rural locations. Therefore, the use of these data over-predict the human health risks associated with Baseline Case and Future Case inhalation exposures to VOC emissions from the Project. Baseline data for particulate matter were derived from 5 years of NAPS data from urban areas both east and west of the Project. The maximum annual average $PM_{2.5}$ concentrations (6.6 µg/m^3) (Winnipeg) was used to represent baseline $PM_{2.5}$ concentrations. This value is very similar to the 90th percentile 24-hour $PM_{2.5}$ concentration measured on-site. Annual average concentrations of CACs are typically lower than 24-hour concentrations. The similarity between the NAPS annual average concentration (6.6 µg/m^3) and the on-site 24-hour concentration (9.2 µg/m^3) suggests that the NAPS baseline data will over-predict baseline conditions for the Project. This, in turn, will over-predict the Future Case human health risks associated with inhalation exposures to $PM_{2.5}$. Similarly, the annual average PM_{10} concentration from 5 years of NAPS data (26.1 µg/m3) is essentially the same as the 90th percentile 24-hour PM_{10} measured on-site (26.1 µg/m^3). These results suggest that the NAPS baseline data will over-predict baseline conditions, which will also over-predict Future Case human health risks associated with inhalation exposures to PM_{10}. B. The Future Case predicted concentrations in air represent the sum of the background concentrations used to estimate the Baseline Case CRs and the contribution of the Project (i.e., Background concentration + Project Alone Concentration). Future Case concentrations of CACs, non-metal COPCs and metals were calculated for each receptor location using this approach. Thus, the predicted Future Case COPC concentrations in air include the Background concentrations.	***N/A***

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CEAA_72 *IR Number: HE(1)-30*	*Appendix C10, CEAA_101*	***Context and Rationale:*** • *In the response to Agency comment HE(0)-36 (CEAA_101) in Appendix C10, it is indicated that intermittent exposure assumptions were "amortized (dose-averaged) to account for the differences in exposure duration between the intermittent exposures and the continuous daily exposures that were assumed in the development of the [applicable] TRVs [toxicity reference values]." Although it is common industry practice, this approach is not supported by Health Canada (HC). As per HC's (2010) Detailed Quantitative Risk Assessment guidance, the TRV should match as closely as possible the duration of exposure that humans will receive from the site.* • *Given that the EIS has established that there is an inhalation pathway, it is important that amortization of exposures does not underestimate potentials for exceeding threshold effects. In addition, the anticipated effects of the dose-averaged exposure should remain biologically equivalent to the unadjusted exposure. It is also unclear how the potential for short-term periodic exceedances has been addressed on a chemical-specific basis.* • *Health Canada recommends that the 2013 "Interim Guidance on Human Health Risk Assessment for Short-term Exposure to Carcinogens at Contaminated Sites" and 2016 memorandum "A Primer for Evaluating Human Health Risk at Contaminated Sites for Chronic and Less-Than-Chronic Exposures to Chemicals" be considered in the HHRA.* ***Specific Question/ Request for Information:*** *A. Describe how the amortization of short-term exposure is appropriate based on the toxicological properties of COPCs, such as mode of action, the duration of effects, whole-body elimination half-life, the potential for sensitive life stages, the persistence and reversibility of effects, and whether effects are expected to be most related to the peak concentration (short term exposure) or to the total dose (long-term exposure) of the chemical.* *B. Describe how the potential for short-term periodic exceedances has been addressed on a chemical-specific basis, with no mathematical dose averaging that would potentially suggest lower exposure and subsequent risk estimates.*	***N/A***
		Response: A. Intermittent exposures were considered for those receptor groups that may not be present within the LAA on a continuous year-round basis, but who are expected to be in the LAA on more than a short-term basis. These receptors include: i. Aboriginal/High Use receptor – 3 days/week, 52 weeks/year = 156 days/year ii. Recreational receptor – 9 hours/day, 5 days/week, 26 weeks/year = 130 days/year (equivalent to a worker at the golf course over the period of the year when the course is open) iii. Commercial receptor – 9 hours/day, 5 days/week, 50 weeks/year = 250 days/year (assumes and 8-hour work day with a 1 hour break 5 days per week 5 weeks per year – with 2 weeks of vacation away from work) iv. Park receptor – 24 hours/day, 7 days/week, 21.7 weeks/year = 152 days/year (21.7 weeks corresponds to 5 months per year when the park is open to campers) (this assumes a person could be in the park for the entire 5 month summer season) These exposure durations are longer than short-term acute exposures (typically 14 days or less) and sub-chronic exposures (typically less than 90 days). The exposure durations assumed in the HHRA are consistent with long-term or chronic durations. Thus, the potential health risks are appropriately compared to TRVs based on chronic (long-term) exposures. The use of amortization factors to provide yearly-averaged daily exposures estimates for exposures of these assumed durations is consistent with the Exposure Terms (ETs) that are used by Health Canada to account for hours per day, days per week, and weeks per year of exposure as outlined in the exposure assessment equations presented in the Health Canada guidance for Preliminary Quantitative Risk Assessment (PQRA) (Health Canada 2012a) and Detailed Quantitative Risk Assessment (DQRA) (Health Canada 2012b).	***N/A***

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		We note that because the Future Case soil concentrations are the same as the Baseline Case soil concentrations to three significant figures, the amortization factors had no effect on our conclusion that Project-related activities had no significant residual adverse effect to human health. B. The HHRA used dose averaging (exposure amortization) when assessing the potential health risks associated with long-term or life-time exposures where the TRVs were based on chronic exposures (yearly-averaged daily exposures for non-carcinogenic compounds and lifetime averaged daily doses for carcinogenic compounds). For those compounds where the human health-based short-term inhalation exposure limits are based on the occurrence of frank health effects such as irritation and/or changes in respiratory function (e.g. NO_2 and SO_2), exposures were compared directly to the predicted short-term (1-hour) air concentrations without dose averaging. **References** Health Canada. 2012a. Federal Contaminated Site Risk Assessment in Canada, Part I: Guidance on Human Health Preliminary Quantitative Risk Assessment (PQRA), Version 2.0. Health Canada. 2012b. Federal Contaminated Site Risk Assessment in Canada, Part V: Guidance on Human Health Detailed Quantitative Risk Assessment for Chemicals ($DQRA_{Chem}$).	
CEAA_73 *IR Number: HE(1)-31*	*Appendix F8, Section 3.5.1; Appendix F8, Section 4.4.3.1.*	***Context and Rationale:*** • *According to Appendix F8, Section 3.5.1, "the health risks associated with the inhalation of particulate-bound metals have been based on predicted annual average metal concentrations in ambient air." However, possible short-term effects, such as irritation, should also be considered. Exposure periods should correspond to the exposure period for the short-term toxicological effect as much as possible.* • *Furthermore, the human health risk assessment (HHRA) identified locations within Geraldton and Rosedale Point which will experience 24-hour PM_{10} exceedances in both Phase 1 and 2 of the project. The frequency analysis for the 24-hour PM_{10} exceedance outside of the Project Development Area (PDA) and off-property also mentions potential repeat exposures for the Aboriginal/High Use receptor. However, there is no discussion of potential short-term health effects from the 24-hour PM_{10} exceedances for these receptors.* • *This information is required to understand potential effects of the project on the health of Aboriginal peoples.* ***Specific Question/ Request for Information:*** *A. Describe how the HHRA considers the potential for human health risks associated with short-term exposure to exceedances of COPCs in air. Update the HHRA to clarify the implications of short-term exposure to exceedances of COPCs in air.* *B. Describe mitigation measures that are applied to reduce potential human health risks associated with short-term exposure to exceedances of COPCs in air.*	***N/A***
		Response: A. As discussed in Section 4.4.2 of Appendix F8 of the Final EIS/EA, short-term health effects for inhalation exposure to metals were not evaluated because the short-term (24-hour) MOECC Ambient Air Quality Criteria (AAQC) for metals do not reflect the potential changes in human health risk. This is because the short-term AAQC were derived based on the application of conversion factors to long-term (annual average) inhalation reference concentrations rather than being based on the dose-response curves for theses contaminants of potential concern (COPCs). Even if the 24-hour MOECC criteria were used, the concentration ratios (CRs) for Baseline Case and Future Case would be well below 1.0 for each exposure scenario and location. Short-term inhalation exposure to 1-hour and 24-hour concentrations of criteria air contaminants (CACs), non-metal COPCs and volatile organic compounds (VOCs) were evaluated in cases where appropriate toxicological benchmarks were available. Calculated CRs for exposures to Baseline Case and Future Case concentrations of 1-hour and 24-hour concentrations of CACs, non-metal COPCs and VOCs were equal to or below the benchmark of 1.0, with the exception of exposures of the Typical Residential receptor (Geraldton), the Typical Residential receptor (Rosedale) and the Aboriginal/High-use receptor to Future Case concentrations of 24-hour PM_{10}. A CR in excess of 1.0 does not necessarily indicate a potential short-term health concern, due to the conservative	***N/A***

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		approach used to calculate health risks. Health risks were calculated based on exposure to the maximum 24-hour concentration of PM_{10} throughout the course of a year. These values do not represent the 24-hour PM_{10} concentrations present for most of the year. Potential short-term health effects are only expected if a human is exposed to concentrations that exceed the guideline for 24-hour for multiple days in a row. Therefore, a frequency analysis was conducted, and the results indicated that for each of the exposure scenarios where the maximum 24-hour concentration of PM_{10} exceeded the toxicity benchmark, the predicted concentrations were below the benchmark 99.7% of the time, and consecutive days with exceedances are not expected. Therefore, health risks associated with short-term inhalation exposure to PM_{10} as a result of the Project are considered negligible. The use of the frequency analysis in assessing the overall health risk associated with exposure to PM is analogous to how the ambient air quality criteria are calculated. Ambient air quality limits for PM such as $PM_{2.5}$ are based on the 98th percentile 24-hour concentrations. The ambient air quality criterion for PM_{10} is based on the distributions of 24-hour means (and its 99th percentile) as well as annual average concentrations. The use of the 98th and 99th percentile 24-hour concentrations to derive ambient air quality criteria recognizes that occasional or infrequent exceedances of the 24-hour benchmarks represent a negligible health risk. No update of the HHRA is required. B. Detailed mitigation measures are described in Section 4.5 of Appendix F1. Additionally, real-time ambient monitoring will be undertaken to measure air quality and proactively implement adaptive management as required (Appendix M7, Appendix A).	
CEAA_74 *IR Number: HE(1)-32*	*Appendix F8, Section 6.0; Appendix O, Table 6-1*	***Context and Rationale:*** • *The Follow-up and Monitoring plans described in Appendix F8, Section 6.0 does not appear to include monitoring of vegetation, small mammals and other animals that are harvested as country foods. Also, the proposed fish monitoring program in Appendix M12 does not identify which chemicals of potential concern (COPCs) are to be monitored in fish tissue. COPCs that can bioaccumulate and biomagnify up the food chain should be considered.* • *A follow-up program related to country foods is proposed to validate the assumptions made in the HHRA, corresponding risk estimates, and allow for adaptive management to adjust mitigation measures appropriately to minimize adverse impacts to human health.* ***Specific Question/ Request for Information:*** *A. In designing the measures contained within follow-up programs, ensure that all negatively impacted valued components are included within the proposed management plans.* *B. Propose a follow-up program related to country foods, to validate the assumptions made in the HHRA, corresponding risk estimates. Incorporate elements of existing monitoring plans for fish, vegetation and wildlife (including moose) that are described elsewhere. Identify the COPCs that would be considered as part of this follow-up program, and provide details of the species to monitor, the frequency and locations of sampling.*	***Context and Information Required for a Complete Response:*** • *The response does not adequately address Part B of the information requirement (IR). The response is unclear as to how changes in metal concentrations in wild meat, along with the soil monitoring study would be used to infer changes in tissue concentrations in vegetation. Revise the response to describe how vegetation would be incorporated into the follow-up program, identifying the specific chemicals of potential concern that would be considered as part of this follow-up program, and how this would be used to validate the assumptions made in the HHRA. The information requested in this IR is required as part of the EA process, in order to determine how the follow-up program will verify EA predictions. The Agency understands that some details may be finalized as part of a permitting process, and as part of consultation with Indigenous groups and other government departments.*
		Response: A. It is impractical and unnecessary to monitor potential concentration changes in all media (including all types of plant and animal tissue) due to Project activities. However, targeted monitoring programs will be implemented to evaluate changes in metal concentrations in selected tissues and this information can be used to infer potential changes in related tissues. For example, changes in Walleye tissue concentrations can be used to infer changes in other fish species. B. As discussed in Section 4.4.3.4 of Appendix F8, GGM has agreed to participate in a moose health study, including tissue sampling and analysis. This study can be used to evaluate potential changes in metal concentrations in wild meat used as country food. This health study along with soil monitoring study can be used to infer changes in tissue concentrations in vegetation that may be used as country food. The details of the moose tissue sampling program (e.g., frequency) will be established through consultation with Aboriginal communities and the MNRF. The target COPCs will be consistent with those in the HHERA (i.e., metals).	**Response:** Changes in metal concentrations in terrestrial plant tissues in the HHERA (Appendix F8 of the Final EIS/EA) are directly related to changes in soil concentrations because the primary method of metal uptake into plants is through the roots. Therefore, monitoring changes in soil concentrations due to the Project can be used to evaluate the concentration changes predicted in the HHERA. Moose and small mammals consume plants, and metals in these plants can alter the metal concentrations in their tissues. Therefore, monitoring changes in metal concentrations in soil and water and even small mammals can be used to consider whether there are likely to be any changes in plant and moose tissue concentrations. Should the monitoring program identify unexpected changes in soil or water concentrations, then a plant vegetation monitoring plan could be conducted. The target chemicals for this monitoring plan would be metals. Establishing levels for changes in soil and/or water concentrations that would trigger a vegetation monitoring program, is a detailed exercise that will need to be developed as part of the monitoring details for the soil and water sampling plans.

Comment Number	Report Section	Agency Comment and GGM Response	Agency Follow-up Comment and GGM Response
		As discussed in Section 23.6 of the Final EIS/EA (i.e., Follow-up and Monitoring Programs), a fish tissue sampling study will be implemented to monitor potential changes in tissue concentrations. Regarding parameters to be sampled in fish tissue, Appendix M12 (Sub-appendix B.4) of the Final EIS/EA describes the proposed parameters for fish tissue monitoring. Muscle tissue will be sent to a laboratory for metals and mercury analysis. Supporting analysis will include percent lipid and percent moisture. In addition to the parameters listed in Appendix M12 (Sub-appendix B.4), GGM also plans to sampling methylmercury in fish tissue. See Appendix M12 of the Final EIS/EA and response to CEAA_27 above regarding aquatic monitoring locations and frequencies. The monitoring plans identified in Appendix M are conceptual will be advanced through permitting. Monitoring methods will be scientifically defensible and designed to test the predictions of the Final EIS/EA.	
CEAA_75 *IR Number: AM(1)-01*	*Section 22.4.1.3.*	***Context and Rationale:*** • *Section 22.4.1.3 (the TMF [tailings management facility] Failure Effects Assessment) indicates that the conservative scenario may result in "long-term effects [that] may cause sublethal effects on fish due to […] chronic toxicity."* • *These long-term effects may become even greater considering the proximity of the TMF to the Goldfield Creek Diversion Pond. This concern is also shared by Red Sky Métis Independent Nation (RSMIN) as offsetting measure for lost habitat proposed in Appendix F10, Section 9.2 is to develop "approximately 7.5 ha of new pond habitat at the interface between the existing Goldfield Creek and the new diversion channel". RSMIN is concerned that if the TMF dam were to fail in any capacity, there is potential for contaminated water to flow into the diversion pond and affect the fish and fish habitat.* • *Additionally, no information was found as to whether this may affect human health via consumption of contaminated fish. This pathway of contamination must be elucidated.* ***Specific Question/ Request for Information:*** *A. Provide a clear description of the worst-case scenario(s) for a TMF failure in the context of human health, considering the movement of contaminants from the release of water and sediments to potential receptors. Include the source, quantity, mechanism, pathway, rate, form and characteristics of contaminants and other materials (physical and chemical) likely to be released to the surrounding environment.* *B. Assess the risk of TMF failure on the Goldfield Creek Diversion Pond proposed for offsetting of loss of fish habitat.* *C. Describe the change to the receiving environment in the Goldfield Creek Diversion Pond, in the case of a TMF failure – e.g. water quality and quantity, sediment quality and quantity.* *D. Describe how the worst-case scenario(s) of a TMF failure may result in effects to fish and fish habitat and aquatic species, and from these, the resultant effects to current use of lands and resources for traditional purposes and human health.* *E. Describe the safety measures and emergency response procedures to mitigate the potential effects of such a scenario, including on the valued components named in question D.*	***Context and Information Required for a Complete Response:*** • *The responses to Parts A and D of the information requirement (IR) are insufficient to allow for a technical review. While the proponent indicates that it presented a worst-case effects assessment in section 22.4.1 of the EIS, the scenario assumed for the worst-case effects assessment is not described in the EIS, and chapter 22 of the EIS does not discuss potential effects of the accident on human health.* • *Revise the response to Part A to provide a clear description of the worst-case scenario for a TMF failure in the context of human health, and revise the response to Part D to provide sufficient detail on the possible effects to human health resulting from the accident. The note that effects on human health would be addressed through the Emergency Response Plan (given in the response to Part A) is insufficient for technical review.* • *The responses to Parts B, C and E, while considered complete at this time, will be reassessed upon revision of Parts A and D.*
		Response: A. The effects assessment provided in Chapter 22 of the Final EIS/EA is not meant to provide a detailed quantitative analysis for conceptual accident and malfunction scenarios as this is highly unlikely, hypothetical and not the Project assessment case. A conservative (worst case) effects assessment has been undertaken for a potential TMF failure in Section 22.4.1 of the Final EIS/EA. Effects on human health from a potential accident or malfunction scenario would be addressed through the Emergency Response Plan (Section 22.2.3 and Appendix M3). In the case of a TMF failure, this may include consumption advisories to avoid a potential health effect. B. The Project layout, as shown on the site plan (Figure 5-2 of the Final EIS/EA), has been considered throughout Chapter 22 of the Final EIS/EA. Therefore, the proximity of the TMF to the Goldfield Creek Diversion Pond has been considered as part of the risk assessment. GGM will be required to post financial assurance for the Project which includes the diversion. The TMF has also been designed according the best practices and an Independent TMF Review Board (ITRB)has already been established for the Project and conducted an initial report on January 22, 2018 (see attached report "ITRB Report No. 1"). The report indicates that "…The Board is of the view that sufficient	**Response:** A. As discussed in response to CEAA_76 information is available in Section 22.4.1.3 of the Final EIS/EA. This section notes that a 'fair weather' scenario was assumed to result in a release volume of 1.0 million cubic metres (m3) of tailings water, and a 'wet weather' scenario was assumed to result in a release volume of 16.2 million cubic metres of tailings water from the TMF. Tailings water would flow along topographic lows in a single short duration release, with the magnitude dependent on the size of the breach. Tailings water would disperse into Kenogamisis Lake either through the Goldfield Creek Tributary, the Goldfield Creek Diversion into the Southwest Arm Tributary, or directly into Kenogamisis Lake, depending on the location of the breach. Contaminant composition of the tailings water at the point of release would be dependent on the contents of the TMF at the time, but it can be expected that limited cyanide (post detox in the mill process), un-ionized ammonia, arsenic, aluminum, cobalt, copper, phosphorus and antimony may exceed the provincial water quality objective (PWQO), and nickel and uranium concentrations can be expected to be at or just above the PWQO. A dam breach would affect the water levels in Kenogamisis Lake. In a 'wet weather' scenario, a release would result in

Comment Number	Report Section	Agency Comment and GGM Response	Agency Follow-up Comment and GGM Response
		effort was undertaken to identify the preferred site (TMF8) for conventional tailings disposal among the candidate sites that were examined", "The board concurs with the approach used to estimate solute loads to Kenogamisis Lake from groundwater", "the scope of investigations to date…is considered typical for a feasibility study", and they are "in agreement with the path forward presented by [the TMF Engineer of Record]". GGM has reviewed the ITRB report in detail and agrees with the recommendations put forth by the ITRB regarding next steps to support detailed engineering. C. The change to the receiving environment, including a consideration of the Goldfield Creek diversion, is presented in Section 22.4.1.3 of the Final EIS/EA. D. A conservative (worst case) effects assessment has been considered throughout Section 22.4.1.3 of the Final EIS/EA. E. Safety measures and emergency response procedures are provided in Sections 22.4.1.1 and 22.4.1.2 of the Final EIS/EA.	an increase in water level of 0.6 m over the 'wet weather' water level. Although the dam breach would result in an increased water level, the probable maximum precipitation (PMP) storm event would already be of such a high magnitude that the incremental increase from the dam breach would likely not be perceptible. Water levels would be similarly affected downstream of Kenogamisis Lake as flows are conveyed through the system, though the volume released from the TMF would have progressively less of an overall effect as the downstream cumulative effects of flooding from natural precipitation increase. Sediment from the TMF would extend into Kenogamsis Lake, with a large deposition fanning out in the immediate vicinity of the breach, and more generalized sedimentation contributing a small amount to natural flood impacts downstream. Additional information on water quality in the receiver is provided in the follow-up response to CEAA-76. D. Although not explicitly stated in the Final EIS/EA, the assessment provided in Section 22.4.1.3 indirectly considers the effects on human heath under the LRU/TLRU subheading. Both land and water based activities are considered. This sub-section considers pathway effects from surface water, fish and fish habitat, vegetation communities, wildlife and wildlife habitat. For example, the release of a parameter of potential concern may also affect human health through the ability to consume fish caught through recreational or traditional fishing. While increased contaminant levels may not affect the activity of fishing itself, if contaminant levels in waterbodies were to rise to levels where fish populations were affected, this would limit the ability to consume fish caught and eliminate exposure pathways. With regard to hunting and gathering, flooding or infilling of vegetation and wildlife habitat could occur near the breach location but effects would be localized and generally within the PDA. Wildlife mortality or a change in regional population sustainability or abundance is not anticipated. Uptake of parameters of potential concern through vegetation would be limited as communities re-establish over one or two growing seasons. Mitigation would be employed in terms engagement with recreational and traditional land users, mitigation in the form of special advisories (such as fisheries advisories) may be required depending upon the scale of the event to avoid effects on human health. The residual adverse effects discussed under the LRU/TLRU sub-section in Section 22.4.1.3 of the Final EIS/EA remain unchanged. Ultimately, TMF failure risks have been fully addressed through Project design measures, GGM's commitments to best practices and staffing, and the pro-active establishment of the ITRB (ITRB Report has been submitted).
CEAA_76 *IR Number: AM(1)-02*	*Section 22.4.1.3.*	***Context and Rationale:*** • *The residual adverse effects on surface water from a potential tailings management facility (TMF) failure, as described in Section 22.4.1.3, are expected to be of "high magnitude, potentially extending beyond the Local Assessment Area (LAA) with an increased potential for effects if a failure was to occur near the end of mine life when higher volumes are contained in the TMF and dry weather conditions exist, long-term and potentially irreversible within the PDA [Project Development Area], with the magnitude of effects diminishing outside the PDA." However, it is unclear how this determination of diminishing magnitude is reached, as the PDA is tightly configured to the TMF components, thus a breach or failure resulting in any movement of solids has very high potential to extend to the LAA (e.g. any breach adjacent to the Goldfield Creek Tributary or Kenogamisis Lake).* • *The predicted magnitude, duration and reversibility of effects within the LAA or beyond are not provided. It is therefore not possible to draw conclusions on the impact of this potential malfunction on the environment.* ***Specific Question/ Request for Information:*** *A. Provide an assessment of the potential environmental effects of a TMF failure extending into the LAA and beyond. Include the quantity, mechanism, rate, form and characteristics of contaminants and other materials (physical and chemical) likely to be released to the surrounding environment.* *B. Describe the change to the receiving environment in the LAA and beyond, in the case of a TMF failure – e.g. water quality and quantity, sediment quality and quantity.*	***Context and Information Required for a Complete Response:*** • *The response does not adequately address Part B of the information requirement (IR). While section 22.4.1.3 of the EIS discusses the quality of the water in the TMF, it does not discuss the water quality in the receiving waterbodies (identified as Kenogamisis Lake), or the extent to which changes to water quality could be observed. Revise the response to provide these details.* • *The response does not adequately address Part C of the information requirement (IR). Revise the response to provide sufficient detail as to the effects on sensitive habitats, migratory birds or human health resulting from the accident, in the LAA and beyond. This information is not described in section 22.4.1.3 of the EIS.*

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<tr><th>Comment Number</th><th>Report Section</th><th>Agency Comment and GGM Response</th><th>Agency Follow-up Comment and GGM Response</th></tr>
<tr><td></td><td></td><td>C. Describe the resulting impacts to wetlands, sensitive habitats, wildlife (including SAR), fish and fish habitat, aquatic species, migratory birds, human health, and current use of lands and resources for traditional purposes, in the LAA and beyond, in the case of a TMF failure.

D. Describe the safety measures and emergency response procedures to mitigate the potential effects of such a scenario, including on the valued components named in question C.</td><td></td></tr>
<tr><td></td><td></td><td>Response:

A. As noted in Section 22.4.1.3 of the Final EIS/EA, a ‘fair weather’ scenario was assumed to result in a release volume of 1.0 million cubic metres (m^3) of tailings water, and a ‘wet weather’ scenario was assumed to result in a release volume of 16.2 million cubic metres of tailings water from the TMF. Tailings water would flow along topographic lows in a single short duration release, with the magnitude dependent on the size of the breach. Tailings water would disperse into Kenogamisis Lake either through the Goldfield Creek Tributary, the Goldfield Creek Diversion into the Southwest Arm Tributary, or directly into Kenogamisis Lake, depending on the location of the breach. Contaminant composition of the tailings water at the point of release would be dependent on the contents of the TMF at the time, but it can be expected that cyanide, un-ionized ammonia, arsenic, aluminum, cobalt, copper, phosphorus and antimony may exceed the provincial water quality objective (PWQO), and nickel and uranium concentrations can be expected to be at or just above the PWQO. A dam breach would affect the water levels in Kenogamisis Lake. In a ’wet weather’ scenario, a release would result in an increase in water level of 0.6 m over the ’wet weather’ water level. Although the dam breach would result in an increased water level, the probable maximum precipitation (PMP) storm event would already be of such a high magnitude that the incremental increase from the dam breach would likely not be perceptible. Water levels would be similarly affected downstream of Kenogamisis Lake as flows are conveyed through the system, though the volume released from the TMF would have progressively less of an overall effect as the downstream cumulative effects of flooding from natural precipitation increase. Sediment from the TMF would extend into Kenogamsis Lake, with a large deposition fanning out in the immediate vicinity of the breach, and more generalized sedimentation contributing a small amount to natural flood impacts downstream.

Overall, TMF failure was assessed as a conceptual scenario, but failure is not anticipated during normal operating conditions. The design of the TMF dams for stability exceeds the required target factors of safety in accordance with the LRIA criteria and the Canadian Dam Association (CDA) guidelines. The dam is comprised of rockfill that will be raised in stages in the downstream manner. This method was selected in consideration of the location factors and to enhance safety. The detailed designs will be further reviewed by the Independent TMF Review Board (ITRB). Please refer to the response to CEAA_75 related to the findings of the January 22, 2018 ITRB report. Also, design engineers from Amec have provided a memo (see attached memo “Hardrock Tailings Management Facility, TMF Design Overview”) that builds on the meeting discussion to further address the approach for ensuring robust dam stability, seepage mitigation and the ability to implement contingency seepage plans, if required.

B/C. The anticipated change in the receiving environment related to surface water, fish and fish habitat, groundwater, vegetation communities, wildlife and wildlife habitat, archaeological and heritage resources, and land and resource use and traditional land and resource use are described in separate subsections in Section 22.4.1.3 of the Final EIS/EA.

D. The safety measures and emergency response measures associated with a TMF breach are described in Sections 22.4.1.1 and 22.4.1.2 of the Final EIS/EA, respectively. As noted above, the design of the TMF dams for stability exceeds the required target factors of safety, and failure is not anticipated under normal operating conditions.</td><td>Response:

B. In the unlikely evert of a TMF failure (risk has been fully addressed by design and mitigation) there would be a change in water quality in the receiver. The predicted water quality in the receiving water body (Kenogamisis Lake) is provided in the table below. The following assumptions were considered in this prediction:

• TMF failure at the end of operation (end of mine life) based on the following statement (Chapter 22, Section 22.4.1.3); “an increased potential for effects if a failure was to occur near the end of mine life when higher volumes are contained in the TMF and dry weather conditions exist”
• Fair Weather scenario TMF release volume is 1.0 million m^3 (higher concentrations than wet weather event due to the lack of dilution from increased precipitation) (Chapter 22, Section 22.4.1.3)
• TMF concentrations were taken from Chapter 10, Table 10-30 of the Final EIS/EA, for the last year of operation. Average concentrations were used.
• Southwest Arm volume based on the most recent bathymetric data; 22796491 m^3
• Southwest Arm water quality was taken from Chapter 10, Table 10-43 of the Final EIS/EA during operation.
• Assumes all discharge released from the TMF enters the Southwest Arm
• Assumes equal mixing of the TMF discharge with the entire Southwest Arm basin

The concentrations presented in the table below represent the initial concentrations immediately following the release as the water released from the TMF is mixed with the water within the Southwest Arm. As the initial release volume passes, and continued flow of water enters the Southwest Arm the water quality will improve significantly with time.

<table>
<tr><th colspan="5">Parameters</th><th>Results</th></tr>
<tr><th>Parameter</th><th>Unit</th><th>PWQO</th><th>Interim PWQO</th><th>CWQG-FAL</th><th>Concentration in SW Arm after TMF Breach</th></tr>
<tr><td>Aluminum</td><td>µg/L</td><td>-</td><td>75 (for clay free sample)</td><td>100</td><td>35.9</td></tr>
<tr><td>Antimony</td><td>µg/L</td><td>-</td><td>20</td><td>-</td><td>8.1</td></tr>
<tr><td>Arsenic</td><td>µg/L</td><td>100</td><td>5</td><td>5</td><td>3.9</td></tr>
<tr><td>Beryllium</td><td>µg/L</td><td>1100</td><td>-</td><td>-</td><td>0.2</td></tr>
<tr><td>Cadmium</td><td>µg/L</td><td>0.2</td><td>0.1</td><td>0.09</td><td>0.009</td></tr>
<tr><td>Cobalt</td><td>µg/L</td><td>0.9</td><td>-</td><td>-</td><td>2.9</td></tr>
<tr><td>Copper[1]</td><td>µg/L</td><td>5</td><td>5</td><td>2.0 -3.11</td><td>2.5</td></tr>
<tr><td>Cyanide (Free)[2]</td><td>µg/L</td><td>5</td><td>-</td><td>5</td><td>30.2</td></tr>
<tr><td>Iron</td><td>µg/L</td><td>300</td><td>-</td><td>300</td><td>94.0</td></tr>
<tr><td>Lead[1]</td><td>µg/L</td><td>25</td><td>5</td><td>1.77 -4.79</td><td>0.3</td></tr>
<tr><td>Mercury</td><td>µg/L</td><td>0.2</td><td>-</td><td>0.026</td><td>0.01</td></tr>
<tr><td>Nickel[1]</td><td>µg/L</td><td>25</td><td>-</td><td>67.27 - 22.08</td><td>1.7</td></tr>
</table></td></tr>
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<table>
<tr><th>Comment Number</th><th>Report Section</th><th>Agency Comment and GGM Response</th><th>Agency Follow-up Comment and GGM Response</th></tr>
<tr><td></td><td></td><td></td><td>
<table>
<tr><td>Phosphorus, Total</td><td>µg/L</td><td>-</td><td>20 (lakes)
30 (rivers & streams)</td><td>-</td><td>11.7</td></tr>
<tr><td>Selenium</td><td>µg/L</td><td>100</td><td>-</td><td>1</td><td>0.95</td></tr>
<tr><td>Silver</td><td>µg/L</td><td>0.1</td><td>-</td><td>0.25 (long-term)</td><td>0.03</td></tr>
<tr><td>Sulfate</td><td>µg/L</td><td>-</td><td>-</td><td>-</td><td>186125.0</td></tr>
<tr><td>Thallium</td><td>µg/L</td><td>-</td><td>0.3</td><td>0.8</td><td>0.08</td></tr>
<tr><td>Uranium</td><td>µg/L</td><td>-</td><td>5</td><td>33(short-term)
15 (long-term)</td><td>2.4</td></tr>
<tr><td>Vanadium</td><td>µg/L</td><td>-</td><td>6</td><td>-</td><td>0.4</td></tr>
<tr><td>Zinc</td><td>µg/L</td><td>30</td><td>20</td><td>30</td><td>2.3</td></tr>
<tr><td colspan="6">1. Hardness depended CWQG-FAL limits for copper, lead and nickel are calculated based on the minimum and maximum hardness observed within the Barton Bay based on surface water quality monitoring results
2. Cyanide detox will be optimized through treatment process design and doesn't account for degradation by sunlight
- not applicable</td></tr>
</table>

The residual adverse effects discussed in Section 22.4.1.3 of the EIS/EA remain unchanged.

C. Although not explicitly stated in the in Final EIS/EA, the effects pathways on surface water, fish and fish habitat (including consideration of any sensitive habitats/communities), vegetation communities (including the consideration of any sensitive habitats), wildlife and wildlife habitat (including migratory birds and sensitive habitats/communities) have been considered. For example, the release of a parameter of potential concern may affect human health through the ability to consume fish caught through recreational or traditional fishing. If contaminant levels in waterbodies were to rise to levels where fish populations were affected, this would limit the ability to consume fish caught, (though increased contaminant levels may not affect the activity of fishing itself). With regard to hunting and gathering, flooding or infilling of vegetation and wildlife habitat could occur near the breach location but effects would be localized and generally within the PDA. Wildlife mortality or a change in regional population sustainability or abundance is not anticipated. Uptake of parameters of potential concern through vegetation would be limited as communities re-establish over one or two growing seasons. Mitigation would be employed in terms engagement with recreational and traditional land users, mitigation in the form of temporary special advisories (such as fish consumption advisories) if required would address/avoid effects on human health.</td></tr>
<tr><td>CEAA_77

IR Number: AM(1)-03</td><td>Section 22.4.3.3.</td><td>Context and Rationale:

• Section 22.4.3.3 (the WRSA [waste rock storage area] or Overburden Storage Areas Slope Failure Effects Assessment) suggests a scenario consisting of a failure of overburden or waste rock into the open pit following closure, disturbing the stratification of the pit lake. This would result in "mixing of the upper and lower layers of the pit lake. This could result in increased concentrations of select elements, potentially above applicable water quality objectives, being discharged to Kenogamisis Lake and requiring treatment." This scenario is not further elaborated. It is not possible to evaluate the effects to the environment without a clear understanding of the release and movement of contaminants.
• Furthermore, it is not clear whether the stratification in the open pit would reform in the event of a disturbance, or if so, how long it would take. There is also no description of how treatment of the discharge would be applied. As such, there is insufficient rationale for the residual adverse effects on surface water to be described as "short-term".

Specific Question/ Request for Information:</td><td>Context and Information Required for a Complete Response:

• The response does not adequately address Part A of the information requirement (IR). Appendix D of Appendix F5 of the EIS does not contain concentrations for potential contaminants in a fully mixed pit lake. Revise the response to provide this information, and to discuss the connection between a fully mixed pit lake and Kenogamisis Lake, and the movement of contaminants between them.
• The response does not adequately address Part D of the IR. Revise the response to provide sufficient detail as to the effects to migratory birds and human health resulting from the accident.
• The response does not adequately address Parts F and G of the IR. Revise the responses to provide the information required. While the reference to the EIS mentions monitoring, it does not indicate how this monitoring could inform a decision to treat the discharge. The treatment of the discharge is also not discussed.
• The responses to Parts B, C and E, while considered complete at this time, will be reassessed upon revision of Parts A, D, F and G.</td></tr>
</table>

Comment Number	Report Section	Agency Comment and GGM Response	Agency Follow-up Comment and GGM Response
		A. Describe the worst-case scenario of failure of overburden or waste rock into the open pit following closure. Include the quantity, mechanism, rate, form and characteristics of contaminants and other materials (physical and chemical) likely to be released to the surrounding environment. *B. Clarify whether stratified conditions in the open pit during post-closure can be re-established following a failure of overburden or waste rock into the open pit. If so, estimate the time required to re-establish stratification, and revise duration of effects on surface water.* *C. Describe the change to the receiving environment – e.g. water quality and quantity, sediment quality and quantity in the event of an overburden or waste rock failure.* *D. Describe the resulting impacts to wetlands, sensitive habitats, wildlife (including SAR), fish and fish habitat, aquatic species, migratory birds, human health, and current use of lands and resources for traditional purposes in the event of an overburden or waste rock failure.* *E. Describe the safety measures and emergency response procedures to mitigate the potential effects of such a scenario, including on the valued components named in question D.* *F. Describe how it will be determined whether discharge from the open pit in the event of an overburden or waste rock failure will require treatment.* *G. Describe the treatment to be applied to the discharge from the open pit to Kenogamisis Lake in the case of a failure of overburden or waste rock into the open pit affecting water quality. Include information about the duration of this treatment, in consideration of the questions related to the duration of the disturbance in stratification posed in B above.*	
		Response: A. Although slope failure is considered as a conceptual scenario, the potential for slope failure is not anticipated under normal operating conditions, as it is specifically addressed through geotechnical work and pit design, and the Hardrock Project already has a feasibility study that has considered these factors. Slope failure of overburden or waste rock into the pit lake may result in full mixing of pit lake and discharge of water resulting from the mixing. Water quality models for a mixed lake can be used as a reasonable approximation for the discharge under a failure scenario. The concentrations for potential contaminants in mixed lake can be found in Appendix D of Water Balance and Water quality modeling report (attachment F5 of the Final EIS/EA). The event would largely be contained within the pit lake with limited effect on the receiver due to the size of the open pit and its ability to absorb a slope failure. B. Stratified conditions in the open pit during post-closure are expected to be re-established within a few months after a potential failure. Literature indicates that permanent stratification is re-established by the next spring after artificial mixing on meromictic lake (Pieters and Lawrence 2013). C and D. Please refer to Section 22.4.3.3 of the Final EIS/EA for this assessment. E. Safety measures are discussed in Section 22.4.3.1 and emergency response measures are discussed in Section 22.4.3.2 of the Final EIS/EA F and G. As noted in Section 22.4.3.2. of the Final EIS/EA, emergency preparedness measures will include maintaining access, setbacks and ongoing monitoring and inspection. **Reference:** Pieters, R. and G. Lawrence, 2013. Circulation of Zone 2 Pit-Lake, Colomac NWT. Report prepared for Contaminants and Remediation Directorate of AANDC.	**Response:** A. An incorrect reference was provided in the original response. The concentrations for potential contaminants for a mixed lake can be found in Appendix C of Water Balance and Water quality modeling report (Appendix F5 of the Final EIS/EA) represented by light green lines on the plots. The worst-case failure scenario would occur when the pit lake was filled to the design elevation and discharging to the environment. Prior to the failure, the Water Balance and Water Quality Model (Appendix F5) indicates that the stratified pit lake at model year 100 would discharge water with concentrations above the PWQO for arsenic, cobalt, antimony, and uranium (42 µg/L, 2.2 µg/L, 38 µg/L and 7.3 µg/L, respectively). The effect of discharging water from the pit lake under this condition was assessed in the surface water effect assessment and concludes that the PWQO will be met within a small mixing zone. Under a failure scenario and a fully mixed pit lake with maximum concentrations of arsenic (77µg/L), cobalt (5.7 µg/L), phosphorus (32 µg/L), antimony (101 µg/L) and uranium (14.5 ug/L) are predicted to exceed the PWQO or/and Interim PWQO. The model overestimates phosphorus concentrations in the mixed open pit because the leaching rates are overestimated in the water quality model. The method detection limits for phosphorus was above the PWQO in leaching tests and a value of half the detection limit was assigned in calculation of leaching rates in the water quality model The residual adverse effects discussed in Section 22.4.1.3 of the EIS/EA remain unchanged and considered this worst case scenario. D. Although not explicitly stated in the Final EIS/EA, the assessment provided in Section 22.4.3.3 inherently considers the effects on human heath under the LRU/TLRU subheading. Both land and water based activities are considered. This sub-section considers pathway effects from surface water and fish and fish habitat. No effects on wildlife and wildlife habitat (including migratory birds) are anticipated based on the water quality of a mixed pit lake. With regard to human health, the pit lake will be a controlled environment off limits to people in accordance with closure requirements. In the unlikely event that contaminant levels in waterbodies were to rise to levels where fish populations were affected, this would limit the ability to consume fish caught and eliminate the exposure pathways.

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			F and G. There will be a permit in-place the outlines the water quality discharge parameters for closure. Monitoring results will be compared against these parameters. If parameters are exceeded water treatment will be required. A number of different treatment options may be applied depending upon the scale of the event that occurs, for example it would be possible to treat in the open pit, use the engineered wetlands that may be in place or there may be a requirement to use a mobile water treatment plant. Depending upon when the event occurs there may also be a requirement to prevent discharge into Kenogamisis lake by using coffer dams (or similar) in the pit outlet channel until treatment is in place.
CEAA_78 *IR Number: AM(1)-04*	*Section 5.2.2; Section 22.3.1.2; Section 22.3.1.4; Section 22.3.1.5.*	***Context and Rationale:*** • *Section 5.2.2 states that "TMF [tailings management facility] reclaim water will be pumped back to the mill to meet the mill demand and will be maintained separate from water collected in pond M1." However, the only mention of the TMF pipeline is in section 5.4.20, which does not provide a full description. The pipeline is also not indicated on the site plan (figure 5-2). Additionally, failure of this pipeline is not addressed in Section 22.3.1.2 (tailings pipeline failure), Section 22.3.1.4 (treatment plants and pipeline failures) or Section 22.3.1.5 (seepage and contact water collection system failure).* ***Specific Question/ Request for Information:*** *A. Identify, on a map, the location of the pipeline used to pump water from the TMF reclaim pond to the mill.* *B. Describe how the TMF reclaim water will be kept separate from the water collected in pond M1.* *C. Describe the worst-case scenario for failure of this pipeline and the resulting potential effects to the environment, including wetlands, sensitive habitats, wildlife (including SAR), fish and fish habitat, aquatic species, migratory birds, human health, and current use of lands and resources for traditional purposes.* *D. Describe the safety measures and emergency response procedures to mitigate the potential effects of a failure of this pipeline, including on the valued components named in question C.* *E. Describe the remediation measures applicable following a failure of this pipeline.*	**N/A**
		Response: A. Referring to Figure 5-2 of the Final EIS/EA and Project Description, the tailings water reclaim pipeline would travel from barge-mounted pumps, across the Inner Dam and along the same corridor as the tailings delivery pipeline via the TMF access road. B. As described in Section 5.4.7.2 of the Final EIS/EA, tailings will be pumped from the process plant to the TMF for permanent storage. TMF reclaim water will be recirculated from the TMF reclaim pond back to the process plant to meet the mill demand via the tailings water reclaim pipeline as described in Response A, thus creating a closed loop system. As discussed in Section 10.4.3.2 of the Final EIS/EA, all excess water from the TMF is needed for mill demand with no discharge from the TMF planned during operation. The water supplied from the TMF reclaim pond will only provide the mill with up to 90% of its water demand during climate normal conditions. The balance of the mill demand will be obtained from contact water collected in pond M1 and from open pit dewatering. A pipeline will be connected from Pond M1 to the mill to provide water demand in excess of available TMF reclaim water. Therefore, the reclaim water from the TMF will be kept separate from the water collected in pond M1 by being routed on separate water circuits. C-E. A Safety Pond has been designed along the tailings delivery and reclaim pipeline corridor (and haul road) in a natural depression at the lowest point of the pipeline corridor alignment. The Safety Pond is proposed north of WRSA D along the tailings and reclaim water pipelines running between the TMF and the processing plant. The Safety Pond is a secondary containment which prevents a release of tailings/reclaim water to the surrounding environment during an upset condition, malfunction or equipment failure. The pipelines have been located and aligned adjacent to the TMF Haul Road to improve pipeline surveillance, operation, maintenance and monitoring capacity. The alignment of the pipeline reduces the number of required watercourse crossings and the total head change along the route, minimizes the route length, and improves the tailings subaerial distribution	**N/A**

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		capacity within the TMF. By reducing pipeline elevation (head) change and overall route length, pumping energy losses due to head loss and friction losses are minimized, reducing pumping energy demand (and related emissions) as well as reducing the risk of pipeline failure due to increased pumping pressure and tailings and water transit residence time. Location of the Safety Pond is dictated by location of the TMF. The TMF was selected based on comprehensive alternative analysis presented in Section 4.2.2 of Chapter 4 of the Final EIS/EA. Current TMF location effectively maximizes the use of natural topography to enhance tailings containment and minimize the dam height and complexity of the facility; this is an important benefit of the chosen location that is not available with other options. The Safety Pond will be lined with geomembrane and will be large enough to contain 110% of the total pipeline volume (approximately 1,000 m³) plus the storm volume from a 1:100 year storm event. The pipeline will be constructed of high-density polyethylene with pressure gauges for leak detection. Should issues with the pipe be detected (such as a loss of pressure in the line), an alarm will be tripped and the pipeline pumping would stop. If this type of event were to occur, the slurry in the pipeline could either be drained to the safety pond or pumped back to the process plant until such time as the pipeline is repaired and pumping of tailings slurry to the TMF can resume. If the pipeline were to drain into the safety pond, a sump pump would be used to transport the contained slurry back to the TMF. During normal mine operation, the safety pond will be maintained empty by a level controlled sump pump that will direct rain water that collects within the Safety Pond to pond M1. Additionally, GGM will develop a safety and surveillance plan that includes routine visual inspection of the pipeline. The probability of a 10-year flood happening simultaneously with a pipe failure during 16 years of mine operation is extremely low due to multiplication of two probabilities and a short duration of these events. A tailings pipeline failure is discussed in Chapter 22, Section 22.3.1.2 of the Final EIS/EA.	
CEAA_79 *IR Number: AM(1)-05*	*Section 22.3.1.8; Section 2.3.1.10; Section 22.4.3; Section 22.4.4.*	***Context and Rationale:*** • *Section 22.3.1.8 states that "[Open pit] Slope failure […] may affect the access road around the open pit or the edges of the surrounding WRSAs [waste rock storage areas] or historical tailings. However, potential environmental effects of any historical tailings slumping into the open pit are not assessed in Section 22.3.1.8 (open pit slope failure), Section 22.3.1.10 or Section 22.4.4 (both for loss of stability of historical MacLeod tailings). Feasibility of remediation, particularly during closure and post-closure, is also not discussed.* • *In contrast, a similar scenario for slumping of waste rock into the flooded open pit was assessed in Section 22.4.3.3.* ***Specific Question/ Request for Information:*** *A. Provide an assessment of the potential environmental effects of a slope failure affecting the edges of both Macleod and Hardrock historical tailings, resulting in material slumping into the flooded open pit. Describe the worst-case scenarios. Include the quantity, mechanism, rate, form and characteristics of contaminants and other materials (physical and chemical) likely to be released to the surrounding environment.* *B. Describe the change to the receiving environment – e.g. water quality and quantity, sediment quality and quantity.* *C. Describe the resulting impacts to wetlands, sensitive habitats, wildlife (including SAR), fish and fish habitat, aquatic species, migratory birds, human health, and current use of lands and resources for traditional purposes.* *D. Describe the safety measures and emergency response procedures to mitigate the potential effects of the open pit slope failure, including on the valued components named in question C.* *E. Describe remediation measures applicable to the open pit slope failure.*	**N/A**
		Response:	

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		A-E. The historical Hardrock tailings will be removed up to 30 m setback from high water, outside the footprint of the open pit. Historical McLeod low tailings will be removed within (and beyond) the footprint of the open pit. The area of excavated tailings beyond the open pit (approximately 30 m from open pit) is shown on Figure 5-18 of the Final EIS/EA. The excavated area will be replaced with rock fill and contained by a seepage collection system. The Final EIS/EA presented a possible worst-case scenario where the edges surrounding the historical tailings (e.g., the stabilized area between the open pit and the historical tailings containing the access road and rockfill) may be affected, but given the distance from the historical tailings to the crest of the open pit, failure of the historical tailings into the open pit is not considered possible. As indicated in Section 22.3.1.8 of the Final EIS/EA, a failure of the open pit wall may affect Project operation or infrastructure, but will not have a residual adverse effect on VCs.	
CEAA_80 *IR Number: AM(1)-06*	*Section 22.4.6.3.*	***Context and Rationale:*** • *Section 22.4.6.3 (Vehicle Collision or Mechanical Failure Effects Assessment) does not describe a worst case scenario, but rather provides a generic statement that "the potential for effects would depend on the location of the collision or failure and the nature of the materials being released." The worst case scenario in this case would be where the access road includes a water crossing which flows to the diverted channel and ultimately to Southwest Arm Tributary and Kenogamisis Lake. This Tributary will also form the fisheries offset, adding importance to the location and significance to potential effects.* ***Specific Question/ Request for Information:*** *A. Provide an assessment of the potential environmental effects of a vehicle collision or mechanical failure at the water crossing of the access road. Include the quantity, mechanism, rate, form and characteristics of contaminants and other materials (physical and chemical) likely to be released to the surrounding environment.* *B. Describe the change to the receiving environment – e.g. water quality and quantity, sediment quality and quantity.* *C. Describe the resulting impacts to wetlands, sensitive habitats, wildlife (including SAR), fish and fish habitat, aquatic species, migratory birds, human health, and current use of lands and resources for traditional purposes.* *D. Describe the safety measures and emergency response procedures to mitigate the potential effects of this scenario.* *E. Describe remediation measures applicable to this scenario.*	**N/A**
		Response: A. – E. The WC-G drainage area upstream of the mine site access road will be intercepted and diverted into the site water management and treatment system. If a spill were to occur on the upstream (i.e., north) side of the road in this location, spilled material would be contained, collected, and treated. If a spill occurs on the downstream (i.e., south) side of the road in this location, contaminant transportation could have a localized effect on surface water and fish and fish habitat in the Southwest Arm Tributary, potentially flowing downstream to Kenogamisis Lake. Effects on these VCs may also impede the use and access of land and water resources for recreational and traditional uses. This was considered and discussed in Section 22.4.6.3 of the Final EIS/EA. However, due to the relatively small haul volumes and safety features of transport vehicles, and the ephemeral state of WC-G, a release at this crossing would have a limited probability of entering the Southwest Arm Tributary, with limited downstream contamination potential. A detailed Emergency Response Plan will be developed and submitted to appropriate regulatory agencies for review prior to the initiation of Project activities. It will contain specific measures related to offsite emergencies, including medical response, notification of regulatory authorities, spill containment, removal/cleanup of contaminated soils and water, monitoring of environment and ongoing staff training to learn from any accidents. A Conceptual Emergency Response Plan is provided in Appendix M3 of the Final EIS/EA. A Spill Prevention and Response Plan will also be developed to address onsite spill scenarios, including related to prevention, contingency planning and reporting practices for the timely and effective response to vehicle collisions involving mine equipment or transport trucks may result in the release of hazardous materials such as mill reagents and fuel,	**N/A**

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		or other non-hazardous materials such as construction material. A Conceptual Spill Prevention and Response Plan is provided in Appendix M8 of the Final EIS/EA.	
CEAA_81 *IR Number: AM(1)-07*	*Section 22.3.1.5.*	***Context and Rationale:*** • *Section 22.3.1.5 states that "A breach of pond M1 would result in a limited volume release along a narrow flow path to the Southwest Arm Tributary, affecting a small area within the PDA, with the potential to effect surface water quality within the Southwest Arm Tributary and Southwest Arm of Kenogamisis Lake." Further consideration is needed as this Tributary is expected to form part of the fisheries offset, and should there be a large breach it would affect the water quality in this diversion. In addition, given the proximity of Pond M1 to Kenogamisis Lake, it seems reasonable that a large breach would also affect the water quality of Southwest Arm Tributary and Kenogamisis Lake.* ***Specific Question/ Request for Information:*** *A. Provide additional detail regarding the potential release due to a breach of pond M1, considering a worst case scenario with a pond at its fullest expected volume. At a minimum, revise the release volume and dispersion to the Southwest Arm Tributary and Kenogamisis Lake.* *B. Revise the effects assessment of effects of the breach of pond M1 taking in consideration the worst case scenario described in question A.* *C. Discuss the effect of the revised scenario on the Southwest Arm Tributary.*	**N/A**
		Response: A/B/C. As described in Section 22.4.2.3 of the Final EIS/EA, if pond M1 were breached, untreated contact water could be released at the location of the breach. A release from pond M1 could enter the Southwest Arm Tributary, depending on the location of the breach (i.e., on the downstream perimeter of the pond near the watercourse). Water quality modelling (Appendix F5 of the Final EIS/EA) identified that near the end of operation, under climate normal conditions, no parameters are predicted to exceed the MMER Schedule 4 criteria and only arsenic, cobalt, antimony, uranium and possibly aluminum may exceed the PWQO. The concentration of these parameters will be dependent on the volume of water and sources to pond M1 at the time and will vary seasonally and in response to operational demands. Based on the short-term nature of the upset conditions following emergency response, the limited volume of a potential release, and the expected pond M1 water quality, concentrations in Kenogamisis Lake will be attenuated within a short distance down gradient of the Southwest Arm Tributary and are expected to meet the PWQO or background levels within the LAA. Based on the water quality modeling predictions for pond M1, an uncontrolled release of water from pond M1 would not be expected to result in lethal or sub-lethal effects on fish due to rapid changes in water quality. Although some parameters may exceed PWQO, concentrations of PoPC are expected to meet effluent discharge criteria (i.e., MMER Schedule 4) and the release would be short term. Contact water in Pond M1 is predicted to have only minor PWQO exceedances. For example, water quality in Pond M1 exceeds PWQO for only four parameters. (Table 10-30 of the Final EIS/EA). Spillways are an important safety feature to mitigate accidents and malfunctions. During a major runoff event (> 1:100 year return period) when the spillway is activated, the assimilated water quality in the ponds will not adversely affect the receiving environment due to substantial assimilation by rain and/or snow melt, reduced mine-water contact time during a large runoff event, also given the large volume of water in the receiving environment and very short-term nature of extreme runoff events. The spillways are anticipated to discharge to land and not directly to waterbodies. In addition, the spillways are located at the pond surface and only excess water from the pond surface is released. Typically, water on the pond surface during a major storm event is of better quality than that lower in the pond profile, as incident rainfall will dilute the water at the pond surface and particulate matter settling in the pond clears first from the pond surface and descends downward through the pond profile. The EIS/EA commitment is to contain the 100-year environmental design flood.	**N/A**

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		The collection ponds will be designed to provide the containment necessary to satisfy the design criterion of containing a 100-year hydrologic event with no discharge.	
CEAA_82 *IR Number: AA(1)-01*	*Section 4.2.8; Appendix K1.2, Section 4.4.*	***Context and Rationale:*** • *In the evaluation of alternatives for aggregate sources (section 4.2.8), one of the alternatives is to create new aggregate sources. Appendix K1.2, Section 4.4 identifies two potential till borrow (aggregate) source areas (T1 and T2), and presents characteristics of the till borrow. However, their location is not identified on a map in Appendix K1.2. In the main EIS, aggregate source areas are identified on maps and in the text as T1, S2 and S4, but no descriptions of the aggregates' characteristics are available. It is unclear whether source area T1 is the same in both documents.* • *It is therefore unclear which aggregate sources were used for alternative assessment and how those sites were selected. Without this information, it is not possible to make a clear assessment of potential changes on water quality, which could lead to effects on fish and fish habitat.* ***Specific Question/ Request for Information:*** *A. Provide further information on the sites that were considered for new aggregate sources as part of the alternative assessment, including their location, the characteristics of the aggregate, the potential environmental effects from the use of each site, and the information that was used to determine which new site was selected. Provide an updated map that shows locations of potential till borrow (aggregate) source areas (T1 and T2).* *B. Refine the alternatives assessment analysis, using relevant information that was provided in the answer to question A.*	**N/A**
		Response: The alternatives assessment is provided in Chapter 4, Section 4.2.8 of the Final EIS/EA. Alternative aggregate sourcing methods include using existing quarries, using mined waste rock with suitable geochemistry, or creating new aggregate sources. Alternatives were focused on design and technology alternatives, since location is fixed as geology dictates aggregate locations and quantity/quality of resource available. The key design assumptions for the assessment are provided in Table 4-17 of the Final EIS/EA. With regard to new aggregate sources it was assumed that sources would be located in close proximity to or within the PDA to reduce haul times, improve efficiency and reduce footprint and emissions. Aggregate source locations are shown on Figure 5-2 (Site Plan). Additional information on aggregate sources is provided in Chapter 5, Section 5.4.22. The aggregate source area described as "south of Goldfield Lake" in Appendix K1.2 is identified on the Site Plan as T1. The aggregate source area described as "North of Goldfield Road/Lake" is no longer proposed for the Project and as such avoids disrupting local and traditional land use activities along the Goldfield Road corridor A refinement of the alternatives analysis is not required.	**N/A**
CEAA_83 *IR Number: EE(1)-01*	*Section 21.3.1.5*	***Context and Rationale:*** • *Section 21.3.1.5 indicates that "ice jams [are common], which can lead to flooding, especially in northern Ontario". However, no information is provided regarding how ice jams will be managed at the various water containment infrastructures on site. Further information is needed to ensure that ice jams are managed effectively, in order to prevent potential accidents or malfunctions.* ***Specific Question/ Request for Information:*** *A. Discuss the risks of ice jams at the various water containment infrastructures, particularly in the tailings management facility (TMF) reclaim pond.* *B. Provide information on the management of watercourses and water features in freezing conditions to address ice jams. Describe any avoidance and/or mitigation measures.*	**N/A**

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		Response: A. With regard to the TMF reclaim pond, one risk of ice formation within the pond is the temporary loss of water volume for use in the mill as reclaim water, however this loss has been accounted for in the Project's water balance. Another risk of ice jams on the TMF reclaim pond, which also has the potential to affect the various water containment infrastructure supporting the mine, relates to the physical stresses exerted on barriers, potentially damaging infrastructure. Ice jams can also restrict flow through hydraulic and hydrologic structures, increasing the risk of their capacity exceedance, potentially causing flooding to the natural environment. B. The following are various methods of mitigating ice jams within the TMF reclaim pond: • For the winter months the TMF will have additional water inventory to consider inaccessible water due to ice (ice losses). • Generally, ice is expected to be formed and floating in the upper 1 m crust of water surface in winter. Therefore, the pump inlet level for reclaim water to the mill will always be maintained below the ice level formation. • Non-structural measures which focus on ice prevention/ice suppression will be adopted which will include de-icer air bubbler systems near the water inlet. These are proven to be effective in prevention of ice formation. • Submersible pumps at the location of water intakes, which circulate relatively warmer waters from deeper depths of the tailings pond will be deployed. • Ice cutting and ice breakers will be deployed (mounted on barge during winter) if required. • The above referred non-structural methods for prevention of ice formation will be applied at the various water intake points in the mine. • During operations of the mine as part of the 'operations, surveillance and maintenance' protocol, the spillway invert elevations and the entire spillway channel will be cleared of ice well ahead of spring freshet. With respect to culverts and ditches, appropriate culvert sizing, relief flow routes and culvert shoulder armouring should be considered in locations where ice jams are possible as per the Ministry of Transportation of Ontario's Drainage Management Manual.	**N/A**
CEAA_84 *IR Number: CE(1)-01*	*Section 20.2.5*	***Context and Rationale:*** • *Section 20.2.5 states that the Brookbank and Viper Projects were both listed as past and present activities for the cumulative effects assessment "because they are existing exploration projects with no current plans to develop resources."* • *The Agency's 2016 technical guidance Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act 2012 indicates, in Section 1.4, that a future physical activity is considered reasonably foreseeable if "the submission for regulatory review is imminent. This could be known if the collection of data has already commenced, regulatory authorities have been contacted about information requirements, or through an announcement from the proponent."* • *The NI 43-101 Technical Report for the Hardrock Project, issued on December 21, 2016 suggests that the Brookbank and Viper Projects are reasonably foreseeable. In particular, the NI 43-101 Technical Report proposes, in Section 1.21, "the use of the Hardrock process plant and TMF [tailings management facility] for the future processing of gold from other GGM Property deposits such as Brookbank, or a potential future Hardrock underground resource to improve the LOM average grade" as revenue-related potential opportunities. It further suggests in Section 1.23 and 26.2 of the NI 43-101 Technical Report that the Brookbank Project is considered "as an eventual source of high grade mill feed material when the average grade [at the Hardrock Project] dips in Year 6 and 8 and 9. These potential mines would need to be mined concurrently with the Hardrock Project open pit given the high milling rates."* • *Furthermore, Animbiigoo Zaagi igan Anishinaabek (AZA) and the Métis Nation of Ontario have stated their concerns regarding the exclusion of Viper and Brookbank projects as future physical activities in the assessment of cumulative effects.* • *Since the Brookbank and Viper projects are under consideration for development in the Hardrock Project's NI 43-101 Technical Report, then they may be considered reasonably foreseeable. Otherwise, an appropriate justification must be provided for their exclusion, which accounts for the statements made in the NI 43-101 Technical Report.*	**N/A**

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		Specific Question/ Request for Information: *A. Revise the assessment of cumulative effects to consider residual effects on atmospheric, physical, biological, socioeconomic, traditional land and resource use valued components, and potential impacts to Aboriginal and Treaty rights, from the inclusion of Brookbank and Viper Projects as reasonably foreseeable physical activities, or provide a thorough rationale for its exclusion, accounting for comments made in the NI 43-101 Technical Report regarding the Brookbank Project.*	
		Response: The Hardrock Project is a standalone Project and economically viable on its own. Exploration at Brookbank has been shut down since 2016 and there are no current plans to advance to Project. The Cumulative Effects Assessment for the Hardrock Project was conducted in line with the following guidance documents provided by the Canadian Environmental Assessment Agency: 1. Canadian Environmental Assessment Agency (CEA Agency). 2014. Technical Guidance for Assessing Cumulative Effects under the Canadian Environmental Assessment Act, 2012. Available at: http://www.ceaa.gc.ca. 2. Canadian Environmental Assessment Agency (CEA Agency). 2015. Assessing Cumulative Effects under the Canadian Environmental Assessment Act, 2012. Available at: http://www.ceaa.gc.ca. Section 19(1)(a) of the *Canadian Environmental Assessment Act, 2012* requires that an environmental assessment (EA) of a designated project "*must take into account cumulative environmental effects that are likely to result from the designated project in combination with other physical activities that have been or will be carried out*". Activities that will be carried out (future physical activities) include those that are "certain" and those that are considered to be "reasonably foreseeable", as established in the above guidance documents. The two technical guidance documents listed above provide the following definitions for "certain" and "reasonably foreseeable": 1. Certain – "*the physical activity will proceed or there is a high probability that the physical activity will proceed, e.g. the proponent has received the necessary authorizations or is in the process of obtaining those authorizations*". 2. Reasonably Foreseeable – "*the physical activity is expected to proceed, e.g. the proponent has publicly disclosed its intention to seek the necessary EA or other authorizations to proceed*". The Brookbank Project is an exploration project at this time; mining has not been authorized, nor does GGM have any current plans to develop the resource. As such, the Brookbank Project is not considered as a future mining activity that is either certain or reasonably foreseeable and therefore was not included with the cumulative effects assessment. However, the Brookbank Exploration Project was listed under "past and present activities" in Table 20-1 to account for the exploration activity on the property to date. The effects of exploration activity at the Brookbank Project to date are considered as part of existing baseline conditions and as such have been included within the residual effects assessment. Similarly, the Viper Project is not considered a future activity, for the same reasons, and it too was considered under existing baseline conditions and included in the residual effects assessment. As such, no revision to the cumulative effects assessment is required. Should either of these developments proceed to development in the future, their EIS/EA would need to consider overlapping environmental effects of their projects with those of the Hardrock Project (since it would be certain and reasonably foreseeable). As such, cumulative environmental effects would be addressed in this manner, with greater certainty than with speculative details on the potential effects of these other projects available at this early exploration stage.	**N/A**
CEAA_85	*Section 20.2.5*	***Context and Rationale:*** • *Section 20.2.5 states that "consultation feedback related to follow-up and monitoring has been addressed through direct responses (in writing and follow-up meetings) and in the Final EIS/EA". However, no reference is provided to where this information can be found in the EIS. Further, no information is found in the Cumulative*	**N/A**

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IR Number: CE(1)-02		*Effects Assessment chapter (Chapter 20) related to follow-up programs and monitoring related to cumulative effects, and no rationale is provided to justify not needing any.* • Part 2, Section 6.6.3 of the EIS Guidelines requires the proponent to "develop a follow-up program to verify the accuracy of the assessment or to dispel the uncertainty concerning the effectiveness of mitigation measures for certain cumulative effects. " ***Specific Question/ Request for Information:*** *A. Describe the follow-up program for cumulative effects, including objectives and any monitoring measures that will be implemented to verify the predictions of effects and evaluate the effectiveness of the proposed mitigation measures. For each valued component, if a follow-up and monitoring program is not required for cumulative effects, provide a rationale.*	
		Response: GGM has committed to a wide range of mitigation measures and monitoring/follow-up programs to address residual environmental effects identified in the Final EIS/EA. Many of these measures will also assist in reducing the Hardrock Project's contribution to cumulative environmental effects. As noted in the Final EIS/EA, no significant cumulative environmental effects are predicted for the Project and in the majority of cases Project contributions to cumulative effects are considered to be low. The Project area has seen a downturn in economic activity and population decline. The Project is expected to bring economic development without contributing to cumulative effects. In fact, the Project is anticipated to reduce arsenic loadings to Kenogamisis Lake and bring about a positive influence on the overall Project area. GGM is responsible for mitigating and monitoring the effects of the Hardrock Project and this has been achieved. GGM cannot be reasonably expected to be responsible for the mitigation and monitoring of other future projects and activities developed by other proponents or through regional planning initiatives. Planning and authorizing regional development falls within the mandate of the provincial and federal government. Mitigation and monitoring on a regional scale is implemented by the appropriate government departments.	**N/A**
CEAA_86 *IR Number: FD(1)-01*	*Appendix C10, CEAA_115; Appendix F10, Section 6.0*	***Context and Rationale:*** • *Agency comment FD(0)-01 on the draft EIS, asked for information to determine potential effects that are directly and indirectly associated with federal decisions (a federal authority's exercise of a power or performance of a duty or function), as described by Section 5(2) of CEAA 2012. These effects may already be described in the EIS, but they are not presented in a manner that the Agency can use to focus the scope of its assessment of effects to be taken into account under subsection 5(2) of CEAA 2012.* • *A separate section or appendix should identify the direct effects of the federal decisions (permits authorizations), and the indirect effects (those directly linked or necessarily incidental) of the effects, resulting from the direct effects of federal decisions.* • *This stand-alone section or Appendix should identify, in a methodical manner, the direct and indirect effects of each federal decision. Included below are general examples that may help illustrate what is meant by direct and indirect effects. Project component with a federal permits or authorization:* *- lead to the loss of a berry batch, which can lead to reduced food for birds, mammals and humans* *- requires the removal of a wetland; which can lead to loss of wetland function, changes to hydrology, loss of certain food species eaten by another animal;* *- requires removal of a wetland could lead to loss of nesting locations for birds; subsequent effect on bird populations;* *- releases effluent; change to water quality, water quality leads to an effect on fish tissue and potential health effects to non-Indigenous people from the consumption of those fish (note that health effects to Indigenous people should be captured under Section 5(1)(c), and described in Appendix O).* • *Most information on anticipated federal permits, with the likely exception of an Explosives Act permit, appears to be located in Appendix F10, Section 6.0, Table 6-1.*	***Context and Information Required for a Complete Response:*** • *The response does not adequately address the information request (IR). The response does not follow the questions posted in the original IR, and the submitted attachment does not provide an analysis of potential* *effects that are directly and indirectly associated with federal decisions (a federal authority's exercise of a power or performance of a duty or function), as described by subsection 5(2) of the Canadian Environmental Assessment Act, 2012 (CEAA 2012).* • *The changes to the environment summarized in the portion of Table 1-4 dedicated to section 5(2), starting on page 1.33, refers the reader to effects to fish and fish habitat. Note that paragraph 5(2)(a) of CEAA 2012 considers "a change, other than those referred to in paragraphs (1)(a) and (b), that may be caused to the environment…". Changes to the environment to be considered under paragraph 5(2)(a) of CEAA 2012 involve project activities that needed to be carried out in order to undertake the activity that is authorized by the federal decisions. As a specific example, where GGM proposes to construct a realigned channel as offset habitat for an authorization under the Fisheries Act, consider changes to the environment that may result from the activities associated with creating the proposed realigned channel. This may include, as one example, the removal of a wetland, which can lead to a loss of nesting locations for birds or habitat for particular animals, amphibians or reptiles. The removal of the wetland may also cause a loss of wetland function in the vicinity, leading to changes in hydrology.* • *Revise the response by following the steps presented in the original IR. The following examples from the Pacific Northwest LNG Project in British Columbia show an EIS which presented an analysis of potential effects under subsection 5(2) of CEAA 2012. A description of project activities associated with each federal decision (i.e., project activities that needed to be carried out in order to undertake the activity that is authorized by the federal decisions) is shown in Section 25.3, pages 25-13 and 25-14 of http://www.ceaa.gc.ca/050/documents/p80032/98699E.pdf. A table working through the changes that may be caused to the environment captured under paragraph 5(2)(a) of*

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		• *As per Part 1, Section 3.3.2 of the EIS Guidelines, additional valued components may ned to be considered in this assessment, such as:* o *Furbearers and their habitat;* o *Amphibians and their habitat;* o *Reptiles and their habitat;* o *Ungulates and their habitat;* o *Species at risk and their habitat;* o *Non-migratory birds and their habitat;* o *Human health (not limited to Indigenous people);* o *Socio-economic conditions (not limited to Indigenous people);* o *Archaeology (not limited to Indigenous people).* ***Specific Question/ Request for Information*** *A. In a stand-alone section or appendix of the EIS, provide a summary of changes to the environment that are directly linked (direct effects) or necessarily incidental (indirect effects) to any federal decisions, and potential effects of those changes. This assessment should include the information listed in B – H below.* *B. Provide a table describing the project activities associated with each federal decision that would be required for the Project. (i.e. road culvert, dam, berm, offset component, tailings impoundment area.) Provide a table and a map identifying the specific project components for which a federal authorization or decision (permit), including the proposed offset measures as a result of the decisions. Include the channel realignment/redirection necessary for the tailings impoundment area.* *C. Identify those changes to the environment that are directly linked or necessarily incidental to each federal decision. For example, identify potential changes to the environment arising from the building and operating of the tailings impoundment area, which is authorized by a federal decision under the Fisheries Act. This may include, as examples, changes to:* *- Water quality and quantity* *- Terrestrial habitat, flora and fauna* *- Riparian areas and wetlands* *- Air Quality* *D. Identify potential impacts related to the changes to the environment, including effects to:* *- health and socio-economic conditions, including navigation,* *- physical and cultural heritage,* *- any structure, site or thing that is of historical, archaeological, paleontological or architectural significance, other than the ones captured under paragraph 5(1)(c) of CEAA 2012.* *E. Identify valued components that may be affected by those changes identified in questions C and D. It is possible that new valued components may need to be considered for this assessment.* *F. Given the changes to the environment and potential impacts identified in questions C and D, describe the potential adverse effects to each valued component identified in question E that are directly linked or necessarily incidental to each federal decision, including those that may not have already been identified in the EIS to date, including effects associated with changes to the environment.* *G. Identify the mitigation measures to avoid, reduce or compensate potential adverse effects.* *H. Characterize residual adverse effects after applying mitigation measures.* *I. Describe a follow-up program, including objectives and any monitoring measures, which will be implemented to verify the predictions of effects and evaluate the effectiveness of the proposed mitigation measures, if required.*	*CEAA 2012 from those project activities, and potential effects to the environment captured under paragraph 5(2)(b) of CEAA 2012 resulting from those changes, is shown in table 26-2, pages 26-5 to 26-8 of http://www.ceaa.gc.ca/050/documents/p80032/100775E.pdf.* • *The Agency encourages GGM to prepare a table that includes the information as seen in Section 26.3 linked above. Note that most of the information that GGM would require to undertake this analysis appears to exist in their effects assessment chapters (7-19); the Agency requires that they are presented in a manner to focus the scope of its assessment of effects to be taken into account under subsection 5(2) of CEAA 2012. The Agency also encourages GGM to arrange a meeting to discuss the implementation of this IR.*

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		Response: Stantec had attempted to address the effects of federal actions in Table 24-1 of the Final EIS/EA, though it is acknowledged that this table serves many purposes and thus perhaps the overall conclusions in relation to effects of federal actions are not clear. In this light, Stantec has attached a document entitled "Summary of Environmental Effects Within Federal Jurisdiction" to address these comments.	**Response:** The attached document entitled "Summary of Environmental Effects within Federal Jurisdiction" has been updated to address effects that are directly and indirectly associated with federal decisions (a federal authority's exercise of a power or performance of a duty or function), as described by subsection 5(2) of CEAA 2012. The changes to the environment originally summarized in the portion of Table 1-4 dedicated to section 5(2), have now been moved to Table 1-5 where indirect effects have been added to the assessment.