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June 11, 2026 **Sent by email**

Dietrich MacRae-Maahs
Great Bear Gold Project
Impact Assessment Agency of Canada - Government of Canada
GreatBear@iaac-aeic.gc.ca

Subject: Natural Resources Canada's submission to the Federal Authorities Advice Record for Great Bear Gold.

Dear Dietrich,

Please accept the following in response to IAAC's April 14, 2026, request for review of the Impact Statement for the Great Bear Gold Project. No targeted review questions were directed to Natural Resources Canada (NRCan) experts. NRCan has reviewed the document in relation to its mandate and areas of expertise in groundwater, geology, geochemistry, economics, and acid rock drainage and metal leachate (ARD/ML).

During the Impact Statement Phase, NRCan was also called upon to review and provide its advice on the Mercury Plan. NRCan acknowledges the valuable work undertaken by the Proponent to measure, model, and assess mercury (Hg). However, the source of mercury within specific material types (tailings, ore, waste rock, etc.) have not been clearly identified. NRCan considers this an important area where additional information is needed.

NRCan has received responses from the Proponent on comments provided through Batch 2 of the IS review. The comments provided below in Enclosure 1 build upon those provided to the Proponent for Batch 2 of the Impact Statement Review.

If you have any questions regarding our submission, please do not hesitate to contact me at alice.tremblay@nrcan-rncan.gc.ca or 613-371-1853.

Sincerely,
Alice Tremblay
Senior Environmental Assessment Officer, Impact Assessment Division, NRCan

Cc: Christina Clarke – Acting Director, Impact Assessment Division

Attachment(s): Federal Authority Advice Record for the Great Bear Gold Project Impact Assessment

Canada

Enclosure 1: Federal Authority Advice Record for the Impact Assessment of Great Bear Gold

Please submit the completed form by May 28, 2026, via email to GreatBear@iaac-aeic.gc.ca.

Department Contact Information

Submission Date	June 11, 2026
Department/Agency	Natural Resources Canada
Lead Contact, Title, Work Unit	Alice Tremblay, Senior Impact Assessment Officer, Impact Assessment Division
Email, Phone	alice.tremblay@nrcan-rncan.gc.ca, 613-371-1853
Alternate Contact, Title, Work Unit	Christina Clarke, Acting Director, Impact Assessment Division
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1. Taking into account the Project Context and Targeted Questions that IAAC has shared, review Batch 3 of the Impact Statement and provide views for IAAC's consideration in the analysis of the project's effects and preparation of the Impact Assessment Report (Table 1) or identify potential outstanding information requirements in the Impact Statement (Table 2). Tables 1 and 2 (attached) provide additional guidance to support your review.
2. As per the Cooperation Plan[1], consider all the mechanisms in place to manage potential federal effects. If your department is responsible for, or aware of, any relevant federal legislative frameworks, policies, programs, or potential complementary measures[2] that may help manage the project's potential adverse federal effects, please specify and describe applicability to the project and any known limitations to managing effects.
3. Indicate whether your department has identified any power that it will be unable, or may be unable, to exercise to allow the project to proceed, in whole or in part as currently planned, and next steps to resolve any issues.
4. Indicate if any proponent information provided in Batch 3 of the Impact Statement changes the previous guidance provided on permitting. If yes, please provide an overview of the new permitting guidance. Please note that the Detailed Permitting Plan will be updated accordingly.

Alice Tremblay

Name of Departmental / Agency Responder

Senior Impact Assessment Officer

Title of Responder

June 11, 2026

Date

[1] https://iaac-aeic.gc.ca/050/evaluations/document/158179

[2] Complementary measures are additional authorities of government officials or programs that may be used to mitigate effects that may be beyond the care and control of the proponent. They can be taken into account in decision-making.

Table 1. Views to Inform the Impact Assessment

Table 1 should be used to provide views for IAAC's consideration in the analysis of the project's effects[3] and preparation of the Impact Assessment Report and potential conditions. Expert advisors should consider project context (see Enclosure 2 for more detail on the key issues and targeted questions) and regulatory context and provide risk-proportional, solution-oriented advice even where potential gaps in the Impact Statement are observed.

Comment ID	Refence to Impact Statement	Description of View or Concern Related to an Effect	Advice to Inform the Impact Assessment
Please identify comments by organization and comment number. *e.g.: HC-01*	*Identify the specific section of the Impact Statement to which your comment applies.*	*Provide a brief description of the view or concern for IAAC's consideration in the analysis of effects, based on available information, such as:* • *a missing pathway of an adverse federal effect that may really increase the overall extent of significance; or* • *sources of uncertainty that, in your department's view, may weaken potential conclusions.*	*Considering project context (see Enclosure 3 for more detail on the key issues and targeted questions) and regulatory context, provide solution-oriented advice for the impact assessment. For example:* • *Characterize residual effects and the level of uncertainty with predictions in the absence of more information from the Proponent, as predicted by your department. Explain the uncertainty. Consider describing the range of possible scenarios.* • *Suggest other mitigation and follow-up measures that may increase certainty in predictions or help manage uncertainty for adverse federal effects, including operational guidance or standards, and well-understood practices.* • *Describe any other federal or provincial legislative frameworks, policies, programs, and potential complementary measures that may provide another means to address adverse federal effects, or considerations related to the public interest factors, including predictable outcomes and whether other tools set conditions on the Proponent.* • *Identify those mitigation measures and project design elements that are necessary to limit the extent of significance of adverse federal effects, and those follow-up program measures that are necessary to address substantial uncertainty with the accuracy of predictions and the effectiveness of mitigation, in relation to key issues that are material to decision-making.* • *Provide advice on risk (likelihood and severity of effects), using applicable frameworks relevant to your mandate, to support IAAC's risk-based decisions.* • *Provide any additional considerations in relation to the Project's contributions to sustainability or to Canada's environmental obligations and climate change commitments.* • *Provide any additional considerations in relation to IAAC's obligations under section 79 of the* Species at Risk Act. *In the event of cross-cutting issues or a shared mandate/expertise with another agency or department, please specify the agency/department and contact persons.*
NRCan-01	Impact Statement Section 5.4.1.4 (Explosives Manufacturing, Storage and Use) Site plans: Figures 5.2.1 and 5.2.2	In order to inform regulatory approval under the *Explosives Act*, NRCan's Regulatory Explosives Division (ERD) must ensure that the proposed location of the explosives factory and magazines is safe. Acceptable distances are determined by ERD on the basis of risk of harm to people or property, taking into account the quantity and type of explosives to be manufactured, the raw materials to be used, the manufacturing operation(s) to be carried out, the strength, proximity, and use of surrounding infrastructure, and the number of people likely to be in the vicinity. The location of the Project's components, including the explosives factory and magazine, is shown on the site plans (Figures 5.2.1 and 5.2.2 of the Impact Statement); however, the document does not include detailed quantities of explosives, including raw materials, proposed to be stored or manufactured on site.	NRCan recommends that the proponent provide information on the quantity of explosive components, including packaged explosive products if any, to be stored or manufactured on site. Proponent can refer to this reference document. RP-05-04: Separation Distances for Explosives
NRCan-02	Impact Statement Section 19.2 Federal Environmental Approvals	The Impact Statement states that ''The manufacturing, transport and storage of explosives required for Project will be under the care and control of a specialized contractor and these activities and facilities are not part of the designated Project." NRCan is of the opinion that the components and activities related to the manufacturing and storage of explosives required for the project is part of the designated Project, even if those under the care and control of a specialized contractor.	NRCan recommends that the proponent provide information on the explosives manufacturing and storage facility. This information is needed to support NRCan's review and assessment of the adequacy of explosives facilities setbacks, or whether changes to the project site layout may be required.

[3] "Effects" means adverse effects within federal jurisdiction and direct or incidental adverse effects (as defined in section 2 of the IAA), and considerations related to the public interest factors (as defined in section 63 of the IAA). Advice is also invited in relation to IAAC's separate obligations under section 79 of the *Species at Risk Act.*

NRCan-03	Geochemistry Summary Report (Appendix J) and Mercury Bioaccumulation Study for Downstream English River to Wabigoon System Waterbodies (Appendix T)	Appendix T states that: "*Sulphate is universally present in surface water and groundwater and can be elevated in waters contacting typical mine site features, like rock stockpiles and within tailings storage facilities. Understanding and managing sulphate on site, as well as the interactions between sulphate and methylmercury production in the receiving environment, is important for predicting and mitigating the potential for increased methylmercury production in the context of proposed Project activities and mining operations.*" NRCan is of the opinion that it is not clearly demonstrated in Appendix J and Appendix T whether mercury is associated with specific material types (e.g., waste rock, tailings, ore) or what mineral phases are hosting the mercury. A clear understanding of mercury sources is fundamental to the assessment, as it underpins predictions of loading, supports the conceptual model, and reduces uncertainty in the effects assessment.	NRCan recommends that the proponent demonstrate that mercury sources have been clearly identified and incorporated into the assessment and management approaches. While Appendix T (Mercury Plan) provides an overview of expected mercury behaviours (using monitoring, modelling and methylation processes), it does not provide adequate linkages to the mineralogical work conducted. This is critical information needed to inform IA predictions as well as appropriate mitigation measures.
NRCan-04	Hydrogeological Modelling Report (Appendix H-2), Section 4.3, Page 51, Table 4-9, Page 61	Groundwater contributions to surface water sustain flow during low precipitation periods and regulate temperature during warm periods. These factors make groundwater an important contributor to Fish and Fish Habitat and are the reasons why groundwater model results are carried forward to surface water and fish habitat assessments. The results of the numerical groundwater model indicate reductions in groundwater contributions to Dixie Creek in the order of 50% during operations, returning closer to baseline conditions with a reduction of 2% in post-closure. These reductions are related to localized groundwater drawdown that extends from just upstream of the headframe to just downstream of the central pit. However, these results are then averaged across the entire watershed of HF-01, which extends 5 km downstream of the boundary of the groundwater model. This approach results in the groundwater report citing a 7.7% reduction in low flows at that station during operations. While not within the scope of the groundwater model, it can be assumed that a 1000 m^3/day change may have a more localized impact closer to the project area, where surface flows are lower.	To support the assessment of fish and fish habitat, NRCan recommends that the results of the groundwater model be used in the assessment of surface water quantity with recognition that the impacts will occur adjacent to the project area. By carrying the results downstream, the impact of groundwater drawdown on streamflow will be attenuated in the related models. NRCan recommends that the temporal and spatial scales of the groundwater impacts be considered in any associated assessments. Where groundwater model results are used in surface water models, the report should include the methods used to integrate the data. NRCan recommends monitoring, mitigation, and adaptive management to address any uncertainty related to the groundwater assessment. NRCan also suggests monitoring be initiated during construction and continued into the post-closure phase. Groundwater recovery will be delayed relative to pit flooding, and reductions in groundwater discharge to surface water are likely to persist for a period after the pits have been flooded.
NRCan-05	Hydrogeological Modelling Report (Appendix H-2) and Receiver Water Balance Report (Appendix I-3) And the proponent's response shared by IAAC	In response to NRCan-04, the proponent indicated that: "*Groundwater was integrated into the surface water flow reductions as described in Appendix I-3. Further discretization of effects on groundwater – surface interactions are provided in this appendix, including surface water modelling nodes farther upstream of HF-01 in proximity to the site. Groundwater and surface water monitoring is proposed for all phases of the Project. Surface water model results are reported on a monthly basis, providing a consistent temporal framework for interpreting predicted changes in surface water conditions.*"	NRCan acknowledges the proponent's response to NRCan-04 (Table 1) provided by IAAC through ongoing permitting coordination. Building on our initial comment and the proponent's response, NRCan recommends that the proponent clarify whether volumetric or percentage changes were carried forward from the groundwater model to the receiver water balance model, and how those results are used. It is also recommended that the Groundwater Model Report be updated with maps and tables that allow comparison to the Receiver Water Balance Report. This information is required to assess the level of confidence in the groundwater model for the reaches assessed in the Water balance Report. No additional modelling is being requested.

		In review of the Draft Groundwater Numerical Model Report (WSP, 2025) Table 4-9, and Appendix I-3 Table 3-3 it is difficult to connect the values used in Table 3-3 to the results reported in Table 4-9. It is understood that the output from the numerical ground model has likely been assessed further to provide results such as DIX-1 through 5 in Table 3-3, but only Dixie Creek (without tributaries) in Table 4-9. However, where direct comparison is possible, such as for Unnamed water course 4 (UN-4), where Table 4-9 shows a change in groundwater flow of -85 m^3/day for the operations (Post MWP-Development) phase, Table 3-3 shows a change of -21 m^3/day. These differences make it difficult to assess the integration between the groundwater model and the receiver water balance model.	
NRCan-06	Hydrogeological Modelling Report (Appendix H-2), Section 4.2.3, Page 49-50	To mitigate the effects of groundwater seepage from the Tailings Management Facility (TMF), the TMF Pond, and the Mine Water Pond, the numerical groundwater model includes 3 pumping wells and large diameter (6ft) wet wells, to intercept seepage. The results of the numerical model indicate that one of these wells, Pump 1, captures 70% of the seepage from the TMF, and more than 60% of the seepage from the TMF Pond. Overall, the seepage collection infrastructure included in the groundwater assessment captures over 87% of the seepage from the TMF, resulting in a relatively small proportion of the groundwater seepage from the facility reaching the receiving environment (Dixie Creek). While these results are carried forward to the assessment of surface water quality, and fish and fish habitat, NRCan recognizes that following the impact assessment, an engineering and design phase will be required to ensure that the simulated capture efficiencies can be realized in the field. Ongoing site characterization, and continued monitoring, mitigation and adaptive management may be required to reduce risk and ensure the assessed fugitive seepage quantities are achievable.	NRCan recognizes that monitoring and adaptative management will be components of all phases of the project. As detailed design of the seepage collection system has been initiated, NRCan recommends that the design of the system meet the assumptions made in the impact assessment. Should design criteria differ, the impacts of the project should be reevaluated using the updated seepage capture efficiency.
NRCan-07	Geochemistry Summary Report (Appendix J), Mine Site Water Quality Modelling Report (Appendix K-2), Draft Assessment for Alternatives for Storage of Mine Waste (Appendix R), and Impact Statement, Section 4 (Alternatives Assessment) and Section 5 (Project Description and Activities).	To predict the effects of mining on water quality and fish habitat at the impact assessment stage, it is necessary to understand how mine materials may release deleterious substances and/or generate acidic drainage. This information is generated through a metal leaching and acid rock drainage (ML/ARD) characterization program based on crushed drill core material and pilot-scale tailings. The inventory and release rate of ML/ARD supports mine material management and mitigation planning to reduce risks to the environment. NRCan's level of confidence in the ML/ARD characterisation program (Appendix J) is high at this stage, despite some gaps in material characterisation. This confidence is accompanied by a key concern that more than 80% of excavated rock is Potentially Acid-Generating (PAG) or may release arsenic. NRCan considers that the risks associated with elevated PAG reactivity and arsenic leaching are not adequately evaluated to validate assumptions on	Considering that over 80% of excavated mine rock may generate acidity or leach arsenic, NRCan recommends that the geochemical characterization program and the ML/ARD source terms be updated regularly. See NRCan-01 (Table 2) for further information on gaps in material characterization. Consequently, NRCan recommends the following mitigation and follow-up measures as the project advances through design and permitting. **Address Data Gaps in the ML/ARD characterisation Program:** • Resolve missing material types and spatial data gaps through ongoing testing to meet MEND 1.20.1 guidance recommendations so that ECCC and DFO can adequately assess potential impacts on water quality, fish, and fish habitat; • Clearly identify ML/ARD characterisation gaps that will be filled when tailings and waste rock management areas are fully designed prior to the provincial permitting decision; • Develop a plan for ongoing mine material testing to ensure site water, and groundwater and surface water quality models, remain accurate and up to date during construction and operations, and support closure planning. **Develop and Update Models**

		material weathering behaviour and to appropriately inform mitigation strategies. Consequently, NRCan is concerned that this risk is not conservatively captured by the source terms, mine site water quality predictions (Appendix K-2). As such, the proposed mitigation measures may not be adequate to ensure protection of the environment during post-closure, which could require water treatment in perpetuity.	• Create detailed conceptual geochemical models for all material types used or managed on-site, integrating the latest mineralogical and geochemical data; • Develop a ML/ARD management plan for each mine material management facility and update this as new data are collected through the ML/ARD characterisation program, especially during construction and early operations; • Reevaluate assumptions and regularly update the source terms and the mine site, and groundwater and surface water quality models, during construction and operations. **Adaptive Management** • Ensure the mine material management plans include clear steps, triggers, decisions, and actions for the ongoing identification and management of all mined and processed materials. For example, the predicted maximum metal concentrations in water from each mine material management facility used to support the final permitting decision should serve as compliance criteria; • Use adaptive management, as needed, when new data become available to minimize risks to fish and fish habitat throughout the mine lifecycle. For waste rock and/or tailings management areas, exceedances of predicted maximum metal concentrations in drainage water (based on the model used for the final permitting decision) should trigger adaptive mitigation measures, where feasible. As noted in this review, one mitigation measure not considered by the Proponent is segregation of faster-reacting potentially acid-generating and metal-leaching excavated rock containing pyrrhotite and gersdorffite into a separate mine rock storage area for backfilling into the open pit. **Demonstrate Integration and Progress** • Show how data gaps in the mine material program will be addressed and how findings from updated studies will inform source terms, mine material management planning, and mitigation measures as the project advances.

Table 2. Identification of Outstanding Information Requirements and Clarifications in Relation to the Requirements of the Tailored Impact Statement Guidelines

Table 2 should be used to identify potential outstanding information requirements in the Impact Statement where information from the proponent is **both** 1) missing or unclear as prescribed by the Tailored Impact Statement Guidelines **and** 2) necessary to formulate advice (Table 1) to IAAC on matters that are likely to be material and relevant to decision-making[4]. Expert advisors should consider project context (see Enclosure 2 for more detail on key issues and targeted questions) and regulatory context and provide risk-proportional, solution-oriented advice.

Outstanding Information Requirement ID	Reference to Impact Statement	Reference to Tailored Impact Statement Guidelines	Description of Outstanding Information Requirement (Context and Rationale)	Advice to Proponent for Resolving the Outstanding Information Requirements
Please identify information requirement by organization and comment number. *e.g.: HC-02*	*Identify the specific section of the Impact Statement related to the information requirement*	*Identify the specific section of the Tailored Impact Statement Guidelines related to the information requirement*	*Provide a brief description of the outstanding information requirement in the Impact Statement, including:* • *why the information or studies are required to formulate advice to IAAC on matters that are likely to be material and relevant to decision-making.* *Include, where relevant:* • *how the outstanding information requirement relates to an adverse federal effect or to a public interest factor including outlining the relevant pathway of effect (see Enclosure 3 for more detail on the key effects and targeted questions);* • *identify the level of concern about the outstanding information and implications or consequences for strength of conclusions; and* • *advice to IAAC on risk (likelihood and severity of effects), using applicable frameworks relevant to your mandate.* *Identify if the outstanding information requirement links to specific advice provided to IAAC in Table 1.*	*Provide a clear and precise description of the missing information or clarification that would resolve the issue detailed at left.* *Also provide, where applicable, other commitments the proponent can make to respond to the issue, such as:* • *offsetting or mitigation to compensate for uncertainty in baseline;* • *follow-up to verify the accuracy of predictions and effectiveness of mitigation;* • *applicable guides, standards and thresholds the proponent intends to meet; and* • *measures the proponent intends to take to comply with other legislative frameworks that provide a means to address effects.*
NRCan-01	Geochemistry Summary Report (Appendix J) and Mercury Bioaccumulation Study for Downstream English River to Wabigoon System Waterbodies (Appendix T)	Section 8.3.1 (Page 42-43) and Section 8.6.2 (Page 54-58)	The Tailored Impact Statement Guidelines requires that the Impact Statement provide a geochemical characterization of expected mined or excavated materials, such as waste rock, ore, low-grade ore, pit wall materials, underground development ramps, process waste (i.e., tailings, treatment sludge), overburden, and potential construction material (i.e., mine rock, quarries, unconsolidated material) As outlined in Table 1 (NRCan-03), A clear understanding of mercury sources is fundamental to the assessment, as it underpins predictions of loading, supports the conceptual model, and reduces uncertainty in the effects assessment as it relates to mercury.	NRCan recommends that the proponent clearly identify sources of mercury in waste rock, tailings and ore, as well as mineral phases that host mercury based on the mineralogical characterization conducted. This is critical information needed to inform IA predictions as well as appropriate mitigation measures.
NRCan-02	Hydrogeology Baseline Report (Appendix H-1), Section 5.4, Page 54 and	Section 8.6.2, Page 55 to 56	NRCan recognizes that existing exploration drillholes complicated the analysis of hydraulic conductivity testing, particularly for fault and shear zones. However, the baseline hydrogeology report concluded that while the fault hydraulic conductivity is not as high as tests indicate, it is assumed that the fault hydraulic conductivity is roughly ten times that of the country rock. While the faults are separated from mine infrastructure and surface water features by low conductivity overburden sequences, the increased hydraulic conductivity has the potential to increase drawdown impacts for the LP Shear	NRCan recommends that an additional sensitivity analysis be conducted that includes enhanced hydraulic conductivity associated with the LP Shear Zone. These model results can be combined with monitoring, mitigation, and adaptive management to reduce the uncertainty related to groundwater drawdown associated with the open pit.

[4] Outstanding information requirements must be limited to information or clarifications that are necessary to formulate or substantially strengthen a conclusion related to decision-making, such as the extent to which federal effects are significant, the identification of appropriate mitigation and follow-up measures, and whether the federal effects are justified in the public interest. “Federal effects” means effects within federal jurisdiction and adverse direct or incidental effects (as defined in section 2 of the IAA). Public interest considerations are outlined in section 63 of the IAA. Comments can also be provided in relation to IAAC’s obligations under section 79 of the *Species at Risk Act.*

	Hydrogeology, Groundwater Model (Appendix H-2), Section 2.7, Page 13, and Section 4.4 (Page 52)		Zone which intersects the underground workings and underlies Dixie Creek. This zone was not included in the baseline numerical model. The Tailored Impact Statement Guidelines require a 3D numerical groundwater model that represents the baseline field data collected. The sensitivity analysis included the assessment of global increases in hydraulic conductivity for the shallow bedrock (factor of 5), and for the intermediate bedrock (factor of 10), resulting in demonstrated sensitivity of the model to bedrock hydraulic conductivity in terms of inflow to the open pit, and changes in discharge to Dixie Creek. As the field data suggests a zone of increased hydraulic conductivity associated with the LP Shear Zone, confidence in model results would be increased by an assessment of the effect of the fault zone on the changes in groundwater discharge to Dixie Creek associated with inflow to the open pit. These results could then add additional bounds to the uncertainty associated with the results carried forward to the assessment of fish and fish Habitat.	
NRCan-03	Hydrogeology Baseline Report (Appendix H-1), Section 5.4, Page 54 Hydrogeology, Groundwater Model (Appendix H-2), Section 2.7, Page 13, and Section 4.4 (Page 52) And Proponent Response shared by IAAC	Section 8.6.2, Page 55 to 56	In response to NRCan-04, the proponent indicated that: "*Despite its likely higher hydraulic conductivity, the transmissivity of the LP Shear Zone is overall much less than the generalized country rock due to its limited width / thickness in comparison to exposure of country rock in the overall shell of the open pit, which were modified as part of the sensitivity cases provided. As noted, the LP Shear Zone is overlain by lower permeability units, providing hydraulic separation from Dixie Creek. As such, it is not expected that sensitivity analyses incorporating the LP Shear Zone alone would yield increases in inflows to the open pit and / changes in baseflow to Dixie Creek to same degree as variation of the generalized bedrock zone already provided, although it is agreed a lesser degree of sensitivity would be likely. Additional sensitivity of the fault is therefore not required at this stage to assess the range flow reductions.*" The conceptual model for the LP Shear Zone cannot be applied to the Auro Fault which appears to also intersect the open pit and underlies Dixie Creek within the zone of influence of open pit dewatering. As stated in section 5.2 of the Baseline Hydrogeological Report (WSP 2025a), the brittle deformation occurred along the Auro fault, with portions of the fault acting as a conduit, with portions being gouge filled and potentially acting as a barrier. This conceptualization is consistent with the review by Bense et al. (2013) which found that brecciated faults in volcanic rock commonly display elevated hydraulic conductivity relative to host rock. Based on an analysis of Figure 5-7 (WSP 2025a), tests within the fault zone resulted in hydraulic conductivity estimates of ~3x10-7 m/s (at ~50 m depth), and ~8x10-6 m/s (at ~125 m depth). From this figure it is not clear whether these depths are from the top of bedrock, or from ground surface. Considering typical overburden thickness, this would likely place these intervals within the intermediate or deep bedrock placing the host rock hydraulic conductivity at 2x10-8 m/s and 2x10-9 m/s respectively (Groundwater Modelling Report (WSP, 2025b)). The information presented within the reports supports a conceptual model of the Auro fault as conductive with the potential to enhance drawdown associated with the open pit. Given the distribution of the monitoring wells, it is unlikely that the	NRCan acknowledges the response to NRCan-02 (Table 2) provided by the proponent and that the conceptualization of the effect of the LP Shear zone aligns with the information presented in the Impact Statement. NRCan would like to clarify that T2-NRCan-02 should have referred to the Auro fault. Based on NRCan additional review, it is recommended that the Auro Fault Zone be included in the numerical groundwater model and its impact on the calibration and forecast results be assessed. Inclusion of a fault zone within the model should require minimal effort but could increase confidence in the modelling results. In the absence of numerical modelling results it is recommended that the proponent provide a cross section following the fault trace, from the pit through Dixie Creek highlighting the overburden thickness, the fault depth, and underground workings and the conceptualization of the host rock hydraulic conductivity to support the conceptualization that the fault is unlikely to underdrain Dixie Creek.

			baseline groundwater model results would be sensitive to the inclusion of this fault zone in the numerical model, so it is plausible that the inclusion of this fault could impact the results of the forecast model, without altering the calibration of baseline model. This differs from the current sensitivity analysis, which would alter the baseline model calibration. Inclusion of the fault in the numerical model has the potential to increase the drawdown below Dixie Creek, without altering any other calibrated parameters. Bense, V.F., Gleeson, T., Loveless, S.E., Bour, O., and Scibek, J. (2013). Fault Zone Hydrogeology. Earth Science Reviews, 127 (2013) 171-192.	
NRCan-04	Hydrogeology, Groundwater Model (Appendix H-2), Section 4.2, Page 49-50	Section 8.6.2, Page 56	The Tailored Impact Statement Guidelines require particle tracking results from the numerical groundwater model. While the groundwater model report includes the results of the particle tracking exercise in terms of the ultimate discharge point, these results are not illustrated, so the path and timing of the discharge are unknown. Travel times and travel pathways for seepage from mine facilities are needed to assess potential monitoring and mitigation plans. These plans impact the ability to manage seepage and to mitigate any associated impacts to surface water quality and fish and fish habitat. NRCan acknowledges that the proponent has provided a response (Comment ID: GBR - 1 – 41) to NRCan-04 (previously Batch 2, Table 2, NRCan-04).	By providing the information in their response to NRCan-04 (previously Batch 2 NRCan-04), the proponent has met the requirements regarding particle tracking outlined in the Tailored Impact Statement Guidelines. The results demonstrate sufficient ability to monitor groundwater within the overburden / unconsolidated materials. NRCan recommends that the monitoring programs finalized through the provincial approvals process include monitoring in both overburden / unconsolidated materials, and bedrock where possible.
NRCan-05	Geochemistry Summary Report (Appendix J)	Section 8.3, Page 42-44	The Tailored Impact Statement Guidelines require the Proponent to complete a geochemical characterization of geological materials to be disturbed, exposed, and produced by mining (e.g., mine rock, ore, quarry rock, overburden, and tailings) to predict their potential to generate metal(loid) leaching (ML) and acid rock drainage (ARD) (ML/ARD) and develop source terms for the assessment of effects to fish and fish habitat. As per MEND (2009)[1] guidance, mine rock samples must be spatially and compositionally representative of the material to be disturbed by mining. The Proponent is commended on completing a comprehensive geochemical characterization program. However, NRCan noted the following gaps: • **Overburden:** sample coverage is lacking within the proposed footprint of various infrastructure, for example the Mine Rock Storage (MRS), Tailings Management Facility (TMF), TMF Pond, Mine Water Pond, and overburden stockpiles (Figure 7.2-1); • **Quarry rock:** the project description (Section 4.4.7.1) states that quarries may be developed as a source of construction rock, but quarry rock has not been sampled or tested; • **Mine rock:** deeper development areas of the underground mine and portions of the open pits that are not currently intersected by exploration drill holes, particularly the pit walls (Appendix B of Appendix J). These data gaps are typical at this stage of a project, due to site or material access, but the information is required to support project planning and engineering design. [1] MEND. 2009. Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials. MEND Report 1.20.1. Mining Environment Neutral Drainage Program, Natural Resources Canada. December 2009.	Sampling and testing of these materials is not warranted during the impact assessment process, but NRCan recommends that these data gaps be addressed to support engineering design as material becomes available. For project planning, NRCan recommends the development of a ML/ARD management plan that includes a description of each material type and its geochemical properties (continually updated with new test results as they become available), an approach to ML/ARD testing during construction and operations, procedures for mine material segregation and management based on ML/ARD risks, and a contact water monitoring program for each mine material facility used to trigger adaptive management. Recommended compliance triggers are maximum predicted concentrations of metals and acidity in contact water quality for each mine material management facility. Adaptive management is triggered when contact water quality exceeds the contact water quality predictions.

NRCan-06	Geochemistry Summary Report (Appendix J)	Section 8.3, Page 42-44	The Tailored Impact Statement Guidelines require an evaluation of the ARD potential of mine rock and construction materials following MEND (2009) guidance, to inform mine rock management plans and segregation of Non-Potentially Acid Generating (NPAG) and Potentially Acid Generating (PAG) material. NRCan commends the Proponent on a comprehensive characterization program with a significant sample population that instils confidence in the determination of materials with key ML/ARD static attributes (arsenic, sulfur, and neutralization potential), and their integration into the block model for refined estimates of material volume, sequencing, and spatial distribution. Based on this, approximately 80% of the tested material is Potentially Acid Generating (PAG). Advanced mineralogy and laboratory and field kinetic tests further refine the understanding of mineral hosts, reactivity, and the potential timing to onset of acidic conditions. Extensive mineralogy analysis identified pyrite and pyrrhotite as the main sulfide minerals and sources of acid generation. Pyrrhotite is known to react much faster than pyrite and could result in a shorter lag time to the generation of ARD. The timing to ARD depends on various factors including neutralizing capacity, grain size, temperature, oxygen exposure, and biological processes, and is thus different for each material type under various environmental conditions. The Proponent also considers that galvanic reactions may be reducing the rate of sulfide mineral oxidation and acid production in the tested material. A conservative estimate of the lag time until PAG material could generate ARD is critical for mine waste and water management planning. The standard approach calculates lag time on laboratory kinetic test results, assuming the 35 samples adequately represent the heterogeneity of 8 lithologies. The theoretical approach is based on pyrite and does not consider the increasing rate of acid production once ARD has commenced, nor does it account for the faster reaction times of pyrrhotite that is present in most lithologies. The Proponent projected the calculated lag times onto the larger dataset and block model, using static attributes like total sulfur as a surrogate for potential predictions of ARD. This approach is standard practice and appropriate for the impact assessment stage. However, optimistic and generic assumptions in the methodology could underpredict the timing of ARD onset at the site. It is currently estimated that mine rock will not produce ML/ARD prior to covering the Mine Rock Storage (MRS). Similarly pit walls will not produce ML/ARD prior to final submergence of LP Central Pit in post-closure. However, the mine material management plan should account for ML/ARD initiating sooner than predicted. Overestimating the delay until ARD develops, not only has implications for mine material management planning and water treatment design, but also directly impacts the source terms and assumptions in the water quality predictions. As such, the potential effects to the environment may be underestimated.	As the project advances, and in addition to ongoing updates to source terms and site water quality models based on new information (Table 1 NRCan-04), NRCan recommends the following: **Ongoing testing:** continued testing should focus on addressing uncertainties in the estimates for ARD lag time including the effect of galvanic reactions on acid production rates. Mineralogy and on-site barrel and pile tests are particularly recommended to augment the understanding of acid production and neutralization rates under field conditions. Until on-site test results are available for acid-generating materials with a variety of mineralogical properties for Acid Potential (AP) and Neutralisation Potential (NP), consideration should be given to conservatively accounting for pyrrhotite oxidation rates in the current theoretical calculations on laboratory test results. **PAG management units:** NRCan agrees with the approach to incorporate findings into the block model and stresses the importance of continuing to refine the discreet PAG management units (e.g., more immediately reactive versus longer lag times) to inform segregation and proactive mine rock management. NRCan recommends that these units be mapped in the block model based on statistically and scientifically robust linkages between static attributes in the block model and results of the advanced geochemical testing. **Spatial distribution and management of high-pyrrhotite materials**: assessment of spatial distribution of sulfide-rich material across the deposit, particularly pyrrhotite is recommended. If segregation is feasible, this material could be managed separately to address potentially faster development of ARD. NRCan recommends the material not be placed within the MRS in a location where it could generate an ARD ‘hot spot’, such as the sides or top of the MRS, or in areas where it may be exposed for extended periods of time prior to the implementation of mitigation measures. Lastly, understanding the presence of this material on exposed pit walls and benches is critical, and implications for pit lake water quality in post-closure. **Adaptive management:** until uncertainties around acid generation are resolved, NRCan recommends that the Proponent consider more conservative estimates to the timing of ARD within the mine plan. Additionally, NRCan recommends that the ML/ARD Management Plan clearly document operational monitoring to identify and segregate PAG materials and adaptive management, should ARD be generated earlier than anticipated.
NRCan-07	Geochemistry Summary Report (Appendix J) and Mine Site Water Quality Modelling	Section 8.3, Page 42-44	The Tailored Impact Statement Guidelines require a conceptual approach to operational testing to identify and manage PAG and/or ML mine materials and to identify non (N)PAG/ML materials for construction use. A decision tree identifies the approach and thresholds (Figure 4-1 Appendix K-2) with the rationale described in Appendix J.	The proposed development of a total arsenic threshold is a valid approach for operational segregation of PAG/ML and NPAG/non-ML waste. However, based on data available at this stage of project planning, NRCan recommends using more conservative thresholds until they can be validated against site conditions.

	for Mine Operations and Closure (Appendix K-2), Figure 4-1, Page 57		NPAG rock must be tested to identify material with elevated arsenic leaching potential. Although arsenic enrichment is determined from solid phase concentrations, this does not necessarily indicate elevated release rates, which are evaluated by kinetic testing. For screening only, release rates are compared to the provincial water quality objectives for aquatic life (PWQO) interim arsenic value (0.005 mg/L) as "…the [column] tests are not a direct assessment of mine water quality and comparisons to screening criteria hold no regulatory significance" (Appendix J page 5-114). To identify NPAG/non-ML materials suitable for construction, the Proponent proposes three solid phase arsenic thresholds based on the observed relationship between solid phase arsenic content and kinetic test leachate concentrations (Figure 5.5-15), where leaching risk is identified by leachate concentrations above the PWQO interim value. Although consistent with expectations at the impact assessment stage, NRCan is concerned that this approach could result in the overestimation of NPAG/non-ML rock for construction, and the underprediction of arsenic leaching potential in the source terms and site-water quality models, including: • **Arsenic host mineralogy**: advanced testing on a subset of samples shows that arsenic is hosted in pyrite and arsenopyrite, with minor gersdorffite in metasediment, basalt, and fragmental rocks. Due to higher reactivity of gersdorffite (by an order of magnitude[1]), its presence elevates the arsenic leaching risk. This is consistent with higher arsenic kinetic test leachate concentrations relative to solid-phase arsenic for six samples (Figure 5.5-15); NRCan notes these samples are from the underground area (Appendix B). NRCan is concerned that gersdorffite, even if present in small volumes of material, is being disregarded as not representative of the bulk of the NAG materials, as noted regarding elevated arsenic leachate concentrations from FLB-10 (page 5-149) and threshold rationale for basalt (Section 5.5.5); • **Arsenic precipitation on iron oxyhydroxides:** Section 5.5.5 describes conceptual arsenic attenuation mechanisms through adsorption onto iron oxyhydroxides. Although valid in theory, this assumes ideal mixing of arsenic-rich materials with contact waters and long-term stability of the appropriate redox conditions; • **Threshold values approach:** this relies on limited empirical laboratory kinetic leach tests compared to the interim PWQO, despite acknowledgement these tests are not direct indicators of mine rock water quality. Because this approach has not been tested at scale in the mine environment, and relies on small sets of samples, these thresholds remain theoretical and refinement by rock type may create a false sense of precision. Sample representativeness is also a concern; for example, most NPAG/NML basalt material comes from Underground (Table 5.5-8) and it appears that gersdorffite bearing samples come from the underground area, yet thresholds appear to rely on broader datasets that include open pit area samples; • **Feasibility of segregation:** the Proponent did not discuss the feasibility of physically segregating arsenic-leaching materials from NPAG/NML materials.	NRCan also recommends ongoing testing to refine understanding of gersdorffite distribution spatially and geologically, to assess the feasibility of segregation or to identify localized areas (e.g., underground) that should be avoided for construction use. The sequencing and volumes of NPAG/non-ML materials should be assessed to confirm availability and the potential need for quarry materials. Targeted testing of key NPAG/non-ML lithologies proposed for construction is also recommended to strengthen the laboratory dataset used to develop thresholds. NRCan recommends that thresholds be updated and refined as new data become available from the ongoing geochemical characterisation program, larger-scale field testing, on-site management of advanced exploration waste materials, and early mine rock handling during construction. Without these refinements, NPAG/non-ML volumes for construction may be overestimated, increasing the risk of PAG and/or ML materials being used for construction purposes.

			[1] Chopard, A., M. Benzaazoua, B. Plante, H. Bouzahzah, and P. Marion. 2015. Kinetic Test to Evaluate the Relative Oxidation Rates of Various Sulfides and Sulfosalts. 10th International Conference on Acid Rock Drainage & IMWA Annual Conference. Santiago, Chile.	