

## Review Comment Table

<b>Board:</b>	MVLWB
<b>Review Item:</b>	DIAND-GIANT - Preliminary Screening Information â€™ MV2019X0007 and MV2007L8-0031 (4 of 7)
<b>File(s):</b>	<a href="#">MV2007L8-0031</a> <a href="#">MV2019X0007</a>
<b>Proponent:</b>	DIAND - GIANT
<b>Document(s):</b>	<a href="#">Preliminary Screening Document (Proponent)</a> (1.03 MB) <a href="#">Preliminary Screening Document (Board Staff)</a> (325.32 KB) <a href="#">Technical Session Presentations</a> (20 MB) <a href="#">Technical Session Agenda</a> (5 MB) <a href="#">Technical Session Agenda Update</a> (5 MB)
<b>Item For Review Distributed On:</b>	Apr 10 at 13:34 <a href="#">Distribution List</a>
<b>Reviewer Comments Due By:</b>	May 30, 2019
<b>Proponent Responses Due By:</b>	June 25, 2019
<b>Item Description:</b>	<p>This is Review item number 4 of 7 associated with the Giant Mine Remediation Project. On April 8, 2019, an e-mail was distributed to the Giant Mine distribution list, providing a detailed explanation of the Online Review System (ORS) plan for the Giant Mine Remediation Project. If you did not receive an e-mail or require additional information, please contact Board staff identified below.</p> <p><b>Instructions</b> The Giant Mine Remediation Project underwent an Environmental Assessment (EA) by the Mackenzie Valley Environmental Impact Review Board (MVEIRB) that was approved by the responsible Minister, with the addition of various measures to mitigate significant adverse impact. Subsequently, the Mackenzie Valley Land and Water Board (MVLWB or the Board) issued an Information Request related to the</p>

implementation of the Report of Environmental Assessment (EA 0809-001 or REA) measures. The Giant Mine Remediation Team (GMRT) has submitted its response.

In order to ensure that the requirements of Part 5 of the Mackenzie Valley Resource Management Act (MVRMA) have been met, the Board needs to confirm that the development described in GMRT's Post-EA Information Package has not been modified from the development that underwent EA. If the development has not been modified, then it is exempt from preliminary screening in accordance with the Exemption List Regulations; otherwise, the Board must conduct a screening.

Board staff note that the EA was not inclusive of the following aspects of the Giant Mine Remediation Project, and recommends that they be screened by the Board:

- Remediate open pits by backfilling with clean borrow material sourced and produced from site, or with contaminated material and a layer of clean borrow material placed over the contaminated material;
- Partially excavate the Shoreline Lands including shoreline soils and near-shore sediments along the townsite area, to the foreshore tailings cover;
- Fence forested terrain, wetlands, and bedrock areas to encompass area most impacted by Roaster emission fallout that has contaminated surficial materials;
- Relocate tailings in South Pond and consolidate in North and Central Ponds;
- Dispose of spent ion exchange adsorptive media in the onsite landfill;
- Quarry onsite for required rock material;
- Install a freshwater intake in Yellowknife Bay;
- Construct a long-term underground access; and
- Partially raise the minewater elevation in underground mine workings.

Reviewers may also identify any additional Project changes beyond those listed above, to ensure all aspects of the Project that require screening are considered.

Please provide comments and recommendations on the following components of the Post-EA Information Package including:

- Preliminary Screening Document (Proponent); and

	<ul style="list-style-type: none"> <li>• Draft Preliminary Screening Document (Board staff)</li> </ul> <p>Reviewers are encouraged to provide comments and recommendations on impacts and mitigation measures related to the Project changes identified in the Post-EA Information Package, including relationships between the changes and the rest of the Project. This information will assist the Board in completing the preliminary screening.</p> <p>Board staff would also like to note that further supporting documentation can be found in ORS reviews:</p> <ul style="list-style-type: none"> <li>• DIAND-GIANT - Land Use Permit Application – MV2019X0007 (1 of 7)</li> <li>• DIAND-GIANT - Water Licence Post-EA Information Package – MV2007L8-0031 (2 of 7)</li> <li>• DIAND-GIANT - Management Plans Group 1 (Standard) – MV2019X0007 and MV2007L8-0031 (3 of 7)</li> <li>• DIAND-GIANT - Closure and Reclamation Plan – MV2019X0007 and MV2007L8-0031 (5 of 7)</li> <li>• DIAND-GIANT - Management Plans Group 2 (Water) – MV2019X0007 and MV2007L8-0031 (6 of 7)</li> <li>• DIAND-GIANT - Management Plans Group 3 (Other) – MV2019X0007 and MV2007L8-0031 (7 of 7)</li> </ul> <p>The documents that have been uploaded to this review are also available on our public Registry.</p> <p>If you have any questions or comments about the ORS or this review, please contact Board staff identified below:</p> <p>Shannon Allerston 867-766-7465 <a href="mailto:sallerston@mvlwb.com">sallerston@mvlwb.com</a>  Tyree Mullaney 867-766-7464 <a href="mailto:tyree@mvlwb.com">tyree@mvlwb.com</a>  Kimberley Murray 867-766-7458 <a href="mailto:kmurray@mvlwb.com">kmurray@mvlwb.com</a></p>
<b>General Reviewer Information:</b>	<p>The following organization has received this review by fax:</p> <p>NWT Metis Nation  Tim Heron NWTMN IMA Coordinator (867) 872-3586</p>
<b>Contact Information:</b>	<p>Kim Murray (867) 766-7458  Shannon Allerston 867-766-7465  Tyree Mullaney 867-766-7464</p>

## Comment Summary

DIAND - GIANT (Proponent)				
ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Staff Response
1	General File	<b>Comment</b> <a href="#">(doc)</a> ORS 4 - Attachment 1 - Contaminated Soils Response <b>Recommendation</b>		
2	General File	<b>Comment</b> <a href="#">(doc)</a> ORS 4 - Attachment 2 - June 24 E-mail from City of Yellowknife <b>Recommendation</b>		
City of Yellowknife: Kerry Penney				
ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Staff Response
1	Preliminary Screening Document (Project) - Table 3-1	<b>Comment</b> The Dust Management Plan is not particularly clear on what mitigations are going to be enacted when - it uses a lot of qualifiers. For instance, regarding movement of soils, it notes that "Physical coverings (Table 3.3-1) will be considered". This notes that mitigations will be employed at all times during movements. <b>Recommendation</b> Other than speed limits, what mitigations will be employed? If they are contingent on circumstances, what are the triggers or thresholds that would apply? [can be answered within responses to Part 7 as well]	<b>June 25:</b> The GMRP would like to note that the following attachment provides feedback from the City of Yellowknife to the responses to their reviewer comments below: ORS 4- Attachment 2 : June 24 E-mail from the City of Yellowknife. As is current practice, each day during remediation activities, a review of expected weather conditions and daily scopes of work with the MCM and all subcontractor supervisors will be conducted to ensure the appropriate dust control measures are implemented to prevent dust migration. Weather conditions inform the rate at which water is needed to be applied to specific tasks. Mitigations employed on site include: water and approved dust suppressant application (proactively and as required), strategic	

			<p>placement of water trucks, minimizing areas of exposed media which could become airborne, continuous presence on-site to monitor for dust, real-time air quality monitoring at strategic locations around the site perimeter (and activity specific air quality monitoring as required) and respecting wind forecasts. As noted in the text preceding Table 3-1 in the Preliminary Screening Document, specific mitigations on a project-specific (or closure activity) component will be included in Design and Construction Plans. For open pit backfill, for example, mitigation measures will follow site-wide dust mitigation measures as outlined in the Dust MMP including strategic use of water, maximizing favourable weather, and minimizing the amount of exposed or stockpiled area. Mitigations specific to the media and methods for depositing the material in the open pits will be included in a construction plan. On-site Security are responsible for patrolling all areas throughout the site. There are approximately 60 locations in which security check in to, and this is done at a minimum of five times daily. As required, the frequency of patrols can be increased to identify any areas of concern. Their presence is critical in noticing any unusual activity in locations around site. Security always has direct contact with any incident response leaders to provide immediate action. Action levels (for wind, dust, and for air monitors) and corresponding mitigations are outlined in the Dust MMP. Final</p>	
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			implementation measures will be developed on a project specific basis and will be further developed during the detail design stage of remediation projects.	
2	Preliminary Screening Document (Project) - Table 3-1	<p><b>Comment</b> The project later notes that these mitigations will be presented in the Design and Construction Plans for review.</p> <p><b>Recommendation</b> Given this, how can they state that mitigations be implemented at all times?</p>	<p><b>June 25:</b> Dust management best management practices are currently in place and will remain so. The MCM is in control of all activities occurring on-site at all times. Monitoring of dust on site is controlled by professional companies who are always in direct contact with the appropriate incident response team, led by the MCM, for action, including dust exceedances. Details of activity-specific mitigation will be articulated in each Design and Construction plan. These specific mitigation measures will be guided by the Dust Management and Monitoring Plan.</p>	
3	Preliminary Screening Document (Project) - Table 3-1 #4	<p><b>Comment</b> The project states that they intend to contour the pit wall to a grade that is safe, but dissuades human use.</p> <p><b>Recommendation</b> Criterion P2-3 states that the project will regrade to an "appropriate slope" and notes that further engineering work is required. Given the straightforward intention, it's not clear criterion cannot be used here. - What engineering work is underway to determine what is safe but dissuades use? What guidelines or standards are the engineers basing their work on?</p>	<p><b>June 25:</b> Pit closure design work is ongoing which includes applying geotechnical engineering that will consider the geotechnical characteristics of quarried durable greenstone rock available at the Giant Mine site to determine the steepest stable fill slope that can be practicably constructed.</p>	

4	Preliminary Screening Document (Project) - Table 3-1 #5	<p><b>Comment</b> This modification is not simply altering the activity being considered. The current proposal is a major downgrade from the goals of the plan assessed at the EA - to "Restore Baker Creek to a condition that is as productive as possible, given the constraints of hydrology and climate."</p> <p><b>Recommendation</b> The City does not support this modification and recommends that the Board require the project to adhere to the original aspect of the assessed project. This reclamation is not simply about doing things, it's about achieving desired results. Returning Baker Creek to a productive state would be a positive outcome of the project, rather than just minimizing risk. Moreover, there is no material reason to debase the goal, particularly given the project's success with the rehabilitation of lower Baker Creek - that work shows that this is reasonably achievable.</p>	<p><b>June 25:</b> The GMRP considers this modification to be an improvement from the DAR and to substantially contribute to the Project's efforts to meet Measure 11b "minimize the exposure of fish in Baker Creek to arsenic from existing contaminated sediments on the minesite.". This modification was supported by many participants during Surface Design Engagement, at which the City was a participant. Project objective BD-5 is intended to meet the original objective from the DAR and the GMRP is confident that the Fisheries Act Authorization and associated monitoring plans will include a robust monitoring program following remediation to ensure Baker Creek is returned to a well-functioning ecosystem.</p>	
5	Preliminary Screening Document (Project) - Table 3-1 #18	<p><b>Comment</b> It is premature to assert that there have been no significant concerns or environmental impacts.</p> <p><b>Recommendation</b> First, some parties asked for this to be excised from this part of the water license -</p>	<p><b>June 25:</b> The GMRP has submitted modification #18 as a potential modification depending on the outcome of the RRP. The GMRP's position is that significant public concern is not anticipated with pursuit of the RRP. The GMRP acknowledges public concerns</p>	

		<p>the proposal under review is already a major review. To evaluate the implications of the mine water raise at the same time instead of as a later amendment complicates the matter. The City would like the review of the Research Reclamation to be deferred for one year. Secondly, it is premature to say that there are no significant concerns prior to the research being commenced. At a minimum, there are repeated and multi-party concerns brought forward during the environmental assessment.</p>	<p>were expressed through the EA of a minewater raise. These are documented in the Report of EA. However, these were in relation to the proposal to allow the minewater to rise to a natural static level near surface, which is not what is proposed in Modification #18. The GMRP is not proposing raising the elevation of the mine pool to a surface spill point, only raising the level within the mine to a point, if identified, that has environmental benefits and reduces long term maintenance, in keeping with the Project's goals, and only after completion of the RRP and subsequent approvals.</p>	
6	<p>Preliminary Screening Document (Project) - Table 3-1</p>	<p><b>Comment</b> The project barely addresses the fact that the majority of the site will now no longer be remediated and will instead be left as is.</p> <p><b>Recommendation</b> The project must present sufficient information to address the modification that more than half the site is being left unremediated and will remain a risk in perpetuity. It will feature an unknown quantity of land that will contain areas up to 3000 parts per million of arsenic. This level of contamination is an order of magnitude higher than was assessed.</p>	<p><b>June 25:</b> The GMRP's position is that the impacts of this modification have been thoroughly assessed and this information is provided in the Water Licence documents. The Project disagrees with the reviewer statement that "the majority of the site will now no longer be remediated". In contrast, the GMRP asserts that the CRP is a significant improvement from the DAR, and moreover risk management is a standard practice for contaminated sites. The CRP is proposing significant increases in volume of soils to be remediated compared to what was proposed in the DAR (i.e. DAR identified 328 000 m3 of material for excavation/covers whereas the CRP has identified 1.3 million m3 of material to be excavated or capped). In addition, the townsite area will now be excavated to meet a residential</p>	

			<p>soil standard, rather than industrial. It is also not accurate to state that the level of contamination is "an order of magnitude higher than what was assessed". The average concentration of soils outside of the fenced area is approximately 747 mg/kg, compared to the industrial soil criteria of 340 mg/kg assumed in the DAR. The GMRP has assessed and engaged on risks associated with existing profile of contamination on the site directly as a result of Measures from the EA, i.e. Measures 5 (Quantitative Risk Assessment in progress), 9 (Health Study in progress), 10 (HHERA complete) and 26 (Surface Design Engagement, engagement on HHERA / CRP). The GMRP is of the opinion that this activity has been thoroughly assessed and the public concerns around risk and health have been and continue to be mitigated through the Measures of the EA. For these reasons, the GMRP continues to recommend that the activity should be included in pre-screening and addressed through the Water Licence process. Please see ORS 4- Attachment 1 : Contaminated Soils Response for a more detailed review the characterization and treatment of contaminated soils from the DAR to the CRP.</p>	
7	<p>Preliminary Screening Document (Project)</p>	<p><b>Comment</b> The project barely addresses (as a side effect of the fencing) the majority of the site will now no longer be remediated and will instead be left as is. <b>Recommendation</b> Instead of a long term solution to reduce the risk</p>	<p><b>June 25:</b> Please refer to the response to City of Yellowknife: Kerry Penney #6.</p>	

		associated with the surface, the majority of the site will be left as is with arsenic levels significantly higher than what was assessed. This change must be presented, with the commitments and a review of the actions to be taken to fill the void between the assessed project (at EA, industrial standard) and the current proposal (as is, very high arsenic levels)		
8	Preliminary Screening Document (Board)	<p><b>Comment</b> As with the Project's Preliminary Screening Document, the board doesn't consider the changed scope to the majority of the surface.</p> <p><b>Recommendation</b> The Board must ask the project to directly address the largest change of scope. The project has to present their position - it cannot ignore the issue.</p>	<b>June 25:</b> Please refer to the response to City of Yellowknife: Kerry Penney #6.	
<b>Giant Mine Oversight Board: GMOB Giant Mine Oversight Board</b>				
ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Staff Response
1	General File	<p><b>Comment</b> <a href="#">(doc)</a> GMOB Comments Cover Letter</p> <p><b>Recommendation</b></p>		
2	General File	<p><b>Comment</b> <a href="#">(doc)</a> Slater Environmental Consulting Memo referenced in GMOB Comments</p> <p><b>Recommendation</b></p>		

3	Board Staff's draft Preliminary Screening Document - general comment	<p><b>Comment</b> GMOB reviewed Board staffs' conclusions about which of the proposed Project changes should be part of the preliminary screening scope.</p> <p><b>Recommendation</b> GMOB agrees with the Board staff's assessment of proposed Project changes to include in the preliminary screening scope.</p>	<p><b>June 25:</b> GMRP has commented on the Board staff's assessment of proposed Project changes to include in the preliminary screening scope. Please refer to the response to MVLWB: Shannon Allerston #1 for additional details.</p>	
4	Preliminary Screening - Potential modification #2 - raise in minewater elevation	<p><b>Comment</b> The GMRP has proposed a Reclamation Research Plan (RRP) to evaluate the potential for raising the underground minewater elevation above the 750 L.</p> <p><b>Recommendation</b> At this time, there is not enough information to assess the impacts of an elevation in the minewater level. GMOB has recommended that a condition be added to the water licence requiring Board approval of any raises in the underground minewater level based on the results of the RRP.</p>	<p><b>June 25:</b> The GMRP acknowledges that information regarding potential impacts is limited. The GMRP has provided an RRP, which outlines the studies and tests the GMRP will undertake to address these uncertainties. The GMRP anticipates that at a minimum changes to the Water Management Plan will be required for approval if the GMRP proposes to proceed with a minewater raise. The GMRP anticipates that the Board will identify what, if any, further approvals will also be required once a better understanding of the proposed activities is understood.</p>	
5	Modification #9 - Expansion of fenced area to encompass areas most affected by Roaster depositions	<p><b>Comment</b> The original closure plan presented in the DAR committed to remediate the surface of the site to the industrial land-use guidelines under the NWT Environmental Protection Act (i.e., 340 mg/kg). The DAR did not distinguish between disturbed and un-disturbed soils (i.e., the entire site was to be remediated</p>	<p><b>June 25:</b> The GMRP considers the perspective of the reviewer that the DAR committed to excavate the surface of the site to the industrial land-use guidelines to be inaccurate. The DAR clearly identified areas for excavation in the developed areas only (not the bedrock/forest/wetland terrain), and provided an estimate of volume of soils to be excavated (328 000 m3). ORS 4- Attachment 1 : Contaminated</p>	

		<p>to the industrial criterion). The revised plan presented in the CRP indicates that the industrial criterion will be applied only to the disturbed areas of the site. In general, the GMRP proposes that undisturbed soils will not be remediated. Undisturbed soils with arsenic concentrations above 3,000 mg/kg will be fenced and areas below this concentration will be accessible to human and ecological receptors. Receptors will therefore be exposed to arsenic concentrations that are up to 3,000 mg/kg (i.e., 9X the criterion specified in the DAR).</p> <p><b>Recommendation</b> Intuitively, the change in approach to the management of undisturbed contaminated soils will result in arsenic exposures that are greater than those that were assessed during the EA process. To ensure all parties are aware of the implications of this proposed change, GMOB suggested in our pre-engagement comments that the incremental risks be quantified and reported in the CRP along with a detailed description of the rationale for the change. We also suggested that the GMRP provide a rationale that clearly indicate why the DAR concept is no longer</p>	<p>Soils Response outlines the development in site characterization since the DAR and, the rationale for risk-managing the bedrock/forest/wetland terrain. The GMRP did not initially provide this analysis as per the reviewer's request because this was not a valid comparison as the DAR never calculated a human health risk based on recreational use. Human health risks due to exposure were ruled out of the 2006 risk assessment because of the assumption of industrial land use. The GMRP has requested the HHERA consultants complete the analysis requested. At a very high level (i.e preliminary results only) the difference to incremental cancer risk between 747 mg/kg and 340 mg/kg as an average soil concentration, with the same assumptions regarding land use is <math>1.1 \times 10^{-5}</math> (0.000011). Both risks i.e. that assuming 340 mg/kg and 747 mg/kg result in the same general risk level of very low as defined in the HHERA (i.e. between <math>1 \times 10^{-5}</math> and <math>1 \times 10^{-4}</math>). Further comparisons between the risk assessment in 2006 and the HHERA (2018) are provided in ORS 4 - Attachment 1 : Contaminated Soils Response.</p>	
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		<p>preferred (i.e., why it does not meet the closure objectives). GMOB maintains that the request is reasonable and appropriate given the proposed change to the project (as compared to the project that was evaluated in the DAR).</p>		
6	<p>Modification #9 - Expansion of fenced area to encompass areas most affected by Roaster depositions</p>	<p><b>Comment</b> GMOB agrees with the evaluation provided by Slater Environmental Consulting (SEC) in section 3.1 of its May 2019 "Review of Post-EA Information Package" (see attached). SEC states: "The scope and potential effects of changes to the plan for soil remediation from what was proposed in the DAR is not fully addressed in the list of modifications described by the GMRP and not considered in the MVLWB Draft Preliminary Screening Document. The expanded scope is not about what activities will be done as part of the remediation (e.g., construction of a fence) but rather about activities that the GMRP will not include (i.e., remediation of all contaminated soil)". The SEC memo provides additional thoughtful discussion about the challenges regarding administrative controls (including messaging and risk management of human activities).</p>	<p><b>June 25:</b> As stated in the response to Giant Mine Oversight Board: GMOB #5, the GMRP considers the perspective of the reviewer that the GMRP committed to excavate the surface of the site to the industrial land-use guidelines to be inaccurate. The DAR clearly identified areas for excavation in the developed areas only (not the bedrock/forest/wetland terrain), and provided an estimate of volume of soils to be excavated (328 000 m<sup>3</sup>). ORS 4 - Attachment 1 : Contaminated Soils Response outlines the development in site characterization since the DAR and, the rationale for risk-managing the bedrock / forest / wetland terrains. The GMRP considers restrictions to land use on the Project site to align with recreational uses as assumed in the HHERA sufficient to mitigate potential effects. The GMRP anticipates that engagement with stakeholders on the framework for the Perpetual Care Plan will include discussions on methods for risk management of these soils outside of the Core Industrial Area fence. The GMRP will also work to align risk management with off-lease risk management efforts. The GMRP cannot develop the approach to managing these areas in isolation of its</p>	

		<p><b>Recommendation</b> GMOB recommends that further discussion is necessary about how to mitigate the potential effects of this modification to the Project.</p>	<p>stakeholders, Indigenous partners, the Government of Northwest Territories (GNWT) and the City of Yellowknife. Furthermore, as stated in the response to Slater Environmental Consulting: Bill Slater #6 The risk management activities will require the co-proponents to use broader government authority, not constrained by the scope of authority currently granted to the GMRP. An example of these kinds of actions is that Chief Public Health Office of the Department of Health and Social Services issued their first health advisory for residents and visitors about precautions they can take to avoid exposure to elevated arsenic levels found in some of the lakes/areas located around Yellowknife in 2016, with subsequent annual updates being informed by university research etc, in addition to including the results from the 2018 GMRP HHERA, which not only assessed risk on the Giant Mine Site, but to residents in general from Yellowknife, Ndilo and Dettah using and harvesting from the land around the Site. The advisory can be found at <a href="https://www.hss.gov.nt.ca/en/newsroom/arsenic-lake-water-around-yellowknife">https://www.hss.gov.nt.ca/en/newsroom/arsenic-lake-water-around-yellowknife</a> .The GMRP will support, align and improve similar risk management practices moving forward.</p>	
<b>MVLWB: Shannon Allerston</b>				
<b>ID</b>	<b>Topic</b>	<b>Reviewer Comment/Recommendation</b>	<b>Proponent Response</b>	<b>Board Staff Response</b>

1	Preliminary Screening Exemption	<p><b>Comment</b> In the Preliminary Screening Document submitted by GMRP it states that: "It is respectfully submitted that, with the exception of modifications that are determined not to be within approved scope, the GMRP be exempted from preliminary screening, as per Schedule 1, Part 1, paragraph 2.1 of the Mackenzie Valley Resource Management Act Exemption List Regulations." It is noted that, on page 10, GMRP states that modifications #1, 5, 12 and 13 do not need to be screened as they are "in direct response to an EA Measure or were previously assessed as part of the EA and are within scope". For modifications #2 to 4, #6 to 11, part of modification #13, modification #16, GMRP states that the activities "satisfy the Scope of Activities as defined in the EA, but are a change in closure activities from those proposed during the EA." Board staff also included an analysis of what modifications could be project changes that need to be included in the scope of the preliminary screening.</p> <p><b>Recommendation</b> Please confirm that that the GMRP Team believes that modifications #1, 5, 12 and 13</p>	<p><b>June 25:</b> The GMRP revises its earlier conclusions on preliminary screening of modifications based on the Board staff's conclusions. The GMRP maintains that modifications #1, 5, 12 and 13 do not need to be included in the preliminary screening. The GMRP agrees with the Board staff's assessment that modifications # 6, 8 and 10 can also be excluded from the preliminary screening. Therefore, the GMRP posits that modifications 1, 5, 6, 8, 10, 12 and 13 should be excluded from the preliminary screening. The GMRP agrees with the Board staff's recommendation that potential modifications 1 and 3 do not require preliminary screening. There is one modification on which the GMRP and the Board staff's recommendations do not align. The Board staff have indicated that modification #12 should be included in the preliminary screening, whereas the GMRP concluded that it was already considered within the scope of the Environmental Assessment (EA) and therefore does not require preliminary screening. The Board staff indicate that the specific activity not included in the EA is the disposal of spent ion-exchange media in the on-site landfill. The GMRP agrees this specific waste was not identified in the DAR (because the requirement to use ion-exchange media is a result of a Measure); however, the ion-exchange media will meet the classification of non-hazardous waste and is therefore no different than any of the other kinds of waste previously identified in</p>	
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		are the only modifications that do not require to be included in the preliminary screening.	the DAR including the on-site disposal of sludge from the water treatment plant.	
2	Partial controlled raise of the minewater elevation in underground mine workings mitigations	<p><b>Comment</b> In Giant's Preliminary Screening Document for modification #18 it states that "Detailed mitigations will be proposed with a submission to the MVLWB to proceed with minewater level rise, should it be determined feasible by the results of the RRP". Further, mitigations associated with minewater quality that are in Tables 4-3, 4-4 and 4-5 are referenced.</p> <p><b>Recommendation</b> Please indicate any known broad mitigations associated with this potential activity that could be used in the Preliminary Screening document.</p>	<p><b>June 25:</b> Potential impacts associated with a mine water raise could include changes to minepool chemistry and the induction of instabilities in the underground that may or may not propagate to surface. The GMRP has confirmed through hydrogeologic modeling that the mine will continue to act as sink until the mine pool is higher than the elevation of Yellowknife Bay, therefore impacts to surrounding water bodies are considered very unlikely. The primary purpose of the RRP is to better understand potential impacts and plan mitigations accordingly. The GMRP has conceived mitigations in support of the mine water raise trial proposed in the RRP. These would also be applicable if Modification #18 was selected to advance. If unexpected conditions are measured or observed during a potential, short-term mine water elevation raise, possible additional mitigation could include:  Keeping mine water at previous deeper management elevation until the situation is understood (e.g. stop mine water level rise);  Changes to the mine water pump capacity and water treatment plant operations or design;  Amending mine water elevation management operations procedures (not yet developed), such as pumping more slowly during low void volume areas at specific mine elevations;  temporarily utilizing multiple mine water</p>	

			<p>pumping locations to keep the mine water feed to the WTP within operational parameters; controlling the rate of rise (as opposed to complete pump shut down) to facilitate incremental and controlled observation of changes in water quality; additional underground backfilling to stabilize local areas or a change in the schedule of planned underground backfilling; moving critical mine infrastructure earlier in the schedule; and storing surface water temporarily for incremental treatment of water, if water quality exceeds current treatment capacity. The Water Management and Monitoring Plan will be updated following the completion of the RRP to include appropriate mitigation and management measures should a mine water elevation raise be deemed appropriate.</p>	
3	<p>Remedial Strategy for Contaminated Soil and Sediment: Disposal of contaminated materials in the open pits</p>	<p><b>Comment</b> In Appendix 5.4A 10.2 Rationale for Open Pit Disposal it states that: "It was determined [during the surface design engagement] that the disposal of contaminated soil and sediment within open pits should be considered with the following conditions: Additional investigation is required to assess long-term implications to groundwater quality with respect to disposal of contaminated materials in the open pits." In Table 5.3-6 Open Pits Mine Workings Uncertainties (p 5-79) for</p>	<p><b>June 25:</b> The GMRP does not expect placement of contaminated granular fill in the pits to impact surrounding groundwater quality. Pit closure design work is ongoing, but the aim is to fill the pits with the coarse contaminated granular fill which is more permeable than pit wall material. The pit closure design also incorporates drains in the base of the pit. These two design components will mitigate impacts to shallow groundwater in the vicinity of the pits or to Baker Creek by preventing water movement laterally out of the pits. This design approach will be effective regardless of the selection of cap or cover. If the final design incorporates a cover that sheds water, that water</p>	

		<p>the groundwater and minewater quality and the WTP uncertainty with respect to placing new contaminated material into A1 and B1 pits it states that "Further testing will be completed in 2018 to continue to investigate this uncertainty".</p> <p><b>Recommendation</b> It is noted that mitigations related to groundwater quality with respect to disposal of contaminated materials in the open pits are not discussed in the GMRP Preliminary Screening document for Modification #3 (Place contaminated soils in A1 Pit (with possible placement in B2 Pit if needed). Have the investigations referred to in Appendix 5.4A 10.2 and CRP Table 5.3-6 been completed? Please discuss mitigations to address potential groundwater quality changes associated with this activity.</p>	<p>will be conveyed to Baker Creek once it is confirmed to meet runoff criteria. Therefore, the GMRP does not consider groundwater monitoring around the pits necessary. Currently, the GMRP does not expect infiltration through the pits to influence minepool chemistry predictions such that the WTP design or proposed EQC will need to be revisited. This is based on preliminary review of short-term geochemistry results to EQC infiltration chemistry assumptions and the ratio of volume of infiltration from pits A1 and B1 to the minepool. A series of analyses are underway to confirm this assumption: geochemical testing of contaminated granular fill for metals leaching and potential acid generation (preliminary results under review, final results to be provided to MVLWB prior to September technical sessions); longer-term kinetic testing (late 2019); comparison of geochemistry results to EQC model inputs. Should these studies indicate that long-term leachate chemistry differs substantially from what was assumed in the EQC assessment, additional modelling will be undertaken. Results of that modelling would then be used to determine if pit covers and caps require re-evaluation</p>	
4	Fence forested terrain, wetlands, and bedrock areas	<p><b>Comment</b> In GMRP's Preliminary Screening Document for modification #9 states that the forested terrain, wetlands, and bedrock areas will be fenced to "encompass area most impacted by</p>	<p><b>June 25:</b> The GMRP disagrees with the statement in the Board staff draft Preliminary Screening Document regarding "the proposed CRP activity of using fencing as a replacement to excavating soil". All developed areas, regardless of their location with respect to the</p>	

	<p>Roaster emission fallout, a radius of approximately one kilometer from the roaster". It is not clear from the assessment of modification #9 that excavation/capping with an engineered cover of the Developed Areas (e.g. Mill/Roaster Area) will occur within the fenced area also (CRP Figure 5.4-5). The Board staff draft Preliminary Screening Document states that "The fenced area proposed currently encompasses some areas (e.g. around the Mill/roaster area) where it was previously intended that soil would be removed or covered" and that "impacts and mitigations specifically related to the activity of using fencing as a replacement to excavating soil is not included in the DAR".</p> <p><b>Recommendation</b> Given that the CRP indicates the Mill/Roaster Area will be excavated and/or capped can the GMRP clarify that the statements in the Board staff draft Preliminary Screening Document for modification #9 are incorrect? If necessary please provide justification if GMRP believes modification #9 does not require to be included in the preliminary</p>	<p>proposed fence, will be remediated to meet, at minimum, industrial soil guidelines. This activity is not considered a modification as this was presented in the DAR. Modification #9 highlights that the GMRP proposes to install a fence to reduce risk of exposure of contaminated soils managed in-situ in the forested/bedrock/wetland terrain (including the Mill/Roaster area). The extent of contamination in these soils was unknown at the time of the DAR. The proposed fence is not a replacement to excavating soil; all areas that were identified in the DAR for excavation will still be removed, in addition to increased volumes subsequently identified. However, the Board staff is correct that using fencing in order to risk manage soil in the bedrock / wetland / forest areas was not included in the DAR. In the Preliminary Screening document, the GMRP recommended Modification #9 be carried into Preliminary Screening, the GMRP continues to recommend this modification be included in the preliminary screening. Please refer to ORS 4 - Attachment 1 : Contaminated Soils Response for more context related to the risk management of contaminated soils on site.</p>	
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		screening document (see also comment ID 1).		
5	Ion exchange adsorptive media	<p><b>Comment</b> In the Board staff draft Preliminary Screening document it is suggested that disposing of the spent ion exchange adsorptive media in the onsite landfill may have to be included in the preliminary screening form.</p> <p><b>Recommendation</b> Please comment on if GMRP agrees, and provide mitigations for disposing of spent ion exchange adsorptive media in the onsite landfill.</p>	<p><b>June 25:</b> The GMRP does not consider disposing spent ion-exchange in the onsite landfill as a modification that requires preliminary screening. The DAR included assessment of disposal of WTP waste in an on-site non-hazardous waste landfill, however the GMRP acknowledges that spent ion-exchange media was not specifically identified as the addition of ion-exchange was a result of an Environmental Assessment (EA) Measure. The spent ion-exchange will meet the non-hazardous classification of spent media per the EPA's SW-846 Test Method 1311: Toxicity Characteristic Leaching Procedure (TCLP). TCLP testing of samples of three brands of spent ion adsorption media from a pilot plant conducted in 2018 yielded arsenic concentration results of 0.355, 0.211 and 0.102 mg/L. All mitigations associated with the proper operation, monitoring and management of the landfill will apply. The potential impacts of a non-hazardous landfill on-site have been previously assessed in the EA.</p>	

**Slater Environmental Consulting: Bill Slater**

<b>ID</b>	<b>Topic</b>	<b>Reviewer Comment/Recommendation</b>	<b>Proponent Response</b>	<b>Board Staff Response</b>
1	1. Preliminary Screening Documents	<p><b>Comment</b> In the Preliminary Screening Document (GMRP, January 2019), the GMRP identifies 16 modifications in closure activities and three potential modifications</p>	<p><b>June 25:</b> Please refer to the responses to Giant Mine Oversight Board #5 and Giant Mine Oversight Board #6, and ORS 4- Attachment 1 : Contaminated Soils Response.</p>	

		<p>(Reclamation Research Plans), as compared with the scope of the previous environmental assessment, that are being considered through proposed reclamation research programs. The GMRP cites three reasons for the changes: 1. Work completed to address EA Measures and Suggestions, and GMRP commitments. 2. Outcomes of engagement with affected/interested parties. 3. Advancement of engineering work and site investigations. Table 3-1 in the Preliminary Screening Document describes the GMRP's analysis of the need for further environmental assessment for each of the proposed modifications, including whether the effects were considered in the previous assessment, and whether the modification may cause significant public concern or have significant environmental impacts. In all cases, the GMRP concludes that no further environmental assessment is needed, and that any concerns can be addressed through the licensing processes. Mackenzie Valley Land and Water Board (MVLWB) staff prepared a Draft Preliminary Screening Document that provides recommendations</p>		
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		<p>about which of the proposed modifications should be screened by the MVLWB, including 11 of the 19 proposed modifications. See Section 3.1 of Slater Environmental Report.</p> <p><b>Recommendation</b> With one exception, Slater Environmental Consulting (SEC) agrees with the description of the issues and recommendations contained in the MVLWB staff document. The exception relates to the proposed change to use of a fence to restrict access to some areas of elevated soil contamination, rather than carrying out soil remediation. For this issue, SEC agrees with the recommendation provided in the MVLWB staff document but also considers the issue to have a much larger scope. See comment 2 below for more detail on this issue. Table 1 in the Slater Environmental Report provides details about review of each of the specific changes, but these do not appear to require specific responses because they are generally consistent with the content of the MVLWB Preliminary Screening Document.</p>		
2	2. Preliminary Screening Documents -	<p><b>Comment</b> The scope and potential effects of changes to the plan for soil remediation from what was</p>	<p><b>June 25:</b> Please refer to the responses to Slater Environmental Consulting: Bill Slater #3 and #6.</p>	

<p>plans for contaminated soil remediation</p>	<p>proposed in the DAR is not fully addressed in the list of modifications described by the GMRP and not considered in the MVLWB Draft Preliminary Screening Document. The expanded scope is not about what activities will be done as part of the remediation (e.g., construction of a fence) but rather about activities that the GMRP will not include (i.e., remediation of all contaminated soil). The DAR envisioned remediation (i.e., removal for safe storage, or covering with clean material) of all arsenic contaminated soil across the site to the industrial remediation objective (340 mg/kg As). The GMRP now asserts that this is no longer practical and proposes to leave un-remediated soils in place with arsenic concentrations that are well above the industrial remediation objective, in some cases 3000 mg/kg and higher. Soil sampling completed since the DAR has identified much more extensive contamination, including contamination in bedrock/forest/wetland areas that were never directly disturbed by mining activities. The contamination in soils is now known to extend across the site and beyond the site</p>		
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	<p>boundaries. If the project proceeds as proposed, much of this soil will remain un-remediated and continue to be a potential long-term contaminant exposure source for humans and the environment. Proposed modification No. 9 addresses the expansion of the area contained by a permanent fence to include areas that are most impacted by roaster emission fallout. The fence will restrict human (and some large wildlife) use of areas with elevated arsenic soil concentrations. The MVLWB staff analysis of this proposed change correctly concludes that the effects of managing contaminated soils by restricting access with a fence was not considered in the previous assessment. Because this change leaves un-remediated soils as part of the closure landscape, it will lead to a lesser level of environmental performance. The human health performance could be similar provided that physical and administrative controls on human activities are effective. See Section 3.1 of Slater Environmental Report. <b>Recommendation</b> See Recommendation for Comments 3 and 6.</p>		
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3	3. Preliminary Screening Documents - plans for contaminated soil remediation	<p><b>Comment</b> An additional and potentially more important concern relates to the un-remediated contaminated soils that will remain outside the proposed fence. The Post-EA Information Package does not specify any definitive criteria for what arsenic concentrations in soil may be allowable in areas outside the fence; but the data indicate that some areas in forest/wetland areas could be as high as 3000 mg/kg arsenic and that soils with concentrations above industrial standards are widespread across the site and extend outside the site boundaries. For the most part, the GMRP does not propose any measures for remediating these soils. For areas outside the proposed fence, there will be no restrictions on wildlife use and the only restrictions on human use will be administrative (i.e., rules or advisories about what people can/should do in specific areas). The DAR estimated the volume of contaminated soils requiring remediation as approximately 328,000 m<sup>3</sup>, while the current estimate is almost four times larger at 1,299,500 m<sup>3</sup> (CRP, Table 5.4-5). This larger volume does not include the soils that the</p>	<p><b>June 25:</b> The GMRP appreciates that the reviewer is in agreement with the GMRP that remediation of a much larger volume of soil spread over larger areas including forests and wetlands is not practical or feasible. The cleanup of these soils would cause extensive additional disturbance and the volumes of soil requiring long-term storage would overwhelm available storage locations at the site. This same conclusion has been supported through numerous public engagement activities including the SDE and the QRA. More information on these engagement processes are provided in ORS 4- Attachment 1 : Contaminated Soils Response . The GMRP has acknowledged the need to risk manage these areas. This is a standard practice in contaminated soils remediation projects and impacts have been mitigated through the Measures of the EA, including Measures 5, 9, 10 and 26.</p>	
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		<p>GMRP now proposes to leave un-remediated. SEC agrees that remediation of a much larger volume of soil spread over larger areas including forests and wetlands is likely not currently practical or feasible. The cleanup of these soils would cause extensive additional disturbance and the volumes of soil requiring long-term storage would overwhelm available storage locations at the site. However, there is no doubt that the remaining contaminated soils will leave a long-term negative legacy for future generations. See Section 3.1 of Slater Environmental Report.</p> <p><b>Recommendation</b> The decision to leave un-remediated soils with arsenic concentrations up to 3,000 mg/kg in areas that are physically accessible to the public and outside of the core industrial area creates potential for adverse effects on human health that were not considered in the DAR or the previous assessment. This legacy will create challenges for long-term management of human activities. The Human Health Risk Assessment concludes that the future risks are acceptable provided that people only use the site casually for short periods</p>		
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		<p>of time (See response to Question No. 1) with activities that have little likelihood for contact with/ingestion of soil. The high arsenic concentrations greatly exceed both industrial and residential remediation objectives, suggesting that more intensive human use of the area would create unacceptable risks. Therefore, it will be critical to permanently constrain human activities in the affected areas to activities that are consistent with the assumptions in the HHERA.</p>		
4	<p>4. Preliminary Screening Documents - plans for contaminated soil remediation</p>	<p><b>Comment</b> The proposed approach for managing contaminated soils also has potential effects on the biophysical environment that were not addressed in the previous assessment. That assessment did not consider the implications of exposed soil with such elevated arsenic concentrations. The Ecological Risk Assessment (HHERA Report; CRP Appendix 2E) evaluated potential risks for terrestrial vegetation and wildlife, and concluded that some effects will continue after the remediation is complete: "At the Giant Mine, the assessment determined that there is the potential for the smaller animals at the site to be affected by arsenic and antimony.</p>	<p><b>June 25:</b> Please refer to the responses to Slater Environmental Consulting: Bill Slater #3 and #6. The GMRP acknowledges the recommendations in the HHERA, which are being considering in the upcoming small mammal monitoring program.</p>	

		<p>This is a particular concern for those animals that consume insects. As animals can adapt to living in areas of high concentrations, the effects may not be as significant as predicted. The remediation will improve the situation, but adverse effects are still predicted in the future." (HHERA Report, Section 5.2) The Ecological Risk Assessment recommended some future investigations aimed at gaining a better understanding of terrestrial effects both currently and in the future. See Section 3.1 of Slater Environmental Report.  <b>Recommendation</b> See Recommendation for Comments 3 and 6.</p>		
5	5. Preliminary Screening Documents - plans for contaminated soil remediation	<p><b>Comment</b> Overall, it appears that the proposed risk management approach for contaminated soils constitutes a change from the DAR, the potential effects of which were not fully considered in the previous assessment, and which appear to be more adverse. It also seems possible that the proposed change could cause significant public concern because it has long-term implications for management of large areas of land at and around the site. Nonetheless, it does appear that</p>	<p><b>June 25:</b> Please refer to the responses to Slater Environmental Consulting: Bill Slater #3 and #6.</p>	

		<p>the proposed approach is likely the only practical approach for addressing the widespread elevated concentrations of arsenic in soils, which leads to the question of what measures are needed to "risk manage" these areas. See Section 3.1 of Slater Environmental Report.</p> <p><b>Recommendation</b> See Recommendation for Comments 3 and 6.</p>		
6	6. Preliminary Screening Documents - plans for contaminated soil remediation	<p><b>Comment</b> The CRP includes Objective SW4 aimed at making sure that people understand the residual risks at the site: "Residual risks are identified, and local residents have been, and continue to be, informed of residual hazards (post-remediation)." The proposed closure criteria provide some guidance about what measures should be taken to establish and maintain a public and government understanding of residual risks like the extensive areas of un-remediated contaminated soils: - SW4-1 Public communication initiatives as outlined in the Perpetual Care Plan/ Engagement Plan are undertaken. - SW4-2 A land map with residual risks identified and available at Land Titles and project websites. - SW4-3 Perimeter barriers are installed near</p>	<p><b>June 25:</b> The reviewer is correct that the risk management will require the co-proponents to use broader government authority, not constrained by the scope of authority currently granted to the GMRP. An example of which is such a risk management strategy is that the Chief Public Health Office of the Department of Health and Social Services issued their first health advisory for residents and visitors about precautions they can take to avoid exposure to elevated arsenic levels found in some of the lakes/areas located around Yellowknife in 2016, with subsequent annual updates being informed by university research, in addition to including the results from the 2018 GMRP HHERA, which not only assessed risk on the Giant Mine Site, but to residents in general from Yellowknife, Ndilo and Dettah using and harvesting from the land around the Site. The advisory can be found at <a href="https://www.hss.gov.nt.ca/en/newsroom/arsenic-lake-water-around-yellowknife">https://www.hss.gov.nt.ca/en/newsroom/arsenic-lake-water-around-yellowknife</a> . The GMRP</p>	

	<p>risk areas to reduce inadvertent access and are visually displeasing to communicate that residual risk is present (e.g., large grey boulders, earth embankments). - SW4-4</p> <p>Landowners are provided with necessary information for Land title caveats, zoning (administrative controls). The single closure objective for contaminated soils and sediments is intended to address the need to reduce risks to humans and the biophysical environment:</p> <p>"Contaminated materials (i.e., soil, sediment, granular fill, and tailings) are remediated or risk managed to reduce risk to humans and the aquatic and terrestrial ecosystems."</p> <p>Most of the criteria for this objective define acceptable conditions for areas that will actually be remediated, but CS1-4 speaks to the risk management component of the objective: - CS1-4: Fence installed to encompass area most impacted by roaster emissions fallout. (Refer to Objective SW4; Administrative controls in place; such as signs.) For contaminated soils and sediments, there are no criteria that define expectations for un-remediated areas outside the fence. The Post-EA Information Package does not</p>	<p>anticipates that engagement with stakeholders on the framework for the Perpetual Care Plan will include discussions on methods for risk management of these soils outside of the Core Industrial Area fence. The GMRP will also work to align risk management with off-lease risk management efforts. The GMRP cannot develop the approach to managing these areas in isolation of its stakeholders, Indigenous partners, the Government of Northwest Territories (GNWT) and the City of Yellowknife.</p>	
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		<p>provide details about proposed risk management measures for areas with contaminated soils and SEC would expect that additional details may be included in the proposed Perpetual Care Plan when it is provided. See Section 3.1 of Slater Environmental Report.</p> <p><b>Recommendation</b> Achieving the closure objectives (i.e., managing the risks and keeping people informed of the risks so they act accordingly) throughout the life of the proposed project will require a robust approach to administrative controls for areas where there are no physical controls on land use activities (i.e., outside the fence), whether within or outside of the lease boundary. Putting effective administrative controls in place will likely require the co-proponents to use broader government authority, not constrained by the scope of authority currently granted to the GMRP. For example, action related to Land Titles may need to go beyond notations about residual risks, and establish permanent legal constraints on land dispositions. The long-term aspect of the administrative controls will also be an important consideration. The</p>		
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		<p>previous assessment considered issues related to long-term care at the site, primarily from the perspective of making sure that someone would continue to care for the site in the far future, and that people would be aware of the risks associated with the frozen arsenic trioxide (and to some extent the tailings and other waste). These long-term concerns were focused on effects that could develop slowly over time because responsible institutions failed to fulfil responsibilities (e.g., failure to maintain the freeze system or pump water from the underground). The concerns about long-term management also pertained to areas that would be subject to active remediation activities, providing the opportunity for design to consider the long-term messaging (e.g., "grey and ugly" for the tailings). The decision to leave extensive areas of un-remediated soils constitutes a different type of ongoing, permanent risk that is more immediate for individuals. Managing the long-term soil condition will require that individuals, on a day-to-day basis, are aware of the risks and make</p>		
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		appropriate decisions about their activities on the affected lands (i.e., not having picnics or playing with children in certain areas). This will create a substantial messaging and management challenge.		
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**Yellowknives Dene First Nation: Machel Thomas**

<b>ID</b>	<b>Topic</b>	<b>Reviewer Comment/Recommendation</b>	<b>Proponent Response</b>	<b>Board Staff Response</b>
1	Giant Mine Remediation Project Preliminary Screening Document, Table 3-1, Item 17: Development of a Wetland Treatment System, or Passive Treatment Wetland, along Baker Creek	<b>Comment</b> Because the Giant Mine Remediation Plan does not include in its scope an assessment of the mass of mine-derived arsenic available in the upper Baker Creek watershed for future flux via the stream reaches through and beyond the defined geographic scope of the Project, even the conceptual design of a passive or other type of treatment wetland is problematic. Engineered or natural wetlands in cold climates or other regions can potentially remove metals/metalloids from the flow through water via one or more of three possible biogeochemical mechanisms: (i) sorption onto sediments and other available surfaces in the wetland; (ii) uptake into macrophytes via foliar and/or root uptake (e.g. phytoremediation); (iii) mineralization within the sediment	<b>June 25:</b> The GMRP has delineated the Baker Creek watershed by sub-basin, and calculated arsenic loading from the Baker Creek Watershed to the Yellowknife Bay as well as the small areas on the eastern edge of the Project site that lie outside the Baker Creek watershed and report directly to Yellowknife Bay. The loadings are evaluated for different drainage basins within the watershed including Upper Baker Creek drainage basin and drainage basins to the west of lower Baker Creek as well as to the east. The results are presented in the EQC report (please refer to Appendix D of the Effluent Quality Report). The GMRP considers the surface water arsenic loading work completed to date to meet the intent of the first recommendation of the reviewer. In addition, in the Passive and Semi-Passive Treatment RRP (Appendix 5.5B of the CRP), GMRP has laid out the multiple steps of research that are on-going and planned to evaluate the feasibility of using passive treatment systems on the Project site. These research tasks include literature	

	<p>to convert to poorly soluble, poorly bioavailable forms such as metal sulfides, which in turn is based on creation of the appropriate geochemical conditions such as in situ microbially mediated production of free sulfides. Especially with regard to arsenic oxyanions, all of these are problematic. Unlike lead sulfides and various other metal sulfides, arsenic sulfide species are more prone to re-oxidation when redox conditions change in wetland bed sediments, as is typically the case in cold climate systems that undergo freeze-up and then high flows during snowmelt. Uptake of arsenic into aquatic macrophytes and other wetland flora and fauna can increase biological exposure pathways for passerine birds, insectivores, etc. Sorption onto sediments will remove arsenic until the sorptive capacity of the exposed media (e.g. upper sediments ) is exceeded, after which the sediment will need to be treated as a highly contaminated media in its own right and remediated. Above all, the size and design features of an engineered wetland cannot be adequately estimated even at a high level in the absence of a clearly articulated set of</p>	<p>reviews, desktop and bench scale testing and on-site testing. Mass arsenic removal off-lease is not proposed.</p>	
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		<p>treatment objectives that in turn reflect a good understanding of the expected mass of contaminant removal, as delivered from the upstream watershed, per unit time.</p> <p><b>Recommendation</b> The co-proponents should commit to an investigation of arsenic flux to the Baker Creek watershed from land areas east of the Project as geographically delimited versus within the remediation project footprint. The consideration of a pilot or full scale treatment wetland should consider the pros and cons of further arsenic mass removal in the upper source water areas versus sequestration in the wetland and the associated need to risk manage the media on and in which the arsenic becomes sequestered.</p>		
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