

Dominion Diamond Corporation

Developer's Assessment
Report – Public Hearings,
September 16, 2015

Water Quality, and Fish and
Fish Habitat



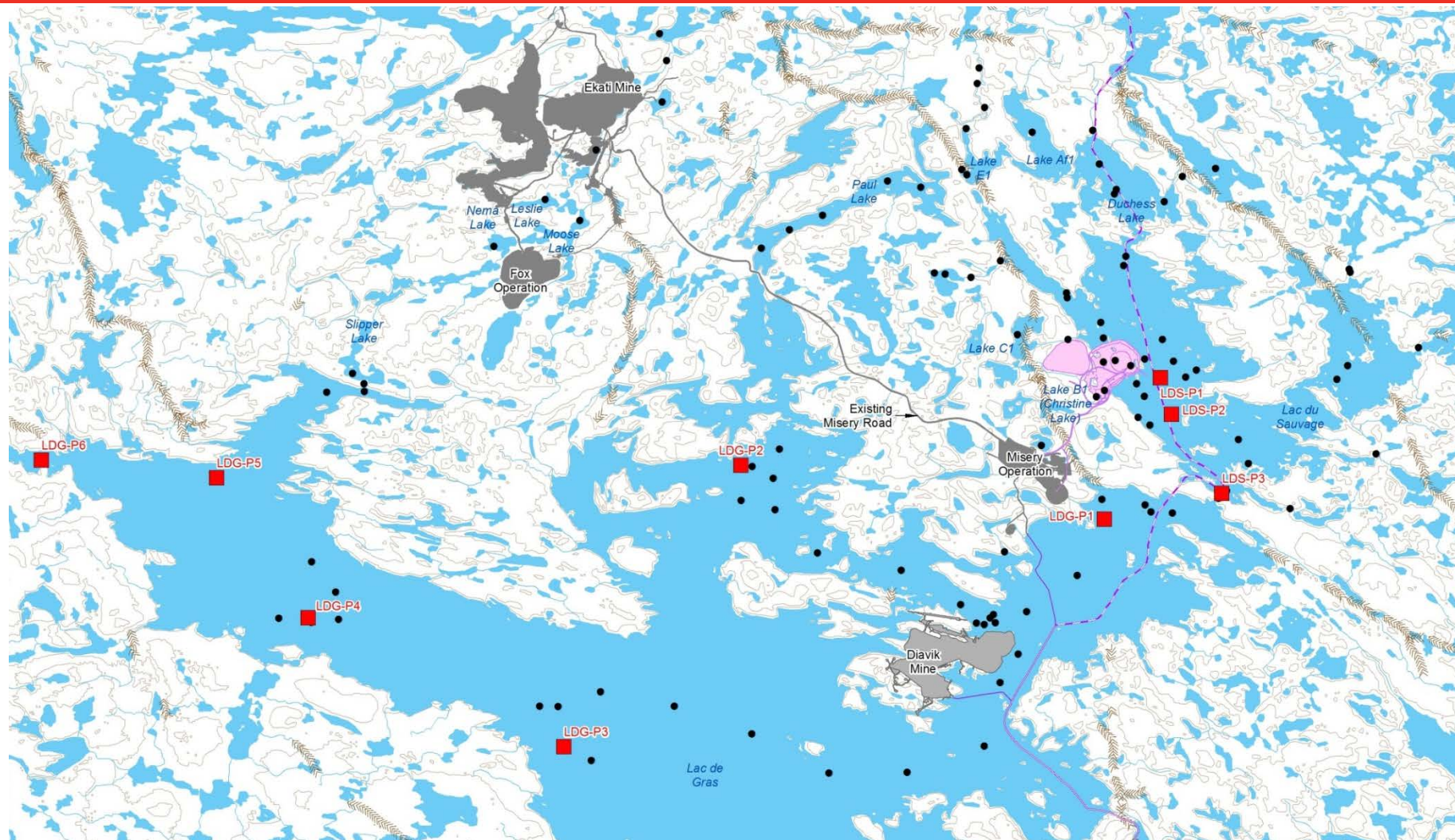
Outline

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- Summary

Traditional Knowledge

- Jay Project and cumulative effects for water quality and fish valued components (VCs) were assessed using an ecologically relevant and conservative approach, which also integrated Traditional Knowledge (TK)
- TK was integrated into DAR through:
 - the selection of VCs and assessment endpoints
 - the identification of effects pathways and mitigation
 - providing context for residual effects analysis
 - residual impact classification and determination of significance of VCs
- Dominion Diamond will continue to engage with communities on mitigation and monitoring for the Jay Project and in the operations of the Ekati Mine and will integrate TK where possible

Model Boundary Conditions



Water Quality Modelling Updates

Additional model scenarios:

Model	Description
Updated Assessment Case	Updated Diavik discharge flows and modifications to Pit Lake Model Assumptions.
Reasonable Estimate Case	Model to provide a more likely but less conservative (i.e., expected) estimate of Project discharge water quality. Less conservative than the DAR case.
2D Monte Carlo Analysis	Model developed through engagement with GNWT to assign probabilities to the deterministic model scenarios that were carried forward into the DAR and subsequent model iterations. Results of this analysis were presented to GNWT and MVEIRB in a modelling workshop hosted by Dominion Diamond on July 6, 2015.
3D First Order Approximation Model	An alternative approach used to assign probabilities to groundwater inflow quantity and quality using the 3D hydrogeological model. Results of this analysis were presented to GNWT and MVEIRB in a modelling workshop hosted by Dominion Diamond on July 6, 2015.

Water Quality Modelling Updates

Additional model scenarios:

Model	Description
Lower Bound Scenario	Model to evaluate meromixis in the Jay and Misery Pits considering lower inflows to the Jay Pit and resultant lower concentrations in Misery Pit.
Additional Pumping During Initial Dewatering	Model developed to evaluate the effects on overall Misery Pit discharge water quality from pumping 74% of the water stored in the diked area to Lac du Sauvage during the initial dewatering period. Results provided in the response to DAR-MVEIRB-IR2-26.
Dry Year Water Quality Modeling	Model developed to determine if reduced runoff, during dry precipitation years would influence Misery Pit discharge water quality. Results provided in the response to DAR-MVEIRB-IR2-26.
Extreme Wind Scenario	A wind speed equal to the 99.99 th percentile observed in the model meteorological data was sustained for a period of one year to determine if this would result in a turnover of the Jay and Misery Pit Lakes. Results submitted to MVEIRB on July 24, 2015.

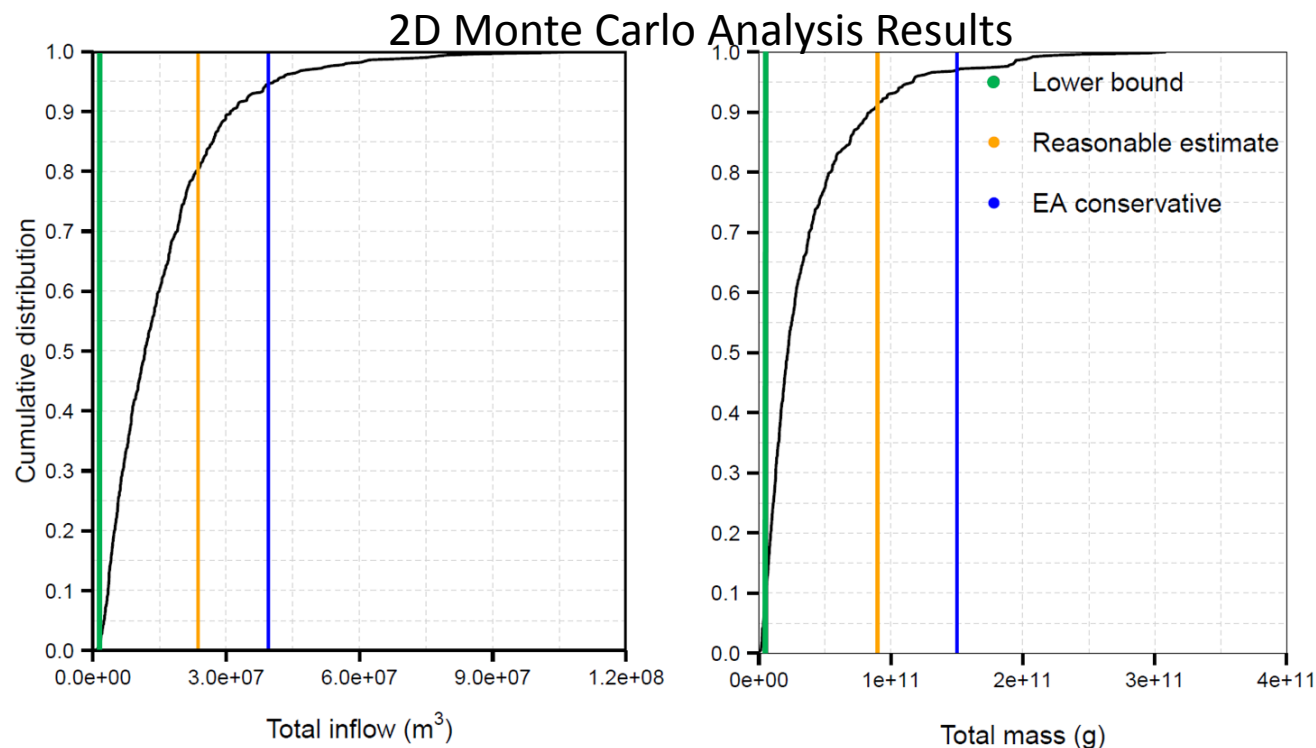
Model Conclusions

- Since the submission of the DAR, substantial and comprehensive modelling has been completed to address concerns raised by Parties which further support the conclusions in the DAR
- Model results for all modelled scenarios indicate the following:
 - Mining of the Jay Project will not result in significant adverse effects to surface water quality in Lac du Sauvage or Lac de Gras during operations and post-closure
 - The water management strategy developed for the Project will result in meromixis in both the Jay and Misery Pits permanently isolating minewater from interacting with Lac du Sauvage during post-closure
 - The water management plan includes effective mitigation strategies to address water quality issues through adaptive management should they become apparent during operations

Water Quality Modelling Updates - Summary

Confidence in water quality predictions:

- Since the submission of the DAR, Dominion Diamond has been actively engaged with GNWT and MVEIRB to provide additional confidence related to the water quality modelling predictions
- A key component of this modelling was to assign confidence limits to the deterministic water quality modelling scenarios that were used to assess impacts to surface water quality



Confidence in Water Quality Projections

Confidence Intervals – First Order Approximation (Assuming Normal Distribution) (End of Mining)

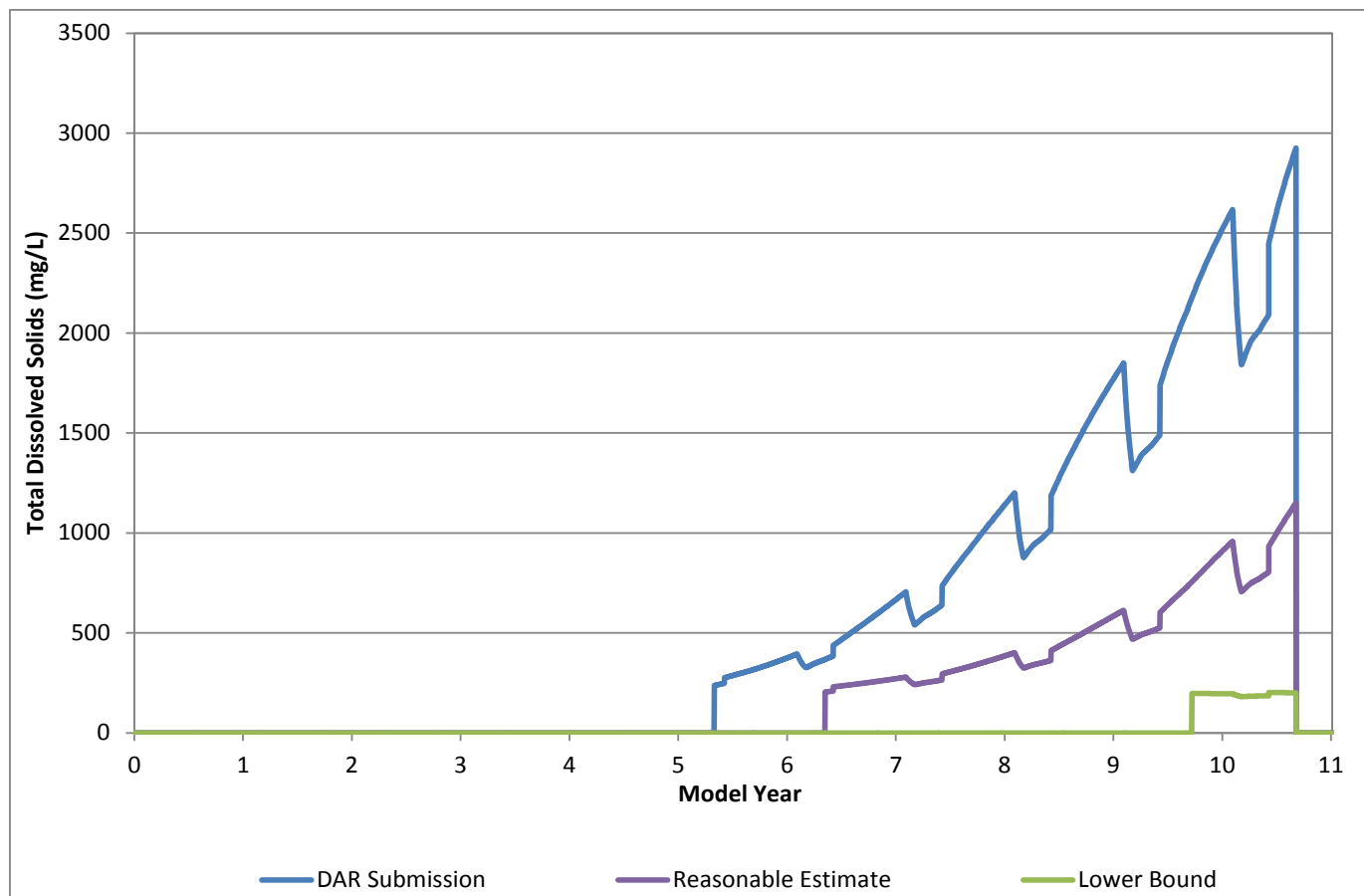
Scenario	Total Flow (percentile)	Total Mass (percentile)
EA Conservative	97	99
Reasonable Estimate	82	88
Lower Bound	27	31

- Supplemental modelling provides confidence that the range of groundwater inflows and TDS concentrations used for assessing impacts to surface water quality is appropriate for the Jay Project
- The upper and lower bounds were carried forward into the surface water quality assessment

Water Quality Modelling Updates

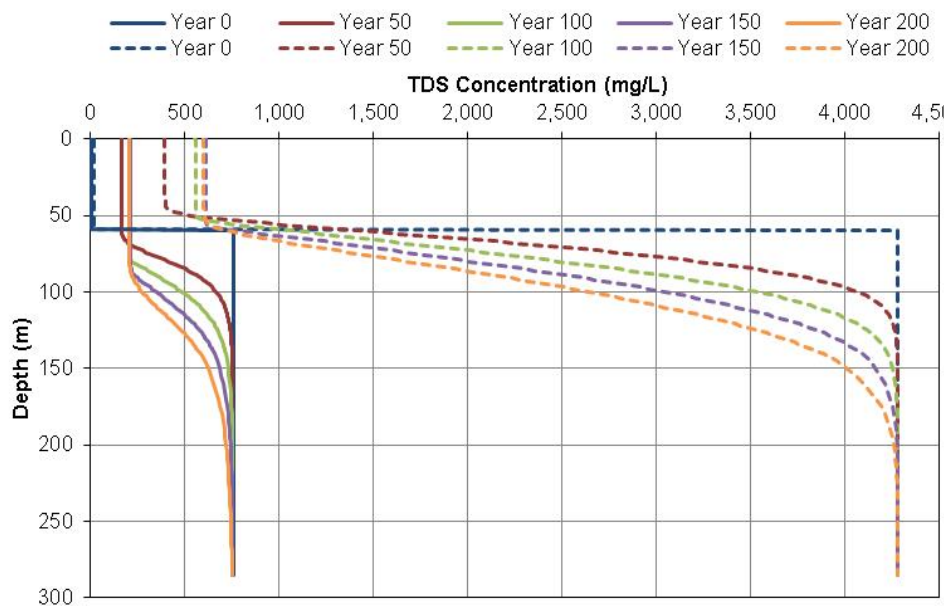
- Another key purpose of the additional water quality modelling that has been completed since the submission of the DAR was to provide confidence that meromictic conditions will form in both the Jay and Misery Pits during post-closure

Misery Pit
Operational
Surface
Water TDS
Projections

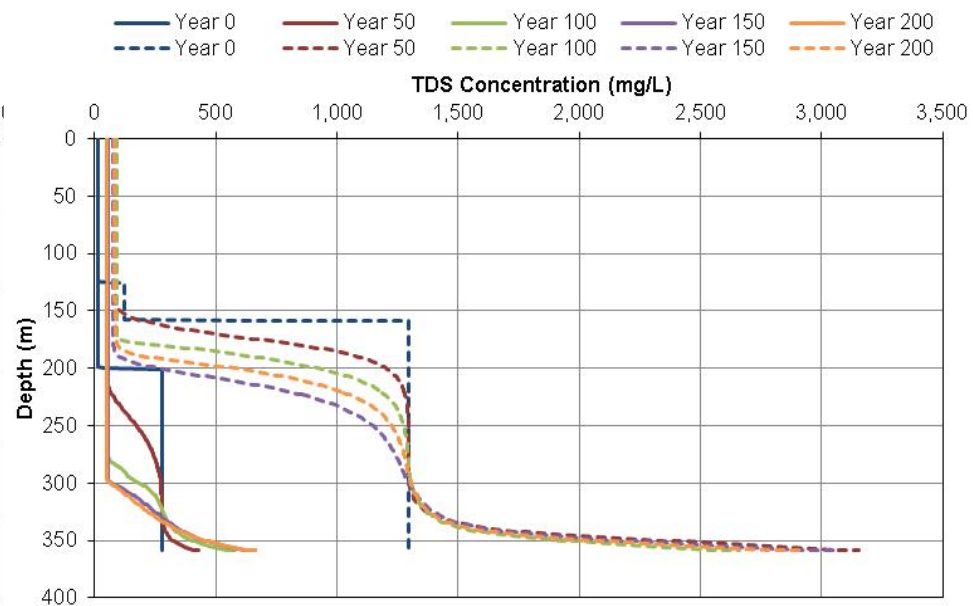


Water Quality Modelling Updates

Misery Pit



Jay Pit



Note: Solid Lines - Lower Bound Scenario, Dotted Lines - Reasonable Estimate Scenario.

TDS = total dissolved solids; m = metre

Water Quality Modelling Updates

- Meromictic conditions formed under all model scenarios completed to date
 - Lower Bound Scenario
 - Extreme Wind Scenario
- Therefore, the proposed water management strategy for the Jay Project will be protective of downstream receptors

Alternate Minewater Discharge Period

Recommendation:

- GNWT-4(1): Dominion Diamond discharge from Misery Pit in Years 3 to 8

Response:

- Dominion Diamond disagrees with this recommendation
- The Project mine water management plan associated with discharge from Years 5 to 10 provides the following advantages:
 - it allows for operational monitoring in the absence of effluent discharge to verify water quality predictions and apply adaptive management adjustments, if necessary
 - it precludes concurrent operational discharge with the Diavik Mine
 - it achieves closure objectives for the pit more rapidly through expediting the back-flooding of Misery Pit

Closure WQ – Misery Pit

Recommendation:

- EC-3: Identify mitigation to minimize the level of contaminants in Misery pit for the closure period
- GNWT-4(2): Dominion Diamond increase the volume of the freshwater cap in Misery Pit at closure as a Board measure

Response:

- Dominion Diamond will evaluate the need to adjust the depth of the freshwater cap as a mitigation strategy, if required based on operational monitoring data
- Dominion Diamond disagrees that a mandated increase in the depth of the Misery Pit freshwater cap be included as a Board measure, but is committed to ongoing evaluation of the mine water management plan as operational monitoring data become available
 - This will include verification and/or updates to the water quality predictions, if required

Closure WQ – Panda and Koala Pit Lake

Recommendation:

- GNWT – Recommendation 5 – MVEIRB include a measure that an optimization study regarding the storage of fine PK in Panda and Koala pits is conducted in Project operations

Response:

- Dominion Diamond commits to undertaking this optimization study
- Dominion Diamond will finalize operational and closure planning for the Panda and Koala pits once the Jay Project Environmental Assessment process has been successfully completed
- Dominion Diamond anticipates that this work will be part of the Wastewater and Processed Kimberlite Management Plan and Interim Closure and Reclamation Plan as requirements of the Water Licence
- Detail regarding operational optimization studies will be developed through engagement with and for approval by the WLWB during the permitting process

Meromixis Development

Recommendation:

- LKDFN-4: Establishment of an independent panel for pit meromixis (also supported by DKFN)

Response:

- Dominion Diamond disagrees with this recommendation
 - Within the mandate of the WLWB, the appropriate review, feedback, and approval process is already in place to meet this recommendation
 - The process will include review by interveners and their technical experts
 - To date, substantial review and feedback effort has been invested by the MVEIRB and interveners, and their technical experts in the water quality assessment
- The development of stable meromixis in the Jay and Misery pits is supported by the following lines of evidence:
 - the DAR
 - Round 1 IR responses (e.g., DAR-EC-IR-22, DAR-GNWT-IR-58, DAR-IEMA-IR-16, DAR-IEMA-IR-17, DAR-LKDFN-IR-05, DAR-GNWT-IR2-08)
 - Round 2 IR responses (e.g., DAR-MVEIRB-IR2-24 and DAR-MVEIRB-IR2-26)
 - the Compendium of Supplemental Modelling
 - the Lower Bound Scenario

Commitment to Diavik Mine

Recommendation:

- DDMI-1: Dominion Diamond commit to advancing the monitoring and mitigation for review and acceptance by WLWB and Parties to the EA

Response:

- The DAR and various WQ assessment updates indicate that the Jay Project will not result in significant adverse effects to the receiving environment
 - Dominion Diamond has demonstrated that it has adequately addressed the potential effects of the Jay Project on downstream users
- Dominion Diamond committed to:
 - continue to engage with DDMI on the development of detailed environmental monitoring plans
 - continue to take part in regional monitoring programs
- Additional support for this response was outlined in DAR-MVEIRB-IR2-32

Trophic Status of Lac du Sauvage

Recommendation:

- EC-1: Lac du Sauvage remain oligotrophic, and setting of the TP benchmark to indicate a change in trophic status from oligotrophic to mesotrophic

Response:

- Dominion Diamond agrees with this recommendation
- Through the DAR and other responses, Dominion Diamond has demonstrated that there is a high degree of conservatism associated with the source term input for TP in the Misery Pit discharge water quality modelling

Assessment Study Area Boundaries

Recommendation:

- GNWT-3 : MVEIRB include a measure that minimizes impacts at local scales from Project activities to the extent practicable

Response:

- Dominion Diamond does not agree with this recommendation
- Dominion Diamond designed a mine water management plan that minimizes potential impacts to the receiving environment at both local and regional scales
- The DAR concluded that there will be no significant adverse effects in the receiving environment within Lac du Sauvage and Lac de Gras
 - Potential effects evaluated at mixing zone, Lac du Sauvage, and Lac de Gras scales
- Monitoring will identify whether Project activities have the potential to result in impacts to the receiving environment
 - SNP operational monitoring within the mine footprint
 - AEMP monitoring in the receiving environment
 - Monitoring associated with construction and operational management plans (e.g., dike construction)
 - These data will be evaluated to determine if additional mitigation or changes to the mine water management plan are required
- Additional support for this response outlined in DAR-MVEIRB-IR2-32

Management Plans

Recommendation:

- IEMA-6 and YKDFN-5: Submission of a revised water management plan within 2 years of initiating dewatering
- IEMA-13: Submission of a revised waste rock and ore storage management plan within 1 year of overburden removal
- LKDFN-7: Preparation of a revised WRSA management plan

Response:

- Dominion Diamond accepts these management plan recommendations
 - anticipated to be a requirement of the Water Licence
- The plans will include
 - details of contingencies
 - monitoring and evaluation
 - adaptive management trigger thresholds
 - timelines for implementation
- Dominion Diamond anticipates that the final structure and content of these plans, and the timing of its submission, will be subject to direction by the WLWB

Mercury in Sediment

Recommendation:

- LKDFN-8 and IEMA-7: Management of sediments contaminated with mercury

Response:

- Dominion Diamond is committed to developing a construction management plan during the detailed design stage of the Project that will detail handling, placement, and the management of lake sediments and soils (e.g., construction of the dike, removal of overburden in diked area), and outline mitigation strategies
- Mercury is not anticipated to be a receiving WQ issue
- Seepage and receiving environment will be monitored
- Dominion Diamond have undertaken supplemental sediment sampling in the proposed diked area to verify reported sediment mercury concentrations

Monitoring

Recommendation:

- IEMA-10: Consideration of ongoing use of Counts Lake as an appropriate reference lake

Response:

- Dominion Diamond will maintain Counts Lake as a reference lake for the Ekati Mine AEMP unless shown to be affected by Jay Project activities as identified through ongoing evaluation
- Counts Lake will also be included in the Jay Project AEMP as it is close to the Project

Monitoring

Recommendation:

- IEMA-11: Effluent toxicity to zooplankton within minewater discharge mixing zone (also supported by DKFN)

Response:

- Dominion Diamond has committed to not discharge any minewater that will be acutely toxic
 - Minewater discharge to the receiving environment will be subject to a chemical tests, and acute and chronic toxicity tests, consistent with Ekati Mine Surveillance Network Program
- Mixing zone represents the zone within a lake where discharge mixes with the receiving environment
 - DAR concluded no chronic effects expected, and no sublethal effects at edge of the mixing zone
- Additional support provided in DAR-EC-IR2-1 and DAR-GNWT-IR2-04

Monitoring

Recommendation:

- IEMA-12: Assessment of taxonomic change in plankton

Response:

- Dominion Diamond is developing an AEMP Design Plan that will include the monitoring phytoplankton and zooplankton species composition, abundance, and biomass
 - This monitoring approach consistent with Ekati Mine AEMP
- Community level changes in plankton will also be considered as part of the fish health component of the AEMP
- If changes are identified, Response Plans will be developed within the AEMP Response Framework, as appropriate

Impacts on Fish Habitat from Dust Deposition

Recommendation:

- IEMA-6: Dominion Diamond shall model the depth of wave turbulence in Lac du Sauvage in areas likely to be affected by dust deposition from the Jay Project

Response:

- Dominion Diamond does not agree that modelling to determine the potential behaviour of deposited dust in the water column is required
- Dust will deposit to Lac du Sauvage, but accumulation at nearby shoals is projected to be non-measurable
 - Wave action, lake currents, and the large volume of water in Lac du Sauvage will disperse the dust and limit accumulation on the shoals
 - This position is supported by literature, and various studies at Diavik and Ekati mines
- Dust generation and receiving environment water quality will be monitored during construction and operations through the AQEMMP and AEMP
 - Mitigation of dust generation will be implemented

Blasting: Avoidance and Mitigation of Effects of Blasting on Fish

Recommendations:

- DFO-1: Revise instantaneous pressure threshold limit of 100 kPa to 50 kPa and recalculate setback distances to develop mitigation measures
- DFO-2: Develop a blast monitoring and mitigation plan to ensure that peak particle velocities do not exceed 13 mm/s at 'Shoal S4' during Lake Trout egg incubation, including procedures to be followed if blasts exceed this threshold

Response:

- Dominion Diamond commits to develop a blasting plan for the Project and will engage with DFO, as appropriate
 - The plan will consider relevant recommendations, guidelines, or standards from the literature for identifying setback distances
- A blast monitoring plan will be developed as part of the blasting plan
 - If blasting standards for the Project are approached, site-specific operating mitigations will be implemented to protect fish, where necessary

Water Crossings: Avoidance and Mitigation of Effects to Fish

Recommendations:

- DFO-3: Implement available best management practices to avoid and mitigate Serious Harm to Fish during water crossing construction, operation, and closure
- DFO-4: Develop an appropriate maintenance and monitoring plan to ensure that barriers to fish passage do not form over time
- DFO-5: Provide DFO with detailed engineering plans of all water crossings for review prior to construction

Response:

- Dominion Diamond will implement best management practices:
 - Culverts will be designed and constructed for peak flows
 - Appropriate erosion /sedimentation controls (e.g., silt fences) will be used
 - A restricted activity timing window will be applied to avoid effects to incubating eggs
- Dominion Diamond will provide:
 - A maintenance and monitoring plan, as recommended
 - Detailed designs and construction plans during the regulatory phase

Sub-Basin B Diversion Channel: Avoidance and Mitigation of Effects to Fish

Recommendation:

- DFO-6: Implement all available best management practices in the design of Sub-Basin B Diversion Channel to avoid and mitigate Serious Harm to Fish

Response:

- Dominion Diamond is committed to an appropriate design to avoid and mitigate effects to fish:
 - Construction will follow restricted activity timing windows
 - Channel flows will facilitate upstream passage of spawning Arctic Grayling, and downstream passage of young-of year
 - Channel and bank design will be based on 1-in-100 year return period with a 0.3 m freeboard
 - Timely reclamation of riparian vegetation disturbed during construction
- Operational monitoring of fish use of the Sub-Basin B Diversion Channel will confirm its expected functions (e.g., as a migratory corridor)

Sub-Basin B Diversion Channel: Avoidance and Mitigation of Effects to Fish and Fish Habitat

Recommendations:

- DFO-7: Create an appropriate stream diversion maintenance and monitoring plan so that barriers to fish passage do not form over time
- DFO-8: Provide detailed engineering plans of the diversion channel for review prior to construction
- DFO-9: Provide detailed closure and reclamation plans for the diversion channel, including reclamation of natural channels and drainage for streams B0 and Ac35

Response:

- Dominion Diamond will include the following in the maintenance and monitoring plan:
 - Regular inspections of channels and culverts for accumulated sediment and the subsequent removal of material
 - Annual inspections of culvert for ice and snow build-up before freshet and the subsequent removal of accumulations that are problematic for fish passage
 - Immediate repair of damaged channel linings
- Dominion Diamond will provide to DFO:
 - Detailed design plans during the regulatory phase of the Project
 - Detailed closure and reclamation plans

Water Levels: Avoiding and Mitigating Effects on the Narrows and Lake/Stream C1

Recommendations :

- DFO-10: Monitor water levels in Lake/Stream C1 and at depth-limiting locations in the Narrows during open water season to ensure that Project effects do not negatively impact fish passage or fish habitat
- DFO-11: Create a mitigation, response, or action plan in the event that significant changes in water levels occur as a result of the Project

Response:

- Dominion Diamond will include hydrology monitoring of Lake C1, Stream C1, and the Narrows in the final design of the AEMP
- The AEMP Response Framework will include early-warning action levels for hydrologic changes that require management actions to prevent adverse effects to fish
- Regulators and communities will continue to be engaged in the design of the AEMP during the Water Licencing process, including Response Plans as needed

Conceptual Fish-Out and Offsetting Plan: Use of Fish from Fish-Out and Offsetting Requirements

Recommendations :

- DFO-12: Conduct additional consultation with the affected communities regarding the handling and fate of fish captured during the fish-out of the diked area
- DFO-13: Conduct additional consultation on the appropriate quantification of fisheries productivity impacts in Lac du Sauvage, and streams Ac35 and B0, and on the options to offset the impacts of the Project on fisheries that cannot be avoided or mitigated

Response:

- Dominion Diamond will continue to engage DFO and communities on:
 - handling and fate of fish from the fish-out
 - development of offsetting options for the Project
 - development of methods for quantifying fisheries productivity (losses and gains) for the offsetting plan

Effects Study Area for Fish and Fish Sampling Program

Recommendation:

- EC-2: The effects study area and the proposed sampling program under the AEMP be aligned
 - The effects assessment area for the fish valued component be reduced from the outlet of Lac de Gras to the outlet of Lac du Sauvage
 - If large bodied fish are to be sampled, a larger effects assessment area may be appropriate for the AEMP
 - Additional details regarding the AEMP study design be provided as well as timelines regarding when the Proponent should provide this information to EC

Response:

- Dominion Diamond disagrees that the study area boundaries need to be aligned
 - it is more important that the AEMP be designed to meet its specific objectives
 - the EA and monitoring programs have different purposes
- AEMP details will be developed through the WLWB process

Summary

- A substantial amount of work has been conducted for this project to clarify and test the WQ modelling and assessment undertaken for this Project
 - Supplemental modelling
 - Evaluation of confidence in modelling results
- Dominion Diamond has agreed or made commitments to the majority of recommendations for Water Quality and Fish by the Parties
- Dominion Diamond does not agree with the following:
 - Modify the discharge schedule from Misery Pit to Years 3 to 8
 - Establish an independent panel for pit meromixis
 - MVEIRB include a measure that minimizes impacts at local scales from Project activities
 - Model the depth of wave turbulence in Lac du Sauvage
 - Alignment of assessment and AEMP study areas
- Dominion Diamond has developed a conceptual AEMP Design Plan, and will further develop this plan through engagement with Parties and the WLWB under the permitting process

Dominion Diamond thanks the Parties for their contributions during the Project Environment Assessment Process

