



JAY PROJECT

FISHERIES AND OCEANS CANADA

TECHNICAL REPORT RESPONSES

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Abbreviations

Abbreviation	Definition
AEMP	Aquatic Effects Monitoring Program
DAR	Developer's Assessment Report
DFO	Fisheries and Oceans Canada
Dominion Diamond	Dominion Diamond Ekati Corporation
Ekati Mine	Ekati Diamond Mine
IR	information request
MVEIRB	Mackenzie Valley Environmental Impact Review Board
Narrows	Lac de Gras Narrows
Project	Jay Project
WLWB	Wek'èezhii Land and Water Board

Units of Measure

Unit	Definition
kg	kilogram
kPa	kiloPascals
m	metre
mm/s	millimetres per second



1 INTRODUCTION

Dominion Diamond submitted a Developer's Assessment Report (DAR) to the Mackenzie Valley Environmental Impact Review Board (MVEIRB) in November 2014. Following completion of the DAR, Dominion Diamond submitted Round 1 and Round 2 information request responses (April 7, 2015 and July 3, 2015, respectively), and attended Technical Sessions hosted by MVEIRB in Yellowknife between April 21 and 24, 2015, to address regulator and parties' questions and concerns in regard to the Jay Project (Project) and the DAR.

On July 31, 2015, Fisheries and Oceans Canada (DFO) submitted their technical report to MVEIRB for the Project outlining recommendations on remaining topics of concern. This report provides responses to those recommendations outlined in the DFO technical report (DFO 2015), with the intent of clarifying these remaining topics as the Project moves into the MVEIRB Hearings Phase.



2 RECOMMENDATION AND RESPONSE

2.1 Blasting: Avoidance and Mitigation of Effects of Blasting on Fish

2.1.1 Recommendation 1

Fisheries and Oceans Canada recommends that the Developer revise their instantaneous pressure threshold limit of 100 kPa to 50 kPa, and recalculate the appropriate setback distances, in order to develop adequate mitigation measures to address the effects of blasting on fish and reduce the risk of serious harm to fish as a result of the Jay Project.

2.1.2 Response 1

Dominion Diamond is committed to developing a blasting plan for the Project for avoiding and mitigating Serious Harm to Fish and engaging with DFO on the plan as appropriate. The plan will consider relevant recommendations, guidelines, or standards from the literature for identifying blasting standards and related setback distances (e.g., Cott and Hanna 2005; Faulkner et al. 2006; Faulkner et al. 2008; Kolden and Aimone-Martin 2013; Timothy 2013). For example, the Alaska Department of Fish and Game recommends new blasting standards for the proper protection of fish (see Timothy 2013, and the references cited within). These standards include the following:

- instantaneous pressure rise in the water column in rearing habitat and migration corridors is limited to no more than 50 kiloPascals (kPa) where fish are present; and,
- peak particle velocities in spawning gravels are limited to no more than 51 millimetres per second (mm/s) during the early stages of embryo incubation before epiboly is complete.

As stated in Round 1 information request (IR) response DAR-IEMA-IR-11, there are currently procedures at the Ekati Diamond Mine (Ekati Mine) for the storage and handling of explosives, as well as for blasting. All blasting will occur in the isolated and dewatered area of Lac du Sauvage, and blasting in the Jay open pit will be away from the nearest open water location that may support fish (i.e., the outer edge of the dike alignment). Thus, effects to fish will be negligible based on the formulas in Wright and Hopky (1998), and assuming the use of 100-kilogram (kg) explosives detonated in rock in the Jay Pit. Peak particle velocities in open water locations outside the diked area are not predicted to exceed the 13 mm/s limit identified by Wright and Hopky (1998), or the 50 kPa identified by Cott and Hanna (2005) and Timothy (2013). Furthermore, potential effects on overpressure and vibrations are also reduced as the pit depth increases.

A blast monitoring plan will be developed as part of the blasting plan, such that overpressures and vibrations are monitored for a subsample of representative detonations during blasting activities. If blasting standards for the Project are approached, then site-specific operating mitigations could be implemented if necessary to protect fish (as stated in Round 1 IR response DAR-IEMA-IR-11). Methods that may be used to minimize the impacts of blasting on fish include the following (Timothy 2013):

- Scheduling blasting to avoid sensitive life stages;
- Waiting until epiboly is complete if embryos present in coarse substrate;



- Scheduling blasting to avoid fish migrations; and,
- Using controlled blasting techniques following industry best management practices.

2.1.3 Recommendation 2

Fisheries and Oceans Canada recommends that the Developer develop an appropriate blast monitoring and mitigation plan to ensure that peak particle velocities do not exceed 13 mm/s at shoal S4 during the time of Lake Trout egg incubation, including procedures to be followed in the event that blasts may exceed this threshold.

2.1.4 Response 2

Dominion Diamond is committed to developing a blasting plan for the Project for avoiding and mitigating Serious Harm to Fish and engaging with DFO on the plan, as appropriate (see Response 1). The plan will be based on achieving the appropriate protective standards (as expressed in the various published documents and guidelines referred to in Response 1 above) at appropriate locations (including the outer edge of the Jay dike). The conceptual estimated maximum particle velocity of 13 mm/s at the outer edge of the dike as presented in the DAR is well below current standards, which indicates that mitigation can be established on an adaptive management basis. Shoal S4 is approximately 315 metres (m) from the edge of the dike and, as such, it is likely that achieving published standards at the edge of the dike will be protective of shoal S4. Dominion Diamond will engage with DFO on this topic as part of the future detailed design stage, and recommends that a determination of the need for shoal S4 to have a specific objective be made at that time.

2.2 Water Crossings: Avoidance and Mitigation of Effects to Fish and Fish Habitat

2.2.1 Recommendation 3

Fisheries and Oceans Canada recommends that the Developer implement all available best management practices to avoid and mitigate serious harm to fish as a result of water crossing construction, operation and decommissioning. This includes, but is not limited to, appropriate design of water crossings to facilitate fish passage at both high and low flows, timing windows that incorporate spawning, incubation and hatch times for all species using water courses, sediment and erosion control, protection and replanting of riparian vegetation, and other forms of bank stabilization.

2.2.2 Response 3

Dominion Diamond is committed to avoid and mitigate Serious Harm to Fish as a result of watercourse crossing construction, operation, and decommissioning.

Proposed best management practices and mitigations applicable and achievable for the Jay Project were discussed in the DAR Section 8.4.2, and in the Round 1 IR responses: DAR-MVEIRB-IR-16 and DAR-DFO-IR-06. These included the following:

- Roads will be built as narrow as practical while maintaining safe construction and operation practices.



- Roads will follow alignments that minimize stream crossings (e.g., heights of land, where practical) and if feasible, stream crossings will be perpendicular to watercourses.
- Roads will avoid sensitive habitat where feasible.
- Culverts will be installed or upgraded as necessary, and monitored along site access roads to use and maintain natural drainage patterns, and reduce the use of ditches and diversion berms.
- Culverts will be designed and constructed for peak flows corresponding to the 1 in 50 year peak Intensity-Duration-Frequency event (peak event for the rainfall intensity and duration associated with the site-specific time of concentration for the contributing watershed), and banks will be stabilized to prevent erosion. In addition, watercourse crossings will be designed to minimize changes to baseline flow velocities and depths.
- Culverts will be constructed using a staggered configuration where possible, and will be regularly inspected and maintained.
- Appropriate sediment and erosion controls will be used during Project activities for construction, operations, and closure (e.g., timing of construction, use of silt curtains within waterbodies or along drainage paths, road watering, site contouring). These practices will be consistent with those presently used at the Ekati Mine. These practices are based on the most appropriate methods that have been found to be most effective in northern mining operations for erosion and sediment control.
- Silt fences will be used according to best management practices to reduce the transport of sediment from the construction and decommissioning of watercourse crossings.
- Frozen ground and ice-covered conditions limit the total footprint of disturbances to the areas immediately adjacent to the construction zone. For example, where possible, watercourse crossings for the Project will be constructed at low or no flow conditions (potentially during the winter months when the streams are frozen or not flowing). In-stream works during frozen or non-flowing conditions will minimize the potential for erosion, sediment releases, and effects on receiving water quality.
- A restricted activity timing window will be applied mid-May to mid-June (approximately a 32-day period) to avoid effects to incubating Arctic Grayling eggs, where required. For example, this mitigation measure will be applied to the proposed crossing on Stream Ac35. Arctic Grayling are known to use Stream Ac35 for spawning and there is potential for spawning to occur near the proposed crossing.
- Construction of crossings across the diversion channel will occur prior to the connection of the diversion channel to Stream B0, and as a result, no fish will be present in the diversion channel during construction.

Consistent with current practice at the Ekati Mine, detailed designs of culvert crossings and associated construction plans will be developed during the detailed design stage of the Project for submission to DFO.

2.2.3 Recommendation 4

Fisheries and Oceans Canada also recommends that an appropriate water crossing maintenance and monitoring plan be in place to ensure that barriers to fish passage do not form over time as a result of crossing damage due to ice blockage, flooding or movement of debris, such as may occur at freshet.

2.2.4 Response 4

Dominion Diamond will develop a maintenance and monitoring plan for the watercourse crossings to prevent the formation of barriers to fish movement at crossing locations designed for fish passage. This plan will be finalized during the permitting phase for the Project.

Proposed maintenance and monitoring activities include (from DAR Section 9.3.2.2):

- Regular inspections of roads and cross-drainage structures to promptly identify requirements for maintenance activities (frequency and details will be included in the monitoring plan);
- Removal of snow and ice at the culvert inlet and outlet (and within the culvert if necessary) before the freshet, to promote drainage during spring thaw and freshet; and,
- Removal of debris at the culvert inlet and outlet, to promote drainage.

2.2.5 Recommendation 5

Fisheries and Oceans Canada recommends that the Developer provide Fisheries and Oceans Canada with detailed engineering plans of all water crossings, supported by measured or modeled stream flow data, for review prior to construction. This may be provided during the regulatory phase.

2.2.6 Response 5

Consistent with current practice at the Ekati Mine, Dominion Diamond is committed to completing the detailed design of all watercourse crossings to support the regulatory phase of the Project and providing these designs to DFO. Available flows measurements as well as modelled flows will be used as basis of the design of the watercourse crossings.

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

2.3.1 Recommendation 6

Fisheries and Oceans Canada recommends that the Developer implement all available best management practices in the design of Sub-Basin B Diversion Channel to avoid and mitigate serious harm to fish as a result of the diversion. This includes, but is not limited to, appropriate design of the stream diversion channel to facilitate fish passage at both high and low flows for Arctic Grayling, Burbot, Lake Trout, Northern Pike at all relevant life stages, and small-bodied fish, adherence to appropriate timing windows, bank stabilization and sediment and erosion control.



2.3.2 Response 6

Dominion Diamond is committed to avoid and mitigate Serious Harm to Fish as a result of the Sub-Basin B Diversion Channel. This includes, but is not limited to, appropriate design of the diversion channel to facilitate fish passage at both high and low flows for relevant species and life stages, and adherence to appropriate timing windows, bank stabilization, and sediment and erosion control.

Section 9.3.2.1.3 of the DAR describes the effectiveness of proposed mitigation related to diversion channels specific to fish use. The diversion channel will include the following design features:

- The channel will cross relatively flat topography along a sinuous path similar to other streams in the area; this design will help maintain relatively low water velocities that facilitate upstream passage of target species, such as adult Arctic Grayling during the peak freshet and juvenile Arctic Grayling immediately following the peak freshet period.
- Another important feature of the channel will be the variability (or unevenness) in the streambed and banks of the channel resulting from the sinuous shape of the diversion channel and the use of substrate of varying size; this design will help create varied flow conditions (i.e., water depths and velocities) for a range of fish species and sizes.
- Maintaining conditions for fish passage for other life history stages will be considered in channel design, for example, the outmigration of young-of-year Arctic Grayling and Burbot that occurs mid-summer.
- Construction of crossings across the diversion channel will occur prior to the connection of the diversion channel to Stream B0, and as a result, no fish will be present in the diversion channel during construction.
- For construction activities in close proximity to Stream B0 or Ac35, a restricted activity timing window will be applied mid-May to mid-June (approximately a 32-day period) to avoid effects to incubating Arctic Grayling eggs, where required.
- The channel and bank design will be based on a design flow of a 1 in 100 year return period, and will include a minimum 0.3 m freeboard.
- Temporary diversion structures (channels or berms) will be constructed immediately outside the construction area to divert any clean water away from the disturbed area; in addition, localized contact water management structures (e.g., sumps, channels with check drains, filter fabric fences) will be provided within the construction area to manage any water from active construction or disturbed areas and to allow for sediment control prior to discharge.
- Any riparian vegetation disturbed during construction will be reclaimed as soon as possible.

Consistent with current practice at the Ekati Mine, Dominion Diamond will engage with DFO on the design of the diversion channel, and will submit final designs to DFO. Operational monitoring of fish use of the Sub-Basin B Diversion Channel will confirm its expected functions (e.g., as a migratory corridor) for Arctic Grayling and other species, and will also any new mitigation strategies as they are required in the future. Environmental design features, mitigations and monitoring plans for the Sub-Basin B Diversion Channel will be finalized during the permitting process for the Project.

2.3.3 Recommendation 7

Fisheries and Oceans Canada also recommends that an appropriate stream diversion maintenance and monitoring plan be in place to ensure that barriers to fish passage do not form over the life of the diversion channel. This may include ongoing mitigation measures for bank stabilization and erosion protection as well as removal of blockages of culverts or other barriers to fish passage due to ice break-up or debris mobilized during freshet.

2.3.4 Response 7

Dominion Diamond is committed to developing a maintenance and monitoring plan for the stream diversion channel for avoiding the formation of barriers to fish passage over time. This plan will be finalized during the permitting phase for the Project.

Proposed maintenance and monitoring activities (DAR Section 9.3.2.1.3) include the following:

- Regular inspections of channels and culverts to promptly identify requirements for maintenance activities including the removal of accumulated sediment and soil/rock fall material (frequency and details will be included in the monitoring plan);
- Inspection of culvert inlets and outlets for ice and snow build-up before freshet, and removal of any accumulated ice and/or snow; and,
- Repair of damaged channel linings immediately to limit the potential for erosion and breach of channel.

Operational monitoring of fish use of the channel will inform any new mitigation strategies as they are required in the future.

2.3.5 Recommendation 8

Fisheries and Oceans Canada recommends that the Developer provide Fisheries and Oceans Canada with detailed engineering plans of the diversion channel for review prior to construction. This may be provided during the regulatory phase.

2.3.6 Response 8

Dominion Diamond is committed to completing the detailed design of the Sub-Basin B Diversion Channel to support the regulatory phase of the Project and providing the design to DFO. Available measurements of flows and modelled estimates of flows will be used as basis of the design of diversion channel.

2.3.7 Recommendation 9

Fisheries and Oceans Canada recommends that detailed closure and reclamation plans for Sub-Basin B Diversion channel, including the reclamation of natural channels and drainage for streams B0 and Ac35, be provided to Fisheries and Oceans Canada for review. This may be provided during the regulatory phase.



2.3.8 Response 9

Dominion Diamond is committed developing a detailed closure and reclamation plan for the Sub-Basin B Diversion Channel, including the reclamation and promotion of natural drainage patterns through the natural drainage channels (lower portions of streams B0 and Ac35), which will be provided to DFO for review. This will become part of the amendment to the existing Interim Closure and Reclamation Plan for the Ekati Mine to include the Jay Project.

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

2.4.1 Recommendation 10

Fisheries and Oceans Canada recommends that water levels be monitored in Lake C1/Stream C1 and at depth-limiting locations in the Narrows during the open water season, particularly during years of low precipitation, extended drought or back-flooding at closure, to ensure that Project effects on these water bodies do not negatively impact fish passage or fish habitat. Such plans may be incorporated into programs such as the Aquatic Effects Monitoring Program (AEMP).

2.4.2 Response 10

The conceptual AEMP Design Plan (Dominion Diamond 2015) stated that monitoring in Lake C1, Stream C1, and the Lac du Sauvage - Lac de Gras Narrows (Narrows) would be considered. Hydrology monitoring in Lake C1, Stream C1, and the Narrows will be incorporated into the final AEMP Design Plan which will be submitted to the Wek'èezhìi Land and Water Board (WLWB) as part of Dominion Diamond's water licence process. The selection of a monitoring location in the Narrows in the AEMP Design Plan will consider depth-limiting locations for fish passage. Dominion Diamond will continue to engage with regulators and communities on the design of the AEMP following the completion of the Environmental Assessment review process.

2.4.3 Recommendation 11

Fisheries and Oceans Canada also recommends that a mitigation, response or action plan be developed in consultation with Fisheries and Oceans Canada in the event that significant changes in water levels as a result of the Project occur, to mitigate the risk of the formation of barriers to fish passage or serious harm to fish in Lake C1/Stream C1 and the Narrows.

2.4.4 Response 11

Early-warning action levels for water levels/flow changes for Lake C1/Stream C1 and the Narrows will be incorporated into the existing Ekai Mine AEMP Response Framework for approval of the WLWB under the Ekati Mine Water Licence. In the response framework, action levels are set to trigger management actions that can be implemented to prevent significant effects. Action levels range from low, medium, and high, with each new level initiating a new set of management actions. Should a low action level be triggered (early warning level of change) for hydrology related to flows in Lake C1/Stream C1 or the Narrows, Dominion Diamond will commit to engaging with DFO during the development of an AEMP Response Plan.

2.4.5 Conceptual Fish-Out Plan: Use and Release of Fish from Fish-Out

2.4.6 Recommendation 12

Fisheries and Oceans Canada recommends that the Developer conduct additional consultation with affected communities regarding the handling and fate of fish captured during the fish-out of the diked area in Lac du Sauvage (either relocation to Lac du Sauvage, or processing for use by communities and for data collection). This may occur during the regulatory phase.

2.4.7 Response 12

Dominion Diamond agrees to continue engaging with the affected communities and DFO regarding the handling and fate of captured fish during the fish-out of the diked area in Lac du Sauvage during the regulatory phase of the Project and prior to developing the detailed fish-out plan.

2.5 Conceptual Offsetting Plan: Offsetting Requirements

2.5.1 Recommendation 13

Fisheries and Oceans Canada recommends that the Developer conduct additional consultation with affected communities and continue to work with Fisheries and Oceans Canada regarding the development of appropriate quantification of fisheries productivity impacts in Lac du Sauvage, and Streams Ac35 and BO, as well as options to offset the impacts of the Project on fisheries productivity that cannot be avoided or mitigated.

2.5.2 Response 13

Dominion Diamond agrees to continue engagement with affected communities on the offsetting plan for the Jay Project, including offsetting options, and to continue to work with DFO on the development of methods for quantifying fisheries productivity and the options (or measures) for offsetting impacts of the Project on fisheries productivity.



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