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AQUATIC EFFECTS MONITORING PROGRAM 2016 ANNUAL REPORT – PLAIN LANGUAGE BRIEFING AND TECHNICAL REVIEW COMMENTS

Technical Memorandum # 367-17-01

Prepared for:

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1.0 BACKGROUND AND SCOPE OF WORK

Diavik Diamond Mines (2012) Inc. (DDMI) submitted the 2016 Aquatic Effects Monitoring Program (AEMP) Annual Report on March 31, 2017 in accordance with Part J, Item 8 of Water Licence W2015L2-0001 (Golder 2017). An updated cover letter, which provided more information about DDMI's responses to Board directives, was provided on April 10, 2017.

The Wek'eezhii Land and Water Board (WLWB) noted the following for the review of the 2016 AEMP (the Report):

"The purpose of this review is to determine whether the Report fulfills the requirements of the Water Licence. The Board will also consider whether the results and conclusions have been appropriately and accurately reported, and whether any other direction provided to the proponent has been addressed. The Report is meant to consider results obtained in the preceding calendar year (i.e., the 2016 sampling year). The cover letter includes information regarding DDMI's response to Board directives and notification of Action Level exceedances."

The WLWB directive dated March 2, 2017 indicated the following with respect to the preparation of the 2016 AEMP report:

- Include a statement explaining how it has incorporated key findings from the Plankton Report into the Eutrophication Report;
- Provide an explanation of how toxicity testing results for plankton have been incorporated into the WOE analysis in the cover letter this submission;
- Include a consideration of the ability of the Action Levels for Plankton to be sequentially evaluated, along with a recommendation and rationale for potential changes, or lack of potential changes to Action Levels;
- Include a recommendation regarding the use of a threshold for censored values, at which point alternative statistical methods will be explored; and
- Clearly identify changes and updates to the WOE analysis in the 2016 AEMP Annual Report.

North/South Consultants Inc. (NSC) conducted a technical review of the 2016 AEMP Annual Report for the Environmental Monitoring Advisory Board (EMAB). The following aquatic environment components were reviewed by NSC personnel with technical knowledge and expertise in each of the areas: dust; effluent and water chemistry; sediment chemistry; plankton; eutrophication indicators; benthic invertebrates, and fish. As directed by EMAB in their Scope of Work for the review, the following points were considered:

- Quality of data collected and analyses;

- Appropriateness of timing for sampling considering seasonal patterns;
- Adequacy of discussion of results;
- Defensibility of conclusions and recommendations;
- Implications of results, particularly any emerging issues that may indicate substantive environmental changes over time;
- Action Levels that were reached;
- Weight of evidence and appropriateness of adaptive management response actions;
- Responsiveness to previous NSC recommendations, including:
    - Diavik's rationale and recommendations for no change to Plankton Action Levels
    - Diavik's explanation of how key findings from the Plankton Report were incorporated into the Eutrophication Report.

Section 2 provides a plain language briefing of the key review comments, along with recommendations for consideration by Diavik and the WLWB. Detailed technical review comments and recommendations are provided in Table 1, and in the Excel comments template as required for submission to the WLWB.

2.0 PLAIN LANGUAGE BRIEFING

The 2016 AEMP Annual Report is generally well written, provides comprehensive and clear descriptions of objectives, methods, and results and the additions and modifications to the reporting is a great improvement. The following sections present key comments for discussion by EMAB members and refer to:

- specific items requested by EMAB in their Scope of Work for discussion as part of the 2016 AEMP Annual Report review (WLWB Directives 3A and 3C);
- dust deposition monitoring and wind data;
- seasonal differences in dust deposition;
- dust deposition monitoring sites;
- timing of water quality and plankton sampling;
- potential dust effects on water quality;
- analysis of nearfield (NF) water quality data;
- spatial extent of effects on total nitrogen (TN);
- spatial extent of effects on phytoplankton biomass;
- dust effects on sediment quality;
- phytoplankton results and supporting variables;
- dust effects on plankton;
- fish metals methods and conclusions;
- fish age partitioning; and
- lake productivity weight-of-evidence analysis.

To aid in this discussion, useful tables and figures (and corresponding numbering and captions) are included from the 2016 AEMP Annual Report. In a few instances, NSC's review comments for the 2015 AEMP Annual Report have not been incorporated into the 2016 AEMP Annual Report; these observations are noted below and in Table 1.

The technical review comments (Table 1) include additional detailed comments that recommend various revisions to clarify either the presentation of results and/or their interpretation to improve the overall quality of the report; these comments are excluded from the discussion below.

2.1 SPECIFIC ITEMS REQUESTED BY EMAB IN SCOPE OF WORK

2.1.1 WLWB Directives 3A and 3C

Comment 1: The WLWB Directive 3A dated March 2, 2017 indicated the following with respect to the preparation of the 2016 AEMP report: "Include a statement explaining how it has incorporated key findings from the Plankton Report into the Eutrophication Report"

The executive summary indicates the following in a footnote: "1 Updates related to WLWB Directive (dated 2 March 2017) were included in the 2016 AEMP document as follows: (1) Re. Directive 3A, a statement explaining how DDMI has incorporated key findings from the Plankton Report into the Eutrophication Report has been added."

Appendix XIII, Eutrophication Report, Section 1.1 (page 1) indicates: "Although AEMP Study Design Version 3.5 (Golder 2014a) is the approved version of the AEMP design at the time this report was written, a number of updates outlined in the proposed AEMP Design Plan Version 4.0 (Golder 2016a) and in Wek'èezhìi Land and Water Board (WLWB) directives (28 July 2015, 26 May 2016, 14 November 2016 and 2 March 2017 Decision Packages) have been incorporated into the 2016 Eutrophication Report, including incorporation of phytoplankton biomass data and statements regarding incorporation of findings from the Plankton Report (Appendix IV)."

While phytoplankton biomass was incorporated into the Eutrophication Report, a clear statement regarding how the results of the Plankton Report were incorporated into this component could not be located in the document.

Recommendation 1: Please provide a clear statement in the report as requested under WLWB Directive 3A.

Comment 2: The WLWB Directive 3C dated March 2, 2017 indicated the following with respect to the preparation of the 2016 AEMP report: "Include a consideration of the ability of the Action Levels for Plankton to be sequentially evaluated, along with a recommendation and rationale for potential changes, or lack of potential changes to Action Levels".

The executive summary indicates the following in a footnote: "1 Updates related to WLWB Directive (dated 2 March 2017) were included in the 2016 AEMP document as follows: ... (3) Re. Directive 3C, consideration of the ability of the Action Levels for Plankton to be sequentially evaluated has been included, along with a recommendation and rationale for potential changes, or lack of potential changes to Action Levels"

Appendix XI, Section 1.1 (page 1) indicates: "Although AEMP Study Design Version 3.5 (Golder 2014a) is the approved version of the AEMP design at the time this report was written, a number of updates outlined in the proposed AEMP Design Plan Version 4.0 (Golder 2016a) and in Wek'èezhìi Land and Water Board (WLWB) directives (28 July 2015, 26 May 2016, 14

November 2016 and 2 March 2017 Decision Packages) have been incorporated into the 2016 Plankton Report, including sequential evaluation of Action Levels for plankton."

The Main Document, Section 13.2 (page 86) indicates: "For the plankton component, sampling in the MF area of Lac de Gras is recommended during interim AEMP years to allow a full evaluation of Action Levels 1 and 2, in the event of an Action Level 1 trigger. No changes are recommended to plankton Action Levels, which are consistent with the benthic invertebrate action levels, and are intended to track the spatial expansion of a potential effect."

Recommendation 2: The report appears to address the WLWB Directive 3C and the recommendation for expansion of plankton sampling into the MF area annually is appropriate given the results of monitoring in the NF areas. No further action is suggested.

2.2 DUST DEPOSITION MONITORING: WIND DATA

There are some discrepancies regarding the description of predominant wind directions in the text in Appendix I (Section 3, page 3-1) and the wind rose provided in Figure 2-1 (page 2-4) and Figure 3.1-1 (page 3-5) in Appendix I and Figures 2-1 (Section 2.2.1, page 8) and 2-2 (Section 2.3.1, page 13) in the main document is for the previous year (2015). The lack of 2016 wind data precludes a thorough review of the dust deposition monitoring information. In particular, the lack of these data prevents the determination of whether the program is adequate in relation to changes in Project infrastructure (e.g., construction of the A21 dike). For these reasons, the review that was undertaken for the dust monitoring component is considered preliminary (i.e., pending inclusion of 2016 wind data).

Recommendation: Please insert the wind rose for 2016 and correct the associated text discussing wind direction and speed.

2.3 DUST DEPOSITION: SEASONAL DIFFERENCES

Appendix I, Section 3 (page 3-1) states: "It was expected that the highest fugitive dust generation and resulting dustfall occurred in areas closest to the mine footprint such as near A21 and the country rock pile between May and September. Dust 10 (downwind of the Mine, southwest, and adjacent to A21 mining operations) recorded the highest dustfall during the summer months (2,032 mg/dm^2/y) compared to the winter months (157 mg/dm^2/y)."

Based on the above statement, rates were higher in summer. It would be useful for the report to include data for the various sampling intervals in addition to the annual rates in a table and/or figure format. This would be particularly relevant for evaluating potential effects in the open-water season when the AEMP, including water quality monitoring, was conducted and given that the AEMP includes a specific analysis of potential dust effects on water quality.

It would also be useful to compare the seasonal rates to the referenced BC objectives although it is acknowledged as noted in the report that the objectives are no longer applied in BC.

Recommendation: Please present detailed results in a table and/or figure format, or at a minimum, provide values in Appendix B of Appendix I showing dust deposition rates for each sampling interval or if feasible for the open-water and ice-cover seasons separately, in addition to the total annual rates, and compare to the former BC objectives.

2.4 DUST DEPOSITION MONITORING SITES

Given the relatively high dust deposition observed at sites south and southeast of the mine, it would be beneficial to add a site between the two monitoring axes (i.e., SSE in the vicinity of the water quality site MF3-3) and a dustfall monitoring station south of site Dust 10 (i.e., at or near one of the snow dust fall sites SS5-4 and SS5-5). See excised Figure 3.1-1 below for reference.

Recommendation: Consider addition of dustfall sites to the SSE of the mine and south of Dust 10.

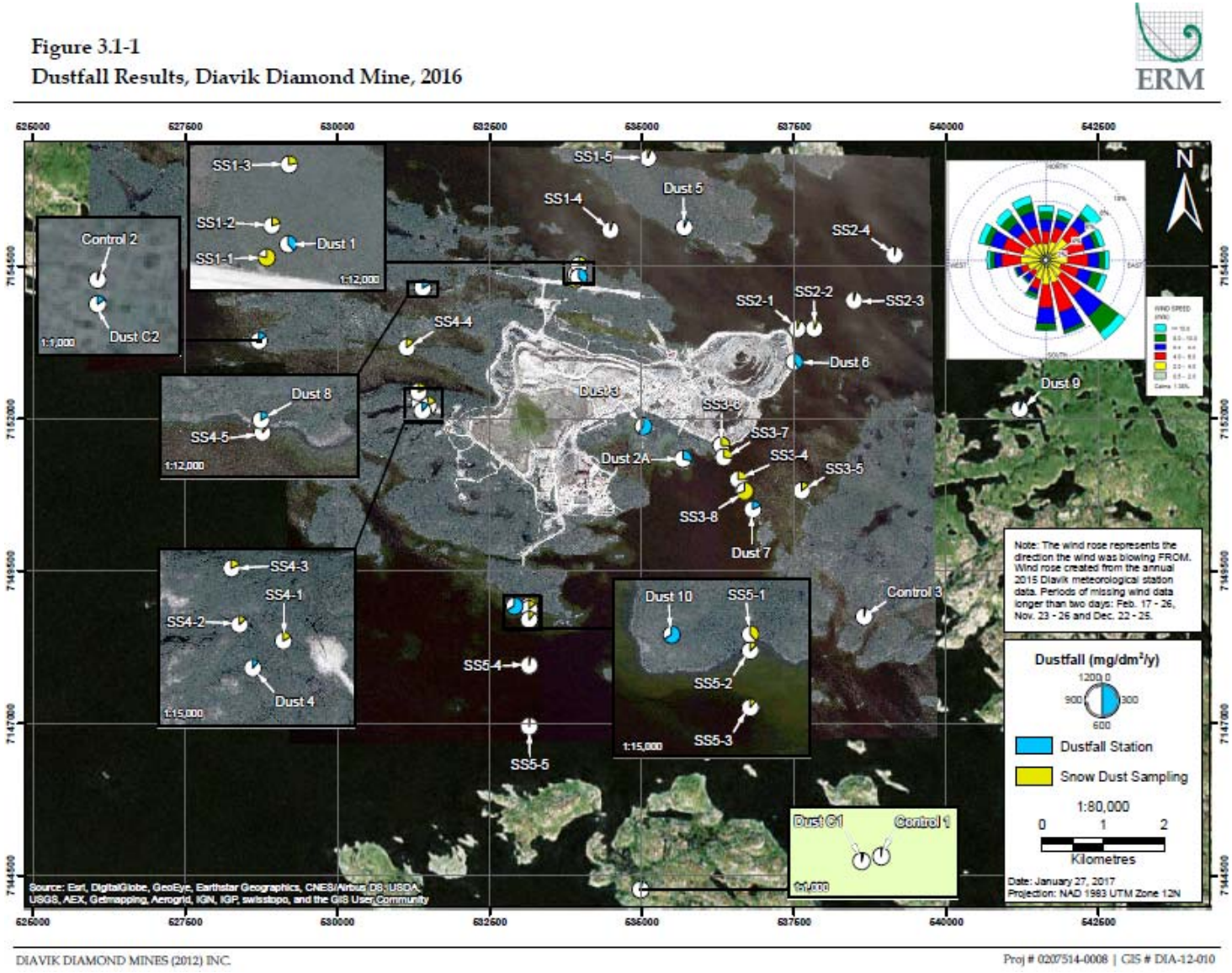


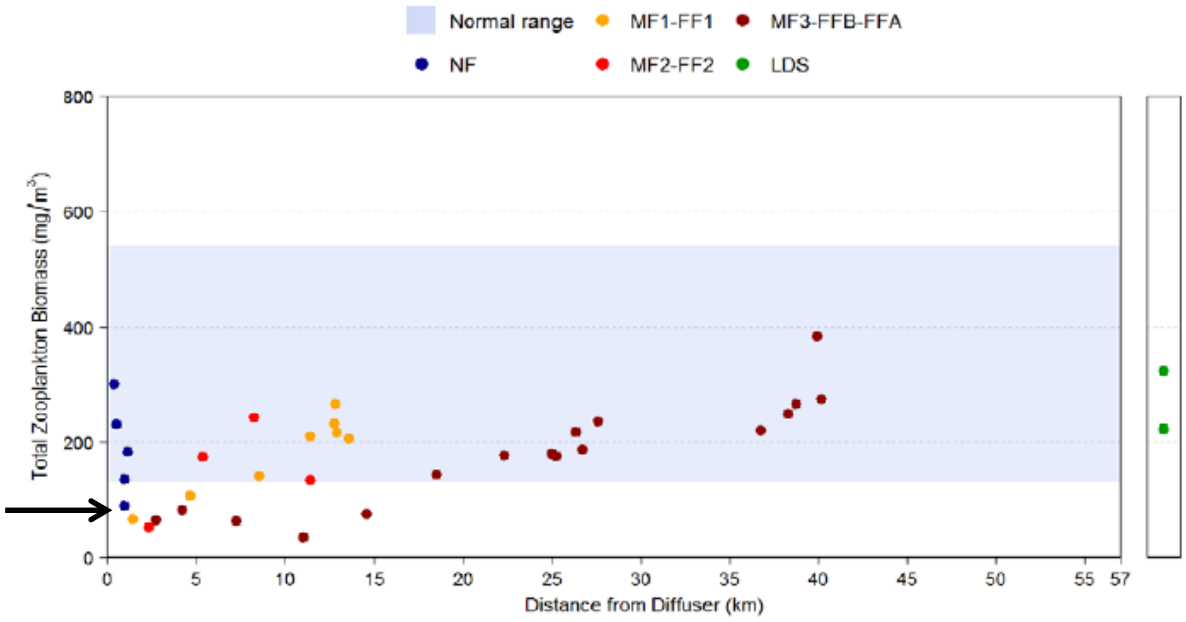
Figure 3.1-1. Dustfall results, Diavik Diamond Mine, 2016. (after Golder 2017)

2.5 WATER QUALITY AND PLANKTON: SAMPLING TIMING

Station NF5 was sampled approximately 2 weeks later (August 30) than the remaining four NF sites (August 15-18). This gap in sampling timing may affect comparability of the water quality, phytoplankton, and zooplankton data for characterizing the NF area. At least two variables were notably different at the NF5 site relative to sites NF1 through NF4; zooplankton biomass (see excised Figure 3-10 below for reference) was below the normal range at site NF5 (Appendix XI Plankton Report, Section 3.2.1.1, page 29) and chlorophyll *a* was highest at site NF5 of all the NF sites (Appendix XIII Eutrophication Indicators Report, Appendix B, page B-25).

Recommendation: Provide a discussion of potential effects related to the later sampling date for NF5 on the dataset and subsequent analyses. Explore the effects of excluding data for site NF5 on data analyses and comparisons among sampling areas and modify if appropriate.

Figure 3-10 Zooplankton Biomass in Lac de Gras and Lac du Sauvage Relative to Distance from the Effluent Discharge, 2016



NF = near-field; MF = mid-field; FF = far-field; LDS = Lac du Sauvage.

Figure 3-10. Zooplankton biomass in Lac de Gras and Lac du Sauvage relative to distance from the effluent discharge, 2016. Arrow indicates site NF5. (after Golder 2017)

2.6 POTENTIAL DUST EFFECTS ON WATER QUALITY

While inclusion of analyses specific to potential dust-related effects on water quality in the report is a great improvement, the zone of influence (ZOI) of dust deposition defined in Golder (2016a)

and applied in the report may be too restrictive and not reflective of results of the dust and water quality monitoring programs completed in 2016.

The report states (Appendix II, Section 2.3.10, page 23):

"The ZOI from dust deposition in Lac de Gras is estimated to be approximately 4 km from the geographic centre of the Mine, or approximately 1 km from the Mine boundary, extending radially from the source (Golder 2016a). These distances were estimated based on gradient analysis of dust deposition relative to distance from the Mine site and encompass the area of the lake where potential effects would be expected to be measureable (see Figures 3-5 and 3-6 and Table 3-1 in Golder 2016a). Beyond this estimated zone, dust deposition levels are similar to background levels. The AEMP sampling stations that fall within the expected ZOI from dust deposition include the five stations in the NF area and stations MF1-1, MF2-1, MF3-1 and MF3-2...Construction of the A21 dike was ongoing during the 2016 open-water AEMP survey and confounded the analysis of potential dust-related effects in the MF area. Water quality variables with elevated concentrations at AEMP stations near the A21 dike were considered potentially affected by dike construction. The influence of dike construction on the assessment of effects from dust deposition on the water quality of Lac de Gras was taken into account when interpreting the results of the analysis described above."

While it is acknowledged that distinguishing effects of construction of the A21 dike from dust deposition is difficult, there are indications from the dust monitoring and water quality programs that effects of dust may have extended to sites MF3-3 and MF3-4. Furthermore, the zone of influence and the associated water quality sites chosen as falling within the ZOI were based on available dust deposition data, prior to construction of the A21 dike.

As noted above, while it is understood that water quality conditions would be a reflection of effects from various pathways, including effluent, dust, and dike construction, and that effects related to dike construction would be short-term, there is still value in including an explicit discussion of the observed conditions at the MF3-3 and MF3-4 sites in the vicinity of the A21 dike within the report.

Recommendation: The analysis of dust deposition effects on water quality should be expanded to include site MF-3 and MF-4. It is also suggested that in future reporting, the sites included in the dust deposition analysis consider the results of the water quality and dust deposition monitoring programs for that year.

The lack of dust deposition sites in the vicinity of the A21 dike and the MF3-3 area increases the uncertainty associated with identifying the actual dust ZOI for the aquatic environment (see earlier comment) and additions of sites in these areas is suggested.

2.7 ANALYSIS OF NEARFIELD WATER QUALITY DATA

Medians of water quality parameters in the NF area were calculated from data pooled across all sample depths, dates and stations (n = 15 samples; Appendix II, Section 3.4.1, page 64, Table 3-5). When water quality is relatively consistent across depth this approach is reasonable and appropriate. However, in instances where conditions vary across the water column such as in winter when the effluent plume is more evident near the bottom of the water column, it may be more conservative to examine data for each sampling depth separately. If effects are greatest near the bottom of the water column, potential effects on benthos would be better represented by the bottom water quality samples. See example Figure 3-24 below for reference.

Recommendation: Consider analysing NF water quality data by sampling depth for deriving median concentrations for comparison to action levels.

Figure 3-24 Specific Conductivity, Dissolved Oxygen, pH and Temperature Profiles at MF2 Transect Stations, 2016

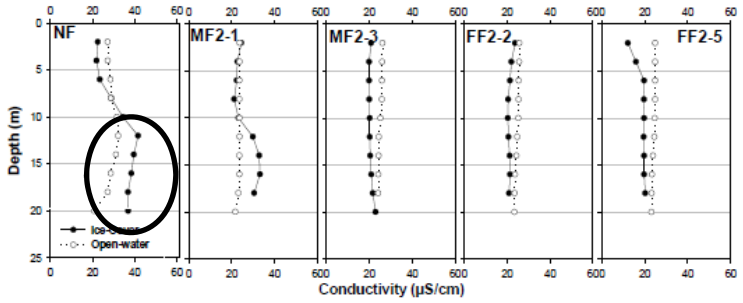


Figure 3-24. Specific conductivity profiles at MF2 Transect Stations, 2016. Circle denotes higher specific conductance values in the lower part of the water column in winter at NF sites (after Golder 2017)

2.8 SPATIAL EXTENT OF EFFECTS ON TOTAL NITROGEN

Comment 1: Section 2.1.2 of Appendix XIII (page 5) indicates that no sample was collected from LDG-48 (the outlet of the lake) in the open-water season. As a result the spatial extent of effects on total nitrogen and cumulative effects were not assessed for the northwest area of the lake beyond sites FFA-4 and FFA-5 (see Figure 4-2 below for reference).

While it is understood that sampling methods employed in the water quality monitoring program are not consistent with those for the eutrophication monitoring program, the TN concentration measured at LDG-48 in August, 2016 (174 µg/L) under the water quality program was above the normal range (122-153 µg/L) for the open-water season. Based on this measurement, the spatial extent of effects extended through the northwest portion of the lake (i.e., effectively 100% of the lake area).

Recommendation 1: Incorporate data collected at site LDG-48 during the water quality monitoring program into the eutrophication analyses and reporting and update maps and spatial extent of effects estimates.

Comment 2: Regardless of the above consideration, the spatial extent of effects for TN increased notably in 2016 relative to previous years. The spatial extent of effects on chlorophyll *a* was also highest in 2016. Given these potential "trends" and observations, increasing the frequency of FF sampling for the eutrophication metrics to annually rather than every three years seems warranted.

Recommendation 2: Consider increasing the frequency of FF sampling for eutrophication metrics to annual and/or provide a rationale for what actions would be taken in the event that the spatial extent of effects on eutrophication metrics extended up to the MF sites in years when FF sampling is not conducted.

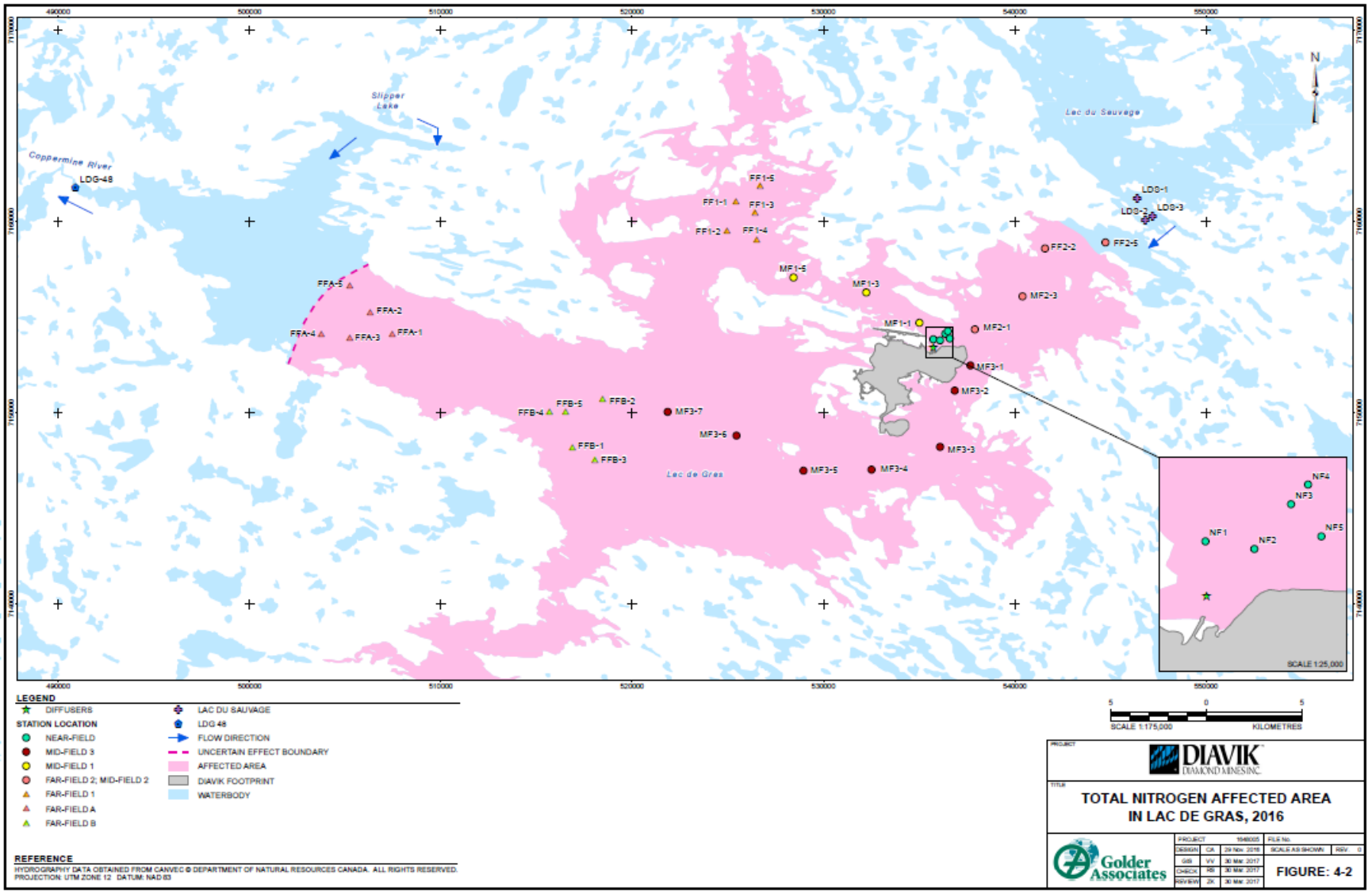


Figure 4-2. Total nitrogen affected area in Lac de Gras, 2016. (after Golder 2017)

2.9 SPATIAL EXTENT OF EFFECTS ON PHYTOPLANKTON BIOMASS

While it is acknowledged that phytoplankton biomass was only recently added to this component of reporting, it would be beneficial to derive estimates of the spatial extent of effects for previous years of monitoring for this metric to provide a long-term record of conditions.

Recommendations: Derive estimates of spatial extent of effects on phytoplankton biomass for previous years of monitoring and update Table 4-1 (Appendix XIII Eutrophication Indicators, Section 4.3, page 44; see excised Table 4-1 below for reference).

Table 4-1. Spatial extent of effects on concentrations of total phosphorus, total nitrogen and chlorophyll *a*, and on phytoplankton and zooplankton biomass, 2007-2016. (after Golder 2017)

Table 4-1 Spatial Extent of Effects on Concentrations of Total Phosphorus, Total Nitrogen and Chlorophyll *a*, and on Phytoplankton and Zooplankton Biomass, 2007 to 2016

Year	Total Phosphorus		Total Nitrogen		Chlorophyll *a*		Phytoplankton Biomass[j]		Zooplankton Biomass (ash-free dry mass)	
	Area (km^2)[a]	Lake Area (%)[b]	Area (km^2)[a]	Lake Area (%)[b]	Area (km^2)[a]	Lake Area (%)[b]	Area (km^2)[a]	Lake Area (%)[b]	Area (km^2)[a]	Lake Area (%)[b]
2007	29.4	5.1	-[d]	-[d]	89	15.5	-	-	-[d]	-[d]
2008	112[c]	19.6	84.8	14.8	77.1	13.5	-	-	-[e]	-[e]
2009	53.5[c]	9.3	180	31.5	121	21.0	-	-	0	0
2010	23.8[c]	4.2	132[c]	23.1	88.5	15.5	-	-	52.3	9.1
2011	9.2[c]	1.6	213[c]	37.2	89.3	15.6	-	-	129	22.5
2012	3.6[c]	0.6	118	20.7	17.0	3.0	-	-	76.7	13.4
2013	80.6[c]	14.1	183[c]	31.9	129	22.6	-	-	355	62.1
2014	3.5[c]	0.6	≥229.6[c]	≥40.1[f]	≥242.8	≥42.4[f]	-	-	-[g]	-[g]
2015	<3.5[h]	<0.6[h]	≥242.8[c]	≥42.4[f]	59.0	10.3	-	-	<3.5[h]	<0.6[h]
2016	37.1[c]	6.5	484.9	≥84.7[i]	250.4	43.7	74.6	13.0	2.9	0.5

a) Lake area reported is the greater of the area affected during the open-water or ice-cover season.
b) The lake area affected represents the percentage (%) of lake area experiencing levels greater than the normal range, and was calculated relative to the total surface area of Lac de Gras (573 km^2).
c) Lake area reported is for the ice-cover season.
d) Data not available due to field subsampling errors (Golder 2016a).
e) Data not available due to differences in sample collection procedures (Golder 2016a).
f) Percent lake area affected could not be estimated with certainty, because the FF1, FFA, and FFB areas were not sampled in 2014 and 2015.
g) Data not available due to the loss of the zooplankton samples.
h) The mean of the NF area stations was within the normal range. Since only one or two NF stations exceeded the normal range, the affected area was assumed to be less than the total area of the NF area (0.6% of lake area).
i) Due to an uncertain effect boundary at the end of the MF3-FFB-FFA transect, the extent of effects could have been greater than the area presented.
j) Phytoplankton biomass was first introduced to the Eutrophication Indicators Report in 2016 in response to a WLWB directive. Therefore, the spatial extent of effects on phytoplankton biomass was not calculated prior to 2016.
<= less than; ≥ = greater than or equal to; - = not determined; NF = near-field; FF1 = far-field 1; FFA = far-field A; FFB = far-field B.

2.10 DUST EFFECTS ON SEDIMENT QUALITY

The analysis approach applied for the sediment quality program is focused on comparisons of NF data to reference conditions and/or FF sites. However, this approach does not account for potential effects of dust deposition and/or dike construction on sediment quality in the MF area (notably MF3 sites). Further, not all data are presented in figures and raw data have not been provided electronically which limits the ability to review the information to consider these effects pathways.

In addition, substances of interest (SOIs) were identified based on visual comparisons of NF and FF data. As noted above, MF sites may also have been affected by dust deposition and dike construction and should be incorporated into the SOI identification and assessed in subsequent sections of the report.

Recommendation: Include explicit consideration of effects of dust deposition and dike monitoring on sediment quality. Provide raw sediment quality data in electronic format. Include review of MF data for the identification of SOIs and compare MF data to sediment quality guidelines.

2.11 PHYTOPLANKTON RESULTS AND SUPPORTING VARIABLES

As noted in the review of the 2015 AEMP, light and temperature conditions may have profound effects on phytoplankton growth, abundance, and taxonomic composition, yet there is no consideration of these variables within the discussion of phytoplankton or eutrophication in the technical appendices. Additionally, Secchi disk depth is a metric under the AEMP (Golder 2016a) yet the results are not presented in the 2016 Annual Report or in the raw datasets provided. A similar comment was raised as part of the review of the AEMP Study Design Version 4.0 document and the 2015 AEMP.

In addition, Appendix XI, Plankton Report, Section 4.1 (page 37) points out that the higher abundance of diatoms observed in the NF area in 2016 may reflect increased concentrations of silica as a result of effluent discharge (see Figure 3-41 below for reference). However, Table 2-2 in Appendix XV, Weight-of-evidence Report (page 8), only identifies nitrogen and phosphorus in water as exposure endpoints in relation to lake productivity.

Recommendation: Include a summary of key supporting variables, including but not necessarily limited to Secchi disk depth, water temperature, and silica within the discussion of results regarding phytoplankton data in the relevant sections of the report.

Figure 3-41 Concentration of Total Silicon at AEMP Stations Relative to the Normal Range and Action Level Criteria, 2016

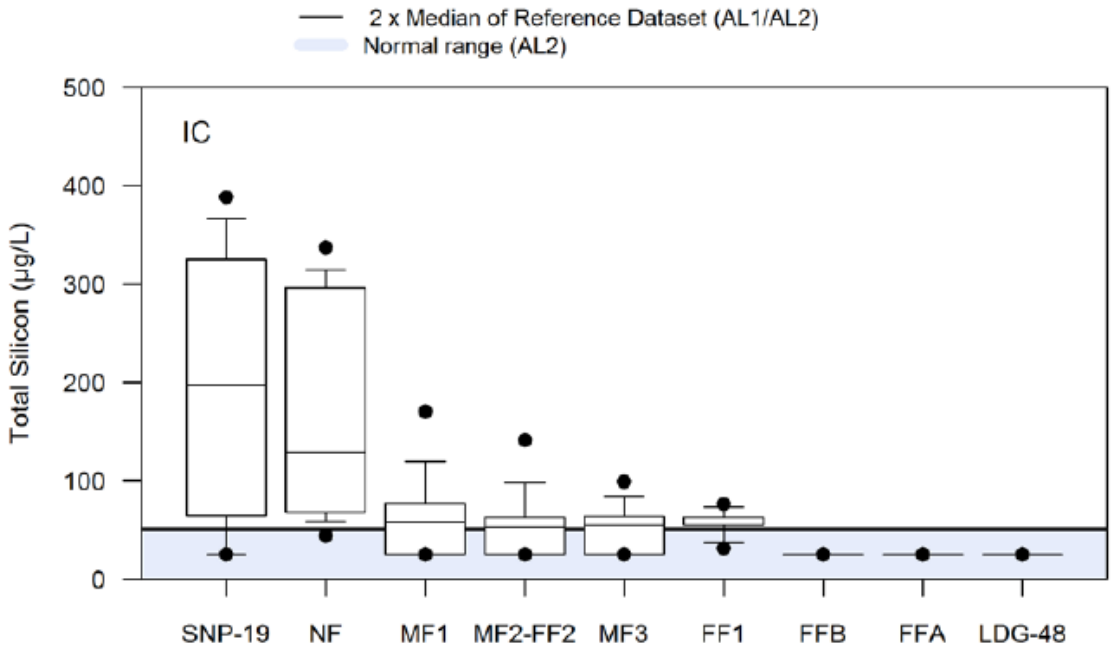


Figure 3-41. Concentration of total silicon at AEMP stations relative to the normal range and action level criteria, 2016. (after Golder 2017)

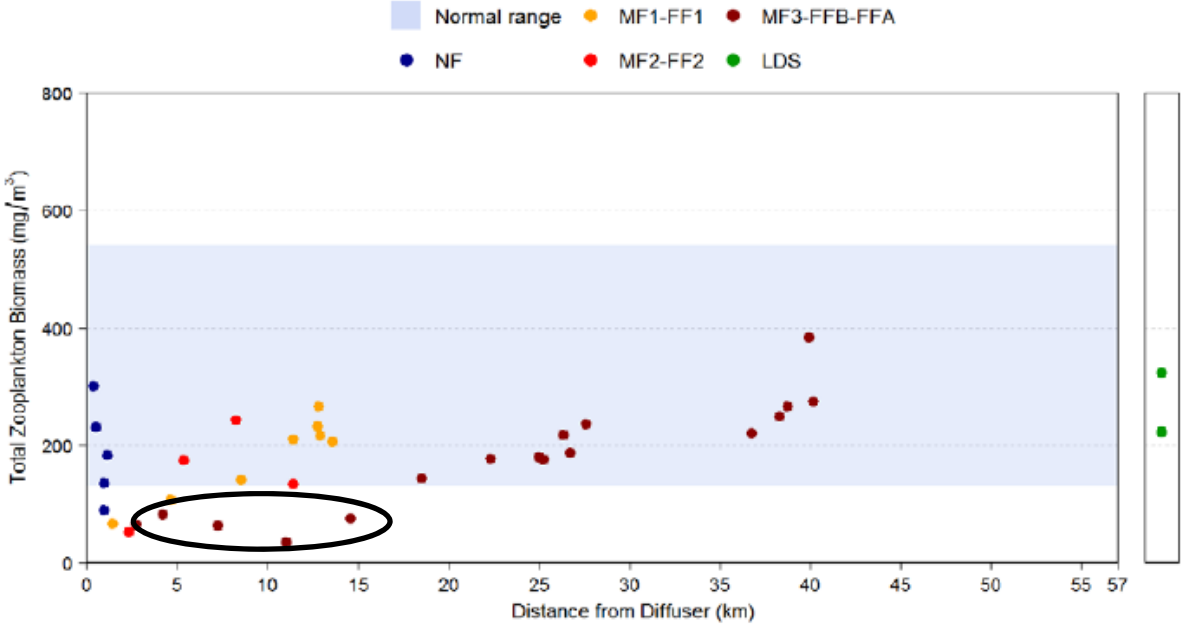
2.12 DUST EFFECTS ON PLANKTON

Zooplankton biomass, particularly calanoid copepod biomass, was below the normal range at sites MF3-1 through MF3-5 (see Figure 3-10 below for reference). These results could indicate a potential effect of dust deposition and/or dike construction on zooplankton and should be explicitly discussed, including within the Action Level response discussions.

A comparison of MF data to FF data with and without data for MF sites known to have been affected by dust and/or dike construction would be useful to try and isolate effluent effects from other pathways.

Recommendation: Expand discussion to incorporate dust deposition and dike construction effects on plankton. Compare MF and FF data with and without MF data for sites affected by dust deposition and/or dike construction.

Figure 3-10 Zooplankton Biomass in Lac de Gras and Lac du Sauvage Relative to Distance from the Effluent Discharge, 2016



NF = near-field; MF = mid-field; FF = far-field; LDS = Lac du Sauvage.

Figure 3-10. Zooplankton biomass in Lac de Gras and Lac du Sauvage relative to distance from the effluent discharge, 2016. Circle indicates sites MF3-1 through MF3-5. (after Golder 2017)

2.13 FISH METALS: METHODS AND CONCLUSIONS

The AEMP text indicates that the composite samples of Slimy Sculpin used for tissue chemistry analysis in 2016 consisted of the carcass excluding gonads, otoliths, livers, and stomachs (Appendix V, Section 2.6.3, page 12). This differs from methods employed in previous years (2011-2013). The 2011-2013 Aquatic Effects Re-evaluation Report (Golder 2016b) indicates that the composites consisted of carcasses without gonads and stomachs, which were needed to be retained for other analyses. Likewise, the AEMP Study Design Version 4.0 (Section 4.9.2, pages 62 and 63; Golder 2016a) does not state that livers are to be excluded from the composite. It is unclear why livers were omitted from the composite samples in 2016 since Section 2.6.1 (Appendix V, page 11) indicates that only gonads were retained for histological analysis.

Exclusion of this organ in the analyses could explain the differences observed in the tissue chemistry compared to the normal range (e.g., Figures 3-10 and 3-11; Section 3.4.2, pages 53-54, Appendix V), as many metals accumulate preferentially in the liver. It is noted in Appendix V (page 60) that the body burden of uranium was lower in 2016 by approximately 50% compared to 2013 - this may be a result of the liver being excluded from the composite samples in 2016 since

fish livers have been shown to accumulate higher concentrations of uranium compared to other tissues such as muscle.

The Weight-of-evidence (WOE) report indicates that "there was uncertainty as to whether these elevated metals [strontium and uranium] in fish tissues were related to effluent released from the Mine" (Appendix XV, Executive summary, page ii). Given the above considerations this statement may be incorrect.

Recommendation: Due to inherent differences in the accumulation of trace metals in different tissues and organs, the results of the 2016 tissue chemistry analysis excluding livers cannot be compared to the normal ranges that were calculated using data from 2007-2013, when livers were included in the composite. If this issue cannot be rectified (i.e., analysis of metals in livers and subsequent addition to carcass results) then, at a minimum, the text and figures should be qualified with clear indications that comparisons to the normal data range are limited by this issue.

2.14 FISH AGE PARTIONING

The method used to partition the Age 1+ from the adults was modified in 2016 (as described in Appendix V, Section 2.7.2.1, pages 15-16) and was based on area-specific data. However, the normal ranges presented in Table 2-5 (page 24) were calculated using the previous length-based method. It is not clear how this change in methodology affects the data and interpretation of results. The change in method could also potentially have effects on the values for the adults.

Recommendation: Ensure method consistency in the calculation of annual metrics with the normal ranges to which they are compared. Recommend re-calculating the normal ranges using the new stage characterization method.

2.15 LAKE PRODUCTIVITY: WOE ANALYSIS

Primary production (i.e., phytoplankton) may also be affected by factors other than the key nutrients (nitrogen and phosphorus) including water clarity, temperature, and other nutrients. Appendix XI, Section 4.1 (page 37) points out that the higher abundance of diatoms in the NF area may reflect increased concentrations of silica as a result of effluent discharge.

Table 2-2 in Appendix XV Weight-of-evidence Report (page 8) only identifies nitrogen and phosphorus in water as endpoints in relation to lake productivity.

Recommendation: Please incorporate other factors that may affect plankton abundance and community composition within the analysis and discussion.

2.16 SPECIFIC AEMP COMPONENT REVIEWS

Detailed technical review comments and recommendations are provided in the following Table 1; these are also provided in the Excel comments template as required for submission to the WLWB.

Table 1. Technical review comments and recommendations on the AEMP 2016 Annual Report

TOPIC	COMMENT	RECOMMENDATION
WLWB DIRECTIVE 3A	The WLWB Directive 3A dated March 2, 2017 indicated the following with respect to the preparation of the 2016 AEMP report: "Include a statement explaining how it has incorporated key findings from the Plankton Report into the Eutrophication Report" The executive summary indicates the following in a footnote: "1 Updates related to WLWB Directive (dated 2 March 2017) were included in the 2016 AEMP document as follows: (1) Re. Directive 3A, a statement explaining how DDMI has incorporated key findings from the Plankton Report into the Eutrophication Report has been added." Appendix XIII, Eutrophication Report, Section 1.1 (page 1) indicates: "Although AEMP Study Design Version 3.5 (Golder 2014a) is the approved version of the AEMP design at the time this report was written, a number of updates outlined in the proposed AEMP Design Plan Version 4.0 (Golder 2016a) and in Wek'èezhìi Land and Water Board (WLWB) directives (28 July 2015, 26 May 2016, 14 November 2016 and 2 March 2017 Decision Packages) have been incorporated into the 2016 Eutrophication Report, including incorporation of phytoplankton biomass data and statements regarding incorporation of findings from the Plankton Report (Appendix IV)." While phytoplankton biomass was incorporated into the Eutrophication Report, a clear statement regarding how the results of the Plankton Report were incorporated into this component could not be located in the document.	Please provide a clear statement in the report as requested under WLWB Directive 3A.
WLWB DIRECTIVE 3C	The WLWB Directive 3C dated March 2, 2017 indicated the following with respect to the preparation of the 2016 AEMP report: "Include a consideration of the ability of the Action Levels for Plankton to be sequentially evaluated, along with a recommendation and rationale for potential changes, or lack of potential changes to Action Levels". The executive summary indicates the following in a footnote: "1 Updates related to WLWB Directive (dated 2 March 2017) were included in the 2016	The report appears to address the WLWB Directive 3C and the recommendation for expansion of plankton sampling into the MF area annually is appropriate given the results of monitoring in the NF areas.

TOPIC	COMMENT	RECOMMENDATION
	AEMP document as follows: ... (3) Re. Directive 3C, consideration of the ability of the Action Levels for Plankton to be sequentially evaluated has been included, along with a recommendation and rationale for potential changes, or lack of potential changes to Action Levels" Appendix XI, Section 1.1 (page 1) indicates: "Although AEMP Study Design Version 3.5 (Golder 2014a) is the approved version of the AEMP design at the time this report was written, a number of updates outlined in the proposed AEMP Design Plan Version 4.0 (Golder 2016a) and in Wek'èezhìi Land and Water Board (WLWB) directives (28 July 2015, 26 May 2016, 14 November 2016 and 2 March 2017 Decision Packages) have been incorporated into the 2016 Plankton Report, including sequential evaluation of Action Levels for plankton." The Main Document, Section 13.2 (page 86) indicates: "For the plankton component, sampling in the MF area of Lac de Gras is recommended during interim AEMP years to allow a full evaluation of Action Levels 1 and 2, in the event of an Action Level 1 trigger. No changes are recommended to plankton Action Levels, which are consistent with the benthic invertebrate action levels, and are intended to track the spatial expansion of a potential effect."	
COVER LETTER, Table 1 , page 4 of 4	There are inconsistencies in the variables presented. Tissue chemistry for the metals in Slimy Sculpin that showed an Action Level 2 has not been included in the table. As well there seems to be repetition of the variables in the first two rows (length, weight). The forth row (Age 1+ male/female length) does not match what is presented in the text on page 3 of 4, which states only Age 1+ length showed action level 2. Section 3.5 of Appendix V (page 58) also indicates that Age 1+ weight showed an Action Level 2.	Make corrections as necessary.
GENERAL COMMENT: Mapping and A21 dike construction summary	The report makes multiple references to the A21 dike construction and a dike monitoring study but there is no description provided regarding the construction activities that occurred over the monitoring period. A map showing the location of the A21 dike and other key infrastructure components would also be valuable. Site maps would also benefit from a label for the A21 dike.	Addition of a map showing the A21 dike and a brief description of the construction activities, particularly as they may relate to effects in the aquatic environment, would be useful to include in the report to assist with interpretation of the monitoring results and the discussion presented.

TOPIC	COMMENT	RECOMMENDATION
MAIN DOCUMENT, Executive summary, page iii	The text referring to the spatial extent of effects on TN should read ≥ 84.7%, to be consistent with Appendix XIII.	Please correct the text.
MAIN DOCUMENT, Executive summary, page iii and Section 3.3.4, Effluent toxicity, page 24; EUTROPHICATION INDICATORS, APPENDIX XIII and PLANKTON, APPENDIX XI	Text states: "The 2016 effluent toxicity results indicated that the effluent discharged to Lac de Gras in 2016 was generally non-toxic." It would be useful to include a statement regarding the observed stimulatory effect of effluent on phytoplankton growth that is reported in Appendix II, Section 3.2.5, page 49 to the Main document and Appendices XIII and XI summaries and discussions.	Identify the observed stimulation of algal growth from effluent toxicity tests in the referenced sections.
MAIN DOCUMENT, Section 2, Dust deposition, Figure 2-1, page 8; DUST DEPOSITION, APPENDIX I, Section 3, pages 3-5, Figure 3.1-1	The wind rose presented in Figure 3.1-1 is for 2015. The lack of labels for the project infrastructure limits the ability for the reader to interpret the data presented. It would also be useful to add the ice road location and update Project infrastructure on all figures.	Please insert the wind rose for 2016. Please insert labels on the project infrastructure, update the project infrastructure, and include the ice road on all figures.
MAIN DOCUMENT, Section 2.3.1, Dustfall gauges, page 10	Text states: "The second highest estimated dustfall rate measured using gauges occurred at Dust 3 (721 mg/dm2/y), which recorded the highest dustfall in 2016 and is located 30m from the Mine perimeter." Suspect that the text should read "highest in 2015".	Review and revise the text as appropriate.
MAIN DOCUMENT, Section 4.2, Methods, page 10	Text indicates that nutrients, chlorophyll a, and zooplankton biomass (as AFDM) were sampled at LDG-48. However, only chlorophyll a data are presented.	Indicate that sampling for nutrients and zooplankton biomass was not completed for site LDG-48.

TOPIC	COMMENT	RECOMMENDATION
MAIN DOCUMENT, Section 4.3.2 and 4.3.3, pages 33-39; EUTROPHICATION INDICATORS, APPENDIX XIII, Section 4.3, page 42	Section 2.1.2 of Appendix XIII (page 5) indicates that no sample was collected from LDG-48 (the outlet of the lake) in the open-water season. As a result the spatial extent of effects on total nitrogen and cumulative effects were not assessed for the northwest area of the lake beyond sites FFA-4 and FFA-5. While it is understood that sampling methods employed in the water quality monitoring program are not consistent with those for the eutrophication monitoring program, the TN concentration measured at LDG-48 in August, 2016 (174 ug/L) was above the normal range (122-153 ug/L) for the open-water season. Based on this measurement, the spatial extent of effects extended through the northwest portion of the lake (i.e., effectively 100% of the lake area). Regardless, the spatial extent of effects for TN increased notably in 2016 relative to previous years. The spatial extent of effects on chlorophyll a was also highest in 2016. Given these potential "trends" and observations, increasing the frequency of FF sampling for the eutrophication metrics to annually rather than every three years seems warranted.	Incorporate data collected at site LDG-48 during the water quality monitoring program into the eutrophication analyses and reporting and update maps and spatial extent of effects estimates. Consider increasing the frequency of FF sampling for eutrophication metrics to annual and/or provide a rationale for what actions would be taken in the event that the spatial extent of effects on eutrophication metrics extends up to the MF sites in years when FF sampling is not conducted.
MAIN DOCUMENT, Section 5.2 Methods, page 42; SEDIMENT, APPENDIX III, Section 2.1, pages 2-3	The methods indicate that TN, TP, TOC, and metals were analysed in the upper 0-1 cm of sediments and organic matter, TOC, particle size, and moisture were measured in the upper 10-15 cm of sediment. If the text is accurate then there is no matching set of data for particle size and chemistry for sediments. This confounds the interpretation of the chemistry data and particle size is a key factor affecting concentrations of nutrients and metals.	Confirm there is no particle size data for the upper 0-1 cm of sediment. Assuming this is correct and that discussions of particle size in the report are based on data from the 10-15 cm depth interval, could information be provided to support the use of the deeper sediment depth in the analyses?

TOPIC	COMMENT	RECOMMENDATION
MAIN DOCUMENT, Sections 4 and 6; EUTROPHICATION INDICATORS, APPENDIX XIII and PLANKTON, APPENDIX XI	Secchi disk depth, which is identified as a measurement parameter at all water quality sites, is not presented in the Main Document or any of the appendices and is not provided in the raw data files. Further, the water quality monitoring program identified turbidity and TSS as being elevated in the NF/MF areas indicating water clarity may have been reduced in some areas. This effect pathway would also contribute to potential effects on the phytoplankton community. Secchi disk depth measurements (as a measure of light penetration/water clarity) provide critical supporting information for the interpretation of phytoplankton biomass, taxonomy, and chlorophyll a data.	Present Secchi disk depth measurements in the report and include discussion of results in relation to interpretation of effects on the phytoplankton community. Provide raw Secchi disk depth data.
MAIN DOCUMENT, Section 7.2, Methods, page 57; BENTHIC INVERTEBRATES, APPENDIX IV, Section 2.3.2, page 6	Author may want to consider providing a brief definition of Simpson's Diversity Index and Evenness Index. In addition, Evenness Index should be specified as Simpson's or Shannon's in this section.	Add definitions and specify which Evenness metric was used.
MAIN DOCUMENT, Section 11.3.1. page 76	The text states: "The AEMP findings for water quality, sediment quality, and Slimy Sculpin tissue chemistry indicate that effluent releases from the Mine have resulted in increases in the concentrations of metals and other substances in NF area. In some cases, the observed concentrations exceed the normal range, but none of the observed exposure concentrations exceeded Effects Benchmarks." It is not clear what benchmarks are referenced here with respect to the tissue chemistry.	Indicate what benchmarks for tissue chemistry were applied and/or clarify the text.
MAIN DOCUMENT, Section 11, Table 11-1, page 77	The observed increase in the size of adult male livers (noted in Section 8.3.1, page 66) was omitted in the Biological Response Lines of Evidence under the column Key Endpoints and in the WOE discussion. According to page 66 (Section 8), an increase in liver size can be an indication of both nutrient limitation and toxicological impairment.	Review and revise text.
DUST DEPOSITION, APPENDIX I, General	Given the relatively high dust deposition observed at sites south and southeast of the mine, it may be beneficial to add a site between the two monitoring axes (i.e., SSE in the vicinity of the water quality site MF3-3) and a dustfall station south of Dust 10 (i.e., at or near one of the snow dust fall sites SS5-4 and SS5-5).	Consider addition of dustfall sites to the SSE of the mine and south of Dust 10.

TOPIC	COMMENT	RECOMMENDATION
DUST DEPOSITION, APPENDIX I, Executive Summary, page i, and Section 3.1, page 3-1	The text on page i states: "As expected, airborne material was deposited primarily southwest (Dust 10 and Dust 3) of the Mine." The text on page 3-1 states: "This is supported by the fact that Dust 10 had the highest recorded dustfall in 2016 (southwest of the Mine and adjacent to A21 mining operations) and Dust 3 had the second highest recorded dustfall in 2016 (east of the Mine)." There is a contradiction regarding the location of the sites in relation to the mine.	Please review the referenced text and modify for consistency.
DUST DEPOSITION, APPENDIX I, Section 2, pages 2-4, Figure 2-1	The wind rose presented in Figure 2-1 is for 2015.	Please insert the wind rose for 2016.
DUST DEPOSITION, APPENDIX I, Section 3, page 3-1	Text states: "The 2016 predominant wind directions at the site were from the southeast, east, and northeast, and there are also strong winds from the northeast and northwest. The expectation is that airborne material will be deposited primarily northwest, west, and southwest of the mine (see Figure 3.1-1). This is supported by the fact that Dust 10 had the highest recorded dustfall in 2016 (southwest of the Mine and adjacent to A21 mining operations) and Dust 3 had the second highest recorded dustfall in 2016 (east of the Mine). There are some discrepancies regarding the description of predominant wind directions in the text and the wind rose provided in Figure 2-1 and Figure 3.1-1 is for the previous year (2015).	Please insert the wind rose for 2016 and correct the associated text discussing wind direction and speed.

TOPIC	COMMENT	RECOMMENDATION
DUST DEPOSITION, APPENDIX I, Section 3, page 3-1	The text states: "It was expected that the highest fugitive dust generation and resulting dustfall occurred in areas closest to the mine footprint such as near A21 and the country rock pile between May and September. Dust 10 (downwind of the Mine, southwest, and adjacent to A21 mining operations) recorded the highest dustfall during the summer months (2,032 mg/dm2/y) compared to the winter months (157 mg/dm2/y)." It would be useful for the report to include data for the various sampling intervals in addition to the annual rates in a table and/or figure format. Based on the above statement, rates were higher in summer. It would also be useful to compare the seasonal rates to the referenced BC objectives although it is acknowledged as noted in the report that the objectives are no longer applied in BC.	Please present detailed results in a table and/or figure format, or at a minimum provide values in Appendix B, showing dust deposition rates for each sampling interval or if feasible for the open-water and ice-cover seasons separately, in addition to the total annual rates, and compare to the former BC objectives.
DUST DEPOSITION, APPENDIX I, Sections 3.1 and 3.2, various pages	Sections 3.1 Dustfall gauges and 3.2 Dustfall snow surveys include discussions of both components in each of these sections.	Consider limiting the discussion within each of the sub-sections to the specific subject of the sub-section.
DUST DEPOSITION, APPENDIX I, Section 3.1 , page 3-2	The text states: "Dustfall at SS3-8 was the highest recorded at that station (monitoring since 2014; Figure 3.1-3)." Text appears to be presented in the wrong section (i.e., should be presented in Section 3.2). Regardless, is there an explanation for the relatively high dust measured at that station in 2016?	Please provide a discussion of potential reasons for the high dust deposition rates at SS3-8.
DUST DEPOSITION, APPENDIX I, Section 3.3, page 3-12	The text states: "should be noted that the 0-100 zone has only one (1) sampling location; therefore, no median was reported or included in Figures 3.3-1 to 3.3-4." While this is understood, omission of the data for the zone nearest the Project site from the figures results in an inability to visualize changes over time.	Add snow chemistry results for site SS3-6 (the only site in the 0-100 m zone) to Figures 3.3-1 and 3.3-4. A footnote could be added clarifying the value represents one sample rather than a median.

TOPIC	COMMENT	RECOMMENDATION
DUST DEPOSITION, APPENDIX I, Section 3.4, pages 3-19 and 3-20	Text states: "According to the Project AEMP, the data quality objective for duplicate water quality samples is a RPD of 20% when concentrations are ≥ 5 times the detection limit (DL; AEMP 2014)...Of the calculated RPD values, almost all exceed 20% and 80% thresholds in the SS5-5 duplicates and none exceeded 80% (three exceeded 20%) for the SS3-5 duplicates." There is no explanation provided for the "80% threshold" referred to.	Please provide a description/rationale for the 80% threshold referenced.
DUST DEPOSITION, APPENDIX I, Appendix D	Data table in Appendix D appears to have some errors. For example, some results are reported as "0".	Please review the table and make corrections to results presented, including adjustment of decimal places.
DUST DEPOSITION, APPENDIX I, Section 3.4, pages 3-19 and 3-20	It would be useful to add the analytical detection limits to both Tables 3.4-1 and 3.4-2 to provide context for interpreting the QA/QC data presented. For example, aluminum was higher in the blank sample than in a snow sample (see Table 3.4-2) but without the analytical detection limits specified it is not possible to interpret the implications of this observation.	Please add analytical detection limit to the referenced tables.
DUST DEPOSITION, APPENDIX I, Section 3.4, page 3-20	Table 3.4-1 includes a footnote that is not applicable and the table does not provide an explanation for the last column on the right (Percent Below Non-blank SS3-6 Sample (%)).	Add explanation for table headers and correct footnotes.
DUST DEPOSITION, APPENDIX I, Section 3.4, general comment	Duplicate samples are collected from different sites than the blank samples. It would be useful to collect duplicates and blanks from the same site in order to provide for comparisons of all of the results collectively.	Consider collecting duplicate and blank samples from the same locations.
DUST DEPOSITION, APPENDIX I, Section 3.4, page 3-21	The text states: "The concentrations of all parameters in the blank processed at station SS5-1 were much less than those from the non-blank sample, suggesting the data were of good quality." Assuming the referenced blank sample is actually the blank from SS3-6 and the "non-blank sample" is referring to the snow sample collected at SS3-6, as identified in Table 3.4-2, this statement is incorrect. Aluminum was higher in the blank sample.	Please correct the text and/or table and define "non-blank sample".
EFFLUENT AND WATER CHEMISTRY, APPENDIX II, General	Station NF5 was sampled approximately 2 weeks later (August 30) than the remaining four NF sites (August 15-18). This gap in sampling timing may affect comparability of the data for characterizing the NF area.	Provide a discussion of potential effects related to the later sampling date for NF5 on the dataset and subsequent analyses.

TOPIC	COMMENT	RECOMMENDATION
EFFLUENT AND WATER CHEMISTRY, APPENDIX II, General	There are references to the A21 dike construction and a dike monitoring study but there is no description provided regarding the construction activities that occurred over the monitoring period.	Addition of a map showing the A21 dike and a brief description of the construction activities, particularly as they may relate to effects in the aquatic environment, would be useful to include in the report to assist with interpretation of the monitoring results and the discussion presented.
EFFLUENT AND WATER CHEMISTRY, APPENDIX II, Section 2.3, page 8	Text reads: "The full suite of water quality variables analyzed in 2016 (Table 2-2) was initially evaluated against the three criteria, with the exception of the following analytes or parameter groups: • pH and specific conductivity, which are assessed in Section 3.3" It is assumed the bullet is in reference to in situ data (not laboratory).	Suggest clarifying this bullet refers to in situ data.
EFFLUENT AND WATER CHEMISTRY, APPENDIX II, Table 2-4, page 14	For clarity if would be useful to: - add MF comparisons related to examination of dust effects; and - define "normal range" in the footnote	Suggest adding a footnote and assessment of MF data in the table.

TOPIC	COMMENT	RECOMMENDATION
EFFLUENT AND WATER CHEMISTRY, APPENDIX II, Section 2.3.10, page 23	Text states that: "The ZOI from dust deposition in Lac de Gras is estimated to be approximately 4 km from the geographic centre of the Mine, or approximately 1 km from the Mine boundary, extending radially from the source (Golder 2016a). These distances were estimated based on gradient analysis of dust deposition relative to distance from the Mine site and encompass the area of the lake where potential effects would be expected to be measureable (see Figures 3-5 and 3-6 and Table 3-1 in Golder 2016a). Beyond this estimated zone, dust deposition levels are similar to background levels. The AEMP sampling stations that fall within the expected ZOI from dust deposition include the five stations in the NF area and stations MF1-1, MF2-1, MF3-1 and MF3-2...Construction of the A21 dike was ongoing during the 2016 open-water AEMP survey and confounded the analysis of potential dust-related effects in the MF area. Water quality variables with elevated concentrations at AEMP stations near the A21 dike were considered potentially affected by dike construction. The influence of dike construction on the assessment of effects from dust deposition on the water quality of Lac de Gras was taken into account when interpreting the results of the analysis described above." (page 23) While it is acknowledged that distinguishing effects of construction of the A21 dike from dust deposition is difficult, there are indications from the dust monitoring and water quality programs that effects of dust may have extended to sites MF3-3 and MF3-4. Furthermore, the zone of influence and the associated water quality sites chosen as falling within the ZOI were based on available dust deposition data, prior to construction of the A21 dike.	The analysis of dust deposition effects on water quality should be expanded to include site MF-3 and MF-4. It is also suggested that in future reporting, the sites included in the dust deposition analysis consider the results of the water quality and dust deposition monitoring programs for that year. The lack of dust deposition sites in the vicinity of the A21 dike and the MF3-3 area increases the uncertainty associated with identifying the actual dust ZOI for the aquatic environment (see earlier comment) and additions of sites in these areas is suggested.
EFFLUENT AND WATER CHEMISTRY, APPENDIX II, Section 3.2.7, page 55	The text notes: "Several field pH values (sample size [n] = 47) measured at the mixing zone boundary in 2016 were below the Effects Benchmark value of 6.5. However, the corresponding laboratory pH values were below the benchmark in all but two samples (i.e., Station 1645-19B2-20 on 17 March 2016 [5.04] and Station 1645-19C-15 on 28 June 2016 [5.8])." Was there any linkage to effluent quality for these occurrences? Similar question for the other exceedances observed (i.e., did they correspond with high concentrations in effluent)?	Please provide a brief discussion of pH and other parameters in effluent (i.e., variability and levels) and how this compares to the "exceedances" of the benchmarks observed in the mixing zone.

TOPIC	COMMENT	RECOMMENDATION
EFFLUENT AND WATER CHEMISTRY, APPENDIX II, Section 3.3, page 55-59	Depth profile data for the NF sites are presented as averages of the 5 stations. This approach may mask occurrences of unusual water quality conditions, notably DO concentrations at one or more of the stations.	Provide depth profile figures for each NF station or, at a minimum, include a statement regarding how results for DO at these (and other) sites compare to the PAL guidelines.
EFFLUENT AND WATER CHEMISTRY, APPENDIX II, Section 3.4.1, page 64, Table 3-5	Table 3-5, footnote b states: "The median of NF area values was calculated from data pooled across all sample depths, dates and stations (n = 15 samples)." When water quality is relatively consistent across depth this approach is reasonable and appropriate. However, in instances where conditions vary across the water column such as in winter when the effluent plume is more evident near the bottom of the water column, it may be more conservative to examine data for each sampling depth separately. If effects are greatest near the bottom of the water column, potential effects on benthos would be better represented by the bottom water quality samples.	Consider analysing NF water quality data by sampling depth for deriving median concentrations.
EFFLUENT AND WATER CHEMISTRY, APPENDIX II, Section 3.4.1, page 75, Figure 3-34	Normal range + 25% of Effects Benchmark in upper figure (ice-cover season) is incorrect. Value should be 761 ug N/L as indicated in Table 3-7, page 66.	Correct benchmark line on upper figure.
EFFLUENT AND WATER CHEMISTRY, APPENDIX II, Section 3.5, page 85	Text reads: "Each of the 18 SOIs tested had NF mean concentrations significantly greater than FF area mean concentrations in one or both sampling seasons (Table 3-8). Generally, comparisons were significant during both the ice-cover and open-water seasons. Exceptions were turbidity and fluoride, which had significant differences during the open-water season, but not during the ice-cover season, and chromium which had a significant difference during the ice-cover season, but not during the open-water season. Fluoride and chromium did not trigger an Action Level in the Response Framework and were added to the list of SOIs because their concentrations in effluent exceeded the AEMP Effects Benchmark in greater than 5% of samples. These results indicate that although concentrations in effluent exceeded the benchmark, there was no difference in the concentration of these SOIs between most and least exposed areas of Lac de Gras." Last sentence contradicts third sentence regarding fluoride.	Correct error in text.

TOPIC	COMMENT	RECOMMENDATION
EFFLUENT AND WATER CHEMISTRY, APPENDIX II, Section 4, page 93; MAIN DOCUMENT, Section 3.3.6 Effects from dust deposition and dike construction, page 26	Text reads: "In-water work associated with construction of the A21 dike was ongoing during the 2016 open-water AEMP field survey. As a result, concentrations of most particulate-related variables, including TSS, turbidity and most total metals were elevated at MF3 area stations located near the construction area. Given the typically short duration of sediment-related impacts from in-water construction, the increases observed in these variables would likely have persisted for only a short period of time. Concentrations in all samples affected by dike construction were within the AEMP Effects Benchmarks for the protection of aquatic life and drinking water, with exception of three total aluminum samples which exceeded the AEMP drinking water Effects Benchmark of 100 µg/L." The dust deposition report indicated relatively high annual rates of deposition areas south and southeast of the mine site (i.e., in the vicinity of AEMP water quality stations MF3-1 to MF3-3). Is there additional information/data that can be included to support the suggestion that effects on water quality were short-term?	Include additional information to support the suggestion that effects on water quality were short-term.
EFFLUENT AND WATER CHEMISTRY, APPENDIX II, Appendix C, pages C-3 and C-5	It is indicated that quality control review of duplicate samples applied the criterion of 20% RPD (page C-3) but the discussion (page C-5) compares RPDs to 50%.	Please correct the text to reflect the use of the 20% criterion.
EFFLUENT AND WATER CHEMISTRY, APPENDIX II, Appendix C, page C-13	Text indicates: "A follow-up investigation by the laboratory determined that most of the open-water AEMP samples had to be sent to the Maxxam Calgary facility for analysis of chloride and sulphate due to an instrument issue that occurred in Burnaby during late August, 2016. In Calgary, samples were analyzed via ion chromatography, whereas in Burnaby, they are typically analyzed via colourimetry. It is unclear specifically what caused the incongruity in concentrations that is evident in Figures C-2, as the analytical method (ion chromatography) and general laboratory procedures were kept consistent across all samples in 2016." There appears to be a contradiction between the last sentence (i.e., same method used for all samples) and the previous sentences.	Please review the text and modify to correct or clarify the apparent contradiction.

TOPIC	COMMENT	RECOMMENDATION
EFFLUENT AND WATER CHEMISTRY, APPENDIX II, Appendix C, page C-14, Figure C-1	Figure C-1 indicates anomalous measurements for specific conductance and DO for site MF1-5. Data presented suggest that the measurements for the two parameters at depths from 4 to 10 m were switched for the two parameters.	Though not a critical issue, suggest reviewing raw data to determine if measurements were reversed.
EUTROPHICATION INDICATORS, APPENDIX XIII; PLANKTON, APPENDIX XI, General comment on phytoplankton	As noted in the review of the 2015 AEMP, light and temperature conditions may have profound effects on phytoplankton growth, abundance, and even taxonomic composition, yet there is no consideration of these variables within the discussion of phytoplankton or eutrophication in the technical appendices. Additionally, Secchi disk depth is a metric under the AEMP (see Golder Associates Inc. 2016b. Diavik Diamond Mines (2012) Inc. Aquatic Effects Monitoring Program Study Design Version 4.0. Submitted to Diavik Diamond Mines (2012) Inc. Yellowknife, NT, July 2016) yet the results aren't presented in the 2016 Annual Report or in the raw datasets provided. A similar comment was raised as part of the review of the AEMP Study Design Version 4.0 document and the 2015 AEMP.	Include a summary of key supporting variables, including but not necessarily limited to Secchi disk depth and water temperature, within the discussion of results regarding phytoplankton data.
EUTROPHICATION INDICATORS, APPENDIX XIII, General	Chlorophyll a data were not provided in the raw data files. This comment was also noted in the review of the 2015 AEMP.	Please provide chlorophyll a data in excel format.
EUTROPHICATION INDICATORS, APPENDIX XIII, General comment; PLANKTON REPORT, APPENDIX XI, Section 3.1.1.1, page 17	Appendix XI, Section 3.1.1.1 (page 17) considers relationships between specific conductance and phytoplankton biomass and indicates a weak positive correlation. It would be useful to compare phytoplankton metrics against nutrient data in the Eutrophication Report Appendix (Appendix XIII).	Evaluate relationships between nutrients and chlorophyll a and phytoplankton biomass.
EUTROPHICATION INDICATORS, APPENDIX XIII, Section 3.2, page 23	The text states: "During the open-water season, specific conductivity and dissolved oxygen profiles indicated vertically well-mixed conditions throughout the sampled areas of the lake, with the exception of the NF area, which showed a decrease in specific conductivity in the bottom half of the profile, reflecting the vertical location of the effluent plume." The depth profile does indicate a slight decrease in specific conductance in the bottom half of the water column. However, levels are similar across depth.	Suggest modifying the statement to clarify that specific conductance is not lower in the bottom half of the water column relative to the upper portion of the water column.
EUTROPHICATION INDICATORS, APPENDIX XIII, Section 4.3, page 44	While it is acknowledged that phytoplankton biomass was only recently added to this component of reporting, it would be beneficial to derive estimates of the spatial extent of effects for previous years of monitoring to provide a long-term record of conditions.	Derive estimates of spatial extent of effects on phytoplankton biomass for previous years of monitoring and update table 4-1.

TOPIC	COMMENT	RECOMMENDATION
EUTROPHICATION INDICATORS, APPENDIX XIII, Appendix B, page B-25	Station NF5 was sampled approximately 2 weeks later (August 30) than the remaining four NF sites (August 15-18). This gap in sampling timing may affect comparability of the data for characterizing the NF area. Chlorophyll a was notably higher at site NF5 than the remaining sites.	Review the data to consider potential effects of variable timing on the results, notably for the NF area.
SEDIMENT, APPENDIX III, General	Raw data have not been provided.	Please provide raw sediment quality data.
SEDIMENT, APPENDIX III, Section 2.3.3, pages 8-11 and Sections 3-5; MAIN DOCUMENT, Section 5, Sediment chemistry	The analysis approach applied for the sediment quality program is focused on comparisons of NF data to reference conditions and/or FF sites. However, this approach does not account for potential effects of dust deposition and/or dike construction on sediment quality in the MF area (notably MF3 sites). Further, not all data are presented in figures and raw data have not been provided electronically which limits the ability to review the information to consider these effects pathways.	Include explicit consideration of effects of dust deposition and dike monitoring on sediment quality. Provide raw sediment quality data in electronic format.
SEDIMENT, APPENDIX III, Section 2.4, page 13	The last paragraph is largely identical to a portion of paragraph 3.	Review and revise text.
SEDIMENT, APPENDIX III, Section 1.3, pages 1-2 and Section 3.4, page 28 and MAIN DOCUMENT, Section 5, Sediment chemistry	SOIs were identified based on comparisons between visual comparisons of NF and FF data. As noted above, MF sites may also have been affected by dust deposition and dike construction and should be incorporated into the SOI identification and assessed in subsequent sections of the report, including but not limited to Section 3.4 Comparison to sediment quality guidelines.	Include review of MF data for the identification of SOIs and compare MF data to sediment quality guidelines.
PLANKTON, APPENDIX XI, General comment	Station NF5 was sampled approximately 2 weeks later (August 30) than the remaining four NF sites (August 15-18). This gap in sampling timing may affect comparability of the data for characterizing the NF area.	Review the phytoplankton data to consider potential effects of variable timing on the results, notably for the NF area.
PLANKTON, APPENDIX XI, Section 2.1, page 2	Phytoplankton are collected across a depth of 0-10 m at all sites. While the consistent sampling depth is desirable from a straight comparative perspective, phytoplankton biomass would be ideally measured from the euphotic zone of the lake; euphotic zone depth can be estimated with Secchi disk depth measurements or directly measured with a Light meter. Given that some water quality parameters that are known to affect light attenuation in the water column (e.g., turbidity and TSS) have been affected at some sites, it would be prudent to review available data to confirm that the 0-10 m sampling depth is still appropriate for monitoring phytoplankton.	Review and discuss Secchi disk depth data and evaluate current (and past) euphotic zone depth estimates for the lake to determine if the 0-10 m sampling depth is still appropriate for monitoring phytoplankton.

TOPIC	COMMENT	RECOMMENDATION
PLANKTON, APPENDIX XI, Section 3.1.2, page 21	Text states: "Out of the 57 taxa identified in the 2016 phytoplankton samples, twelve dominated the NF and FF areas of Lac de Gras (Table 3-4). The microflagellate, Ochromonas sp., and the chlorophyte, Oocystis sp., were the dominant taxa in the NF area and the three FF areas." Text appears to be incorrect (see Table 3-4).	Review and revise text to correct errors.
PLANKTON, APPENDIX XI, Section 3.2.1.1, page 29	Text and results indicate that zooplankton biomass was below the normal range at site NF-5. Site NF-5 was sampled much later (August 30) than the remaining NF sites (August 15-18) which may have affected comparability of the data across the stations.	Include a discussion of the potential effect of sampling timing on results.
PLANKTON, APPENDIX XI, Section 3.2.1.1, page 29	Zooplankton biomass, particularly calanoid copepod biomass, was below the normal range at site MF3-1 through MF3-5. These results could indicate a potential effect of dust deposition and/or dike construction on zooplankton.	Expand discussion to incorporate dust deposition and dike construction effects on zooplankton.
PLANKTON, APPENDIX XI, Section 3.3, page 35	The lowest zooplankton biomass occurred in the MF3 area where dust deposition was greatest and where dike construction affected water quality. These pathways of effect should be considered and discussed in the AEMP. A comparison of MF data to FF data with and without data for MF sites known to have been affected by dust and/or dike construction would be useful to try and isolate effluent effects from other pathways.	Evaluate MF zooplankton data and potential effects related to dust deposition and/or dike construction. Compare MF and FF data with and without MF data for sites affected by dust deposition and/or dike construction.
PLANKTON, APPENDIX XI, Section 4.1, page 37	It is suggested that the lower cyanobacteria biomass observed in 2016 may be related to nutrient enrichment from effluent discharges and increases in phosphorus. Examination of nitrogen to phosphorus ratios may provide some insight into potential nutrient limitation.	Review nutrient ratios to evaluate potential nutrient limitation and subsequent effects on N-fixing bacteria.

TOPIC	COMMENT	RECOMMENDATION
PLANKTON, APPENDIX XI, Section 4.2, page 38 and Section 6, page 39	The text indicates: "The statistically lower mean total zooplankton biomass in the NF area and nearest MF stations compared to the FF areas triggered an Action Level 2; however, mean zooplankton biomass in the NF area remained within the normal range, based on the 2008 to 2010 reference area data. Zooplankton biomass (i.e. ash-free dry mass) reported by the Eutrophication Indicators component (Appendix XIII) was greater in the NF area compared to the FF areas, supporting the nutrient enrichment hypothesis. Rather than demonstrating toxicological impairment, the Action Level 2 trigger for zooplankton may be providing an indication of a nutrient enrichment-related community change, with a shift towards smaller taxa (i.e., rotifers) in the NF area compared to the FF areas." As noted above, MF sites, particularly sites MF3-1 through MF3-3, were affected by dust deposition and dike construction and an Action Level 2 observed in 2016 could reflect these impact pathways in whole or in part.	Include consideration of dust deposition and/or dike construction on results for zooplankton.
PLANKTON, APPENDIX XI, Appendix A Quality assurance and quality control, page A-4	Comparison of duplicate phytoplankton samples should be done both for abundance (i.e., cell counts) as well as biomass. The latter is typically more variable than the former as it is derived from two measurements (cell counts and algal cell size). As biomass is the metric of concern for the AEMP QA/QC should focus on this metric.	Calculate relative percent differences (RPDs) for phytoplankton biomass as well as abundance.
BENTHIC INVERTEBRATES, APPENDIX IV, Section 2.5, page 586	Remove the following sentence as it appears twice in the last paragraph: "The WOE analysis is described fully in the Weight of Evidence Report (Appendix XV)."	Revise text.

TOPIC	COMMENT	RECOMMENDATION
BENTHIC INVERTEBRATES, APPENDIX IV, Section 3.4, pages 595-596	Consider providing some basic information on the biology and ecology of the key taxa that are noted in the Community Composition section to provide context for Conclusions and Action Level examinations.	Consider providing information on the biology and ecology of key taxa. For example, *Procladius*: cosmopolitan and ubiquitous group of non-biting midges commonly found in profundal and littoral habitats in lakes; early instars and winter morphs are collector-gatherers of benthic fine particulate organic matter (FPOM); later instars actively feed on micro, meio, and macro-fauna (e.g., protozoa, zooplankton, etc.). *Micropsectra*: widespread group of midges typical of littoral lake habitat; are collector-gatherers of benthic FPOM; Pisidiidae: common freshwater bivalve, small is size, also referred to as pea clams or fingernail clams, filter feeders (e.g., algae, phytoplankton, etc.), play an important role in energy and nutrient cycling, etc.
BENTHIC INVERTEBRATES, APPENDIX IV, Section 3.4, pages 595-596	The text states: "Within the NF area, mean chironomid density accounted for 76.8% of total density; this was higher and based on less variable percentages compared to the FF1, FFA and FFB areas, suggesting the NF area provides more favourable conditions for Chironomidae." It would valuable to elaborate further on this suggestion by specifying what conditions at the NF site are likely contributing to this observation (i.e., expand on what is meant by "more favourable conditions").	Provide an explanation that suggests how "more favourable conditions" explain the high/less variable Chironomidae density at the NF area compared to FF areas (i.e., linkages to nutrient enrichment or other components (e.g., water or sediment quality) or habitat differences (e.g., physical differences - substrate)). Provide a statement of how this observation/effect in the same areas compares to past benthic surveys (operation).

TOPIC	COMMENT	RECOMMENDATION
BENTHIC INVERTEBRATES, APPENDIX IV, Section 2.3.1, page 581 and Section 3.5, page 600	The text reads: "Initial data screening did not identify potential anomalous data in the 2016 benthic invertebrate community dataset." (page 581) "One statistical outlier was identified in the Chironomidae dataset, which was removed for analysis." (page 600) Statements appear to be contradictory.	Verify that these two statements are not contradictory and revise if required.
BENTHIC INVERTEBRATES, APPENDIX IV, Executive Summary, page I; Section 3.5, page 25; and MAIN DOCUMENT, Section 13.1, page 84	The text states (Appendix IV, Section 3.5, page 25): "The lower Pisidiidae density in the NF area appears to reflect the greater midge dominance in areas closer to the diffuser in response to nutrient enrichment....The reason for significantly lower Pisidiidae density in the NF area is unclear, but may be related to the community shift towards greater chironomid dominance under enriched conditions." Conceptually, nutrient enrichment could lead to an increase in Pisidiidae density in the NF area, however the opposite was observed (relative to the FF area). Statement also seems to contradict the statement in the Main Document, Section 13.1, Conclusions (page 84): "The significantly lower evenness and Pisidiidae density in the NF area compared to the FF areas triggered an Action Level 1 for toxicological impairment."	The discussion would benefit from consideration of observations from previous years of operation monitoring (i.e., did the density change over time as well as differ spatially in the lake in 2016?). Please review statements throughout the document respecting decreases in Pisidiidae for consistency.
BENTHIC INVERTEBRATES, APPENDIX IV, page i and Section 3.5, page 600	Author may want to consider that the significantly lower evenness index at NF and MF areas may be driven by the predominance of Chironomidae at those sites. A discussion of why the evenness index was significantly different and the diversity index was not would be useful.	Provide an explanation that link Chironomidae predominance and the significantly lower evenness index value to relevant sites. Provide a discussion regarding why the evenness index was significantly different and the diversity index was not.

TOPIC	COMMENT	RECOMMENDATION
FISH, APPENDIX V, general	The words age and stage are used interchangeably to describe the metrics used (e.g., page 19 third bullet size by age and sex). Since the Age 1+ were not determined by ageing the otoliths (described page 16), the consistent use of the term "stage" may be more appropriate.	Review and revise text.
FISH, APPENDIX V, Section 3.5, page 58; MAIN DOCUMENT, Section 8.2, page 65	Action levels only address the address the toxicological impairment hypothesis and not the nutrient response pathway. Footnote a) (both tables) indicates that FFB was included in the analysis, but this area was not sampled in 2016.	Modify as necessary. Explain why the action levels for fish health do not address the nutrient response or include tissue chemistry.
FISH, APPENDIX V, Section 2.7.5, page 1	CPUE is listed as a variable for the evaluation of effects to Slimy Sculpin (page 1). Although CPUE was calculated, it was not included in the statistical analysis as were the other variables.	Provide clarification.
FISH, APPENDIX V, Photo 2-3, page 9	The photo shows an infected Slimy Sculpin. It would be helpful to the reader to show a photo of a normal Slimy Sculpin for comparison.	Add a second photo of a "normal" fish for comparison.
FISH, APPENDIX V, Section 2.6.3 , page 12 and Section 4.2, page 60	The text indicates that the composite samples of Slimy Sculpin used for tissue chemistry analysis in 2016 consisted of the carcass excluding gonads, otoliths, livers, and stomachs (Section 2.6.3, page 12). This differs from methods employed in previous years (2011-2013). The 2011-2013 Aquatic Effects Re-evaluation Report (Golder 2016b) indicates that the composites consisted of carcasses without gonads and stomachs, which were needed to be retained for other analyses. Likewise, the AEMP Study Design Version 4.0 (Section 4.9.2, pages 62 and 63; Golder 2016a) does not state that livers are to be excluded from the composite. Exclusion of this organ in the analyses could explain the differences observed in the tissue chemistry compared to the normal range (e.g., Figures 3-10 and 3-11; Section 3.4.2, pages 53-54), as many metals accumulate preferentially in the liver. It is unclear why livers were omitted from the composite samples in 2016 since Section 2.6.1 indicates that only gonads were retained for histological analysis. It is noted on page 60 that the body burden of uranium was lower in 2016 by approximately 50% compared to 2013 - this may be a result of the liver being excluded from the composite samples in 2016 since fish livers have been shown to accumulate higher concentrations of uranium compared to other tissues such as muscle.	Due to inherent differences in the accumulation of trace metals in different tissues and organs, the results of the 2016 tissue chemistry analysis excluding livers cannot be compared to the normal ranges that were calculated using data from 2007-2013, when livers were included in the composite.

TOPIC	COMMENT	RECOMMENDATION
FISH, APPENDIX V, Section 2.7.4, page 18	The calculation of condition factor of adults used carcass weight rather than total body weight. It is unclear why this was done. The guidance document for using Slimy Sculpin for EEM (Arciszewski et al. 2010, page 15) recommends using body weight for this calculation. [Arciszewski, Gray, Munkittrick, and Baron. 2010. Guidance for the collection and sampling of slimy sculpin (Cottus cognatus) in northern Canadian lakes for environmental effects monitoring (EEM). DFO]	Provide explanation for method of calculating this metric.
FISH, APPENDIX V, Section 2.7.2.1, pages 15-16 and Section 3.3.11, page 24	The method used to partition the Age 1+ from the adults was modified in 2016 (as described on page 15-16) and was based on area-specific data. However, the normal ranges presented in Table 2-5 (page 24) were calculated using the previous length-based method. It is not clear how this change in methodology affects the data. The change in method could also potentially have effects on the values for the adults.	Ensure method consistency in the calculation of annual metrics with the normal ranges to which they are compared. Recommend re-calculating the normal ranges using the new stage characterization method.
FISH, APPENDIX V, Section 3.2, pages 30-31	The values calculated for the CPUE of "All Species" are heavily influenced by the abundance of the targeted species. Because of this, the statement that the relative abundance of all species combined was highest at FF2 and similar in both the NF and MF3 relative to the two FF is the result of the high Slimy Sculpin catch. It would be better to present the CPUE of the combined catch, excluding Slimy Sculpin.	Review and revise text.
FISH, APPENDIX V, Section 3.2, page 31	The CPUE for Slimy Sculpin is presented for the total catch and has not been calculated for the different stage/sex categories separately as has been done for other variables.	Review and revise if appropriate.
FISH, APPENDIX V, Section 3.3.4, pages 33-34	The purpose of this section is unclear. The text states that length combined with other biological variables was used as a surrogate for age. The figure referred to in the text is a length histogram that does not include any reference to age or stage.	Omit section or provide age/stage-specific statistical analysis or figures that clarify what is being discussed.

TOPIC	COMMENT	RECOMMENDATION
FISH, APPENDIX V, Section 3.3.5, page 34	The length of slimy sculpin was used as surrogate for reproductive success, unlike previous monitoring reports where the abundance of Age 1+ fish was used. It is not clear why this change in assessment methodology was done. The text states that Age 1+ fish were present at all sites, citing Figure 3-3, which presents the values for YOY, Age 1+ and adults combined. The length ranges for these categories are also not provided in the text. The text states that reproductive success is similar between the NF/MF areas and the FF areas based on the abundance of a similar size range of sculpin and the presence of Age 1+ fish at all areas as shown in Figure 3-3. However, there are no fish between about 25 and 40 mm at FF1, which based on the normal ranges presented in Table 2-5 indicate Age 1+ fish range from 34 to 50 mm.	Length-frequency histograms may not be a sufficient surrogate for assessment of reproductive success. Explain why the abundance of Age 1+ was dropped as the metric.
FISH, APPENDIX V, Section 3.5, page 58	An increase in the occurrence of tapeworm infection in the NF compared to FF was not included in the Action Level Evaluation on page 58. However, this metric is included in the WOE (e.g., Table A-1 and A-2 of Appendix XV). Likewise, tissue chemistry residues are not discussed in this section.	Review and modify as necessary. Clarify what variables are included in the Action Level assessment.
WEIGHT-OF-EVIDENCE, APPENDIX XV, Executive Summary, page ii and Section 3.3.1.3, page 41	The text states: "Fish Population Health – EOI Rank 2 (Moderate): – Strontium and uranium concentrations in fish from the NF area (and extending into MF areas) were greater than the normal range, and concentrations were significantly greater than the FF areas. However, there was uncertainty as to whether these elevated metals in fish tissues were related to effluent released from the Mine." (page ii). As previously noted, the exclusion of liver from the fish tissue metals analysis may have resulted in underestimation of metal concentrations. This consideration should be explicitly identified in all discussions and interpretation of results. Due to this uncertainty, statements regarding links between mine effluent and elevated metals in fish should be revised.	Please provide a discussion of the implications of omitting the liver in the fish analyses in all discussions and interpretation of results. Due to this uncertainty, statements regarding links between mine effluent and elevated metals in fish should be revised.
WEIGHT-OF-EVIDENCE, APPENDIX XV, Executive Summary, page iii and Section 3.2, page 36	The report states that the body burdens of metals in fish were below those known to cause toxicity in fish. These values and/or references to which this statement is referring are not presented in the document.	Provide information to support the statement.

TOPIC	COMMENT	RECOMMENDATION
WEIGHT-OF-EVIDENCE, APPENDIX XV, Section 2.3.1, page 8, Table 2-2	Primary production (i.e., phytoplankton) may also be affected by factors other than the key nutrients (nitrogen and phosphorus) including water clarity, temperature, and other nutrients. Appendix XI Plankton Report Section 4.1 (page 37) points out that the higher abundance of diatoms in the NF area may reflect increased concentrations of silica as a result of effluent discharge. Table 2-2 in Appendix XV (page 8) only identifies nitrogen and phosphorus in water as exposure endpoints in relation to lake productivity.	Please incorporate other factors that may affect plankton abundance and community composition within the analysis and discussion.
WEIGHT-OF-EVIDENCE, APPENDIX XV, Section 2.3.1, page 8, Table 2-2	Table 2-2 omits benthic macroinvertebrates as a line of evidence linked to the fish community component. Nutrient enrichment and subsequent increases in BMI abundance/density could affect fish metrics (growth and energy).	Add BMI to the fish community component of Table 2-2 or provide explanation for omission of this linkage.
WEIGHT-OF-EVIDENCE, APPENDIX XV, Section 2.3.2.1, pages 11-12	Table 2-3 does not include exceedance of the ISQG in the effect level ratings.	Please add an exceedance of an ISQG to Table 2-3.
WEIGHT-OF-EVIDENCE, APPENDIX XV, Section 2.3.2.2, pages 11-13	A discussion of how the effect rating for exposure endpoints and biological response endpoints is not provided for fish.	Provide missing information.
WEIGHT-OF-EVIDENCE, APPENDIX XV, Section 2.3.3.1, Table 2-5, page 19	A few of the endpoints that were described as having been omitted from the analysis (see page 2), are still included in Table 2-5 (fish population structure - survival, Fish Population Structure - size, Relative Reproductive Success - Age 1). Would this affect the a priori weighting factors applied?	Please review and clarify.
WEIGHT-OF-EVIDENCE, APPENDIX XV, Section 2.3.3.1, pages 16-19	Although tissue chemistry is included in the WOE analysis for toxicological impairment impacts (see Table A-1), this endpoint has not been included in the a priori weighting factors applied. Was this endpoint not subject to a priori weighting?	Please clarify.
WEIGHT-OF-EVIDENCE, APPENDIX XV, Table 2-6, page 21	The direction of change of tapeworm parasitism was assigned a 0 for the nutrient enrichment hypothesis. An increase in Ligula infection in Slimy Sculpin was described as being associated with a toxicological response only. However, increased infection can also result from eutrophication. This can occur through an increase in the intermediate host (e.g., copepods).	Re-examine the effect rating (e.g., Table 3-7, page 34 of Appendix XV) with this endpoint for the nutrient enrichment versus toxicological impairment hypothesis.

TOPIC	COMMENT	RECOMMENDATION
WEIGHT-OF-EVIDENCE, APPENDIX XV, Section 3.1.7, page 33	Reproductive fitness was determined by Age-1 abundance according to Section 3.1.7 and data for this endpoint has been included in the WOE analysis for both the toxicological impairment and nutrient enrichment response pathway (see Table A-1 and A-2). However, according to the results presented in the Fish Report (Section 2.7.1 and Section 3.2) the abundance of Age 1+ was not calculated.	Add information on CPUE for the different stages/sexes to the Fish Report.
WEIGHT-OF-EVIDENCE, APPENDIX XV, Section 3.1.7, page 34	The document states that because the occurrence of tapeworm parasitism at the NF area was not outside the normal range, the endpoint was rated as low-level response. However, a normal range is not provided in the Fish Report as is for the other fish health endpoints (see Figure 3-8 and Figure 3-9). As well, tapeworm parasitism was not included in the Reference Condition Report.	Provide normal ranges for this endpoint. If there are no normal ranges for this metric, then another rationale should be developed to assess a moderate and high level rating.
Appendix XV Weight-of-Evidence Report, Section 3.3.2.2, page 42	The text indicates: "The AEMP findings also indicated a consistent pattern of response between nutrient enrichment in the water column and enrichment responses in the benthic invertebrate community of the NF area of Lac de Gras…..All endpoint responses (including the low-level decrease in Pisidiidae density and evenness) were considered to be more likely related to nutrient enrichment". There is no evidence or literature cited to support the suggestion that the reduction in Pisidiidae in the NF area was due to nutrient enrichment. Similar statements are made throughout the document. Please see earlier comment regarding potential inconsistencies in interpretation of these results.	Please provide references and/or further discussion in support of the suggestion that decreases in Pisidiidae were more likely related to nutrient enrichment than toxicological impairment. The discussion would benefit from consideration of observations from previous years of operation monitoring (i.e., did the density change over time as well as differ spatially in the lake in 2016?). Please review statements throughout the document respecting decreases in Pisidiidae for consistency.

3.0 SUPPORTING MATERIALS FOR REVIEW

Arciszewski, T., M.A. Gray, K.R. Munkittrick, and C. Baron. 2010. Guidance for the collection and sampling of slimy sculpin (*Cottus cognatus*) in northern Canadian lakes for environmental effects monitoring (EEM). Can. Tech. Rep. Fish. Aquat. Sci. 2909: v + 21 p.

Golder (Golder Associates Inc.). 2015. AEMP Reference Conditions Report Version 1.1. Submitted to Diavik Diamond Mines (2012) Inc. Yellowknife, NT, September 2015.

Golder. 2016a. Diavik Diamond Mines Inc. Aquatic Effects Monitoring Program Study Design Version 4.0. Submitted to Diavik Diamond Mines (2012) Inc. Yellowknife, NT, July 2016.

Golder. 2016b. 2011 to 2013 Aquatic Effects Re-evaluation Report Version 3.2. Prepared for Diavik Diamond Mines (2012) Inc. Yellowknife, NT. June 2016.

Golder. 2017. Diavik Diamond Mines (2012) Inc. Aquatic Effects Monitoring Program 2016 Annual Report. Submitted to Diavik Diamond Mines (2012) Inc. Yellowknife, NT, March 2017.