APPENDIX E.10

AQUATIC EFFECTS MONITORING REPORTS

2014 AEMP ANNUAL REPORT

MARCH 2015

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ABBREVIATIONS

the Project	the Mary River Project
AANDC	Aboriginal Affairs and Northern Development Canada
AEMP	Aquatic Effects Monitoring Plan
BMI	benthic macroinvertebrates
CCME	Canadian Council of Ministers of the Environment
CES	critical effect size
CREMP	Core Receiving Environment Monitoring Program
CW□G-PAL	Canadian Water □uality Guidelines for Protection of Freshwater Aquatic Life
DFO	Department of Fisheries and Oceans
EC	Environment Canada
EEM	Environmental Effects Monitoring Program
ERP	Early Revenue Phase
FEIS	Final Environmental Impact Statement
HADD	Harmful Alternation, Disruption or Destruction of Fish Habitat
INAC	Indian and Northern Affairs Canada (now AANDC)
MBR	membrane bioreactor
MMER	Metal Mining Effluent Regulations
Mt/a	million tonnes per annum (or per year)
NLCA	Nunavut Land Claims Agreement
NSC	North/South Consultants Inc.
NWB	Nunavut Water Board
PWSP	polishing/waste stabilization pond
□IA	□ikiqtani Inuit Association
SNP	Surveillance Network Program
TEMMP	Terrestrial Environment Management and Monitoring Plan
TEWG	Terrestrial Environment Working Group
TSP	total suspended particulate
TSS	total suspended solids
VECs	valued ecosystem components
WWTF	wastewater treatment facility
WOE	weight-of-evidence

1 – INTRODUCTION

1.1 OVERVIEW

The Mary River Project (the Project) is an iron ore mine currently under construction and operation. The Project is owned and operated by Baffinland Iron Mines Corporation (Baffinland). The Project is located in the □ikiqtani Region of Nunavut on northern Baffin Island, approximately 160 km south of the community of Pond Inlet (Mittimatalik), and 1,000 km northwest of Nunavut's capital city of Iqaluit.

The project will involve the mining of up to 22.2 million tonnes per annum (Mt/a) of iron ore from Deposit No. 1 at the Mary River mine site. Mining was initiated in late 2014, at the end of the open water season, and ore is being transported over the Milne Inlet Tote Road to Milne Port. In the near term, up to 4.2 Mt/a will be transported out of Milne Port during the open water season. Eventually, Baffinland intends to develop a railway and port facility at Steensby Inlet to transport up to an additional 18 Mt/a (22.2 Mt/a total) by year-round shipping from Steensby Port.

The Aquatic Effects Monitoring Plan (AEMP) is a monitoring program designed to:

- Detect short-term and long-term effects of the Project's activities on the aquatic environment resulting from the Project;
- Evaluate the accuracy of impact predictions;
- Assess the effectiveness of planned mitigation measures; and
- Identify additional mitigation measures to avert or reduce unforeseen environmental effects.

The AEMP is a requirement of Baffinland's Type A Water Licence No: 2AM-MRY1325. Baffinland submitted its AEMP to the Nunavut Water Board in July 2014, and implemented the AEMP monitoring programs for the first time in 2014. Aquatic effects monitoring in 2014 focused on detecting potential construction phase effects to the freshwater environment, and supplementing the pre-mining baseline for to support future comparison of operation phase (mining) activities to pre-mining baseline conditions.

Schedule B, Section e, Item (i) of the Type A Water Licence requires Baffinland to report the results of its AEMP monitoring on an annual basis. This is the first annual report prepared for the Mary River Project AEMP.

The AEMP Annual Report consists of a high level summary of monitoring activities and outcomes and any management responses identified according to the AEMP data assessment and management response framework (Baffinland, 2014; see Section 4). The AEMP Annual Report also provides an evaluation of effects to the freshwater aquatic environment. Revisions to study designs or management response actions are summarized and discussed if appropriate. Monitoring results for each component study are presented in technical reports appended to the annual report.

1.2 2014 PROJECT ACTIVITIES

Construction of mine infrastructure for the 4.2 Mt/a Early Revenue Phase (ERP) Project was initiated in mid-2013 and continued through 2014. Project activities were undertaken in 2014 at Milne Port, along the Milne Inlet Toe Road, and at the Mine Site. For the sake of brevity, only the activities with the potential to influence the freshwater environment are listed below.

- General Project Activities
  - Year-round operation of camp facilities at the mine site and Milne Port

- Continued progressive reclamation of areas of current and past use in association with drilling and bulk sample programs
- Drill programs at the proposed life of mine (LOM) waste rock stockpile, and infrastructure drilling at Milne Port.

- Activities at the Mine Site
  - Construction and installation of the waste rock haul road, waste rock pad, drainage ditches and settling pond
  - Construction of crusher pad, ore stockpile pad area, drainage ditches and settling pond
  - Installation and commissioning of an explosives emulsion plant
  - Construction of the haul road to the open pit and initial development of the preliminary Deposit No. 1 pit benches
  - Airstrip upgrades, including extension of the airstrip and installation of: an aerodrome office, field electrical center, airfield lighting, power generation and fuel supply systems
  - Installation and commissioning of various site buildings
  - Installation of power generation systems
  - Continued extraction from quarry □MR2 and commenced the development of quarries D1□1 and D1□2
  - Construction, commissioning and filling of a steel tank bulk fuel storage facility

- Activities along the Tote Road
  - Continued upgrade and maintenance of road to improve safety and reduce environmental risk, including:
    - Alignment corrections to improve sight distances and to reduce the potential road/vehicle departures, and grade reductions at steep hills to accommodate heavily loaded trucks
    - Installation of four (4) new single span bridges
  - Drainage improvements, including:
    - Culvert installations
    - Ditch construction
    - Installation of sediment and erosion control measures
    - Development of □uarries □7, □11, □19 and borrow pits P1, Km 97, Km 98, Km 1/2 and Km 103/104 to provide aggregate for upgrades
    - Crushing of aggregate, haul and placement on the roadbed as required
    - Transport of needed fuel and supplies stored at Milne Port to the Mine Site

- Activities at Milne Port
  - Placement of remaining earth/rock fill for laydown areas, the concrete batch plant pad, and local site roads
  - Installation of various buildings
  - Construction and commissioning of additional fuel storage
  - Construction of hazardous waste containment area(s) for storage of hazardous wastes
  - Construction of the waste disposal landfarm, contaminated snow dump and containment pad
  - Sealift deliveries of equipment and materials, and tanker deliveries of fuel
  - Sealift backhaul of waste/material transport to Southern Canada for disposal in licensed waste disposal facilities
  - Discharge of treated sewage effluent stored in the polishing/waste stabilization pond (PWSP) at the Milne Port Camp into Milne Inlet

- Decommissioning of the bladder fuel storage facility at Milne Port, including placement of contaminated soil in a new landfarm facility and backhauling the bladders and other hazardous waste to a licensed disposal facility in Southern Canada.
- Geotechnical drill program to support the construction of the ore dock at Milne Port.
- Construction of the ore dock commenced in the summer of 2014.

No development activities were undertaken along the railway or at Steensby Port, and neither of the mid-way rail camp or the Steensby camp was utilized in 2014.

1.3 RELEVANT PROJECT CERTIFICATE CONDITIONS

NIRB issued Project Certificate No. 005 to Baffinland in December 2012 and the Project Certificate was amended in May 2013. A number of Project Certificate terms and conditions (PC Conditions) relate to the protection of the aquatic environment. PC Condition □21 relates specifically to the AEMP, and states the following (from NIRB, 2014):

The Proponent shall ensure that the scope of the Aquatic Effects Monitoring Plan (AEMP) includes, at a minimum:

a) monitoring of non-point sources of discharge, selection of appropriate reference sites, measures to ensure the collection of adequate baseline data and the mechanisms proposed to monitor and treat runoff, and sample sediments; and

b) measures for dustfall monitoring designed as follows:

   i. To establish a pre-trucking baseline and collect data during Project operation for comparison;

   ii. To facilitate comparison with existing guidelines and potentially with thresholds to be established using studies of Arctic char egg survival and/or other studies recommended by the Terrestrial Environment Working Group (TEWG); and,

   iii. To assess the seasonal deposition (rates, quantities) and chemical composition of dust entering aquatic systems along representative distance transects at right angles to the Tote Road and radiating outward from Milne Port and the Mine Site.

The above PC condition is met through both the development and the implementation of the AEMP. In terms of dustfall monitoring under Item (b) above, the focus of dustfall monitoring in 2014 was the collection of pre-trucking baseline dustfall measurements at reference stations. Construction-related traffic was also monitored, but the comparisons and assessments of dustfall monitoring data has not been carried out as the above terms are focused on the future and more frequent ore haulage traffic that will occur during the operation phase of the Project.

1.4 2014 AEMP MONITORING ACTIVITIES

Table 1.1 summarizes the AEMP component studies undertaken in 2014. A description of whether or not the component study focused on the collection of supplemental baseline data or monitored construction-related project effects is also indicated in the table.

Table 1.1 Summary of AEMP Component Studies in 2014

Study Program	Description
Environmental Effects Monitoring (EEM) Program	
EEM Cycle One Study Design	A Draft EEM Cycle One Study Design was submitted as part of the AEMP in 2014. The Mary River Mine is expected to become subject to the Metal Mining Effluent Regulations (MMER) starting in June 2015. Therefore, no EEM study was conducted in 2014.
Core Receiving Environment Monitoring Program (CREMP)	
Water □uality	Water quality samples were collected in the mine area lakes and streams. An objective of the 2014 water quality monitoring program was to collect additional data that, subject to analysis and validation, could potentially be added to the pre-mining baseline. The 2014 data was also used to monitor construction-phase project effects.
Sediment □uality	Sediment samples were collected in the mine area lakes and streams. An objective of the 2014 monitoring program was to collect additional data for inclusion into the pre-mining baseline, and to support the establishment of final sediment quality benchmarks. The 2014 data was also used to monitor construction-phase project effects.
Lower Trophic Level Freshwater Biota	Phytoplankton (chlorophyll *a*) and benthic macroinvertebrates (BMI) are lower trophic level components used for monitoring, and the detection of Project-related changes in the aquatic ecosystem. Both chlorophyll *a* and BMI sampling was conducted in 2014; BMI results are still pending.
Fish (Arctic Char)	The CREMP includes an Arctic Char (*Salvelinus alpinus*) monitoring program in the mine area lakes. The 2014 data was collected based on the methodology outlined in the AEMP to establish a pre-mining baseline for future comparison of data during mining. The method of data collection differs from earlier baseline studies. The 2014 data, therefore, is not intended to be used to assess potential effects.
Targeted Studies	
Lake Sedimentation Program	This study involves the deployment of sediment traps at three sites in Sheardown Lake NW twice a year, to measure sedimentation rates in the open water and ice-covers periods. Traps were retrieved and redeployed in 2014 to measure baseline (pre-mining) conditions.
Dustfall Monitoring Program	The dustfall monitoring program in 2014 included the operation of 34 dustfall monitoring stations at Milne Port, along the road, at the mine and at reference/control sites. The 2014 data was also used to establish the pre-mining baseline.
Stream Diversion Barrier Study	The initial stream diversion barrier study will document pre-mining flow conditions prior to meaningful diversions associated with the full scale project will occur. One survey was completed in August 2014. The 2014 data, therefore, is not intended to be used to assess potential effects.

2 – 2014 AEMP MONITORING RESULTS

The results of the component monitoring studies are summarized below.

2.1 HYDROLOGY AND CONSTRUCTION DISCHARGE MONITORING

Baffinland continued its long-term hydrological monitoring program in 2014, consisting of the operation of the 6 season stream gauging stations identified in the AEMP (Baffinland, 2014). The 2014 monitoring program report is included as Appendix A (Knight Pi□sold, 2014).

Additionally, Schedule I of Type A Water Licence No. 2AM-MRY1325 requires Baffinland to monitor discharge at a number of construction areas at the Mine Site and Milne Port. The results of this monitoring are presented in Appendix B (Knight Pi□sold, 2015a).

2.2 EEM CYCLE ONE STUDY DESIGN

The Mary River Project is not yet subject to the Metal Mining Effluent Regulations (MMER), and as such, no EEM study was conducted in 2014. The mine is expected to become subject to the MMER starting in June 2015.

A Draft EEM Cycle One Study Design was filed with the NWB as part of the AEMP in 2014. Environment Canada (EC) provided preliminary comments on the Draft EEM study design in November 2014, and acknowledged that a detailed review will occur when the MMER are triggered, to ensure all updates to the guidance and legislation are considered (EC, 2014). EC suggested further discussion of the study design, particularly the analysis of baseline fish population data.

Discussion with EC will continue in 2015 to help develop a path forward, which will also facilitate acceptance of the Cycle One EEM study design at the end of 2015. The draft study design notes additional fishing effort at the Mary River MRY-REF2 area (to be conducted in 2015) will likely provide a sufficient number of fish to conduct a comparison to the exposure MRY-NF area. Also, sufficient numbers of fish were collected in the proposed Camp Lake Tributary reference areas; however the populations were significantly different. Consequently, discussions with EC will help to provide an acceptable course of action to satisfy the EEM requirements.

2.3 CREMP MONITORING

The CREMP is being established to monitor effects of the Project from multiple pathways (i.e., effluent discharges, dust deposition and other non-point sources) on the downstream aquatic environment. The CREMP focuses on follow-up monitoring to validate predictions to aquatic valued ecosystem components (VECs) and key indicators.

2.3.1 Water □uality

An objective of the 2014 water quality monitoring program was to collect additional data that, subject to analysis and validation, could potentially be added to the pre-mining baseline. Water quality monitoring in 2014 was undertaken concurrent with site construction activities, but prior to the production (drill, blast, haul, crush and stockpile) of ore.

Knight Pi□sold Ltd. (KP) undertook the water and sediment quality CREMP monitoring program in 2014 (KP, 2015b; Appendix C). The 2014 water and sediment quality CREMP monitoring program was

executed as described in the AEMP, and focused on both detecting construction-related project effects and supplement the existing pre-mining baseline dataset if appropriate.

Monitoring detected evidence of Project-related change was observed in Camp Lake Tributary, Camp Lake, and in Sheardown Lake NW and SE. Each of these waterbodies showed a slight increase in concentrations of nitrogen compounds, including ammonia. Though elevated above baseline concentrations, ammonia remained well below the AEMP benchmark. Nitrate however, exceeded the benchmark in Camp Lake Tributary downstream of MR2 quarry on a single sampling event in the spring. Aluminum and iron also exceeded the benchmarks in Camp Lake Tributary. The exceedances in Camp Lake Tributary have been attributed to upstream quarry activities.

Other water quality parameters in these waterbodies, as well as Mary Lake, were consistent with previous baseline concentrations.

2.3.2 Sediment uality Monitoring

Sediment quality monitoring was undertaken in 2014 in conjunction with water quality monitoring and as described in the AEMP (Knight Pi sold, 2015b; Appendix C). An objective of the 2014 monitoring program was to collect additional data for inclusion into the pre-mining baseline. With the supplemental baseline sediment quality data, final sediment benchmarks would be established.

The lake-wide sample sizes of the 2014 sediment quality dataset were greater than the baseline datasets for some lakes. As such, it was not unexpected that the 2014 results included concentrations higher than previously detected. In many cases the 2014 lake-wide standard deviations were lower than the baseline standard deviation. The high number of stations used in 2014 resulted in greater geographic coverage within the waterbodies and therefore better represents the natural variability among stations.

Evidence of mine-related change was observed in Sheardown Lake NW in 2008, attributable to the 2008 bulk sampling program. Post-2008 monitoring results for the same parameters (arsenic, iron and manganese) appear generally consistent with 2007.

Also within Sheardown Lake NW sediment, differences were observed in concentrations between sample stations and years for the following correlated parameters: chromium, copper, nickel, lead and zinc. There is an apparent increase of these five correlated metals over time. A number of factors were considered in establishing the potential cause(s) of the apparent increase:

- The previous baseline results for Sheardown Lake NW may not have fully represented the range of natural variability of metals in sediment
- The stations sampled in 2014 with some of the highest metals concentrations are new stations; a lack of continuity in sediment quality stations make interpretation of the results between years difficult
- There is a gap in the data over the years; i.e., no data collected in 2009 and 2010, limited sampling in 2011.
- A change in sediment sample collection procedure between 2007-2011 and 2012-2014 may contribute to differences in the data
- The apparent increase in concentrations of the five correlated metals (Cr, Cu, Ni, Pb and Zn) over time is not matched by similar increases in arsenic, iron and manganese over time. Therefore, it does not appear likely that the apparent increase of the five correlated metals is due to ore dust.

It is possible however, that the apparent increase in these metals over time could be mine-related, though a definitive cause-effect relationship has not been identified.

2.3.3 Final Sediment Quality Benchmarks

The AEMP identified interim area-wide sediment quality benchmarks and proposed the development of final sediment quality benchmarks following supplementary baseline collection in 2014, as described above.

Intrinsik Environmental Sciences Inc. (Intrinsik) completed a review of the 2014 sediment quality data and recommended final sediment quality benchmarks applying the same approach that was applied in the development of the water quality benchmarks and the interim sediment quality benchmarks (Intrinsik, 2015; Appendix D). As with the water quality benchmarks, one of three methods was used to develop benchmarks for each sediment quality parameter:

- Method A - Adoption of the generic Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guideline for the Protection of Freshwater Aquatic Life (CWQG-PAL);
- Method B - Adoption of the 97.5th percentile of baseline (the CCME background concentration procedure) for parameters that are naturally elevated; or
- Method C - 3x the method detection limit (MDL) for those parameters that are <5% detectable

Review of the 2014 sediment quality data by Knight Piésold (2015b; Appendix C) as well as further analysis by Intrinsik (2015; Appendix D) determined that 2014 sediment quality results in Camp Lake, Mary Lake and Sheardown Lake SE were consistent with previous baseline. Sediment quality in both Camp Lake and Mary Lake is similar, and therefore a common set of final sediment quality benchmarks were developed for Camp Lake and Mary Lake. Review of the Sheardown Lake SE sediment quality data found that while sediment quality appears unaffected by the Project, there are distinct differences in sediment quality that warranted development of sediment quality benchmarks specific to that lake.

Sediment quality in Sheardown Lake NW showed signs of elevated arsenic, iron and manganese in 2008, likely attributable to the bulk sampling program. Additionally, five correlated metals (chromium, copper, nickel, lead and zinc) appear to increase over time. A number of factors complicate the interpretation of the Sheardown Lake NW sediment quality data. The 2014 sediment quality data in all lakes demonstrated that previous sampling did not adequately characterize the natural variability of metals in sediment. Additionally, changes in sampling protocols, variation in sample locations based on the CREMP gradient study design, and the proximity of Sheardown Lake to the mining activities may all contribute to the observed differences among the datasets.

2.3.4 Lower Trophic Level Aquatic Biota

Phytoplankton (chlorophyll *a*) and benthic macro invertebrates (BMI) are lower trophic level components included in the AEMP (Baffinland, 2014) for monitoring and detection of Project-related changes in the aquatic ecosystem. Sampling was conducted as per the CREMP study design during the late winter, and open water seasons of 2014 (NSC, 2015a; Appendix E). In addition to the chlorophyll *a* and BMI samples, taxonomic samples of phytoplankton from the euphotic zone and tow samples of zooplankton were collected at each lake water quality stations for archiving and future analysis as required.

The 2014 chlorophyll *a* monitoring results indicate few inter-annual differences within each of the lakes, and chlorophyll a concentrations were similar to the ranges observed in the baseline from 2007 to 2014.

Sampling of BMI was conducted in the mine area lakes and streams as per the CREMP but results are not yet available.

2.3.5 Fish (Arctic Char)

The CREMP includes an Arctic Char monitoring program in the mine area lakes. The program is conducted in late summer/early fall in each lake, with the objective to collected 100 individuals of 1 age and 100 young-of-the-year (YOY). The 2014 program was intended to provide data that could potentially be added to the pre-mining baseline (NSC, 2015a). Therefore, the 2014 data on fish was not used to assess project effects in 2014. Fish were captured using a variety of methods, and were enumerated, weighed, measured and examined for sex and maturity. Ageing structures (pectoral fin rays) were collected from live caught fish.

2.3.6 Baseline Data Collection at Candidate Reference Lakes

Additional baseline data collection was conducted at three (3) reference lakes in 2014, to characterize conditions within each lake and determine the relative comparability to Camp Lake and Sheardown Lake within the mine site area. Field surveys included aquatic habitat mapping, and reconnaissance-level sampling of water, sediment, lower trophic levels and fish sampling and ageing (NSC, 2015b; Appendix F). The findings for each of the three candidate reference lakes are summarized in Table 2.1.

Table 2.1 Reference Lake Summary

Ref. Lake	Max Depth (m)	Dominant Substrate (0-5 m depth)	Dominant Substrate (> 5 m depth)	Arctic Char Presence				Fish and Fish Habitat Suitability [1]	
				Juvenile Rearing	Adult Feeding	Adult Spawning	Over-wintering	Similarities	Differences
1	15.3	Sand /Cobble /Boulder	Sand/Silt /Clay	Y	Y	Unknown	Probable	Ideal substrate composition; juvenile use of nearshore habitat	Lake is small; only two adult ARCH captured in five gill nets set; spawning not confirmed; growth rates may be lower
2	11.7	Sand	Sand/silt	Y	Y	Y	Probable	Resident fish populations of ARCH and NNST present; juvenile use of nearshore areas and tributary streams; spawning likely based on presence of adult in spawning condition	Lake is shallow and large differences in substrate composition and distribution
3	38.3	Mainly Cobble	NA	Y	Y	Y	Probable	Presence of adult and juvenile ARCH; ideal, abundant habitat; sufficient depths	Nearshore areas rockier than Camp Lake

[1] ARCH = Arctic Char; NNST = Ninespine Stickleback

Based on data collected to date, it appears that Reference Lake 3 is most similar to mine area lakes, particularly Camp Lake, due its relatively larger volume and surface area, and water depth. Available information regarding Arctic Char populations and aquatic habitat in the three candidate reference lakes indicate all three lakes support what are likely land-locked resident populations and at least two (Reference lakes 1 and 2) are supplied by tributary streams that appear to provide juvenile rearing habitat (similar to mine area lakes). Reference lakes 1 and 3 also provide abundant juvenile rearing habitat in rocky nearshore areas. All three potential reference lakes also appear to provide suitable overwintering and spawning habitat. However, spawning has only been indirectly confirmed (based on extrusion of

mature gametes from fall 2014 catches) in Reference Lake 2. Spawning adults have not yet been identified from Reference lakes 1 or 3, though suitable spawning habitat is abundant in both.

Based on available information, the fish population in Reference Lake 1 may be the least suitable of the three for comparison with mine area lakes. Low catch rates suggest the population of large Arctic Char in Reference Lake 1 may be small. In addition, preliminary age data suggest that growth rates may be lower in Reference Lake 1 relative to mine area lakes. Reference Lake 2, with its lack of rocky habitat, may be the least similar to mine area lakes in terms of habitat, but fish population data suggest a good match with either Camp Lake or Sheardown Lake NW.

2.4 TARGETED STUDIES

Specific effects monitoring (or targeted monitoring) programs/studies have been identified to address specific questions or potential impacts. These are programs or studies that are relatively confined in terms of spatial and/or temporal scope. Targeted environmental studies relate to specific environmental concerns that require further investigation or follow-up but are not anticipated to be components of the core monitoring program. The Lake Sedimentation Study, Dustfall Monitoring Program, and the Stream Diversion Barrier Study are the targeted studies identified in the AEMP.

2.4.1 Lake Sedimentation Monitoring Program

The AEMP includes a lake sedimentation monitoring component to address potential effects of the Project (Baffinland, 2014). This AEMP targeted study involves the deployment of five replicate sediment traps installed at each of three sites in Sheardown Lake NW (NSC, 2015c; Appendix G). The sites were selected to generate measurements of sedimentation rates at a deep site, where sedimentation is typically greatest, and at two shallower locations - one of which was located in potential Arctic Char spawning habitat, to generate baseline information on the critical habitat of concern with respect to this effects pathway. The sediment traps are deployed twice a year to measure sedimentation rates in the open water and ice-covered periods.

The sediment trap results indicate sedimentation rates for the open-water season of 2014 were higher than observed for the 2013-2014 ice-cover season, but rates were lower than those observed in the open-water season of 2013. Due to minimal sediment sample size collected in the traps, additional analyses (e.g., chemical composition) could not be conducted.

2.4.2 Dustfall Monitoring Program

Part (b)i of the PC Condition □21 requirements is to establish a baseline dustfall deposition rate for comparison to the operations phase. Pre-mining measurement of baseline conditions was accomplished by monitoring sampling locations representative of various predicted dustfall concentrations at reference areas, near the mine site, along the Tote Road and near Milne Port, as described in the Terrestrial Environment Management and Monitoring Plan (Baffinland, 2015b). The monitoring stations were setup perpendicular to potential point sources, and compared to the reference stations positioned outside of the areas of influence. Thereby measuring the magnitude and extent of dustfall, and supporting temporal comparisons. The FEIS and FEIS Addendum predicted the deposition of fugitive dust during the construction phase had the potential to increase total suspended solids (TSS) and metals concentrations in local water bodies, potentially affecting fish habitat and health (Section 2.2.5). Part ii of PC Condition □21, measuring sedimentation rates to compare against thresholds related to Arctic Char egg survival was achieved through the lake sedimentation monitoring program discussed in Section 2.3.1. The lake sedimentation program measured sedimentation rate using the dry weight of samples collected in the

traps, however additional chemical composition analysis could not be conducted due to the minimal sample amount. Laboratory analysis of total, fixed and volatile dustfall components from terrestrial stations were presented in the 2014 Annual Terrestrial Monitoring Report (EDI, 2014). The seasonal deposition rates were measured during the 2013-2014 dustfall monitoring program as per part iii of PC Condition 21, results of this program are shown in Table 2.2.

Table 2.2 2013-2014 Dustfall Monitoring Results Summary

Monitoring Criteria	Mine Site	Tote Road	Milne Port
Magnitude and Extent	Increase in dustfall deposition at mine site, dustfall was below the detection limit at corresponding reference locations.	Dustfall concentration decreased sharply with increased distance from the road centerline. The south sampling area had higher deposition than the north, likely due to the increased activities in the south.	Highest dustfall concentrations during 2013-2014, associated with construction activities, dustfall was below the detection limit at corresponding reference locations.
Seasonal Comparison	No seasonal differences noted.	Statistically significant seasonal differences noted at the South study area (increases construction activities), and no statistical difference at the North study area.	No seasonal differences noted.
Annual Dustfall	Less than predicted, 2013-2014 results show a 'moderate' dustfall amount.	As predicted, 2013-2014 results show a 'moderate' dustfall amount.	Higher than predicted, 2013-2014 results show a 'high' dustfall amount, reflective of the construction activities.

Year round construction activities were conducted at the Mine Site and Milne Port through the 2013-2014 dustfall sample periods. Mining activity will eventually be limited to road haulage and site operation, and dust emissions are expected to decrease. Future dustfall sampling will assist in determining whether the higher levels of dustfall at Milne Port are associated with construction or are part of a long-term trend.

2.4.3 Initial Stream Diversion Barrier Study

The Project has the potential to reduce flows in five mine site streams, once the 22.2 Mt/a Project (inclusive of the railway) is fully developed. Full development of the open pit and waste rock stockpile, as well as the rail infrastructure including the large associated ore stockpiles, are predicted to result in meaningful reductions in flow in the five mine site streams. The flow reductions are expected to have the potential to affect the ability of arctic char (primarily juveniles) to access small tributaries of the mine site area, particularly in the spring when arctic char move into the streams and in the fall when the fish return to the lakes to overwinter. These potential effects are described in the Final Environmental Impact Statement (Baffinland, 2012).

The 2014 survey provided further documentation of pre-mining (baseline) conditions when none of the subject streams have been meaningfully affected by the Project (Knight Pi sold, 2015c; Appendix H).

Transects were identified within each stream where potential fish barriers existed. Incidental fish were observed in all streams, except in SDLT-9 or SDLT-12. Within the CLT-1, CLT-2 and SDLT-1 streams, fish were identified above potential fish barriers at the observed water levels in late August. These observations suggest that fish passage did occur under higher flow conditions earlier in the season. These observations are consistent with previous observations during baseline studies.

As per the initial study design, an interpretive report will be compiled at the end of three years of monitoring (2014, 2015 and 2016). Continuation of the monitoring program beyond 2016 will depend upon the results of the initial 3-year study as well as the schedule and size of the Project (that is, the extent of project diversions) after 2016.

3 – 2014 AEMP-RELATED MONITORING

A number of environmental monitoring programs relate to and support the AEMP. This includes monitoring programs prescribed by the Type A Water Licence, as well as other long-term monitoring programs undertaken by Baffinland and outlined in its management plans. The related monitoring programs and the 2014 results are summarized below.

3.1 SURVEILLANCE NETWORK PROGRAM

The Surveillance Network Program (SNP) is a compliance-based "General Monitoring Program". Data generated by the SNP will help inform effects evaluations conducted as part of the AEMP by providing the loading information on authorized discharges (flow and quality). The SNP results are integrated into interpretation and recommendations of the annual AEMP program, if and as required to support the interpretation of monitoring results. Table 3.1 summarizes the SNP monitoring activities undertaken in 2014 as required by the Type A Water Licence.

Table 3.1 Summary of SNP Monitoring in 2014

Program Component	Monitoring Activities (and Applicable Water Licence Requirements)
Site Runoff □uality and □uantity	Surface water quality monitoring during construction to demonstrate compliance with site runoff effluent quality limits (Part D, Table 1). Discharge measurements at 11 stream gauging sites (9 at Mine Site, 2 at Milne Port) within construction areas (Schedule I. Tables 13 and 14).
Water Use	Water usage was monitored by Baffinland to demonstrate compliance with water use limits (Part E, Tables 2 and 3).
Treated Sewage Effluent	Treated sewage effluent quality from sewage treatment plants (Part F, Tables 4 and 5).
Oily Water Treatment	Effluent quality from oily water treatment facilities (Part F, Table 6).
Landfill Effluent	Effluent quality from the landfill facilities (Part F, Table 7).
Bulk Fuel Storage	Effluent quality from the bulk fuel storage facilities (Part F, Table 8).
Landfarm Facilities	Effluent quality from the landfarm facilities (Part F, Table 9).
Bulk Sample Open Pit and Stockpile	Effluent quality from the bulk sample open pit, stockpile and seepage areas (Part F, Table 10).

Results from the above SNP monitoring programs are described in Baffinland's 2014 Annual Report under Type A Water Licence No: 2AM-MRY1325 (Baffinland, 2015c). A summary of the results is presented below.

3.1.1 Water Use

Under the Type A Water Licence, Baffinland is required to record and report on its water usage, and remain within the limits identified in the water licence. Baffinland did not exceed its daily water usage limits in 2014.

3.1.2 Site Runoff Monitoring

Compliance monitoring specific to Project effects on the freshwater environment were conducted as part of the SNP to satisfy the Type A Water Licence 2AM-MRY1325 requirements outlined in Section 5, and PC conditions 17 and 24. The monitoring results are reported in the 2014 Water Licence Annual Report (Baffinland, 2015c). The 2014 monitoring program focused mainly on the monitoring site runoff at Milne Port, the Mine Site and any active quarries.

There were three instances of non-compliance noted in the monthly water licence reports. There were three events in which site runoff was measured and exceeded water licence site runoff criteria for total suspended solids (TSS). These instances of non-compliance are summarized in Table 3.2.

Table 3.2 Water Licence Monitoring Results

SNP Station	Description	Non-compliance	Date
MS-C-E	Site runoff downstream of construction at Mine Site	TSS exceedance	May 31, 2014
MP-□1-02	□uarry runoff downstream of quarry at Milne Port	TSS exceedance	June 30, 2014
MP-C-A	Site runoff downstream of construction at Milne Port	TSS exceedance	July 7, 2014

Occasional exceedances of TSS in general site runoff will occur, particularly during high rainfall events. This occurrence was predicted in the FEIS and its effects are considered to be minor given the short duration of the effect. Inspectors at the □ikiqtani Inuit Association (□IA) and/or Aboriginal Affairs and Northern Development Canada (AANDC) were notified of all exceedances in monthly reporting.

3.1.3 Effluent Discharges

Baffinland operated sewage treatment plants at the mine and at Milne Port in 2014. The mine site PWSP was used for storage of treated effluent until February 2014 when the new wastewater treatment facility, equipped with Membrane Bioreactor (MBR) technology was operating within the direct discharge criteria. Treated effluent from the Mine Site was discharged at the approved location near the Mary River as per the Type A Water Licence for the remainder of 2014. The effluent in the PWSP was treated as required and discharged to Sheardown Lake NW in July and August. All discharged effluent was below or within prescribed water licence criteria and was demonstrated to be acutely non-toxic.

The treated effluent from the Milne Port MBR treatment plant was discharged to Milne Inlet and was below or within the prescribed water licence criteria and was acutely non-toxic.

Storm water, oily water (stormwater from tank farms) and seepage from the bulk sample pit, waste and ore stockpiles and non-hazardous landfill was treated and discharged within prescribed water licence criteria. Except one total suspended solids (TSS) sample in July at monitoring location MS-MRY-13a, most likely attributable to the flow conditions of peak freshet. Subsequent sampling events at this location yielded results that did not exceed TSS limits.

3.1.4 Discharge Measurements from Construction Areas

A monitoring requirement of the Type A Water Licence □2AM-MRY1325 for the Project is to measure the flow and the water quality of surface discharge at locations established as part of the SNP. Hydrometric monitoring stations were installed in June or July 2014 to measure surface water discharge at or near each of the SNP stations where possible. The discharge measurement results are presented in Appendix B.

3.2 OTHER MONITORING

Table 3.3 summarizes related monitoring programs that support the AEMP.

Table 3.3 Summary of AEMP-Related Monitoring in 2014

Program	2014 Activities
Inuit □aujimajatuqangit	Discussions with the Mittimatalik Hunters and Trappers Organization (MHTO) regarding marine fish habitat compensation plans; Inuit involvement in field programs.
Meteorology	Baffinland continued to operate climate stations at three project locations in 2014.
Stream Flow Monitoring	Baffinland continued to operate its six (6) long-term seasonal stream gauges in 2014, as described in Section 3.3 of the AEMP.
Fish and Fish Habitat Monitoring	The 2014 monitoring activities associated with approvals and letters of advice issued by the Department of Fisheries and Oceans (DFO) under the *Fisheries Act* for the tote road and Milne Port ore dock.

Of the above monitoring programs, the habitat compensation program results are reported below.

3.2.1 Fish and Fish Habitat Monitoring under DFO Authorizations

The following sections discuss the monitoring activities associated with Baffinland's authorizations under the *Fisheries Act* and letters of advice issued by DFO, for either tote road crossings or construction of the ore dock at Milne Port.

3.2.2 Fish and Fish Habitat Assessments along the Tote Road

The DFO issued a HADD authorization (Harmful Alteration, Disruption or Destruction of Fish Habitat authorization; now a Serious Harm authorization) for approximately 8,500 m^2 of fish habitat that was to be disturbed for the Tote Road upgrade. The plan also described a monitoring plan to be implemented during and after construction. This plan has been implemented during the period of construction (2007-2009) and post-construction from 2009 to the present.

A total of four amendments of the DFO HADD authorization have been obtained to date. Any physical works as well as monitoring results carried out under the Authorization are described in an annual report submitted to DFO before December 31 of each year. No issues were identified in the 2014 monitoring (Baffinland, 2015a).

In 2014, bridges were installed at each of the four existing seacan crossings (CV-128, BG-50, CV-217, and CV-223). Some additional restoration work including removal of the old seacans to the landfill will be completed in 2015. Several culvert replacements were also undertaken. The remainder of the changes are planned for completion during winter 2014/15.

The emphasis of the 2014 monitoring program was to assess fish and habitat at only the sites where upgrades were completed prior to freeze-up in fall 2014. This is described below. Monitoring will continue in 2015 with descriptions of changes and potential impacts to be provided upon completion of upgrades. It is expected that there will be some habitat gains (replacement of sea container crossings with bridges) and losses (extension/lengthening of some existing culverts) that will need to be accounted for.

Compensation works remain successful including fish use of the rustic fishway installed at BG-30. Fish presence upstream of the fishway was confirmed during site visits in spring and summer 2013 and

summer 2014, indicating structural integrity and successful fish passage. Areas of compensation will continue to be monitored since changes at many of these sites are expected during ERP upgrades that continue into 2015.

It is expected that there will be a reduction in the original HADD footprint size at crossings where bridges replaced sea containers and an increase in the footprint size at crossings were culverts are being extended. Following completion of ERP upgrades, HADD and compensation will be revisited to determine if sufficient compensation remains, or if additional works will be required.

3.2.3 Milne Port Ore Dock

In accordance with the revised *Fisheries Act*, the footprint of the Milne Ore Dock was determined by DFO to constitute a Serious Harm to fish habitat. In 2014, Baffinland received approval from DFO to construct the ore dock with prescribed offset measures for the replacement of fish habitat lost due to the construction. Ore dock construction began in 2014, and a construction monitoring report will be submitted to DFO by the end of 2015.

4 – MANAGEMENT RESPONSES AND EFFECTS ASSESSMENT

4.1 DATA ASSESSMENT AND MANAGEMENT RESPONSE FRAMEWORK

As stated in Section 1, the AEMP is a monitoring program designed to:

- Detect short-term and long-term effects of the Project's activities on the aquatic environment resulting from the Project;
- Evaluate the accuracy of impact predictions;
- Assess the effectiveness of planned mitigation measures; and
- Identify additional mitigation measures to avert or reduce unforeseen environmental effects.

A common assessment (data evaluation) and management response framework will be implemented, as outlined on Figure 4.1.

This multi-step process includes the following:

Step 1: Initial Data Analysis

Step 1 consists of data management, quality assurance/quality control (□A/□C) review, compilation of summary statistics, comparison of results to AEMP reference values (benchmarks and midpoints), and determination of whether or not a change in the 2014 data is evident, relative to the baseline water quality. The evaluation of sediment quality data has the added step of excluding any samples not meeting the cut-offs for total organic carbon (TOC) and fines content established in the CREMP study design.

Step 2: Determine if Change is Mine-Related

Step 2 involves determining if the changes in water or sediment quality parameters of concern are due to the Project or due to natural variability or other causes. In some instances, results were identified that were considered potentially indicative of change, but for which a Project-related linkage is absent, or the weight of evidence (i.e., other elevated parameters) does not suggest a Project-related change. These results were identified on a watch list, for subsequent evaluation following the future year's monitoring.

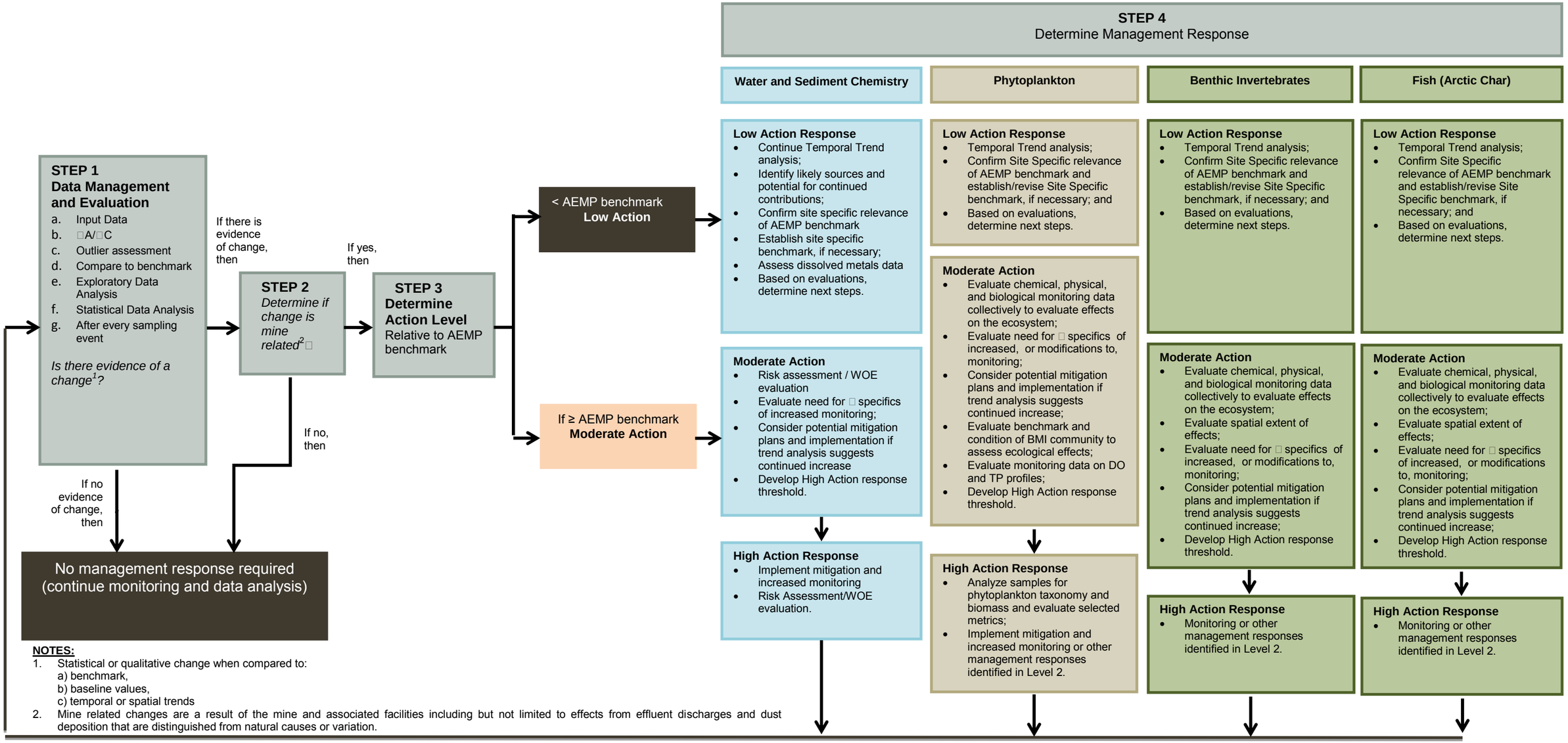
Step 3: Determine Action Level

Results that indicate a potential Project-related change are subject to low or moderate action if below or above the benchmark. Alternatively, if the weight of evidence suggests that a change (above or below the benchmark) is not mine-related, Step 3 is not carried out. With this approach, it is expected that benchmarks will be exceeded periodically for those parameters that are naturally elevated and for which benchmarks have been established based on the 97.5th percentile of the baseline dataset.

If the benchmark is not exceeded, a **low action response** would be undertaken and could include any number of potential responses, including the following:

- Evaluate temporal trends
- Identify likely source(s) and potential for continued contributions
- Confirm the site-specific relevance of benchmark and establish a site-specific benchmark, if necessary
- Further evaluation of data (for example, for water quality, review dissolved metals data or supporting variables).
- Based on evaluations, determine next steps

Figure 4.1 Data Assessment Approach and Response Framework



NOTES:

1. Statistical or qualitative change when compared to:
   a) benchmark,
   b) baseline values,
   c) temporal or spatial trends
2. Mine related changes are a result of the mine and associated facilities including but not limited to effects from effluent discharges and dust deposition that are distinguished from natural causes or variation.

If the benchmark is exceeded and it is concluded to be Project-related, a **moderate action level response** would be undertaken and could include, in addition to analyses identified for a low action response, the following:

- Consider a weight-of-evidence (WOE) evaluation and/or risk assessment, considering other monitoring results collectively with the indicator that has changed, to evaluate effects on the ecosystem
- Evaluate the need for and specifics of increased monitoring
- Evaluate the need for additional monitoring (e.g., confirmation monitoring) and/or modifications to the CREMP
- Consider results of the trend analysis (i.e., trend analysis indicates an upward trend) and evaluation of potential pathways of effect (i.e., causes of observed changes) to determine if management/mitigation is required
- Identify next steps based on the above analyses. Next steps may include those identified for the high action level response.

A quantitative trigger for the **high action level response** has not been identified as the need for additional study and/or mitigation will depend on the ultimate effects of the observed increases in the indicator parameter(s) of concern on the lakes as a whole. Also, the benchmark may need to be revised in consideration of ongoing monitoring results. The precise relationships between water quality, sediment quality and lower trophic level changes and the collective effects on fish is difficult to predict and therefore actions undertaken under Level 2 will attempt to explore these relationships to advise on overall effects to the ecosystem. Results would be discussed with regulatory agencies and the next steps would be identified. Additional actions that may be implemented in a subsequent phase (i.e., high action level response) could include:

- Implementation of increased monitoring to further assess the potential for effects and/or define magnitude and spatial extent if warranted
- Implementation of mitigation measures or other management actions that may be identified under the moderate action level response

The specifics of how the framework is implemented are described in the individual study designs in the appendices.

4.2 INDICATORS AND BENCHMARKS

Indicators are measurable parameters that can be used to detect change in the environment. Benchmarks are established for various indicators to establish the point at which actions will be triggered before unacceptable adverse effects occur (INAC, 2009). Benchmarks have been identified for each of the aquatic components to be monitored at the mine (refer to the technical reports presented in the appendices).

As discussed earlier, the 2014 sediment quality monitoring program collected additional data that was incorporated into the baseline dataset for development of lake-specific sediment quality benchmark concentrations. Sheardown Lake NW was the only lake where previous area-wide interim benchmarks were used for comparison to the 2014 data. Additional investigation of sediment quality with this particular lake basin is required before final sediment quality benchmarks can be established (see Section 2.3.3).

Arctic Char have been sampled in the mine area lakes since 2006, using a combination of sampling techniques that allow for the live capture of multiple size classes and detailed analysis of population

metrics. These metrics are used to detect Project-related change and include fish condition, age and contaminants (NSC, 2015a; draft). The 2014 fish community data shows preliminary evidence that some Arctic Char fish are growing more slowly and reaching sexual maturity sooner than other fish. Information collected in future years will help to substantiate this observation.

4.3 MANAGEMENT RESPONSES ARISING FROM 2014 MONITORING

Management actions will be implemented as identified in the low and moderate action responses for each aquatic component, based on assessment of whether the change is considered to be mine-related, and the action level determined relative to the benchmark(s) (Figure 4.1). In the instance of detecting change among multiple stressors, action will be implemented according to a weight of evidence evaluation.

Evidence of Project-related change in water quality was observed in Camp Lake Tributary, Camp Lake, and in Sheardown Lake NW and SE. Table 4.1 summarizes waterbody, parameter(s), potential sources and proposed actions to mitigate or confirm determination of a mine-related change.

Table 4.1 Evidence of Project-Related Change - Water Quality

Waterbody	Parameter(s)	Potential Source(s)	Management Response Level	Proposed Action(s)
Camp Lake Tributary	Total Aluminum Total Iron Ammonia Nitrate	• MR2 quarry operations upstream (explosives residue) • Fill material for tote road and pad construction (explosives residue)	Moderate Moderate Low Moderate	Continue to monitor and continue proper explosive handling procedures.
Camp Lake	Ammonia	• MR2 quarry operations upstream via Camp lake Tributary • Fill material for tote road and bridge construction activities (Tom River bridge, 2014) • Nearby borrow area activities	Low	Continue to monitor and continue proper explosive handling procedures.
Sheardown Lake NW	Ammonia	• Fill material used at mine site development area	Low	Continue to monitor
Sheardown Lake SE	Ammonia	• Fill material used at mine site development area (explosives residue)	Low	Continue to monitor

There were no other observations from the 2014 AEMP monitoring programs suggesting Project-related changes have occurred.

5 – EFFECTS EVALUATION

A risk-based approach to integrating the results of the component monitoring programs will be undertaken, drawing from the approach applied at the Meadowbank Mine (Azimuth, 2010). Monitoring results were evaluated against the criteria applied in the FEIS and FEIS Addendum, as summarized in Appendix I. The original assessment tables from the FEIS/FEIS Addendum are presented and are updated based on the outcome of 2014 activities and monitoring. Any changes to the rating criteria are indicated in red text in the assessment tables in Appendix I.

The following sections present the effects evaluations for water quantity, water and sediment quality and effects to aquatic biota. The 2014 Project activities summarized in Section 1.2 have been carried forward through the effects evaluation and are identified within the following tables.

5.1 WATER □UANTITY

Conditions applying to water use and management have been outlined in Part E of the Water Licence (NWB, 2013). These conditions will be adhered to throughout applicable timeframe of this licence. The current limits on water use in the Water Licence are 1,589 m^3/day and 580,000 m^3/year total water use from all sources during the construction phase, and 630 m^3/day or 230,000 m^3/year during the operation phase, for total domestic camp and industrial water use from all sources.

The potential Project-related effects identified in the FEIS and FEIS Addendum to water quantity includes water withdrawals, water diversion and runoff or effluent discharge. Table 5.1 summarizes these key issues, indicators and benchmarks. Effects to freshwater quantity were assessed using the above risk-oriented criteria, which are show in greater detail in Appendix I.

Table 5.1 2014 Activities Potentially Affecting Water Quantity

Key Issue	Indicator	Benchmark	2014 Activities		
			Mine Site	Tote Road	Milne Port
Water Withdrawal	Water withdrawn (m^3)	Water Licence Limit (various)	Camp water from Camp Lake	Dust suppression water from Km 32 Lake	Camp water from Km 32 Lake
Water Diversion	Streamflow □ increase/decrease	FEIS Threshold (10□ change from natural discharge)	Minor site drainage alterations in development area (see Section 1.2)	Culvert and bridge replacements; Minor realignment and improvements to road	Minor site drainage alterations in development area (see Section 1.2)
Runoff and/or Effluent Discharge	Streamflow □ Increase	FEIS Threshold (10□ change from natural discharge)	Minor site drainage alterations in development area (see Section 1.2)	Culvert and bridge replacements; Minor realignment and improvements to road	Minor site drainage alterations in development area (see Section 1.2)

No significant effects to water quantity occurred in 2014, as predicted in the FEIS and FEIS Addendum (Baffinland, 2012 and 2013). No effects occurred related to the rail and Steensby Port components of the Project, as no activities were undertaken in 2014.

5.2 WATER AND SEDIMENT □UALITY VEC

Project activities releasing aqueous point source and non-point source discharges directly into freshwater or through surface drainage, that eventually reports to a freshwater receiver are regulated under the Type A Water Licence No: 2AM-MRY1325. Water quality and sediment quality are the indicators specified in the FEIS and FEIS Addendum, with benchmarks established in the AEMP monitoring programs (e.g., SNP, CREMP). Table 5.2 summarizes the activities potentially affecting water quality and sediment quality in 2014.

Table 5.2 2014 Activities Potentially Affecting Water and Sediment Quality

Key Issue	2014 Activities		
	Mine Site	Tote Road	Milne Port
Aqueous Non-Point Source Emissions			
SWS□-1 Ground preparation and earthworks	Site development activities (see Section 1.2)	Construction activities (realignment, improvements, crossing replacements)	Site development activities (see Section 1.2)
SWS□-2 Site Water Management	Site development activities (see Section 1.2)	Construction activities (realignment, improvements, crossing replacements)	Site development activities (see Section 1.2)
SWS□-3 Laydown Areas	Site development activities (see Section 1.2)	Construction activities (realignment, improvements, crossing replacements)	Site development activities (see Section 1.2)
SWS□-4 Explosives	Development of □uarries □MR2, D1□1, D1□2	Development of □uarries □7, □11, and □19.	Development of □uarry □1
SWS□-5 □uarries and Borrow Areas	Development of □uarries □MR2, D1□1, D1□2	Development of □uarries □7, □11, and □19, and Borrow Pits P1, Km 97, Km 98, Km 1/2 and Km 103/104	Development of □uarry □1 and Borrow Area Km 2
SWS□-7 Camps and Fuel Management	Site development activities (see Section 1.2)	N/A	Site development activities (see Section 1.2)
SWS□-8 Water Use and Management	Site development activities (see Section 1.2)	Construction activities (realignment, improvements, crossing replacements)	Site development activities (see Section 1.2)
SWS□-9 Airstrips and Airstrip Use	Construction activities (new apron, extending airstrip)	N/A	N/A
Aqueous Point Source Discharges			
SWS□-11 Waste Rock and Ore Stormwater Discharge to Mary River	Site development activities (see Section 1.2)	Construction activities (realignment, improvements, crossing replacements)	Site development activities (see Section 1.2)
SWS□-14 Exploration Camp WWTF Effluent Discharge to Sheardown Lake	Treated sewage effluent release during open-water season to Sheardown Lake NW	N/A	N/A
SWS□-15 Mine Site WWTF Effluent Discharge to Mary River	Treated sewage effluent release to Mary River via land deposition year-round	N/A	N/A

One project activity was identified where the assessment criteria were adjusted. The development of quarries and borrows frequency increased to Level II since the construction phase involves nearly continuous aggregate production for the Mine Site, Tote Road and Milne Port. These activities will be substantially reduced after completion of the construction phase and the frequency criteria will be adjusted appropriately.

No significant effects to water or sediment quality occurred in 2014, as predicted in the FEIS and FEIS Addendum (Baffinland, 2012 and 2013). No effects occurred related to the rail and Steensby Port components of the Project, as no activities were undertaken in 2014.

5.3 FRESHWATER A□UATIC BIOTA AND HABITAT

Project-related changes in water and/or sediment quality have the potential to affect the health, condition and habitat of freshwater biota; specifically Arctic Char as identified in the FEIS and FEIS Addendum. Arctic Char are the primary freshwater biota of interest regarding potential effects of the Project on the aquatic environment. Linkages for the potential effects include three general categories:

- Point source discharges (treated sewage effluent, waste rock stockpile runoff, ore stockpile runoff, mine pit water, run of mine stockpile runoff, and exploration drilling runoff)
- Aqueous non-point sources (NPS; including effects related to sediment and erosion, release of blasting residues, general site runoff, development of quarries and borrow pits)
- Dust emissions and introduction to surface waters

Arctic Char health, condition, and habitat are the indicators specified in the FEIS and FEIS Addendum, with benchmark criteria provided in the freshwater biota AEMP monitoring programs. Table 5.3 summarizes the activities potentially affecting Arctic Char health, condition, and habitat in 2014.

The freshwater biota monitoring component of the AEMP primary focussed on collection of additional baseline data in 2014. The 2014 studies collected baseline data and collection of Arctic Char data in future years will assist with the evaluation of potential effects.

Baffinland's understanding of the baseline data and the ecology of Arctic Char support the assumption that Project activities during 2014 did not likely cause significant effects to the Arctic Char population. Changes in the lower trophic level components during 2014 studies were not apparent, supporting the conclusion that no Project-related effects to Arctic Char health, condition or habitat occurred.

An assessment of the activities included in the FEIS and FEIS Addendum pertaining to the Steensby Port, railway construction and the mining operations phase was not applicable since 2014 is within the construction phase (no Steensby Port or railway development). The operation phase activities are shown in Appendix I.

Table 5.3 2014 Activities Potentially Affecting Arctic Char Health, Condition and Habitat

Key Issue	Mine Site	Tote Road	Milne Port
Effects of Non-Point Sources on Water □uality	Site development activities (see Section 1.2)	Culvert and bridge replacements; Minor realignment and improvements to road	Site development activities (see Section 1.2)
Effects of Fugitive Dust on Water □uality During Construction	Site development activities (see Section 1.2)	Culvert and bridge replacements; Minor realignment and improvements to road	Site development activities (see Section 1.2)
Ore and Waste Rock Dust Generation and Dispersion: water quality changes	Site development activities (see Section 1.2)	Culvert and bridge replacements; Minor realignment and improvements to road	Site development activities (see Section 1.2)
Sedimentation of Habitat	Site development activities (see Section 1.2)	Culvert and bridge replacements; Minor realignment and improvements to road	Site development activities (see Section 1.2)
Project Footprints in Arctic Char Habitat	Site development activities (see Section 1.2)	Culvert and bridge replacements; Minor realignment and improvements to road	Site development activities (see Section 1.2)
Water Diversion affecting Arctic Char habitat	Site development activities (see Section 1.2)	Culvert and bridge replacements; Minor realignment and improvements to road	Site development activities (see Section 1.2)
Effects on Lower Trophic Level Biota	Site development activities (see Section 1.2)	Culvert and bridge replacements; Minor realignment and improvements to road	Site development activities (see Section 1.2)
Direct Mortality of Arctic Char	Site development activities (see Section 1.2)	Culvert and bridge replacements; Minor realignment and improvements to road	Site development activities (see Section 1.2)

6 – CONCLUSIONS

6.1 AIR QUALITY MONITORING

No effects occurred to suggest that mitigation measures implemented as identified in the Air and Noise Abatement Management Plan have not been effective. Effects to the atmospheric environment that occurred in 2014 were measured or expected to be within FEIS predictions.

6.2 HABITAT COMPENSATION

Compensation works remain successful including fish use of the rustic fishway installed at BG-30. Fish presence upstream of the fishway was confirmed during site visits in spring and summer 2013 and summer 2014, indicating structural integrity and successful fish passage. Areas of fish habitat compensation will continue to be monitored since changes at many of these sites are expected during ERP upgrades that continue into 2015.

6.3 EEM CYCLE ONE STUDY DESIGN

Discussion with EC will continue in 2015 to help develop a path forward, which will also facilitate acceptance of the Cycle One EEM study design at the end of 2015. Discussions with EC in 2015 regarding the fish population results from the Camp Lake Tributary exposure and reference areas will help to provide an acceptable course of action to satisfy the EEM requirements.

6.4 CREMP MONITORING

6.4.1 Water Quality Monitoring

Evidence of Project-related change was observed in Camp Lake Tributary, Camp Lake, and in Sheardown Lake NW and SE. Each of these waterbodies show a slight increase in concentrations of nitrogen compounds, including ammonia, though elevated above baseline, remained well below the benchmarks. Baffinland will continue to monitor water quality and ensure proper explosives handling and runoff management practices in order to minimize potential the introduction of nitrogen compounds into the watershed.

6.4.2 Sediment Quality Monitoring

There was no evidence of Project-related effects due to 2014 activities are indicated by the 2014 sediment quality monitoring program. The sediment quality of Sheardown Lake NW showed signs of elevated arsenic, iron and manganese in 2008, likely attributable to the bulk sampling program.

An apparent increase in five correlated metals in Sheardown Lake NW sediment will continue to be monitored to understand the contributions of natural variability, sampling methods and Project induced changes.

6.4.3 Lower Trophic Level Aquatic Biota

The 2014 chlorophyll *a* monitoring results indicate few inter-annual differences within each of the lakes, and chlorophyll *a* concentrations were similar to the ranges observed in the baseline from 2007 to 2014.

Results of the 2014 benthic macroinvertebrate sampling completed in the mine area are not yet available.

6.4.4 Fish (Arctic Char)

The freshwater biota monitoring component of the AEMP primary focussed on collection of additional baseline data in 2014. The 2014 studies collected baseline data and collection of Arctic Char data in future years will assist with the evaluation of potential effects.

6.5 TARGETED STUDIES

6.5.1 Lake Sedimentation

The sediment trap results indicate sedimentation rates for the open-water season of 2014 were higher than observed for the 2013-2014 ice-cover season, but rates were lower than those observed in the open-water season of 2013. This is expected to be due to normal inter-annual variability.

6.5.2 Dustfall Monitoring

The 2014 dustfall monitoring conducted at the Mine Site, Milne Port and along the Tote Road indicated less than predicted deposition at the Mine Site, higher than predicted deposition at Milne Port and low deposition along the Tote Road which was as predicted. The increase from predicted dustfall at Milne Port is likely attributable to the construction activities and deposition rates are expected to decrease once construction is complete.

6.5.3 Stream Diversion

The 2014 survey provided further documentation of pre-mining (baseline) conditions when none of the subject streams have been meaningfully affected by the Project. These observations suggest that fish passage did occur under higher flow conditions earlier in the season. These observations are consistent with previous observations during baseline studies.

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APPENDICES