APPENDIX E.11

Freshet Monitoring Report

BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT

Freshet 2020 Monitoring Report

Rev 0

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1. INTRODUCTION AND OBJECTIVES

This report was prepared by Baffinland Iron Mines Corporation (Baffinland) to present the results of the 2020 freshet water quality monitoring program and to document the corrective actions taken in response to observed sediment releases that occurred during freshet 2020 at the Mary River Project (the Project). Surface water runoff during freshet causes ongoing challenges for the Project that Baffinland is committed to facing by implementing effective mitigation measures to minimize effects on water quality.

Two unauthorized releases of sediment occurred during freshet 2020 on May 16, 2020 and June 14, 2020 that were reported to Environment and Climate Change Canada (ECCC), Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), Qikiqtani Inuit Association (QIA), the Nunavut Water Board (NWB), and the Nunavut 24-hour spill report line (NT-NU 24-Hour Spill Report Line). The sediment release on May 16, 2020 was recorded as NT-NU Spill Report No. 20-141 and the release on June 14, 2020 was recorded as NT-NU Spill Report No. 20-179. Immediate and follow up corrective actions and mitigation measures to address the causes of the sediment releases are summarized in Section 5. Copies of the 30-day follow up reports for the sediment releases are provided in Appendix A.

2. WATER QUALITY MONITORING PROGRAMS

During freshet 2020, Baffinland conducted water quality monitoring programs at the Mary River Mine Site (Mine Site), Milne Port, and along the Tote Road connecting the two sites. The freshet monitoring programs are detailed below and a copy of the Freshet Monitoring Program is provided in Appendix D. Details for freshet monitoring locations and a drawing showing their locations at the Mine Site are provided in Appendix B.1. Results of the Mine Site water quality-monitoring program are provided in Appendix B.2 and summarized in Section 3. Results for the Surveillance Network Program (SNP) are reported in monthly and annual NWB Water Licence reports and results of Tote Road Monitoring Program (TRMP) are reported in the QIA & NWB Annual Report for Operations.

2.1. Mine Site Freshet Monitoring Program

The Mine Site freshet-monitoring program is conducted every year to characterize the water quality of several Mine Site tributaries and drainages during the elevated snowmelt runoff flows of the freshet period. The program starts around mid-May when snowmelt causes elevated runoff flows and ends around the end of June after runoff flows have receded. Four (4) monitoring locations on the Mine Site are routinely monitored during the freshet period, including the Camp Lake Settling Ponds outlet (CLSP-OUT), the Camp Lake Tributary 1 outfall (CLT-OUT), Sheardown Lake Landfill Gate Tributary outfall (LDFG-OUT), and Sheardown Lake Tributary 1 outfall (SDLT-OUT). Water quality monitoring involves measuring water quality parameters in the field using a portable meter and collecting water samples to be sent to an external laboratory for analyses. Water quality parameters include total suspended solids (TSS), total

dissolved solids (TDS), pH, and turbidity. Intermittent monitoring is performed at additional locations along the tributary, upstream of the monitoring location, if elevated turbidity is identified at the monitoring location.

During the May 14 to June 28, 2020 period, monitoring locations CLSP-OUT, CLT-OUT, LDFG-OUT, and SDLT-OUT were inspected and water quality monitoring was performed if there was active flow. There were several days when water quality monitoring was not possible at one or more of the monitoring locations due to a lack of flow caused by snow, ice, and/or slush. Samples were collected daily at each monitoring location with active flow until seven (7) consecutive compliant results were received, after which sampling at that location was reduced to weekly. Daily sampling was resumed if a non-compliant result occurred at a monitoring location at any time during freshet. Details for Mine Site freshet monitoring locations and a site layout drawing showing their locations are provided in Appendix B.1.

2.2. Milne Port Freshet Monitoring Program

The Milne Port freshet-monitoring program is conducted every year to characterize the water quality of tributaries and drainages during the elevated runoff freshet period. The program starts around mid-May when snowmelt causes elevated runoff flows and ends around the end of June after runoff flows have receded. During past freshet periods, as many as ten (10) locations have been monitored during active flows including MP-C-B, MP-C-B01, MP-C-F, MP-C-G, MP-C-H, MP-C-J, MP-ED, MP-FFG, MP-Q1-01, and MP-Q1-02. Daily water quality monitoring involves measuring water quality parameters in the field using a portable meter and collecting water samples that are sent to an external laboratory for analyses. Water quality parameters include TSS, TDS, pH, and turbidity.

During the May 15 to June 13, 2020 period, Milne Port freshet-monitoring locations were inspected daily and water quality monitoring was performed if there was active flow. There were several days when water quality monitoring was not possible at one or more of the monitoring locations due to a lack of flow caused by snow, ice, and/or slush. Samples were collected daily at each monitoring location with active flow until seven (7) consecutive compliant results were received, after which sampling at that location was reduced to weekly. Daily sampling was resumed at a monitoring location if a non-compliant result occurred at any time during the freshet. Details for the 2020 freshet Milne Port monitoring locations are provided in Appendix B.1. The Milne Port water quality monitoring data is reported in the 2020 QIA & NWB Annual Report for Operations. Water quality results collected under the Milne Port freshet-monitoring program are not discussed further within this report.

2.3. Tote Road Monitoring Program

The TRMP was developed to monitor the water quality of surface water flows at select Tote Road water crossings (culverts and bridges), with a focus on comparing upstream and downstream TSS concentrations and addressing sedimentation concerns. Water crossings monitored under the TRMP give a geographically representative sample set of water crossings for each watershed intersected by the Tote Road. Key

depositional habitats located downstream of the Tote Road (e.g. fish habitat) and areas historically susceptible to sedimentation events were considered in selecting the water crossings. The program includes weekly visual inspections and water quality sampling at designated water crossings during freshet followed by monthly monitoring until the water crossings freeze due to winter conditions.

As per Baffinland's TRMP, a potential Project related change is defined as a greater than 50 mg/L increase in downstream TSS concentration when upstream TSS concentrations are less than 250 mg/L. The TRMP is part of the Roads Management Plan and water quality monitoring is reported in the 2020 QIA & NWB Annual Report for Operations. Water quality results collected under the TRMP are not discussed further within this report.

2.4. Surveillance Network Program

Water quality monitoring under the SNP is conducted each year during periods of flow as outlined in Baffinland's Type 'A' Water Licence 2AM-MRY1325 – Amendment 1 (Type 'A' Water Licence). Water quality results collected under the SNP are reported monthly to the NWB and CIRNAC and summarized in the QIA & NWB Annual Report for Operations. Water quality results collected under the SNP are not discussed further within this report.

3. WATER QUALITY MONITORING RESULTS AND DISCUSSION

The following subsections discuss the water quality monitoring results as they relate to each NT-NU Spill Report. Monitoring data for the water quality monitoring locations are provided in Appendix B.2. Photos of mitigation measures and corrective actions taken in response to each sediment release are included in the spill reports in Appendix A. Additional details on corrective actions and mitigation measures currently implemented or planned to be implemented in the future are detailed in Section 5.

Water quality monitoring results were evaluated using criteria in Baffinland's Type 'A' Water Licence Table 11: Effluent Quality Discharge Limits for Contact Water during Operations Phase and the Early Revenue Phase of the Project as presented in Table 1. The numbers of water quality exceedances that occurred at the Mine Site during the 2020 freshet for grab samples and monthly averages and the highest verified TSS concentration that occurred are presented in Table 2. Plots showing TSS concentrations in the Camp Lake Settling Ponds, Camp Lake Tributary 1, and Sheardown Lake tributaries during the 2020 freshet are provided in Appendix B.2.

3.1. Spill Report 20-141 - Camp Lake Settling Ponds, Sheardown Lake Tributaries, and Camp Lake Tributary

On May 16, 2020, warming temperatures caused rapid snowmelt that resulted in runoff with elevated TSS concentrations in Mine Site surface water tributaries and drainages that exceeded the Water Licence criteria presented in Table 1 at the freshet monitoring locations between May 16 and June 11, 2020. The

TSS exceedances were reported to the Nunavut Spill Reporting line on May 18, 2020 as NT-NU Spill No. 20-141 and a follow up report was submitted on June 15, 2020. The follow up report is provided in Appendix A.1. The June 9, 2020 water quality results were not included in the follow up report submission because they were received from the external laboratory following the submission due date, however, are included in Appendix B.2. In addition, incorrect sample results were included in the follow up sample report for sample location SDLT-OUT for June 7 and June 8. The corrected laboratory results are provided in Appendix B.2.

3.2. Camp Lake Settling Ponds

CLSP-OUT, referred to as the Camp Lake Settling Ponds, is located down gradient of a series of runoff check dams and settling ponds near the Camp Lake Water Jetty. Check dams are shallow basins constructed in steep ditch sections from crushed aggregates to slow surface runoff flows and create pooling to allow solids settling. Details for monitoring location CLSP-OUT and a drawing showing its location on the Mine Site are provided in Appendix B.1. Water quality results for samples collected from CLSP-OUT and sent to an external laboratory for analyses of TSS, TDS, pH, and turbidity during the 2020 freshet are provided in Appendix B.2.

In comparing TSS results for CLSP-OUT to the water quality criteria in Table 1, TSS exceedances of the 30 mg/L Water Licence limit for grab samples occurred on May 16, 18, 22, 23, 25, 29, and 30. During the freshet monitoring period TSS concentrations in daily grab samples ranged from 37.8 mg/L to 520 mg/L. The monthly average TSS concentration for May was 139 mg/L, exceeding the Water Licence limit for monthly average TSS of 15 mg/L. Water samples were not collected from CLSP-OUT on May 17, 19, 20, 21, 24, 26, and 28 due to frozen conditions. Water quality monitoring at CSLP-OUT stopped after May 30 due to lack of flow, frozen conditions, and back pooling of the Camp Lake water level into the bottom portion of the CSLP. Aside from the TSS exceedances detailed above, there were no additional exceedances of the Water Licence criteria at the CLSP-OUT monitoring location in 2020.

3.2.1. Camp Lake Tributary

CLT-OUT, located near the outfall of Camp Lake Tributary 1, was monitored daily for the 2020 Mine Site freshet-monitoring program. Details for monitoring location CLT-OUT and a drawing showing its location on the Mine Site are provided in Appendix B.1. Water quality results for samples collected from CLT-OUT and sent to an external laboratory for analyses of TSS, TDS, pH, and turbidity during the 2020 freshet are provided in Appendix B.2.

In comparing TSS results for CLT-OUT to the water quality criteria in Table 1, TSS exceedances of the 30 mg/L limit for grab samples occurred on May 16, 17, and 22 and June 7. During the freshet monitoring period TSS concentrations in daily grab samples ranged from <2.0 mg/L to 422 mg/L. The monthly average TSS concentration for May and June were 53.9 mg/L and 25.3 mg/L, respectively, both exceeding the Water Licence limit for monthly average TSS of 15 mg/L. Samples were not collected from CLT-OUT on

May 19, 20, 21, 27, and 28 due to frozen conditions, June 1 due to snow and slush, and June 5-6 and June 18 due to compliant samples for seven (7) consecutive days. Sampling returned to daily following the TSS exceedance on June 7 and was then reduced to weekly after June 17 following compliant samples for at least seven (7) consecutive days. Aside from the TSS exceedances detailed above, there were no additional exceedances of the Water Licence criteria at the CLT-OUT monitoring location in 2020.

3.2.2. Sheardown Lake Tributaries

LDFG-OUT and SDLT-OUT, located near tributary outfalls into Sheardown Lake, were monitored daily for the 2020 Mine Site freshet monitoring program. Coordinates and figures showing the locations of LDFG-OUT and SDLT-OUT are provided in Appendix B.1. Water quality results for samples collected from LDFG-OUT and SDLT-OUT and sent to an external laboratory for analyses of TSS, TDS, pH, and turbidity during the 2020 freshet are provided in Appendix B.2.

In comparing TSS results for LDFG-OUT to the water quality criteria in Table 1, TSS exceedances of the 30 mg/L Water Licence limit for grab samples occurred on May 17 and June 9. The TSS exceedance on June 9 was determined to have resulted from sampling error or external laboratory error, since the TSS concentrations for grab samples collected on June 7, 8, 10, and 11 had an average concentration of 6.4 mg/L and there were no visual indications of a large increase in sedimentation on June 9. Additionally, the external laboratory turbidity value for the June 9 grab sample of 48.2 NTU was not a dramatic increase in comparison with the average turbidity value of 30.1 NTU for grab samples collected on June 7, 8, 10, and 11.

During the freshet monitoring period TSS concentrations in daily grab samples collected from LDFG-OUT ranged from <2.0 mg/L to 34.0 mg/L, excluding the TSS concentration on June 9. The monthly average TSS for May 2020 was 8.4 mg/L and the monthly average TSS for June was 5.7 mg/L, excluding the TSS concentration on June 9. Samples were not collected from LDFG-OUT on May 20, 21, 27, and 28 due to frozen conditions and from May 31 to June 6 due to compliant samples for seven (7) consecutive days. Aside from the TSS exceedances on May 17 and June 9, there were no additional exceedances of the Water Licence criteria at the LDFG-OUT monitoring location in 2020.

In comparing TSS results for SDLT-OUT to the water quality criteria in Table 1, TSS exceedances of the Water Licence limit of 30 mg/L for grab samples occurred on May 16, 17, and 29 and June 5, 6, 7, and 11. During the freshet monitoring period TSS concentrations in daily grab samples ranged from <2.0 mg/L to 98.1 mg/L. The monthly average TSS concentrations for May and June were 28.4 mg/L and 21.9 mg/L, respectively, both exceeding the Water Licence limit for monthly average TSS of 15 mg/L. Samples were not collected from SDLT-OUT on May 20, 21, 27, and 28 due to frozen conditions, June 1 due to snow and slush, and June 18 due to a sampling error. Sampling was reduced to weekly following collection of a grab sample on June 21 due to compliant TSS results for seven (7) consecutive days. Aside from the TSS

exceedances detailed above, there were no additional exceedances of the Water Licence criteria at the SDLT-OUT monitoring location in 2020.

3.3. Spill Report 20-179 – Mary River

On June 14, 2020, warming temperatures caused rapid snowmelt resulting in sediment laden surface water from the Mine Haul Road (MHR) ditches located at Km 108.5, Km 107, and Km 106.5 being released onto mountain tundra downslope from the MHR. It was determined that the sediment-laden water flowed down the mountain tundra and discharged into a tributary of the Mary River resulting in elevated TSS concentrations in the Mary River downstream of the confluence with the tributary that exceeded the Water Licence criteria presented in Table 1. The TSS exceedances were reported to the Nunavut Spill Reporting line on June 15, 2020 as NT-NU Spill No. 20-179 and a follow up report was submitted on July 14, 2020. The follow up report is provided in Appendix A.2. The laboratory results for a downstream sample collected on June 23 were not included in the follow up report submission, however, the results are provided in Appendix B.2.

Water quality grab samples were collected from existing Aquatic Effects Monitoring Program (AEMP) Mary River monitoring site E0-20, located downstream of the confluence with the tributary, on June 15 and 23 and July 3 to assess potential effects of the sediment release. Coordinates and figures showing the location of monitoring location E0-20 are provided in Appendix B.1. The water quality results for the grab samples collected at monitoring location E0-20 are provided in Appendix B.2.

The grab sample collected from monitoring location E0-20 on June 15 and 23 both exceeded the 30 mg/L Water Licence limit for grab samples presented in Table 1, with TSS concentrations of 45.9 mg/L and 47.2 mg/L, respectively. The monthly average TSS concentration for June was 46.6 mg/L, exceeding the Water Licence limit for monthly average TSS of 15 mg/L. The grab sample collected on July 3 had a TSS concentration of resample was 7.7 mg/L, indicating that water quality in the Mary River was in compliance with the Water Licence criteria and that sediment mitigation measures implemented in response to the sediment release were effective for reducing sediment loading to the Mary River. There were no water quality samples collected upstream from the confluence of the tributary and Mary River on June 15 and 23, preventing any possibility of identifying if the TSS concentrations measured at E0-20 on those dates were potentially influenced by upstream water quality in the Mary River, which has occurred during past freshet monitoring periods.

4. NATURAL SEDIMENTATION EVENTS

Seven (7) natural sedimentation events were identified in 2020 including three (3) near the Milne Port Site and four (4) near the Mine Site. Each of the events were investigated, photographed, and monitored for potential water quality effects. Summaries of the natural sedimentation events are provide in

Appendix C, the locations of the events that occurred near Milne Port are presented in Figure 1, and the locations of three of the four events that occurred near the Mine Site are presented in Figure 2.

On June 17, 2020, a natural sedimentation event occurred approximately 8 km north of Milne Port. The natural sedimentation event identified as MIL-NATSED-1 involved turbid flow in a location where snowmelt runoff was flowing down across an area of unconsolidated glacial till that is poorly sorted with high clay and silt content. A water sample collected downstream of the affected area had TSS of 209 mg/L compared with TSS of 7.9 mg/L in a water sample that was collected upstream of the affected area.

On June 17, 2020, a natural sedimentation event occurred approximately 12 km north of Milne Port. The natural sedimentation event identified as MIL-NATSED-2 involved turbid water flowing into several small water bodies located downstream from a small braided stream where a hillslope composed of loose granular glacial till had sloughed into a section of the stream. A water sample collected downstream of the affected stream section had TSS of 346 mg/L compared with TSS of <2.0 mg/L in a water sample that was collected upstream of the affected stream section.

On June 17, 2020, a natural sedimentation event occurred approximately 7 km northwest of Milne Port. The natural sedimentation event identified as MIL-NATSED-3 involved a gap in a mountain giving way to reveal two steps of rocks where loose soil poses a risk for sediment loading into a downstream water body. A water sample collected downstream of the seasonal stream that drains through the affected area had TSS of 168 mg/L compared with TSS of 7.1 mg/L in a water sample that was collected downstream of the affected area.

On July 11, 2020, a natural sedimentation event occurred approximately 14 km northeast of the Deposit 1 open pit at the Mary River Mine Site. At the site of the event identified as MR-NATSED-1 a large mudslide released turbid water into the Mary River from an area where the ground slid away due to snowmelt. Instream water quality monitoring performed upstream and downstream of the affected stream section on July 15, 2020 indicated that downstream turbidity increased to 38.5 NTU from the upstream turbidity of 30.5 NTU due to the event. When inspected on July 15, 2020, it appeared that there was low risk for further sediment loading from the affected area and the effects on water quality in the Mary River were expected to be short-lived.

On July 15, 2020, a natural sedimentation event occurred approximately 8 km northeast of the Deposit 1 open pit at the Mary River Mine Site. At the site of the event identified as MR-NATSED-2 a large bank of granular sediment approximately 300 m in length had sloughed down a steep hillslope to the banks of a tributary of the Mary River resulting in downstream sediment loading. Instream water quality monitoring performed in Mary River upstream and downstream of the confluence of the tributary on July 15, 2020 indicated that downstream turbidity increased to 55.0 NTU from the upstream turbidity of 21.5 NTU due to the event. Instream water quality monitoring performed upstream and downstream of the confluence on July 19, 2020 indicated that downstream turbidity increased to 62.0 NTU from the upstream turbidity

of 18.8 NTU due to the event. This sedimentation area is expected to be a source of sediment loading into the Mary River again in 2021 and will be monitored during the 2021 freshet season.

On July 15, 2020, thawing conditions caused an active layer of granular material to slide down a slope above the Mary River approximately 15 km northeast of the Deposit 1 open pit resulting in sediment loading to the Mary River. This natural sedimentation event was identified as MR-NATSED-3. Water quality samples collected upstream and downstream of the affected section of the Mary River on July 15, 2020 indicated that downstream TSS increased to 18.6 mg/L from the upstream TSS of 10.8 mg/L due to the event. Water quality samples collected upstream and downstream of the affected section of the Mary River on July 19, 2020 indicated that downstream TSS increased to 11.8 mg/L from the upstream TSS of 3.9 mg/L due to the event.

On August 1, 2020, a natural sedimentation event occurred on the west side of a glacier located along a tributary to the Mary River approximately 16 km east of the Deposit 1 open pit at the Mary River Mine Site. This natural sedimentation event was identified as MR-NATSED-4. Water quality samples collected upstream and downstream of the affected section of the tributary on August 3, 2020 indicated that downstream TSS increased to 348.0 mg/L from the upstream TSS of 4.4 mg/L due to the event. The sloughed hillslope is considered an active source of sedimentation loading into the Mary River and will be monitored again during the 2021 freshet season.

5. CORRECTIVE ACTIONS AND MITIGATION MEASURES

Consistent with Baffinland's Surface Water and Aquatic Ecosystem Management Plan (SWAEMP), corrective actions and mitigation measures implemented in response to the sediment releases associated with NT-NU Spill Reports No. 20-141 and 20-179 included the following:

- Installing and maintaining silt fences and runoff mitigation berms in strategic locations;
- Constructing runoff check dams and settling ponds;
- Armouring existing ditches and road embankments with erosion protection;
- Clearing excess snow at culvert inlets and outlets; and,
- Diverting sediment-laden runoff away from fish habitat using ditches, swales, and pumps.

Photos showing the mitigation measures and corrective actions taken in 2020 in response to each reported sediment release are attached to the spill reports in Appendix A. Corrective actions, mitigation measures, and monitoring for the sediment release events are summarized in Sections 5.1 and 5.2.

5.1. Corrective Actions and Mitigation Measures for Spill Report 20-141

Prior to the start of freshet 2020, excess snow was relocated from areas around the Camp Lake Settling Ponds, including from up gradient runoff check dams, to reduce the amount of surface water runoff from snowmelt. Additional excess snow was relocated from the inlets and outlets of culverts located near the

Camp Lake tributary and Sheardown Lake tributaries, including culverts located at the SDLT and CLT water crossings, prior to the start of freshet. The excess snow was placed in approved snow stockpile areas that are monitored as per Baffinland's Snow Management Plan. Water quality monitoring results for snow stockpile runoff samples are provided in the NWB annual report. Reducing snowmelt in tributaries and drainages reduces downstream TSS concentrations by preventing saturated soil conditions in areas susceptible to localized erosion.

Permanent and temporary erosion and sedimentation mitigation measures were installed and maintained in strategic areas near the Camp Lake and Sheardown Lake tributaries including ditches, culvert outlets, runoff check dams, and road embankments. Materials used include silt fences, sand bag berms, coir logs, and crushed aggregate and rip rap armouring. The runoff check dams up slope of the CLSP outfall were improved by placing rip rap armouring in areas susceptible to erosion including a sandy slope located upstream of the CLSP outfall.

Culvert water crossings CV-186 and CV-187, located on Sheardown Lake tributary SDLT, were previously upgraded during the 2017 to 2018 winter period as part of the Tote Road Earthworks Execution Plan (TREEP). The water crossings were extended, modified, and armoured with rip rap to improve culvert flow and erosion protection during freshet. Upon observing elevated runoff during freshet 2019, check dams were constructed and silt fences were installed at the outlet of CV-186 and the inlet of CV-187, to reduce erosion and sedimentation.

Upon observing elevated runoff conditions at monitoring locations CLSP-OUT, CLT-OUT, SDLT-OUT, and LDFG-OUT at the start of freshet 2020, erosion and sedimentation mitigation measures were implemented including diverting and pumping runoff water to existing check dams, constructing new runoff check dams, installing silt fences, sand bag berms, and coir logs, and installing a silt curtain at the CLSP outfall to Camp Lake. During the freshet, the measures were monitored and maintained to identify and correct deficiencies to keep them in effective condition. Erosion and sedimentation mitigation measures were implemented, installed, inspected, and maintained in accordance with Section 6.2 of Baffinland's SWAEMP.

As an outcome of the freshet 2020 sediment releases in the Camp Lake and Sheardown Lake Tributaries Baffinland has developed a two-step approach for mitigating the effects of future freshet periods. The first step is to improve upon existing mitigation measures using additional temporary and permanent erosion and sedimentation mitigation measures detailed in the SWAEMP in the short term. The second step is to develop and implement a long-term surface water management plan with support from a third party consultant, which started in 2020 and is currently in progress. In preparation for freshet 2021, the Mine Site Freshet Monitoring Program will be updated and a freshet preparedness meeting will be held with representatives from relevant government agencies to evaluate mitigation measures planned for the freshet period.

An additional mitigation measure involves the application of a dust suppression product for road surfaces called Dust Stop®, to reduce the amount of fine particulate deposited onto snow that becomes mobilized during the freshet period. Dust Stop® was applied on the surface of the entire length of the Tote Road and the Mine Site roadways from 2019 to 2020. Touch up applications of Dust Stop® were done during the summer in 2020 on an as needed basis in response to deficiencies identified during visual inspections. The performance of the Dust Stop® treatment is currently being evaluated to determine its suitability for continued use.

The Mine Site freshet-monitoring program will resume in 2021 to assess the performance of erosion and sedimentation mitigation measures and to monitor compliance with Water Licence water quality criteria in the Camp Lake Settling Ponds, Camp Lake tributary, and Sheardown Lake tributaries.

5.2. Corrective Actions and Mitigation Measures for Spill Report 20-179

Prior to the start of freshet 2020, excess snow was relocated from areas around the MHR culverts and ditches to reduce the amount of surface water runoff from snowmelt. The excess snow was placed in approved snow stockpile areas that are monitored as per Baffinland's Snow Management Plan, where it did not contribute to runoff flows to the mountain tundra that drain to the Mary River tributary. Erosion protection was improved and maintained at strategic locations including the outlets of the MHR culverts located at Km 106.5, Km 107, and Km 108.5. Surface water runoff was diverted from areas of concern using portable pumps and temporary berms.

Upon observing sediment-laden water entering the Mary River tributary and Mary River, additional erosion and sedimentation mitigation measures were implemented including maintenance to improve drainage in the MHR ditches to prevent erosion from scouring sediment from the surface of the MHR. Existing runoff check dams were maintained and new silt fences were installed in strategic areas. Improvements in the mitigation measures slowed runoff flow rates to reduce erosion and increase settling time in runoff check dams prior to affected water discharging to the Mary River tributary. Erosion and sedimentation mitigation measures were implemented, installed, inspected, and maintained in accordance with Section 6.2 of Baffinland's SWAEMP.

Baffinland continued to implement existing controls detailed in the SWAEMP and Mine Operations 2020 Freshet and Mine Haul Road Water Management Improvements plan prior to the start of freshet 2020 and during the entire duration that elevated runoff occurred from the MHR. Baffinland is currently in the progress of developing and implementing a long-term surface water management plan with support from a third party consultant. Work to be completed for the plan includes designing and constructing surface water collection, retention, and treatment systems that will remove sediment from freshet runoff to comply with Water Licence water quality criteria during freshet periods. In preparation for freshet 2021, the Mine Site Freshet Monitoring Program will be updated and a freshet preparedness meeting will be

held with representatives from relevant government agencies to evaluate mitigation measures planned for the freshet period.

To mitigate potential permafrost degradation and related sediment mobilization during the removal of surface materials, the following mitigation measures will be implemented throughout Project areas:

- Only remove surface materials from approved areas and avoid removing surface materials from areas that are susceptible to permafrost degradation;
- Grade surface areas by filling in areas of low ground with approved clean fill instead of cutting into areas of high ground, where feasible;
- Install and maintain erosion mitigation measures in areas where surface material removal is planned; and,
- Place insulating materials and/or install erosion mitigation measures, such as concrete fabric or rip rap armouring, in areas that are susceptible to permafrost degradation.

6. CONCLUSIONS

Baffinland continues to implement erosion and sedimentation mitigation measures at the Project to reduce sediment loading to receiving water bodies in accordance with Section 6.2 of Baffinland's SWAEMP. Baffinland is developing and implementing a long-term surface water management plan with support from a third party consultant. The Mine Site Freshet Monitoring Program (Appendix D) will be updated and a freshet preparedness meeting will be held with representatives from relevant government agencies to evaluate mitigation measures included in this conceptual plan.

TABLES

Table 1 - Effluent Quality Discharge Limits for Contact Water during the Operations Phase and the Early Revenue Phase of the Project (Type 'A' Water Licence – 2AM-MRY1325 – Table 11)

Parameter	Maximum Average Concentration (mg/L)	Maximum Concentration of any Grab Sample (mg/L)
Total Suspended Solids (TSS)	15	30
Oil and Grease	No Visible Sheen	No Visible Sheen
pH	Between 6.0 and 9.5	Between 6.0 and 9.5

Table 2 - Summary of Exceedances for Mine Site during Freshet 2019/2020

Parameter	2019 Value	2020 Value
Number of TSS exceedances in grab samples [1]	22	19
Number of TSS exceedances for monthly averages [2]	4	6
Maximum TSS concentration observed at drainage outlets (mg/L) [1]	432	520

Notes:
[1] TSS concentration for June 9, 2020 was excluded since it was the result of a sampling error or an external laboratory error.
[2] Exceedances of the Water Licence limit for monthly average TSS concentrations in 2020 occurred at CLSP-OUT for May, CLT-OUT for May and June, SDLT-OUT for May and June, and E0-20 for June. Exceedances of the Water Licence limit for monthly average TSS concentrations in 2019 occurred at CLSP-OUT for May and June, CLT-OUT for May, and SDLT-OUT for May.

FIGURES

LEGEND

- Project Development Area
- 2020 Natural Sedimentation Event

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2020 Natural Sedimentation Events Milne Port

Projection: NAD 1983 UTM ZONE 17N.
Base Map: © 2020 Digital Globe, Inc.
Imagery is representative as of August 2020.
ESRI, DigitalGlobe, GeoEye, Earthstar

0 150 300 600 900 1,200 Meters

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Baffinland

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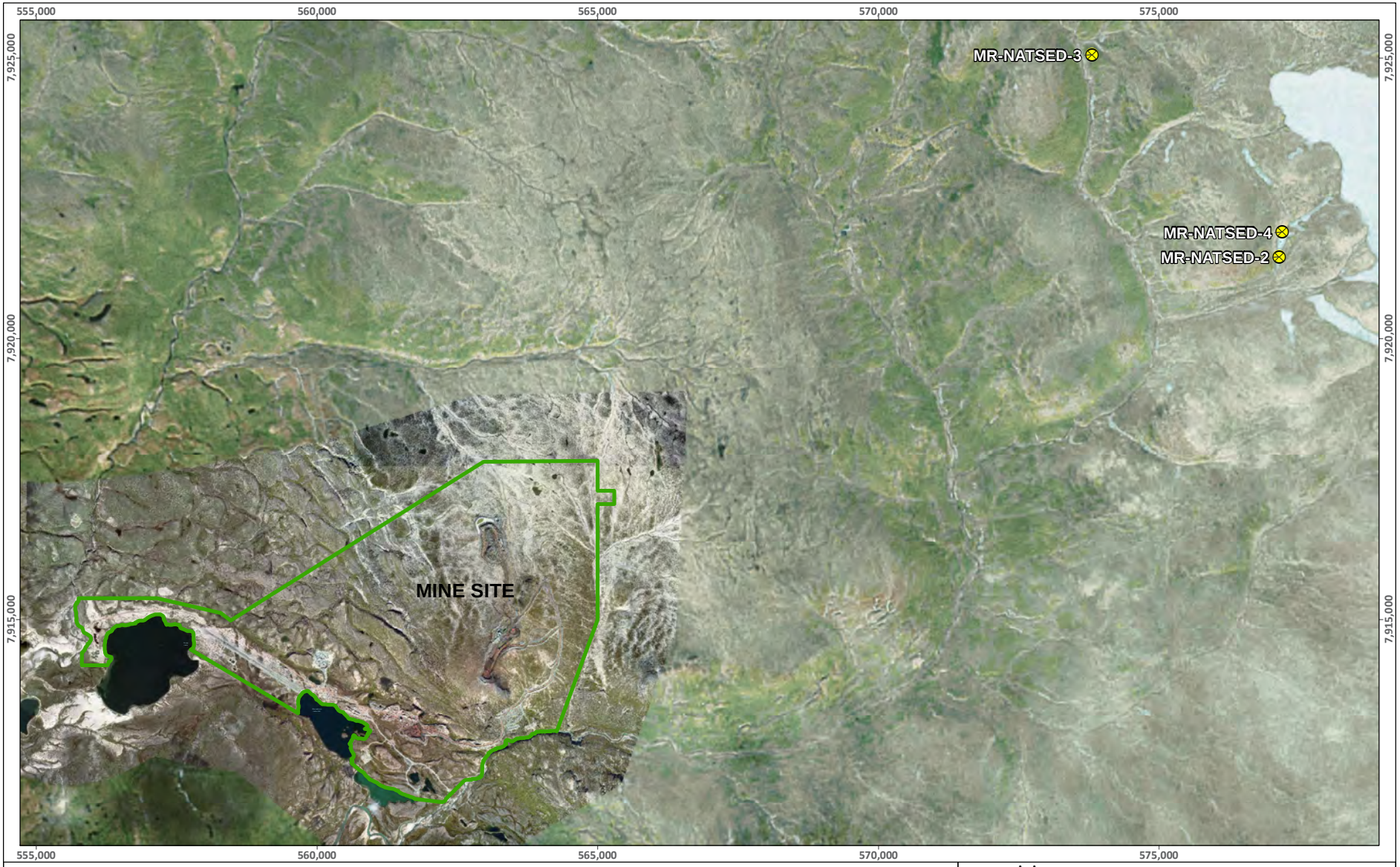
FIGURE 1

SAVED: C:\Users\katie.mcguire\Documents\v4 - Maps\Reporting\Freshet Monitoring\2020\BIM_4_NaturalSed_Milne.mxd; 24-Mar-21



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LEGEND

- Project Development Area
- 2020 Natural Sedimentation Event

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2020 Natural Sedimentation Events
Mine Site

Projection: NAD 1983 UTM ZONE 17N.
Base Map: © 2020 Digital Globe, Inc.
Imagery is representative as of August 2020.
ESRI, DigitalGlobe, GeoEye, Earthstar

0 650 1,300 2,600
Meters

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Baffinland

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APPENDICES

APPENDIX A – NT-NU SPILL REPORTS

APPENDIX A.1 – SPILL REPORT NO. 20-141 – CAMP LAKE SETTLING PONDS, SHEARDOWN LAKE TRIBUTARIES, CAMP LAKE TRIBUTARY

June 15, 2020

Water Resources Officer
Nunavut Field Operations
Crown Indigenous Relations and Northern Affairs Canada
Box 100
Iqaluit, NU X0A 0H0

Regulatory Manager
Qikiqtani Inuit Association
P.O. Box 219
Iqaluit, NU X0A 0H0

Enforcement Officer
Environment and Climate Change Canada
933 Mivvik Street
Iqaluit, NU X0A 0H0

Re: Follow-up to Spill #20-141 - Mary River Project - Water Licence No. 2AM-MRY1325

Summary:

On May 16, 2020, warming temperatures resulted in snowmelt runoff containing sediment-laden water which was observed to be flowing at the following locations at the Mary River Mine Site:

Sample Location	Description	Location (UTM; NAD83 Zone 17W)	
		Easting	Northing
CLSP-OUT	Camp Lake Sedimentation Ponds outlet	557805.43	7914795
CLT-OUT	Camp Lake Tributary 1 (100 m upstream of Camp Lake outfall)	557686.20	7914947
SDLT-OUT	Sheardown Lake Tributary 1 (100 m upstream of Sheardown Lake outfall)	560332.41	7913519
LDFG-OUT	Sheardown Lake Landfill gate tributary (40 m Upstream of Sheardown Lake outfall)	561017.65	7912968

The source of the sedimentation was snow melt from the surrounding mine site infrastructure. The event resulted in sediment-laden water flowing onto and under the ice of Camp Lake and Sheardown Lake. Attachment 4 outlines the water quality results from monitoring conducted from May 16 to June 13, 2020.

Immediate and Follow-Up Action:

Upon discovery of the elevated instream Total Suspended Solids (TSS) conditions at these drainages, personnel worked to install sedimentation mitigation measures including check dams, silt fences, sand bags and coir logs in accordance with Baffinland's Surface Water and Aquatic Ecosystem Management Plan to slow the flow and settle sediments prior to the water entering the streams. Water diversion and pumping strategies were also implemented to reduce potential erosion and sedimentation. With freshet conditions present, daily monitoring of the water quality is ongoing. As per Baffinland's Freshet Monitoring Procedure, daily monitoring is conducted until seven (7) compliant sample results are obtained and, subsequently, the sampling frequency is reduced to weekly. The sampling frequency returns to a daily frequency if further non-compliant results are obtained.

In 2020, permanent erosion and sediment control measures were implemented and reinforced, including the maintenance of check dams up slope of the CLSP outfall, and rip rapping of high risk areas, including the sandy slope upstream of the CLSP outfall. In the days leading up to freshet, snow pack around the inlets and outlets of select culvert locations was excavated, including the CLT and SDLT crossings, to reduce the volume of snow melt and thus, the amount of overland flow present to mobilize sediment.

Current Status:

Conditions at CLT, CLSP, SDLT and LDGF, as well as other freshet monitoring locations, are currently being sampled and assessed as per Baffinland's Freshet Monitoring Program. An updated report will be submitted on completion of the monitoring program to document the water quality of water bodies and surface water drainages near Project infrastructure and summarize the corrective actions implemented to address sediment releases and other areas of concern identified during freshet 2020. Monitoring will continue during the presence of freshet conditions and routine maintenance of check dams, silt fences and other ESC measures will be performed as necessary to ensure their effective operation.

Sampling at outfall sample locations LDFG and CLT has indicated seven (7) consecutive days of compliant TSS results and, as such, the sampling frequency at these two (2) locations was reduced from daily to weekly, in accordance with the Freshet Monitoring Program. A return to the daily frequency will resume at these locations if future non-compliant results are received.

Water Licence compliance samples for contact water and surface runoff taken on May 25 and June 5 at downstream surface discharge monitoring station MS-C-E, located near CV-187, indicate TSS concentrations of 4.4 mg/L and 35.0 mg/L, respectively.

Should you require further information or clarification on the incident described above, please feel free to contact Aaron MacDonell at (647) 253-0596 (ext. 6735) or Connor Devereaux (ext. 6016).

Prepared by:

Connor Devereaux
Environmental Superintendent

Reviewed by:

Shawn Stevens
Manager of Health, Safety, Environment and Security

Cc: Justin Hack, Jeremy Fraser (CIRNAC)
Tayfun Eldem, Tim Sewell, Shawn Stevens, Connor Devereaux, Brian Marshall, Francois Gaudreau, Christopher Murray, Amanda McKenzie (Baffinland)

Attachments

Attachment 1: Photos
Attachment 2: Mine Site Freshet Monitoring Locations
Attachment 3: Baffinland NT-NU Spill Report
Attachment 4: Water Quality Results

Attachment 1

Photos

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CLT Drainage

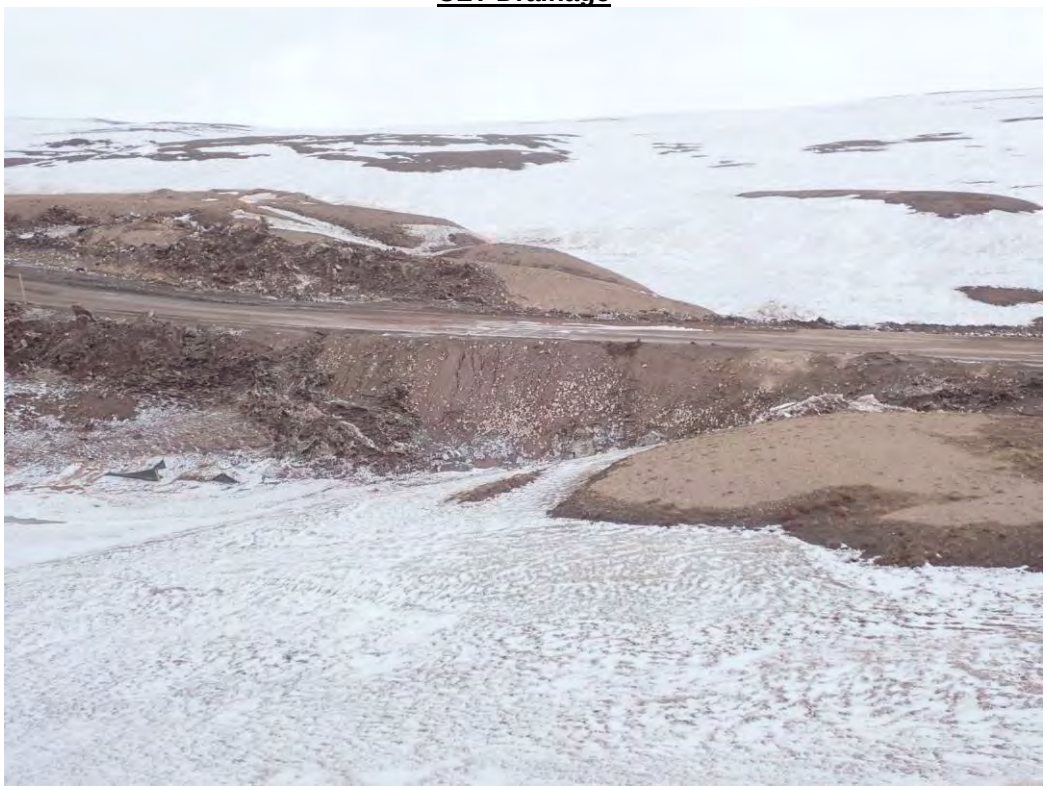

Photo 1. Snow Clearing at the Outlet of BG-01 (May 14, 2020)

Photo 2. CLT Outfall on May 14, 2020

Photo 3. CLT Outfall on May 16, 2020

Photo 4: BG-01 Downstream Ditch with Sand Bags (May 18, 2020)

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Photo 5. Silt Fencing at the Outlet of BG-01 (May 18, 2020)

Photo 6. Pumping Diversion from Unstable Sandy Slope at the Outlet of BG-01 (May 18, 2020)

Photo 7. CLT Outfall on June 11, 2020

CLSP Drainage

Photo 1. Snow Removal at the Camp Lake Check Dams on April 21, 2020

Photo 2. Camp Lake Check Dams on May 16, 2020

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Photo 3: CLSP Outfall on May 16, 2020

Photo 4: Camp Lake Sump with Coir Log on May 18, 2020

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Photo 5: Camp Lake Check Dams with Sand Bags on May 18, 2020

Photo 6: Camp Lake Settling Improvements on May 21, 2020

Photo 7: Camp Lake Check Dam Improvements on May 21, 2020

Photo 8: Camp Lake Slope Rip Rapping on May 23, 2020

Photo 9: CLSP Outfall into Silt Curtain on June 11, 2020

SDLT Drainage

Photo 1: Snow removal upstream of SDLT-OUT on May 16, 2020

Photo 2: SDLT Outfall on May 14, 2020

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Photo 3. SDLT Outfall on May 16, 2020

Photo 4. Erosion and Sediment Control Down Slope of Power Generation Building Minimizing Sediment Entering CV-187 (May 22, 2020)

Photo 5. Check Dam Reinforcement and Expansion at the Inlet of CV-187 (May 20, 2020)

Photo 6: SDLT Outfall on June 13, 2020

LDFG Drainage

Photo 1: LDFG Outfall on May 14, 2020

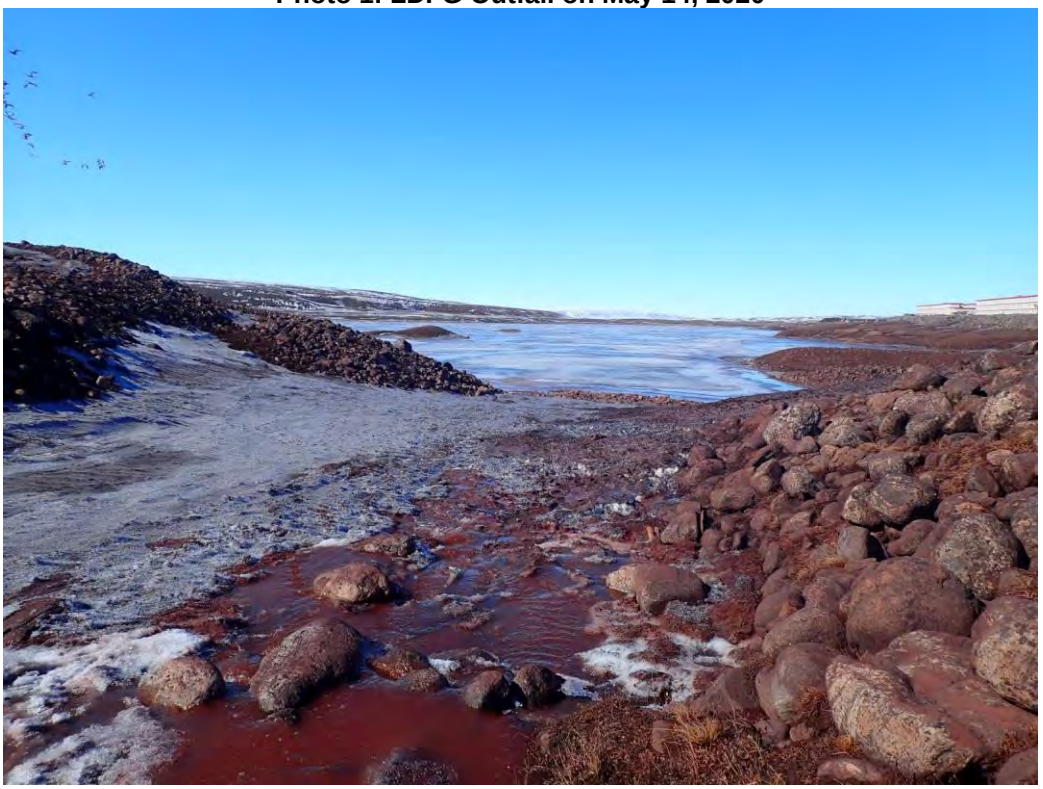

Photo 2: LDGF Outfall on May 17, 2020

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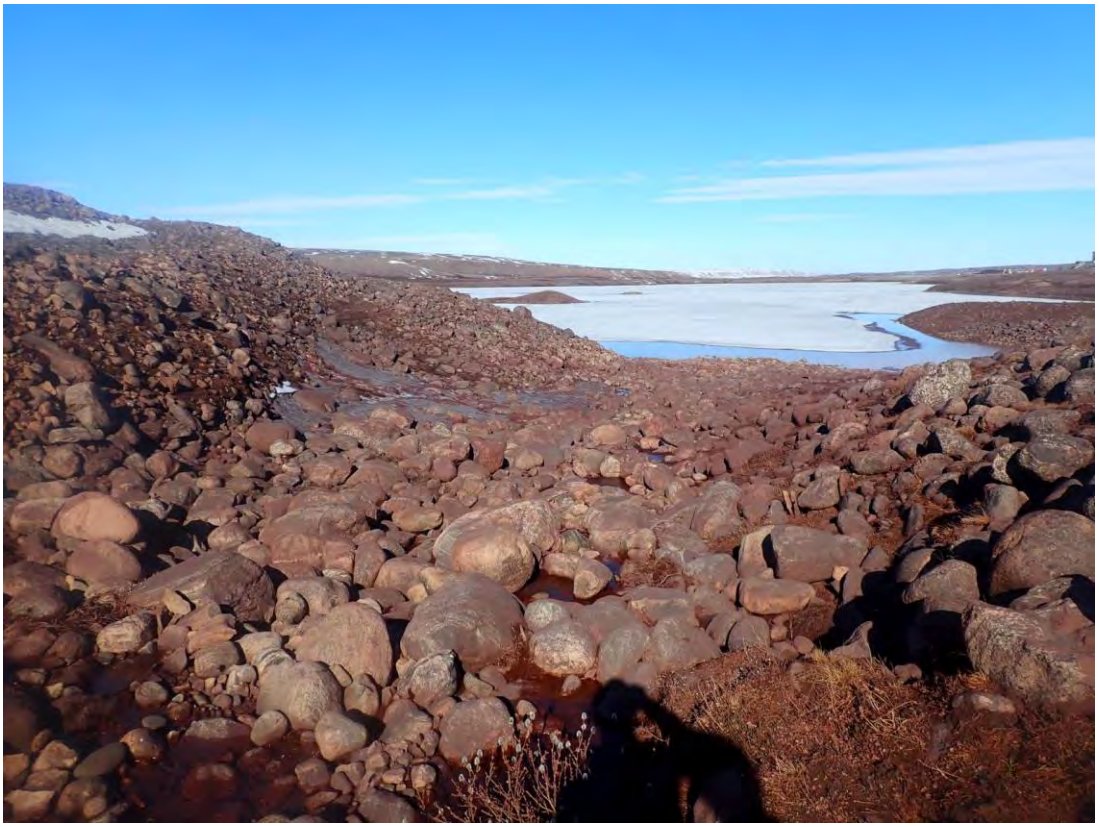

Photo 3: LDGF Outfall on June 11, 2020

Attachment 2

Mine Site Freshet Monitoring Locations

2275 Upper Middle Road East, Suite 300 | Oakville, ON, Canada L6H 0C3
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LEGEND

- Freshet Monitoring Location
- Project Development Area

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Mine Site Monitoring Locations

Projection: NAD 1983 UTM ZONE 17N.
Base Map: © 2019 Digital Globe, Inc.
Imagery is representative as of August 2019.

0 120 240 480
Meters
N

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FIGURE 3

SAVED: C:\Users\katie.mcguire\Documents\4 - Maps\Reporting\Freshet Monitoring\2020\BIM_3_Freshet_Mine.mxd; May 13, 2020 9:01 AM

Attachment 3

Baffinland NT-NU Spill Report

2275 Upper Middle Road East, Suite 300 | Oakville, ON, Canada L6H 0C3
Main: 416.364.8820 | Fax: 416.364.0193 | www.baffinland.com

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE
TEL: (867) 920-8130
FAX: (867) 873-6924
EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR 05-18-2020	REPORT TIME **14:00**	☒ ORIGINAL SPILL REPORT, OR ☐ UPDATE # _____ TO THE ORIGINAL SPILL REPORT	REPORT NUMBER **20** - _____
B	OCCURRENCE DATE: MONTH – DAY – YEAR 05-16-2020	OCCURRENCE TIME **17:00**		

C	LAND USE PERMIT NUMBER (IF APPLICABLE) **IOL - Commercial Lease No.: Q13C301**	WATER LICENCE NUMBER (IF APPLICABLE) **2AM-MRY1325 Type "A"**
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION **Mary River Project Mine Site, Baffin Island, NU**	REGION ☐ NWT ☒ NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN
E	LATITUDE DEGREES MINUTES SECONDS	LONGITUDE DEGREES MINUTES SECONDS
F	RESPONSIBLE PARTY OR VESSEL NAME **Baffinland Iron Mines Corp.**	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION **2275 Middle Road East, Suite 300, Oakville, ON L6H 0C3**
G	ANY CONTRACTOR INVOLVED **N/A**	CONTRACTOR ADDRESS OR OFFICE LOCATION **N/A**

H	PRODUCT SPILLED **Sediment-laden water**	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES **Unquantified**	U.N. NUMBER **N/A**
	SECOND PRODUCT SPILLED (IF APPLICABLE) **N/A**	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES **N/A**	U.N. NUMBER **N/A**
I	SPILL SOURCE **Melting snow, overland flow**	SPILL CAUSE **Rapid melt**	AREA OF CONTAMINATION IN SQUARE METRES **N/A**
J	FACTORS AFFECTING SPILL OR RECOVERY **Snow covered area, high flow**	DESCRIBE ANY ASSISTANCE REQUIRED **N/A**	HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT **N/A**

K — ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS

On May 16, 2020, warming temperatures resulting in snowmelt runoff containing sediment-laden water observed to be flowing at multiple locations at the Mary River Mine Site (SDLT, CLSP, LDFG and CLT). The source of the sedimentation was snow melt from the surrounding mine site infrastructure. The event resulted in sediment-laden water flowing onto and under the ice of Camp Lake and Sheardown Lake. In accordance with the Surface Water Management Plan, sedimentation mitigation measures are being implemented including; actively pumping water, check dams, silt fences and spring berms in an attempt to settle sediments prior to discharge. With freshet conditions present, daily monitoring of the water quality is ongoing; initial water quality sample results were submitted to ALS lab for analysis. This spill is being reported as required by the conditions of Water License no. 2AM-MRY1325, Part H, item 9 (b) pursuant to subsection 12(3) of the Nunavut Waters and Nunavut Surface Rights Tribunal Act and as required by subsection 38(5) of the Fisheries Act.

L	REPORTED TO SPILL LINE BY Aaron MacDonell	POSITION **Env Superintendent**	EMPLOYER **Baffinland**	LOCATION CALLING FROM **647.253.0596**	TELEPHONE Ext. 6735
M	ANY ALTERNATE CONTACT **Tim Sewell**	POSITION **Director of HSEST**	EMPLOYER **Baffinland**	ALTERNATE CONTACT LOCATION **647.253.0596**	ALTERNATE TELEPHONE **Ext. 6054**

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION STATION OPERATOR	EMPLOYER	LOCATION CALLED YELLOWKNIFE, NT	REPORT LINE NUMBER (867) 920-8130

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC | SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN | FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

Attachment 4

Water Quality Results

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Table 1. CLT Outfall Water Quality Results

Analyte	Sample ID			CLT-OUT	CLT-OUT	CLT-OUT	CLT-OUT	CLT-OUT	CLT-OUT	CLT-OUT	CLT-OUT	CLT-OUT	CLT-OUT	CLT-OUT
	ALS Laboratory Sample ID			L2448446-3	L2448471-1	L2448485-2	L2450893-5	L2450957-5	L2450971-1	L2451385-2	L2451851-1	L2452769-1	L2454043-1	L2454046-2
	Sample Date & Time			2020-05-16 17:50	2020-05-17 11:30	2020-05-18 15:15	2020-05-22 11:15	2020-05-23 8:30	2020-05-24 11:05	2020-05-25 10:05	2020-05-26 8:15	2020-05-27 9:30	2020-05-28 9:05	2020-05-29 10:05
	QA/QC Sample Type			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Units	LOR	Limits											
pH	pH units	0.1	6.0 - 9.5	8.12	7.61	7.67	7.76	7.66	7.69	7.70	7.75	7.70	7.79	7.78
Total Suspended Solids	mg/L	2	30	**422**	**113**	9.2	**53.5**	8.8	8.8	11.7	8.0	8.3	20.2	22.5
Total Dissolved Solids	mg/L	20	-	228	116	78	236	26	33	66	67	98	90	73
Turbidity	NTU	0.1	-	742	150	44.4	83.8	26.2	21.2	28.7	24.0	14.2	27.5	27.2

Analyte	Sample ID			CLT-OUT	CLT-OUT	CLT-OUT	CLT-OUT	CLT-OUT	CLT-OUT	CLT-OUT	CLT-OUT	CLT-OUT	CLT-OUT	CLT-OUT
	ALS Laboratory Sample ID			L2454126-2	L2454149-1	L2455249-1	L2455933-1	L2456613-1	L2457275-1	L2457742-1	L2459153-4	L24604354-1	L2460353-1	L2460439-1
	Sample Date & Time			2020-05-30 9:45	2020-05-31 8:40	2020-06-02 9:00	2020-06-03 7:50	2020-06-04 8:10	2020-06-07 9:45	2020-06-08 8:45	6/10/2020 10:35	6/11/2020 7:45	6-12-2020 8:05	6-13-2020 10:55
	QA/QC Sample Type			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Units	LOR	Limits											
pH	pH units	0.1	6.0 - 9.5	7.94	7.70	7.56	7.60	7.58	7.90	7.57	7.61	7.56	7.59	7.59
Total Suspended Solids	mg/L	2	30	10.2	4.5	5.4	21.1	13.2	**188**	26.4	13.9	7	4.5	8.7
Total Dissolved Solids	mg/L	20	-	104	67	48	71	64	132	58	40	49	39	59
Turbidity	NTU	0.1	-	15.2	11.7	8.09	25.0	9.35	125	27.0	21.7	13.6	9.75	11.5

Table 2. CLSP Outfall Water Quality Results

Analyte	Sample ID			CLSP-OUT	CLSP-OUT	CLSP-OUT	CLSP-OUT	CLSP-OUT	CLSP-OUT	CLSP-OUT[1]
	ALS Laboratory Sample ID			L2448446-1	L2448485-1	L2450893-4	L2450957-4	L2451385-1	L2454046-1	L2454126-1
	Sample Date & Time			2020-05-16 17:15	2020-05-18 14:45	2020-05-22 10:30	2020-05-23 8:45	2020-05-25 9:40	2020-05-29 9:45	2020-05-30 9:30
	QA/QC Sample Type			N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Units	LOR	Limits							
pH	pH units	0.1	6.0 - 9.5	7.78	7.78	7.91	7.89	7.92	7.57	7.69
Total Suspended Solids	mg/L	2	30	**520**	**60.7**	**117**	**71.4**	**46.0**	**37.8**	**121**
Total Dissolved Solids	mg/L	20	-	178	130	246	230	152	64	125
Turbidity	NTU	0.1	-	835	244	400	264	216	99.9	180

1. No additional samples taken due to frozen and then no flow conditions.

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Table 3. SDLT Outfall Water Quality Results

Analyte	Sample ID			SDLT-OUT	SDLT-OUT	SDLT-OUT	SDLT-OUT	SDLT-OUT	SDLT-OUT	SDLT-OUT	SDLT-OUT	SDLT-OUT	SDLT-OUT	SDLT-OUT
	ALS Laboratory Sample ID			L2448446-4	L2448471-3	L2448485-3	L2448977-3	L2450893-2	L2450957-2	L2450971-2	L2451385-3	L2451851-3	L2454046-3	L2454126-3
	Sample Date & Time			2020-05-16 18:20	2020-05-17 12:20	2020-05-18 16:00	2020-05-19 17:50	2020-05-22 9:40	2020-05-23 9:25	2020-05-24 12:15	2020-05-25 11:35	2020-05-26 8:50	2020-05-29 10:50	2020-05-30 10:15
	QA/QC Sample Type			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Units	LOR	Limits											
pH	pH units	0.1	6.0 - 9.5	7.64	7.63	7.47	7.57	7.70	7.63	7.82	7.67	7.68	7.47	7.56
Total Suspended Solids	mg/L	2	30	**98.1**	**96.3**	7.6	16.0	13.6	7.6	3.2	6.5	2.4	**60.9**	17.9
Total Dissolved Solids	mg/L	20	-	155	120	79	41	99	44	40	87	113	49	72
Turbidity	NTU	0.1	-	353	191	63.8	64.7	52.5	38.9	18.3	30.0	24.3	51.3	28.3

Analyte	Sample ID			SDLT-OUT	SDLT-OUT	SDLT-OUT	SDLT-OUT	SDLT-OUT	SDLT-OUT	SDLT-OUT	SDLT-OUT	SDLT-OUT	SDLT-OUT	SDLT-OUT	SDLT-OUT
	ALS Laboratory Sample ID			L2454149-3	L2455249-3	L2455933-3	L2456613-2	L2457149-1	L2457251-1	L2457275-3	L2457742-2	L2459153-3	L2460354-4	L2460353-4	L2460439-3
	Sample Date & Time			2020-05-31 9:30	2020-06-02 9:45	2020-06-03 8:30	2020-06-04 8:40	2020-06-05 9:50	2020-06-06 9:30	2020-06-07 11:40	2020-06-08 9:20	6/10/2020 10:00	6/11/2020 9:05	6/12/2020 9:25	6/13/2020 18:35
	QA/QC Sample Type			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Units	LOR	Limits												
pH	pH units	0.1	6.0 - 9.5	7.57	7.66	7.73	7.77	7.67	7.57	7.59	7.63	7.59	7.63	7.66	7.74
Total Suspended Solids	mg/L	2	30	11.0	18.8	25.9	27.7	**75.0**	**38.8**	17.4	**67.2**	17.4	**67.2**	16.1	5.5
Total Dissolved Solids	mg/L	20	-	75	62	99	165	142	91	63	104	63	104	67	87
Turbidity	NTU	0.1	-	22.2	33.0	58.7	56.8	124	75.0	43.7	161	43.7	161	41.4	26.6

Table 4. LDFG Outfall Water Quality Results

Analyte	Sample ID			LDFG-OUT	LDFG-OUT	LDFG-OUT	LDFG-OUT	LDFG-OUT	LDFG-OUT	LDFG-OUT	LDFG-OUT	LDFG-OUT	LDFG-OUT	LDFG-OUT
	ALS Laboratory Sample ID			L2448471-4	L2448485-5	L2448977-1	L2450893-1	L2450957-1	L2450971-3	L2451385-4	L2451851-4	L2454046-5	L2454126-5	L2457275-4
	Sample Date & Time			2020-05-17 12:55	2020-05-18 16:20	2020-05-19 8:50	2020-05-22 8:40	2020-05-23 9:50	2020-05-24 14:35	2020-05-25 12:00	2020-05-26 9:35	2020-05-29 11:20	2020-05-30 10:40	2020-06-07 12:00
	QA/QC Sample Type			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Units	LOR	Limits											
pH	pH units	0.1	6.0 - 9.5	7.47	7.40	7.39	7.56	7.51	7.60	7.62	7.65	7.41	7.46	7.53
Total Suspended Solids	mg/L	2	30	**34.0**	2.4	4.0	6.0	2.4	<2.0	<2.0	<2.0	7.5	2.5	6.5
Total Dissolved Solids	mg/L	20	-	85	65	32	70	21	30	40	71	24	44	30
Turbidity	NTU	0.1	-	84.7	27.4	18.5	36.5	23.3	25.4	18.1	18.1	31.2	27.7	38.1

Analyte	Sample ID			LDFG-OUT	LDFG-OUT	LDFG-OUT	LDFG-OUT
	ALS Laboratory Sample ID			L2457742-3	L2459153-1	L2460354-3	L2460353-2
	Sample Date & Time			2020-06-08 9:55	6-10-2020 9:40	6-11-2020 8:40	6-12-2020 8:40
	QA/QC Sample Type			N/A	N/A	N/A	N/A
	Units	LOR					
pH	pH units	0.1	6.0 - 9.5	7.54	7.66	7.67	7.74
Total Suspended Solids	mg/L	2	30	6.1	9.6	3.4	4.6
Total Dissolved Solids	mg/L	20	-	38	45	56	73
Turbidity	NTU	0.1	-	31.0	35.8	15.6	14.4

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APPENDIX A.2 – SPILL REPORT NO. 20-179 – MARY RIVER

July 14, 2020

Water Resources Officer
Nunavut Region
Crown Indigenous Relations and Northern Affairs Canada
Box 100
Iqaluit, NU X0A 0H0

Regulatory Manager
Qikiqtani Inuit Association
P.O. Box 219
Iqaluit, NU X0A 0H0

Enforcement Officer
Environment and Climate Change Canada
933 Mivvik Street
Iqaluit, NU X0A 0H0

Re: Follow-up to Spill #20-179
Mary River Project - Water Licence No. 2AM-MRY1325

Summary:
On June 14th 2020, temperature fluctuations experienced on Deposit 1 caused rapid snow melt/runoff from the Mine Haul Road ditches at km 108.5, 107 and 106.5 to flow onto the tundra. Water flowing through the road's ditching and culvert system resulting in sediment-impacted water traveling across the mountain tundra, entering the Mary River Tributary and Mary River.

Sample Location	Description	Coordinates (Lat/Long)
E0-20	Mary River- Downstream of Project Infrastructure	71°17'45.1"N 79°16'34.5"W

Immediate and Follow-Up Action:
Upon discovery of the elevated TSS conditions, as outlined in the Surface Water Aquatic Effects Management Plan, sedimentation mitigation measures were implemented. Project personnel worked to install sedimentation mitigation measures, including ditch maintenance to ensure all runoff reported to the ditches and reduced interaction with impacted road surfaces. Check dams were maintained and silt fences added in an attempt to settle sediments before reaching the receiving environment.

Water quality samples, were collected on June 15th on Mary River at E0-20, an approved Aquatic Effects Monitoring Program sample site downstream of sediment releases to evaluate the impact on the receiving environment,.

In the days leading up to freshet, snow pack around the Mine Haul Road culverts and ditches were excavated to reduce the volume of snowmelt and thus, reduce the amount of overland flow present to mobilize sediment. Rip rap and check dams were also maintained at strategic locations. Water diversion and pumping strategies were implemented to reduce potential erosion and sedimentation.

Current Status:
Conditions at Mary River are currently being sampled and assessed as per Baffinland's Aquatic Effects Monitoring Program. Mary River is currently observed to be flowing under normal conditions and routine maintenance of check dams down gradient of the road is ongoing.

Should you require further information or clarification on the above noted spill, please feel free to contact Connor Devereaux or Aaron MacDonnell at (647) 253- 0596 x6016.

Prepared by:

Aaron MacDonnell
Environmental Superintendent

Attach: Photos, Map, Baffinland NT-NU Spill Report, Water Quality Results

cc. Sylvain Proulx, Tayfun Eldem, Tim Sewell, Shawn Stevens, Connor Devereaux, Brian Marshall, Francois Gaudreau, Christopher Murray, Lou Kamermans (Baffinland), Justin Hack, Jeremy Fraser (CIRNAC)

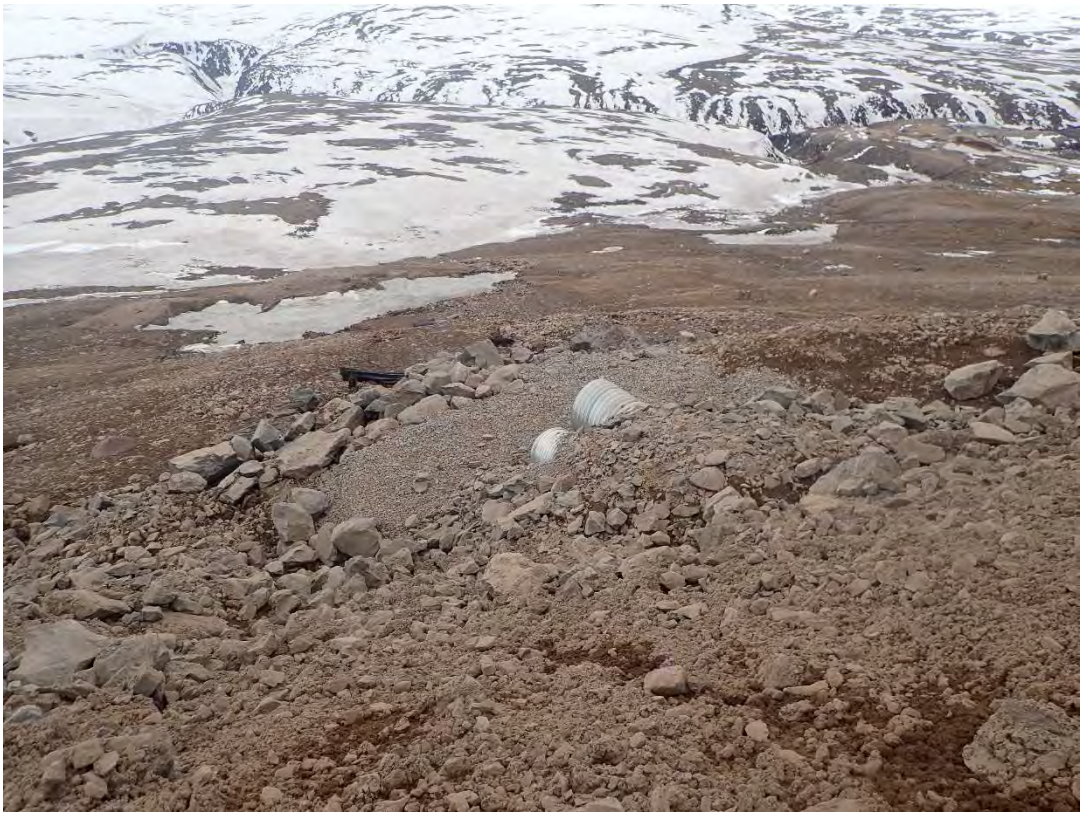

Photo 1.

KM106.5 Extended Culvert with Rip Rap

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Main: 416.364.8820 | Fax: 416.364.0193 | www.baffinland.com

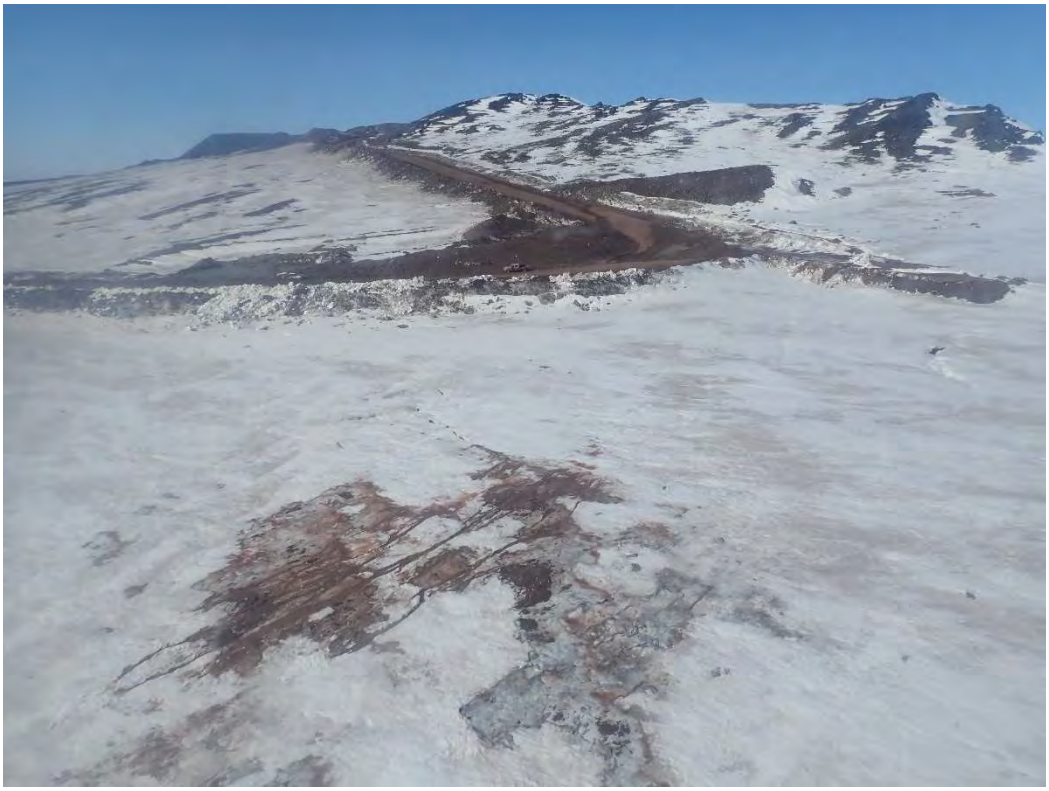


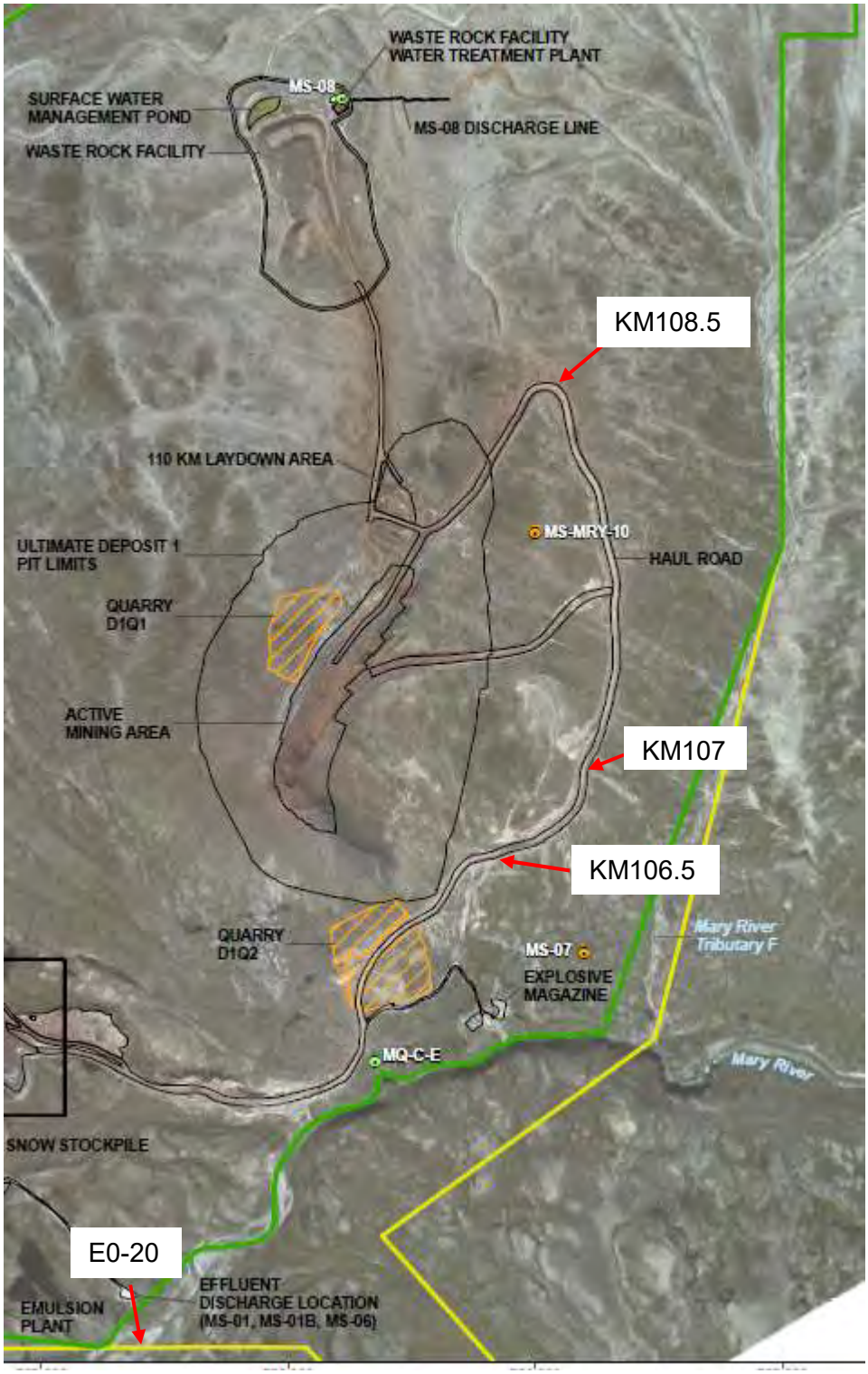
Photo 2. Sediment impacted water traveling across the tundra on June 15, 2020

Photo 3. Sediment impacted water traveling across the tundra on June 15, 2020

Photo 4. Sediment-impacted water quality at E0-20 on Mary River on June 15, 2020

Photo 5. Water quality at E0-20 on Mary River on July 3, 2020

Figure 1. Map of E0-20 sample location, KM 108.5, 107 and KM 106.5 impacted sediment locations



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Baffinland

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NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE
TEL: (867) 920-8130
FAX: (867) 873-6924
EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR: 06-15-2020	REPORT TIME: 18:00	[X] ORIGINAL SPILL REPORT OR [ ] UPDATE # _____ TO THE ORIGINAL SPILL REPORT	REPORT NUMBER: 20 - 179
B	OCCURRENCE DATE: MONTH – DAY – YEAR: 06-14-2020	OCCURRENCE TIME: Unknown		
C	LAND USE PERMIT NUMBER (IF APPLICABLE): IOL - Commercial Lease: Q13C301	WATER LICENCE NUMBER (IF APPLICABLE): 2AM-MRY1325 Type "A"		
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION: Mary River Milne Inlet Site, Baffin Island, NU	REGION: [ ] NWT [X] NUNAVUT [ ] ADJACENT JURISDICTION OR OCEAN		
E	LATITUDE: DEGREES 71 MINUTES 18 SECONDS 39	LONGITUDE: DEGREES 79 MINUTES 11 SECONDS 56		
F	RESPONSIBLE PARTY OR VESSEL NAME: Baffinland Iron Mines Corp.	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION: 2275 Middle Road East, Suite 300, Oakville, ON L6H 0C3		
G	ANY CONTRACTOR INVOLVED: N/A	CONTRACTOR ADDRESS OR OFFICE LOCATION: N/A		
H	PRODUCT SPILLED: Sediment	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES: unquantifiable	U.N. NUMBER: N/A	
	SECOND PRODUCT SPILLED (IF APPLICABLE): N/A	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES: N/A	U.N. NUMBER: N/A	
I	SPILL SOURCE: Snow melt	SPILL CAUSE: Rapid snow melt	AREA OF CONTAMINATION IN SQUARE METRES: N/A	
J	FACTORS AFFECTING SPILL OR RECOVERY: Steep embankment, poor access	DESCRIBE ANY ASSISTANCE REQUIRED: N/A	HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT: N/A	

K — ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS:

On June 14th 2020, temperature fluctuations experienced on Deposit 1 caused rapid snow melt/runoff from the Mine Haul Road ditches at km 108.5, 107 and 106.5 to flow impacted onto the tundra. Water runoff was observed through the road's ditching and culvert system resulting in sediment impacted water traveling across the mountain tundra, entering the Mary River Tributary and Mary River. In accordance with the surface water management plan, mitigation measures are being implemented including; reinforcing check dams, silt fences and ditch maintenance to settle sediments before discharge to the receiving environment. Surface water has also been diverted away from problematic areas to minimize the impacted water entering Mary River. A follow up report will be provided with further information on additional mitigation measures. This incident is being reported as required by the conditions of Water License no. 2AM-MRY1325, Part H, item 9(b) and as required by subsection 38(5) of the Fisheries Act.

L	REPORTED TO SPILL LINE BY: Connor Devereaux	POSITION: Env. Superintendent	EMPLOYER: Baffinland	LOCATION CALLING FROM: 416-364-8820	TELEPHONE: ext. 6016
M	ANY ALTERNATE CONTACT: Shawn Stevens	POSITION: Manager of HSES	EMPLOYER: Baffinland	ALTERNATE CONTACT LOCATION: 416-364-8820	ALTERNATE TELEPHONE: ext. 6006

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY:	POSITION: STATION OPERATOR	EMPLOYER:	LOCATION CALLED: YELLOWKNIFE, NT	REPORT LINE NUMBER: (867) 920-8130

LEAD AGENCY [ ] EC [ ] CCG [ ] GNWT [ ] GN [ ] ILA [ ] INAC [ ] NEB [ ] TC | SIGNIFICANCE [ ] MINOR [ ] MAJOR [ ] UNKNOWN | FILE STATUS [ ] OPEN [ ] CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

PAGE 1 OF _____

Figure 2. Baffinland NT NU spill report

Baffinland

Table 1. E0-20 Water Quality Results

Analyte	Sample ID			E0-20	E0-20
	ALS Laboratory Sample ID			L2460909-1	L2470180-12
	Sample Date & Time			2020-06-15 09:50	2020-07-03 12:30
	Units	LOR	Limits		
pH	pH units	0.1	6.0 - 9.5	7.61	7.54
Total Suspended Solids	mg/L	2	30	**45.9**	7.7
Total Dissolved Solids	mg/L	20	-	**73**	67
Turbidity	NTU	0.1	-	31.3	6.79

APPENDIX B – SURFACE WATER QUALITY RESULTS FOR AREAS AFFECTED BY FRESHET RUNOFF

APPENDIX B.1 – SAMPLE LOCATION DETAILS AND LOCATIONS

Mine Site Sample IDs and Locations

Sample Location	Description	Coordinates (Lat/Long)
CLSP-OUT	Camp Lake Sedimentation Ponds outlet	N 71° 19’ 42.2” W 79° 22’ 55.4”
CLT-OUT	Camp Lake Tributary 1 (100 m upstream of Camp Lake outfall)	N 71° 19’ 46.8” W 79° 23’ 08.6”
SDLT-OUT	Sheardown Lake Tributary 1 (100 m upstream of Sheardown Lake outfall)	N 71° 18’ 57.6” W 79° 18’ 46.8”
LDFG-OUT	Sheardown Lake Landfill gate tributary (40 m Upstream of Sheardown Lake outfall)	N 71° 18’ 41.0” W 79° 17’ 40.6”
E0-20	AEMP sample site on Mary River downstream of all potential mine effects	N 71° 17’ 45.0” W 79° 16’ 34.5”

Milne Port Sample IDs and Locations

Sample Location	Description	Coordinates (Lat/Long)
MP-C-B	Freshet and Surveillance Network Program site West of Ore Pad	71° 52' 54" N 80° 55' 06" W
MP-C-B01	Freshet and Surveillance Network Program site West of LP3 Laydown	71° 52' 41" N 80° 54' 51" W
MP-C-F	Freshet and Surveillance Network Program site East of Hazardous Waste Berm	71° 53' 12" N 80° 53' 13" W
MP-C-G	Freshet and Surveillance Network Program site West of Ore Pad	71° 53' 10" N 80° 54' 55" W
MP-C-H	Freshet and Surveillance Network Program site on Sealift Ramp Upstream of Culvert	71° 53' 19" N 80° 52' 53" W
MP-C-J	Freshet and Surveillance Network Program site South of Laydown LP3	71° 52' 22" N 80° 54' 55" W
MP-ED	Freshet Monitoring site monitoring runoff from road north of Fuel Farm	71° 53.079' N 80° 53.162' W
MP-FFG	Freshet Monitoring site monitoring potential runoff from Mobile Maintenance Laydown area	71° 53.213' N 80° 53.593' W
MP-Q1-01	Freshet and Surveillance Network Program site (surface water drainage downstream of Q1 Quarry)	71° 52' 13" N 80° 53' 22" W
MP-Q1-02	Freshet and Surveillance Network Program site (surface water drainage downstream of Q1 Quarry)	71° 52' 43" N 80° 53' 23" W

LEGEND

- Sampling Location
- Infrastructure
- Project Development Area

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Freshet Sampling Locations

Projection: NAD 1983 UTM ZONE 17N.
Source: © Her Majesty the Queen in rights of Canada Department of Natural Resources (2009). All rights reserved.

0 185 370 740
Meters

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Baffinland

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FIGURE 1

SAVED: C:\Users\katie.mcguire\Documents\4 - Maps\Reporting\Freshet Monitoring\BIM_Freshet_MineSite.mxd, Jan 24, 2020 9:55 AM

APPENDIX B.2 – WATER QUALITY AND RESULTS AND GRAPHS

2020 Freshet Surface Water Quality Monitoring Results for CLSP-OUT

Analyte	Sample ID			CLSP-OUT	CLSP-OUT01	CLSP-OUT	CLSP-OUT	CLSP-OUT	CLSP-OUT	CLSP-OUT	CLSP-OUT
	ALS Laboratory Sample ID			L2448446-1	L2448446-2	L2448485-1	L2450893-4	L2450957-4	L2451385-1	L2454046-1	L2454126-1
	Sample Date & Time			2020-05-16 17:15	2020-05-16 17:15	2020-05-18 14:45	2020-05-22 10:30	2020-05-23 8:45	2020-05-25 9:40	2020-05-29 9:45	2020-05-30 9:30
	QA/QC Sample Type			N/A	Field Duplicate	N/A	N/A	N/A	N/A	N/A	N/A
	Units	LOR	Water Licence Criteria [1]								
pH	pH units	0.10	6.0 - 9.5	7.78	7.84	7.78	7.91	7.89	7.92	7.57	7.69
Total Suspended Solids [2]	mg/L	2.0	Grab 30 and Average 15	**520**	486	**60.7**	**117**	**71.4**	**46.0**	**37.8**	**121**
Total Dissolved Solids	mg/L	10	-	178	225	130	246	230	152	64	125
Turbidity	NTU	0.10	-	835	831	244	400	264	216	99.9	180

Notes:

Bold highlight indicate results that exceeded the applicable water quality criteria.

[1] Type A Water Licence (2AM-MRY1325 - Amend. 1) - Table 11.

[2] Average TSS for May exceeded maximum average TSS concentration discharge limits.

2020 Freshet Surface Water Quality Monitoring Results for CLT-OUT

Analyte	Sample ID			CLT-OUT	CLT-OUT	CLT-OUT01	CLT-OUT	CLT-OUT	CLT-OUT	CLT-OUT
	ALS Laboratory Sample ID			L2448446-3	L2448471-1	L2448471-2	L2448485-2	L2450893-5	L2450957-5	L2450971-1
	Sample Date & Time			2020-05-16 17:50	2020-05-17 11:30	2020-05-17 11:30	2020-05-18 15:15	2020-05-22 11:15	2020-05-23 8:30	2020-05-24 11:05
	QA/QC Sample Type			N/A	N/A	Field Duplicate	N/A	N/A	N/A	N/A
	Units	LOR	Water Licence Criteria [1]							
pH	pH units	0.10	6.0 - 9.5	8.12	7.61	7.63	7.67	7.76	7.66	7.69
Total Suspended Solids [2]	mg/L	2.0	Grab 30 and Average 15	**422**	**113**	116	9.2	**53.5**	8.8	8.8
Total Dissolved Solids	mg/L	10	-	228	116	77.00	78.00	236	26	33
Turbidity	NTU	0.10	-	742	150	146	44.4	83.8	26.2	21.2

Notes:

Bold highlight indicate results that exceeded the applicable water quality criteria.

[1] Type A Water Licence (2AM-MRY1325 - Amend. 1) - Table 11.

[2] Average TSS for May and June exceeded maximum average TSS concentration discharge limits.

2020 Freshet Surface Water Quality Monitoring Results for CLT-OUT

Analyte	Sample ID			CLT-OUT	CLT-OUT	CLT-OUT03	CLT-OUT	CLT-OUT01	CLT-OUT	CLT-OUT03
	ALS Laboratory Sample ID			L2451385-2	L2451851-1	L2451851-2	L2452769-1	L2452769-2	L2454043-1	L2454043-2
	Sample Date & Time			2020-05-25 10:05	2020-05-26 8:15	2020-05-26 8:15	2020-05-27 9:30	2020-05-27 9:30	2020-05-28 9:05	2020-05-28 9:05
	QA/QC Sample Type			N/A	N/A	Travel Blank	N/A	Field Duplicate	N/A	Travel blank
	Units	LOR	Water Licence Criteria [1]							
pH	pH units	0.10	6.0 - 9.5	7.70	7.75	5.81	7.70	7.68	7.79	5.75
Total Suspended Solids [2]	mg/L	2.0	Grab 30 and Average 15	11.7	8.0	<2.0	8.3	9.0	20.2	<2.0
Total Dissolved Solids	mg/L	10	-	66	67	19	98	99	90	<10
Turbidity	NTU	0.10	-	28.7	24.0	<0.10	14.2	14.3	27.5	<0.10

Notes:

Bold highlight indicate results that exceeded the applicable water quality criteria.

[1] Type A Water Licence (2AM-MRY1325 - Amend. 1) - Table 11.

[2] Average TSS for May and June exceeded maximum average TSS concentration discharge limits.

2020 Freshet Surface Water Quality Monitoring Results for CLT-OUT

Analyte	Sample ID			CLT-OUT	CLT-OUT	CLT-OUT	CLT-OUT03	CLT-OUT	CLT-OUT01	CLT-OUT
	ALS Laboratory Sample ID			L2454046-2	L2454126-2	L2454149-1	L2454149-2	L2455249-1	L2455249-2	L2455933-1
	Sample Date & Time			2020-05-29 10:05	2020-05-30 9:45	2020-05-31 8:40	2020-05-31 8:40	2020-06-02 9:00	2020-06-02 9:00	2020-06-03 7:50
	QA/QC Sample Type			N/A	N/A	N/A	Travel Blank	N/A	Field Duplicate	N/A
	Units	LOR	Water Licence Criteria [1]							
pH	pH units	0.10	6.0 - 9.5	7.78	7.94	7.70	5.92	7.56	7.58	7.60
Total Suspended Solids [2]	mg/L	2.0	Grab 30 and Average 15	22.5	10.2	4.5	<2.0	5.4	6.3	21.1
Total Dissolved Solids	mg/L	10	-	73	104	67	30	48	42	71
Turbidity	NTU	0.10	-	27.2	15.2	11.7	<0.10	8.09	8.52	25.0

Notes:

Bold highlight indicate results that exceeded the applicable water quality criteria.

[1] Type A Water Licence (2AM-MRY1325 - Amend. 1) - Table 11.

[2] Average TSS for May and June exceeded maximum average TSS concentration discharge limits.

2020 Freshet Surface Water Quality Monitoring Results for CLT-OUT

Analyte	Sample ID			CLT-OUT01	CLT-OUT	CLT-OUT	CLT-OUT02	CLT-OUT	CLT-OUT	CLT-OUT01
	ALS Laboratory Sample ID			L2455933-2	L2456613-1	L2457275-1	L2457275-2	L2457742-1	L2461162-1	L2461162-2
	Sample Date & Time			2020-06-03 7:50	2020-06-04 8:10	2020-06-07 9:45	2020-06-07 9:45	2020-06-08 8:45	2020-06-09 10:45	2020-06-09 10:45
	QA/QC Sample Type			Field Duplicate	N/A	N/A	Field Blank	N/A	N/A	Field Duplicate
	Units	LOR	Water Licence Criteria [1]							
pH	pH units	0.10	6.0 - 9.5	7.61	7.58	7.90	6.01	7.57	7.71	7.68
Total Suspended Solids [2]	mg/L	2.0	Grab 30 and Average 15	21.3	13.2	**188**	<2.0	26.4	22.0	21.7
Total Dissolved Solids	mg/L	10	-	51	64	132	<10	58	70	56
Turbidity	NTU	0.10	-	24.8	9.35	125	<0.10	27.0	24.6	24.2

Notes:

Bold highlight indicate results that exceeded the applicable water quality criteria.

[1] Type A Water Licence (2AM-MRY1325 - Amend. 1) - Table 11.

[2] Average TSS for May and June exceeded maximum average TSS concentration discharge limits.

2020 Freshet Surface Water Quality Monitoring Results for CLT-OUT

Analyte	Sample ID			CLT-OUT	CLT-OUT	CLT-OUT01	CLT-OUT	CLT-OUT	CLT-OUT01	CLT-OUT
	ALS Laboratory Sample ID			L2459153-4	L24604354-1	L2460354-2	L2460353-1	L2460439-1	L2460439-2	L2460468-4
	Sample Date & Time			2020-06-10 10:35	2020-06-11 7:45	2020-06-11 7:45	2020-06-12 8:05	2020-06-13 10:55	2020-06-13 10:55	2020-06-14 9:15
	QA/QC Sample Type			N/A	N/A	Field Duplicate	N/A	N/A	Field Duplicate	N/A
	Units	LOR	Water Licence Criteria [1]							
pH	pH units	0.10	6.0 - 9.5	7.61	7.56	7.55	7.59	7.59	7.64	7.62
Total Suspended Solids [2]	mg/L	2.0	Grab 30 and Average 15	13.9	7.0	6.6	4.5	8.7	8.0	<2.0
Total Dissolved Solids	mg/L	10	-	40	49	50	39	59	56	32
Turbidity	NTU	0.10	-	21.7	13.6	13.3	9.75	11.5	11.7	9.35

Notes:

Bold highlight indicate results that exceeded the applicable water quality criteria.

[1] Type A Water Licence (2AM-MRY1325 - Amend. 1) - Table 11.

[2] Average TSS for May and June exceeded maximum average TSS concentration discharge limits.

2020 Freshet Surface Water Quality Monitoring Results for CLT-OUT

Analyte	Sample ID			CLT-OUT	CLT-OUT	CLT-OUT	CLT-OUT	CLT-OUT-01	CLT-OUT
	ALS Laboratory Sample ID			L2460911-1	L2461576-2	L2463020-2	L2467118-3	L2467118-4	L2467077-1
	Sample Date & Time			2020-06-15 14:35	2020-06-16 8:40	2020-06-17 9:00	2020-06-21 11:20	2020-06-21 11:20	2020-06-28 10:10
	QA/QC Sample Type			N/A	N/A	N/A	N/A	Field Duplicate	N/A
	Units	LOR	Water Licence Criteria [1]						
pH	pH units	0.10	6.0 - 9.5	7.59	7.58	7.6	7.78	7.82	7.96
Total Suspended Solids [2]	mg/L	2.0	Grab 30 and Average 15	9.6	3.8	<2.0	4.7	4.7	<2.0
Total Dissolved Solids	mg/L	10	-	53	32	53	54	25	65
Turbidity	NTU	0.10	-	10.2	6.3	3.33	1.81	2.3	1.28

Notes:

Bold highlight indicate results that exceeded the applicable water quality criteria.

[1] Type A Water Licence (2AM-MRY1325 - Amend. 1) - Table 11.

[2] Average TSS for May and June exceeded maximum average TSS concentration discharge limits.

2020 Freshet Surface Water Quality Monitoring Results for LDFG-OUT

Analyte	Sample ID			LDFG-OUT	LDFG-OUT	LDFG-OUT	LDFG-OUT01	LDFG-OUT	LDFG-OUT	LDFG-OUT	LDFG-OUT02	LDFG-OUT
	ALS Laboratory Sample ID			L2448471-4	L2448485-5	L2448977-1	L2448977-2	L2450893-1	L2450957-1	L2450971-3	L2450971-4	L2451385-4
	Sample Date & Time			2020-05-17 12:55	2020-05-18 16:20	2020-05-19 8:50	2020-05-19 8:50	2020-05-22 8:40	2020-05-23 9:50	2020-05-24 14:35	2020-05-24 14:35	2020-05-25 12:00
	QA/QC Sample Type			N/A	N/A	N/A	Field Duplicate	N/A	N/A	N/A	Field Blank	N/A
	Units	LOR	Water Licence Criteria [1]									
pH	pH units	0.10	6.0 - 9.5	7.47	7.40	7.39	7.43	7.56	7.51	7.60	5.76	7.62
Total Suspended Solids [2]	mg/L	2.0	Grab 30 and Average 15	**34.0**	2.4	4.0	2.8	6.0	2.4	<2.0	<2.0	<2.0
Total Dissolved Solids	mg/L	10	-	85	65	32	38	70	21	30	<10	40
Turbidity	NTU	0.10	-	84.7	27.4	18.5	18.4	36.5	23.3	25.4	<0.10	18.1

Notes:

Bold highlight indicate results that exceeded the applicable water quality criteria.

[1] Type A Water Licence (2AM-MRY1325 - Amend. 1) - Table 11.

[2] TSS concentration for sample collected on June 9, 2020 resulted from a sampling error or an external laboratory error and is not included in the monthly average TSS for June 2020.

2020 Freshet Surface Water Quality Monitoring Results for LDFG-OUT

Analyte	Sample ID			LDFG-OUT01	LDFG-OUT	LDFG-OUT	LDFG-OUT	LDFG-OUT	LDFG-OUT	LDFG-OUT	LDFG-OUT	LDFG-OUT03
	ALS Laboratory Sample ID			L2451385-5	L2451851-4	L2454046-5	L2454126-5	L2457275-4	L2457742-3	L2461162-4	L2459153-1	L2459153-2
	Sample Date & Time			2020-05-25 12:00	2020-05-26 9:35	2020-05-29 11:20	2020-05-30 10:40	2020-06-07 12:00	2020-06-08 9:55	2020-06-09 11:45	2020-06-10 9:40	2020-06-10 9:40
	QA/QC Sample Type			Field Duplicate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Travel Blank
	Units	LOR	Water Licence Criteria [1]									
pH	pH units	0.10	6.0 - 9.5	7.62	7.65	7.41	7.46	7.53	7.54	7.75	7.66	6.00
Total Suspended Solids [2]	mg/L	2.0	Grab 30 and Average 15	2.8	<2.0	7.5	2.5	6.5	6.1	**1240** [2]	9.6	<2.0
Total Dissolved Solids	mg/L	10	-	46	71	24	44	30	38	43	45	<10
Turbidity	NTU	0.10	-	18.3	18.1	31.2	27.7	38.1	31.0	48.2	35.8	<0.10

Notes:

Bold highlight indicate results that exceeded the applicable water quality criteria.

[1] Type A Water Licence (2AM-MRY1325 - Amend. 1) - Table 11.

[2] TSS concentration for sample collected on June 9, 2020 resulted from a sampling error or an external laboratory error and is not included in the monthly average TSS for June 2020.

2020 Freshet Surface Water Quality Monitoring Results for LDFG-OUT

Analyte	Sample ID			LDFG-OUT	LDFG-OUT	LDFG-OUT03	LDFG-OUT	LDFG-OUT01	LDFG-OUT	LDFG-OUT
	ALS Laboratory Sample ID			L2460354-3	L2460353-2	L2460353-3	L2460468-1	L2460468-2	L2467118-2	L2467077-3
	Sample Date & Time			2020-06-11 8:40	2020-06-12 8:40	2020-06-12 8:40	2020-06-14 8:15	2020-06-14 8:15	2020-06-21 8:50	2020-06-28 15:50
	QA/QC Sample Type			N/A	N/A	Travel Blank	N/A	Field Duplicate	N/A	N/A
	Units	LOR	Water Licence Criteria [1]							
pH	pH units	0.10	6.0 - 9.5	7.67	7.74	5.93	7.79	7.8	8.1	8.17
Total Suspended Solids [2]	mg/L	2.0	Grab 30 and Average 15	3.4	4.6	<2.0	<2.0	<2.0	3.9	<2.0
Total Dissolved Solids	mg/L	10	-	56	73	13	70	99	124	124
Turbidity	NTU	0.10	-	15.6	14.4	<0.10	8.74	8.64	3.85	13.4

Notes:

Bold highlight indicate results that exceeded the applicable water quality criteria.

[1] Type A Water Licence (2AM-MRY1325 - Amend. 1) - Table 11.

[2] TSS concentration for sample collected on June 9, 2020 resulted from a sampling error or an external laboratory error and is not included in the monthly average TSS for June 2020.

2020 Freshet Surface Water Quality Monitoring Results for SDLT-OUT

Analyte	Sample ID			SDLT-OUT	SDLT-OUT	SDLT-OUT	SDLT-OUT03	SDLT-OUT	SDLT-OUT	SDLT-OUT01	SDLT-OUT	SDLT-OUT01	SDLT-OUT
	ALS Laboratory Sample ID			L2448446-4	L2448471-3	L2448485-3	L2448485-4	L2448977-3	L2450893-2	L2450893-3	L2450957-2	L2450957-3	L2450971-2
	Sample Date & Time			2020-05-16 18:20	2020-05-17 12:20	2020-05-18 16:00	2020-05-18 16:00	2020-05-19 17:50	2020-05-22 9:40	2020-05-22 9:40	2020-05-23 9:25	2020-05-23 9:25	2020-05-24 12:15
	QA/QC Sample Type			N/A	N/A	N/A	Travel Blank	N/A	N/A	Field Duplicate	N/A	Field Duplicate	N/A
	Units	LOR	Water Licence Criteria [1]										
pH	pH units	0.10	6.0 - 9.5	7.64	7.63	7.47	5.75	7.57	7.70	7.73	7.63	7.58	7.82
Total Suspended Solids [2]	mg/L	2.0	Grab 30 and Average 15	**98.1**	**96.3**	7.6	<2.0	16.0	13.6	12.4	7.6	7.6	3.2
Total Dissolved Solids	mg/L	10	-	155	120	79	<10	41	99	105	44	45	40
Turbidity	NTU	0.10	-	353	191	63.8	0.11	64.7	52.5	52.3	38.9	38.8	18.3

Notes:

Bold highlight indicate results that exceeded the applicable water quality criteria.

[1] Type A Water Licence (2AM-MRY1325 - Amend. 1) - Table 11.

[2] Average TSS for May and June exceeded maximum average TSS concentration discharge limits.

2020 Freshet Surface Water Quality Monitoring Results for SDLT-OUT

Analyte	Sample ID			SDLT-OUT	SDLT-OUT	SDLT-OUT	SDLT-OUT01	SDLT-OUT	SDLT-OUT01	SDLT-OUT	SDLT-OUT	SDLT-OUT	SDLT-OUT
	ALS Laboratory Sample ID			L2451385-3	L2451851-3	L2454046-3	L2454046-4	L2454126-3	L2454126-4	L2454149-3	L2455249-3	L2455933-3	L2456613-2
	Sample Date & Time			2020-05-25 11:35	2020-05-26 8:50	2020-05-29 10:50	2020-05-29 10:50	2020-05-30 10:15	2020-05-30 10:15	2020-05-31 9:30	2020-06-02 9:45	2020-06-03 8:30	2020-06-04 8:40
	QA/QC Sample Type			N/A	N/A	N/A	Field Duplicate	N/A	Field Duplicate	N/A	N/A	N/A	N/A
	Units	LOR	Water Licence Criteria [1]										
pH	pH units	0.10	6.0 - 9.5	7.67	7.68	7.47	7.46	7.56	7.55	7.57	7.66	7.73	7.77
Total Suspended Solids [2]	mg/L	2.0	Grab 30 and Average 15	6.5	2.4	**60.9**	60.9	17.9	18.2	11.0	18.8	25.9	27.7
Total Dissolved Solids	mg/L	10	-	87	113	49	40	72	66	75	62	99	165
Turbidity	NTU	0.10	-	30.0	24.3	51.3	53.3	28.3	26.9	22.2	33.0	58.7	56.8

Notes:

Bold highlight indicate results that exceeded the applicable water quality criteria.

[1] Type A Water Licence (2AM-MRY1325 - Amend. 1) - Table 11.

[2] Average TSS for May and June exceeded maximum average TSS concentration discharge limits.

2020 Freshet Surface Water Quality Monitoring Results for SDLT-OUT

Analyte	Sample ID			SDLT-OUT02	SDLT-OUT	SDLT-OUT03	SDLT-OUT	SDLT-OUT01	SDLT-OUT	SDLT-OUT	SDLT-OUT	SDLT-OUT	SDLT-OUT
	ALS Laboratory Sample ID			L2456613-3	L2457149-1	L2457149-2	L2457251-1	L2457251-2	L2457275-3	L2457742-2	L2461162-3	L2459153-3	L2460354-4
	Sample Date & Time			2020-06-04 8:40	2020-06-05 9:50	2020-06-05 9:50	2020-06-06 9:30	2020-06-06 9:30	2020-06-07 11:40	2020-06-08 9:20	2020-06-09 11:20	2020-06-10 10:00	2020-06-11 9:05
	QA/QC Sample Type			Field Blank	N/A	Travel Blank	N/A	Field Duplicate	N/A	N/A	N/A	N/A	N/A
	Units	LOR	Water Licence Criteria [1]										
pH	pH units	0.10	6.0 - 9.5	5.96	7.67	5.94	7.57	7.62	7.55	7.54	7.86	7.59	7.63
Total Suspended Solids [2]	mg/L	2.0	Grab 30 and Average 15	<2.0	**75.0**	<2.0	**38.8**	40.0	**37.7**	21.9	23.7	17.4	**67.2**
Total Dissolved Solids	mg/L	10	-	13	142	16	91	78	49	46	53	63	104
Turbidity	NTU	0.10	-	<0.10	124	<0.10	75.0	67.5	70.4	43.5	47.2	43.7	161

Notes:

Bold highlight indicate results that exceeded the applicable water quality criteria.

[1] Type A Water Licence (2AM-MRY1325 - Amend. 1) - Table 11.

[2] Average TSS for May and June exceeded maximum average TSS concentration discharge limits.

2020 Freshet Surface Water Quality Monitoring Results for SDLT-OUT

Analyte	Sample ID			SDLT-OUT	SDLT-OUT	SDLT-OUT	SDLT-OUT	SDLT-OUT01	SDLT-OUT	SDLT-OUT	SDLT-OUT	SDLT-OUT01	SDLT-OUT
	ALS Laboratory Sample ID			L2460353-4	L2460439-3	L2460468-3	L2460911-2	L2460911-3	L2461576-1	L2463020-1	L2463620-1	L2463620-2	L2463692-1
	Sample Date & Time			2020-06-12 9:25	2020-06-13 18:35	2020-06-14 8:45	2020-06-15 15:10	2020-06-15 15:10	2020-06-16 9:05	2020-06-17 9:40	2020-06-19 16:20	2020-06-19 16:20	2020-06-20 8:20
	QA/QC Sample Type			N/A	N/A	N/A	N/A	Field Duplicate	N/A	N/A	N/A	Field duplicate	N/A
	Units	LOR	Water Licence Criteria [1]										
pH	pH units	0.10	6.0 - 9.5	7.66	7.74	7.72	7.77	7.79	7.73	7.79	7.93	7.94	7.83
Total Suspended Solids [2]	mg/L	2.0	Grab 30 and Average 15	16.1	5.5	6.6	12.6	12.6	17.2	12.2	9.9	9.7	8.7
Total Dissolved Solids	mg/L	10	-	67	87	65	92	78	58	97	100	100	113
Turbidity	NTU	0.10	-	41.4	26.6	19.8	38.4	37.4	53.6	60.1	45.4	44.5	40.5

Notes:

Bold highlight indicate results that exceeded the applicable water quality criteria.

[1] Type A Water Licence (2AM-MRY1325 - Amend. 1) - Table 11.

[2] Average TSS for May and June exceeded maximum average TSS concentration discharge limits.

2020 Freshet Surface Water Quality Monitoring Results for SDLT-OUT

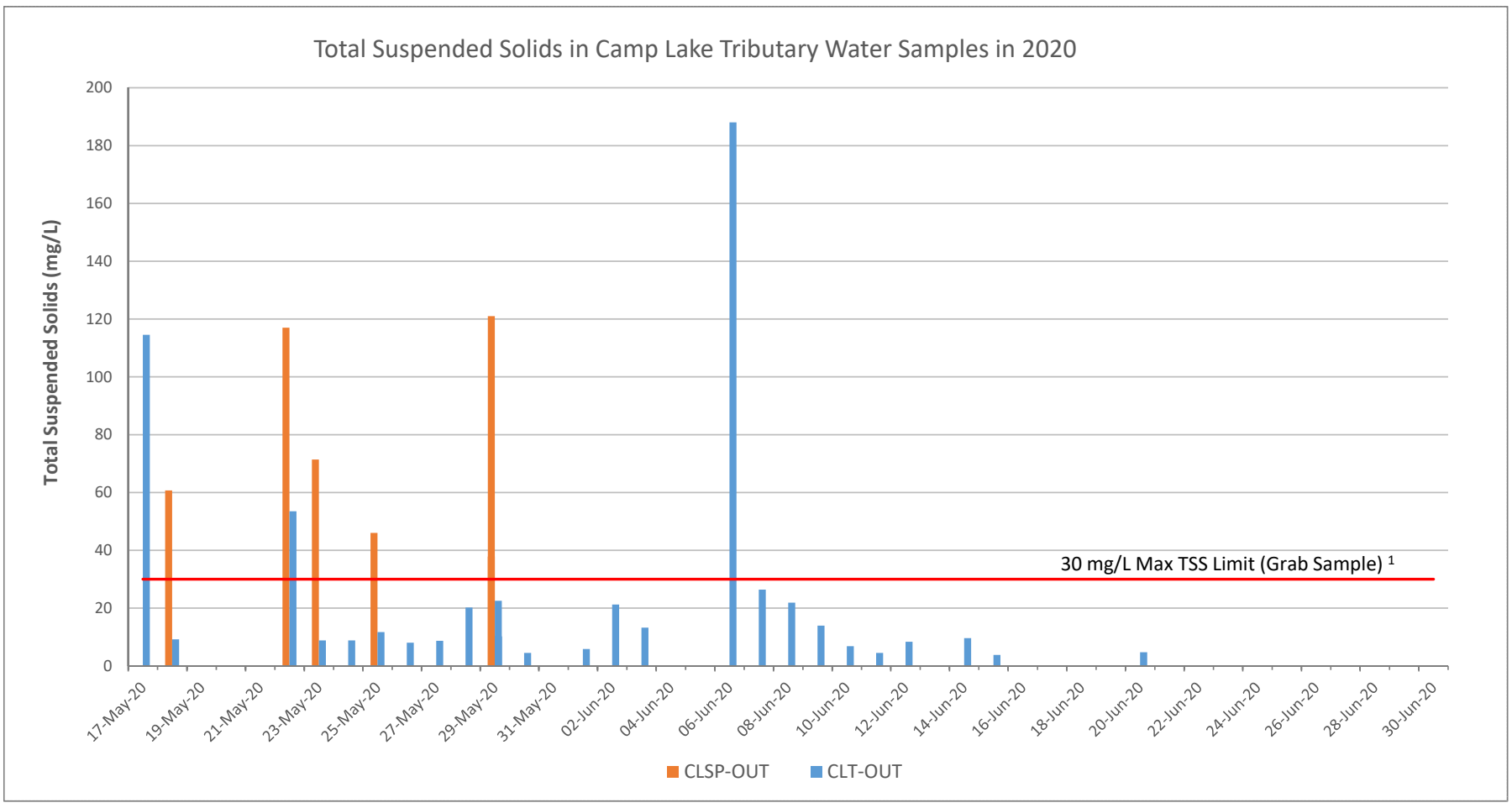
Analyte	Sample ID			SDLT-OUT01	SDLT-OUT	SDLT-OUT
	ALS Laboratory Sample ID			L2463692-2	L2467118-1	L2467077-2
	Sample Date & Time			2020-06-20 8:20	2020-06-21 10:15	2020-06-28 15:30
	QA/QC Sample Type			Field duplicate	N/A	N/A
	Units	LOR	Water Licence Criteria [1]			
pH	pH units	0.10	6.0 - 9.5	7.87	7.96	8.13
Total Suspended Solids [2]	mg/L	2.0	Grab 30 and Average 15	8.4	4.0	2.6
Total Dissolved Solids	mg/L	10	-	86	120	145
Turbidity	NTU	0.10	-	40.8	24.2	5.64

Notes:

Bold highlight indicate results that exceeded the applicable water quality criteria.

[1] Type A Water Licence (2AM-MRY1325 - Amend. 1) - Table 11.

[2] Average TSS for May and June exceeded maximum average TSS concentration discharge limits.

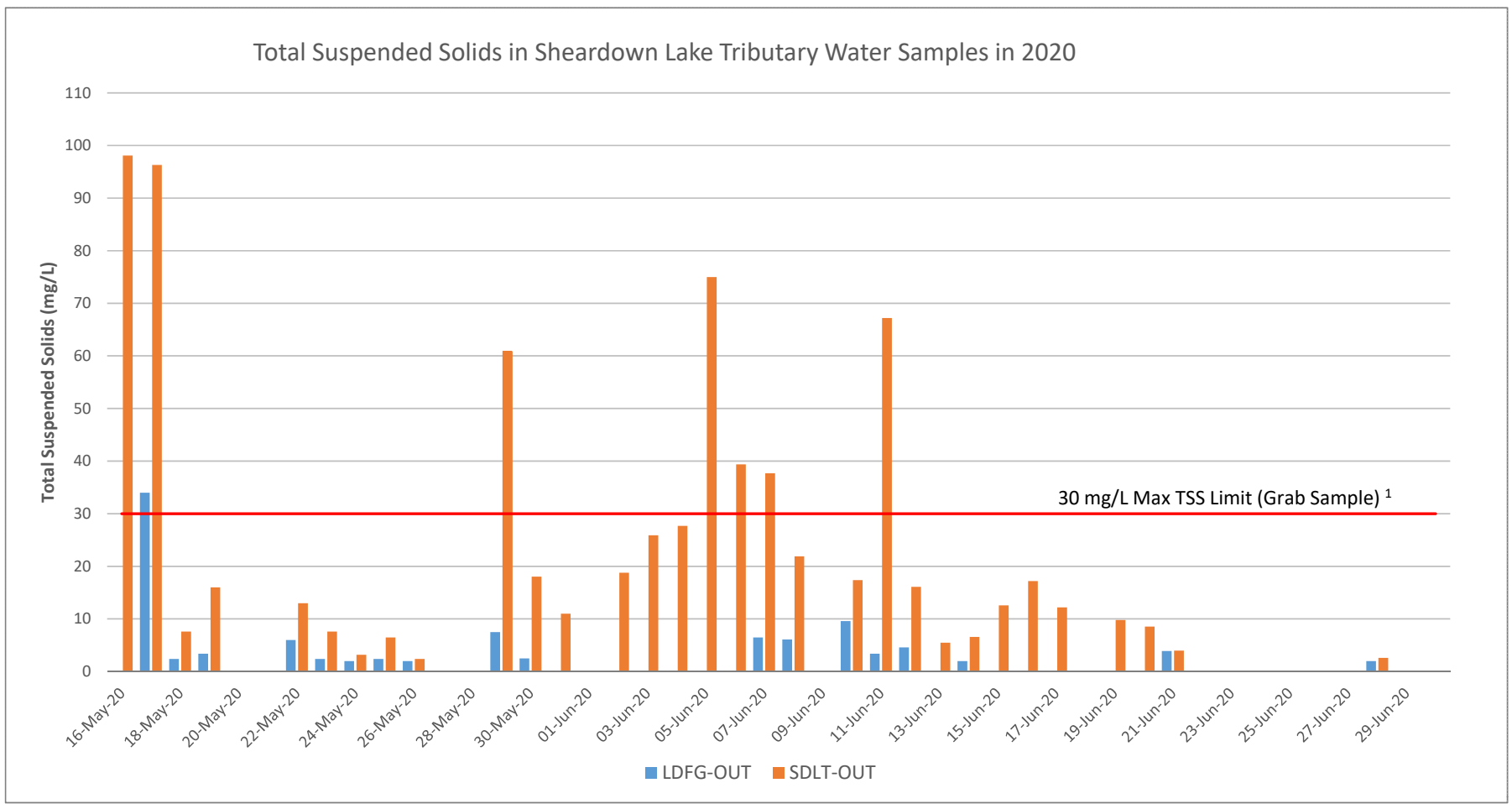


Notes:

Bold highlight indicate results that exceeded the applicable water quality criteria.

[1] Type A Water Licence (2AM-MRY1325 - Amend. 1) - Table 11.

TSS for May 16, 2020 CLSP-OUT (520 mg/L) and CLT-OUT (422 mg/L) grab samples removed to improve TSS scale for the remaining freshet monitoring period.



Notes:

Bold highlight indicate results that exceeded the applicable water quality criteria.

[1] Type A Water Licence (2AM-MRY1325 - Amend. 1) - Table 11.

TSS for June 9, 2020 LDFG-OUT (1249 mg/L) grab sample removed since it resulted from a sampling error or external Laboratory error.

2020 Freshet Surface Water Quality Monitoring Results for E0-20

Analyte	Sample ID			E0-20	E0-20	E0-20
	ALS Laboratory Sample ID			L2460909-1	L2466669-1	L2470180-14
	Sample Date & Time			2020-06-15 9:50	2020-06-23 15:00	2020-07-03 12:30
	QA/QC Sample Type			N/A	N/A	N/A
	Units	LOR	Water Licence Criteria [1]			
Hardness (as CaCO3)	mg/L	0.50	-	49.9	12.2	20.2
pH	pH units	0.10	6.0 - 9.5	7.61	6.91	7.54
Total Suspended Solids [2]	mg/L	2.0	Grab 30 and Average 15	**45.9**	**47.2**	7.7
Total Dissolved Solids	mg/L	20/10	-	73	<10	67
Turbidity	NTU	0.10	-	31.3	8.67	6.79
Alkalinity, Total (as CaCO3)	mg/L	10	-	40	<10	21
Ammonia, Total (as N)	mg/L	0.010	-	0.021	<0.010	<0.010
Chloride (Cl)	mg/L	0.50	-	1.73	0.83	0.95
Fluoride (F)	mg/L	0.020	-	<0.020	<0.020	-
Nitrate (as N)	mg/L	0.020	-	0.204	0.036	0.02
Total Kjeldahl Nitrogen	mg/L	0.15	-	0.29	<0.15	<0.15
Phosphorus, Total	mg/L	0.0030	-	0.0477	0.0419	0.0295
Sulfate (SO4)	mg/L	0.30	-	3.64	0.46	1.36
Dissolved Organic Carbon	mg/L	0.50	-	3.73	2.79	2.15
Total Organic Carbon	mg/L	2.5/0.50	-	3.23	2.82	3.15
Aluminum (Al)-Total	mg/L	0.0050	-	2.32	0.766	0.213
Arsenic (As)-Total	mg/L	0.00010	-	<0.0010	0.00015	<0.00010
Cadmium (Cd)-Total	mg/L	0.0000050	-	0.0000171	0.0000061	<0.000010
Calcium (Ca)-Total	mg/L	0.50	-	8.5	2.09	3.98
Copper (Cu)-Total	mg/L	0.0010	-	0.0048	0.00128	0.00074
Iron (Fe)-Total	mg/L	0.050	-	3.3	0.937	0.198
Lead (Pb)-Total	mg/L	0.000050	-	0.00210	0.000734	0.000216
Magnesium (Mg)-Total	mg/L	0.050	-	6.97	1.68	2.6
Manganese (Mn)-Total	mg/L	0.00050	-	0.0659	0.0225	0.0041
Mercury (Hg)-Total	mg/L	0.000010	-	<0.0000050	0.0000069	<0.0000050
Molybdenum (Mo)-Total	mg/L	0.000050	-	<0.00050	0.000056	0.000074
Nickel (Ni)-Total	mg/L	0.00050	-	0.0072	0.00161	<0.00050
Potassium (K)-Total	mg/L	0.050	-	1.59	0.518	0.49
Selenium (Se)-Total	mg/L	0.000050	-	<0.00050	<0.000050	<0.0010
Sodium (Na)-Total	mg/L	0.050	-	1.24	0.466	0.58
Thallium (Tl)-Total	mg/L	0.000010	-	<0.00010	0.000023	<0.00010
Uranium (U)-Total	mg/L	0.000010	-	0.00085	0.000335	0.000241
Zinc (Zn)-Total	mg/L	0.0030	-	<0.030	<0.0030	<0.0030
Aluminum (Al)-Dissolved	mg/L	0.0050	-	-	-	0.0456
Arsenic (As)-Dissolved	mg/L	0.00010	-	-	-	<0.00010
Cadmium (Cd)-Dissolved	mg/L	0.000010	-	-	-	<0.000010
Calcium (Ca)-Dissolved	mg/L	0.050	-	-	-	3.98
Copper (Cu)-Dissolved	mg/L	0.00020	-	-	-	0.00054
Iron (Fe)-Dissolved	mg/L	0.010	-	-	-	0.032
Lead (Pb)-Dissolved	mg/L	0.000050	-	-	-	<0.000050
Magnesium (Mg)-Dissolved	mg/L	0.050	-	-	-	2.49
Manganese (Mn)-Dissolved	mg/L	0.00050	-	-	-	0.00123
Mercury (Hg)-Dissolved	mg/L	0.000010	-	<0.0000050	0.0000061	<0.0000050
Molybdenum (Mo)-Dissolved	mg/L	0.000050	-	-	-	0.000101
Nickel (Ni)-Dissolved	mg/L	0.00050	-	-	-	<0.00050
Potassium (K)-Dissolved	mg/L	0.050	-	-	-	0.43
Selenium (Se)-Dissolved	mg/L	0.000050	-	-	-	<0.0010
Sodium (Na)-Dissolved	mg/L	0.50	-	-	-	0.576
Thallium (Tl)-Dissolved	mg/L	0.000010	-	-	-	<0.00010
Uranium (U)-Dissolved	mg/L	0.000010	-	-	-	0.000184
Zinc (Zn)-Dissolved	mg/L	0.0010	-	-	-	<0.0030

Notes:

Bold highlight indicate results that exceeded the applicable water quality criteria.

[1] Type A Water Licence (2AM-MRY1325 - Amend. 1) - Table 11.

[2] Average TSS for June exceeded maximum average TSS concentration discharge limits.

APPENDIX C – NATURAL SEDIMENTATION EVENTS

Natural Sedimentation Event North of Milne Port
17 June 2020

MIL-NATSED-1: Turbid flow was observed draining from an area located approximately 8 km north of Milne Port. UTM coordinates for the site are NAD83, Zone 17N, 506172 E, 7984204 N.

Description: Substrate in the natural sedimentation event area is an unconsolidated glacial till that is poorly sorted and has a high content of clay and silt (Fig. 1). There are seasonal streams and permanent ponded areas in the area where the natural sedimentation event occurred (Fig. 2). Water quality samples collected upstream and downstream of the confluence of the affected area on June 17, 2020 indicated that downstream total suspended solids (TSS) increased to 209 mg/L from the upstream TSS of 7.9 mg/L due to the event. The affected area is a seasonal drainage (Fig. 3) that is affected by natural sedimentation events each year during freshet and will be monitored again in 2021.


Figure 1. Substrate of affected area.


Figure 2. Overview of water bodies in the area.


Figure 3. Overview of the affected area.

Natural Sedimentation Event North of Milne Port
17 June 2020

MIL-NATSED-2: Turbid water was observed in several small water bodies located downstream from a small braided stream approximately 12 km north of Milne Port. UTM coordinates for the site are NAD83, Zone 17N, 501499 E, 7988487 N.

Description: The source of the natural sedimentation event identified as MIL-NATSED-2 was determined to be a sloughed hillslope of what appeared to be glacial till that was partially covered with snow (Fig. 1). The sloughed hillslope was causing sediment loading into the braided stream resulting in elevated turbidity in the downstream water bodies. Water quality samples collected upstream and downstream of the affected area on June 17, 2020 indicated that downstream total suspended solids (TSS) increased to 346 mg/L from the upstream TSS of <2.0 mg/L due to the event. The affected area is a seasonal drainage that is affected by natural sedimentation events each year during freshet and will be monitored again in 2021.

Figure 1. Overview of affected area.

Natural Sedimentation Event Northwest of Milne Port
17 June 2020

MIL-NATSED-3: A gap in a mountain located approximately 7 km northwest of Milne Port gave way to reveal two steps of rocks where loose soil poses a risk for sediment loading to a downstream water body (Fig. 1). UTM coordinates for the site are NAD83, Zone 17N, 497527 E, 7979818 N.

Description: Substrate in the natural sedimentation event area is an unconsolidated glacial till that is poorly sorted and has a high content of gravel, clay and silt. A seasonal stream drains through the affected area during freshet and carries sediment into the downstream water body. Water quality samples collected upstream and downstream of the affected area on June 17, 2020 indicated that downstream total suspended solids (TSS) increased to 168 mg/L from the upstream TSS of 7.1 mg/L due to the event.

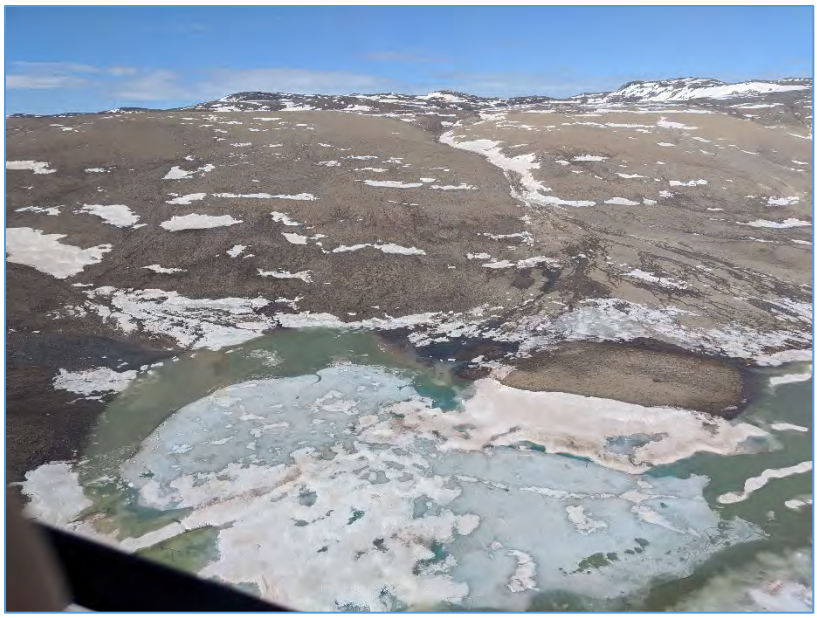


Figure 1. Overview of the natural sedimentation event area.

Natural Sedimentation Event on the Mary River
11 July 2020

MR-NATSED-1: A large mudslide affected the Mary River approximately 14 km northeast of the Deposit 1 open pit when the ground slid away due to snowmelt.

Description: Substrate is an unstable mix of gravel, sand/silt and large boulders (Fig. 1). Turbid flow from the mudslide was observed entering the Mary River (Fig. 2). Instream water quality monitoring performed upstream (Fig. 3) and downstream (Fig. 4) of the affected stream section on July 15, 2020 indicated that downstream turbidity increased to 38.5 NTU from the upstream turbidity of 30.5 NTU due to the event. When the site was inspected on July 15, 2020, it appeared that the mudslide was not at risk of further movement at that time and the effects on the Mary River water quality would likely be short-lived.

Figure 1. Substrate of mudslide area.

Figure 2. Turbid flow entering the Mary River.

Figure 3. Downstream monitoring site.

Figure 4. Upstream monitoring site.

Natural Sedimentation Event on a Tributary of the Mary River
15 July 2020

MR-NATSED-2: An approximately 300 m long hillslope sloughed to the banks of a tributary of the Mary River approximately 8 km northeast of the Deposit 1 open pit due to melting conditions. UTM coordinates for the site are NAD83, Zone 17N, 0577143 E, 7921462 N.

Description: Substrate is an unstable mix of gravel, cobble and sand/silt (Fig. 1). Sediment from the sloughed hillside was observed entering the tributary of the Mary River (Fig. 2). The sediment carried into the Mary River from the affected tributary was observed to increase turbidity in the Mary River downstream of the confluence. UTM coordinates for a water quality monitoring location downstream of the confluence are NAD83, Zone 17N, 574946 E, 7920199, N. UTM coordinates for a water quality monitoring location upstream of the confluence are NAD83, Zone 17N, 574934 E, 7920838 N. Water quality samples collected upstream and downstream of the confluence of the tributary with the Mary River on July 15, 2020 indicated that downstream total suspended solids (TSS) increased to 18.1 mg/L from the upstream TSS of 15.5 mg/L due to the event. Water quality samples collected upstream and downstream of the confluence of the tributary with the Mary River on July 19, 2020 indicated that downstream TSS increased to 16.8 mg/L from the upstream TSS of 6.4 mg/L due to the event. The sloughed hillslope is considered an active source of sedimentation loading into the Mary River and will be monitored again during the 2021 freshet season.


Figure 1. Substrate of sloughed hillside.


Figure 2. Sediment entering the tributary.


Figure 3. Downstream monitoring site.


Figure 4. Upstream monitoring site.

Natural Sedimentation Event on the Mary River
15 July 2020

MR-NATSED-3: Thawing conditions caused an active layer of granular material to slide down a slope above the Mary River approximately 15 km northeast of the Deposit 1 open pit resulting in sediment loading to the Mary River. UTM Coordinates for the site are NAD83, Zone 17N, 573802 E, 7925059 N.

Description: Substrate is an unstable mix of gravel, cobble and sand/silt (Fig. 1). Sediment from the sliding slope was observed entering the Mary River (Fig. 2). The sediment carried into the Mary River from the affected slope was observed to increase downstream turbidity in the Mary River. UTM coordinates for a water quality monitoring location downstream of the confluence are NAD83, Zone 17N, 573616 E, 7925011 N. UTM coordinates for a water quality monitoring location upstream of the confluence are NAD83, Zone 17N, 573616 E, 7925011 N. Water quality samples collected upstream and downstream of the affected section of the Mary River on July 15, 2020 indicated that downstream total suspended solids (TSS) increased to 18.6 mg/L from the upstream TSS of 10.8 mg/L due to the event. Water quality samples collected upstream and downstream of the affected section of the Mary River on July 19, 2020 indicated that downstream total suspended solids (TSS) increased to 11.8 mg/L from the upstream TSS of 3.9 mg/L due to the event.


Figure 1. Substrate of sliding slope.


Figure 2. Sediment entering the Mary River.


Figure 3. Downstream monitoring site.


Figure 4. Upstream monitoring site.

Natural Sedimentation Event on the Mary River
1 August 2020

MR-NATSED-4: Slumping hills on the west side of a glacier along a tributary of the Mary River located approximately 16 km northeast of the Deposit 1 open pit at the Mary River Mine Site (Fig. 1).

UTM Coordinates: NAD83, Zone 17N, 577188 E, 7921903 N.

Figure 1. Map showing location of MR-NATSED-4 (red marker) and approximate location of Deposit 1 open pit at the Mary River Mine Site (white circle).

Description: Substrate is an unstable mix of gravel, sand/silt and large boulders (Fig. 2). Flow from the slumping hills enters a tributary that joins the Mary River downstream (Fig. 3).

Figure 2. Substrate of slumping hills.

Figure 3. Turbid flow from MR-NATSED-4 entering the Mary River.

Figure 4. Aerial photograph of sloughed hillside.

On August 1, 2020, elevated turbidity was observed in the Mary River at an existing water quality sampling location used for the Aquatic Environmental Effects Monitoring Program (E0-21). A helicopter fly-over inspection of upstream sections of the Mary River identified that the active layer on a long section of hillside located approximately 16 km northeast of the Deposit 1 open pit at the Mary River Mine had sloughed into a tributary of the Mary River resulting in sediment loading to the river. On August 3, 2020, water samples were collected in the tributary from sampling locations upstream and downstream affected section of the tributary. UTM coordinates for a water quality monitoring location downstream of the affected area (Fig. 5) are NAD83, Zone 17N, 577058 E, 7921123 N. UTM coordinates for a water quality monitoring location upstream of the affected area (Fig. 6) are NAD83, Zone 17N, 577188 E, 7921903 N. Water quality samples collected upstream and downstream of the affected section of the tributary on August 3, 2020 indicated that downstream total suspended solids (TSS) increased to 348.0 mg/L from the upstream TSS of 4.4 mg/L due to the event. The sloughed hillslope is considered an active source of sedimentation loading into the Mary River and will be monitored again during the 2021 freshet season.

Figure 5. Downstream sampling location.

Figure 6. Upstream sampling location.

APPENDIX D – FRESHET MONITORING PROGRAM

Freshet Monitoring Program

The Freshet Monitoring Program is conducted each year to characterize the water quality of several Mine Site tributaries and drainages during the high flow period of freshet. The monitoring program begins each year upon the start of flows at the monitoring locations, which typically begins around mid-May. Based on site knowledge from prior years, review of meteorological and snow data and through an increased frequency of inspections in the time period leading up to freshet, the site team is able to forecast the timing of freshet to the best of their ability and initiate the monitoring program.

All employees involved in the implementation of the Freshet Monitoring Program receive thorough training during their on-boarding before being authorized to conduct inspections and water sampling on-site. Training includes reading and understanding all relevant standard practices and procedures in addition to in-field training with subject matter experts.

Mine Site Freshet Monitoring Program

At the Mine Site, the following four (4) monitoring locations (CLSP-OUT, CLT-OUT, SDLT-OUT, LDFG-OUT) are included in the program. These stations are monitored during freshet (typically May 15 to June 30) for the following parameters in accordance with Baffinland's Type "A" Water Licence – 2AM-MRY1325:

- pH
- Total suspended solids (TSS)
- Total dissolved solids (TDS)
- Turbidity

Water quality at these sampling locations must adhere to the concentrations listed below in Table 1.

Table 1 Effluent Quality Discharge Limits for Contact Water during the Operations Phase and the Early Revenue Phase of the Project (Type "A" Water Licence – 2AM-MRY1325 – Table 11)

Parameter	Maximum Average Concentration	Maximum Concentration of any Grab Sample
TSS	15 mg/L	30 mg/L
Oil and Grease	No Visible Sheen	No Visible Sheen
pH	Between 6.0 and 9.5	Between 6.0 and 9.5

Mine Site Freshet Sampling Locations

There are four (4) outfalls that are monitored and sampled throughout freshet. CLSP-OUT and CLT-OUT enter Camp Lake, and SDLT-OUT and LDFG-OUT enter Sheardown Lake. Their locations are listed in Table 2.

Table 2 Sample Locations - Camp Lake and Sheardown Lake Outfalls

Sample Location	Description	Location (UTM; NAD83 Zone 17W)	
		Easting	Northing
CLSP-OUT	Camp Lake Sedimentation Ponds outlet	557805.43	7914795
CLT-OUT	Camp Lake Tributary 1 (100 m upstream of Camp Lake outfall)	557686.20	7914947
SDLT-OUT	Sheardown Lake Tributary 1 (100 m upstream of Sheardown Lake outfall)	560332.41	7913519
LDFG-OUT	Sheardown Lake Landfill gate tributary (40 m Upstream of Sheardown Lake outfall)	561017.65	7912968

Milne Port Freshet Monitoring Program

At Milne Port, the following monitoring locations as detailed below are included in the program. These stations are monitored druing freshet (typically May 20 to June 30) for:

- pH
- Total suspended solids (TSS)
- Total dissolved solids (TDS)
- Turbidity

Water quality at these sampling locations must adhere to the concentrations listed below in Table 1.

Table 3 Effluent Quality Discharge Limits for Contact Water during the Operations Phase and the Early Revenue Phase of the Project (Type "A" Water Licence – 2AM-MRY1325 – Table 11)

Parameter	Maximum Average Concentration	Maximum Concentration of any Grab Sample
TSS	15 mg/L	30 mg/L
Oil and Grease	No Visible Sheen	No Visible Sheen
pH	Between 6.0 and 9.5	Between 6.0 and 9.5

Monitoring of possible Surveillance Network Program (SNP) sites is required daily. Pond and berm monitoring is required weekly. The locations are listed in Table 4.

Milne Port Freshet Sampling Locations

Table 4: Sample Locations: Milne Port

Sample Location	Description	Location (UTM; NAD83 Zone 17W)	
		Easting	Northing
MP-C-G[1]	West of Ore Pad – Possible decommissioning site	502939	7976238
MP-C-H	Sealift Ramp, Upstream of culvert	504113	7976509
MP-C-J[2]	Southwest of LP3 pad	502940	7974760
MP-C-B	West of Ore Pad	503187	7975602
MP-C-B01	West of LP3 laydown	502982	7975333

1. Monitoring only if flow is observed.
2. New location for 2020; proposed new SNP site.

Mine Site and Milne Port Freshet Sampling Procedure

1. When water begins flowing at the outfall locations, samples will be collected at these locations daily for pH, TSS, TDS and Turbidity.
2. Field readings will be recorded at every sampling event after the sample has been collected.
3. The daily frequency will continue until seven (7) days of consecutive compliant results are received from the laboratory.
4. Once a sample location has seven (7) days of consecutive compliant results, the frequency will be reduced to a weekly sample event, where the week begins on Sunday.
5. If the sample location has a non-compliant result at any point, sampling will return to the daily frequency.

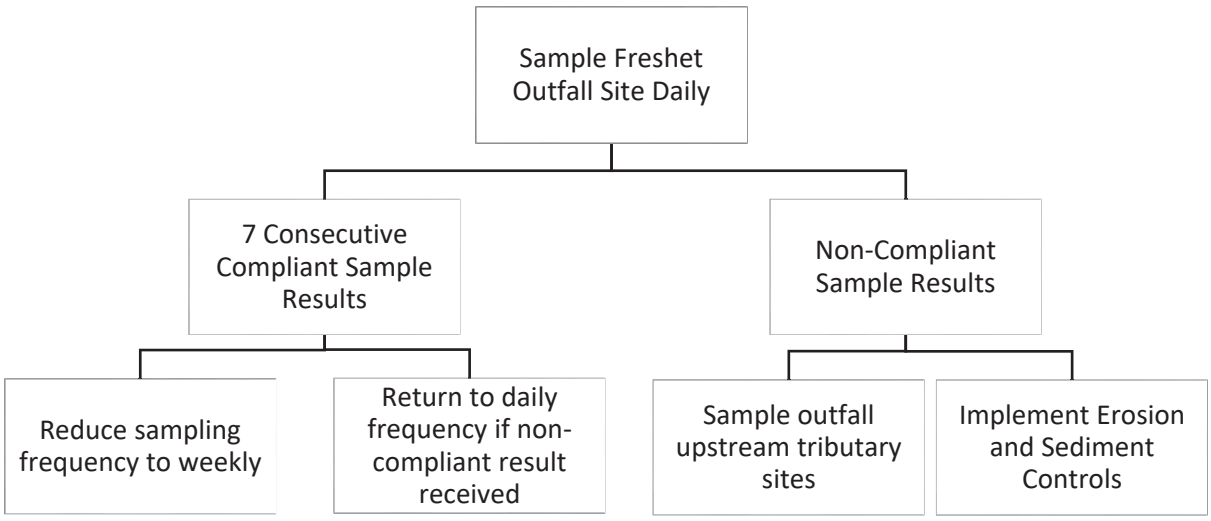


Figure 1 Sampling Flowchart

If a non-compliant result is received for an outfall site:

1. Continue to sample on a daily frequency.
2. Sample the outfall tributary locations upstream of the outfall site, listed in Table 5. Upstream locations will be assessed based on current flow conditions.
3. Implement required erosion and sediment controls. Lab results of the tributary locations and visual observations will assist in identifying the source, and the location and type of ESC required.
4. Locations on a tributary must be sampled in a downstream to upstream direction, starting at the outfall location.

Table 5 Tributary Sample Locations - Camp Lake and Sheardown Lake

Outfall	Sample Location	Description	Location (UTM; NAD83 Zone 17W)	
			Easting	Northing
CLT-OUT	BG-01-DS	Downstream of BG-01 culvert in KM100 dip	557892.98	7914937
	BG-01-US	Upstream of BG-01 culvert in KM100 dip	558050.73	7914941
SDLT-OUT	CV-186-DS	Downstream of CV-186 culvert in KM103 S-Bend	560642.04	7913497
	CV-186-US	Upstream of CV-186 culvert in KM103 S-Bend	560757.13	7913503
	CV-187-US	Upstream of CV-187 culvert at KM103; MS-C-E	560980.03	7913386
LDFG-OUT	LDFG-MID	Downstream of the Landfill gate culvert	561096.56	7912884
	LDFG-US	Upstream of the Landfill gate culvert	561297.50	7912737

Monitoring at Mine Haul Road Culverts and Check Dams

Baffinland will monitor culverts and check dams along the Mine Haul Road on a weekly frequency during freshet. Weekly monitoring of Mine Haul Road culverts and check dams will be conducted by the Environmental team. In addition, Baffinland employees in the Mine Operations team routinely conduct visual observations of channels, culverts, ditches, and water management embankments around the active mining area and Mine Haul Road. This is to ensure adequate performance, identify potential obstructions, and observe signs of deterioration or physical instability. If identified, mitigations and corrective actions are implemented in a timely manner to prevent impacts to water flow and quality. In response to communication regarding a suspected exceedance, the Environment Department will assist in implementing appropriate control measures focused at the source of the issue.

Routine maintenance or remedial actions are carried out prior to freshet and as required according to inspection results.

Typical maintenance requirements involve the following:

- Repairing damage observed during regular physical inspections of channels, ditches and water retaining embankments; and
- Keeping flow channels and ditches free of obstruction.

Water quality sampling along the Mine Haul Road is conducted in an opportunistic manner based on visual observations by Baffinland employees. The location must be safe to access based on current mining operations/proximity to equipment and the speed/flow and depth of the moving water. All sampling events along the mine haul road must adhere to Baffinland's Health and Safety policies and practices for sampling around swift water.

Table 6 provides a list of Mine Haul Road culverts and check dams which will be monitored during freshet. A figure showing the culvert locations is included as Appendix A.

Table 6: Mine Haul Road Culvert and Check Dam Monitoring Locations

Culvert/Check Dam	Location (UTM; NAD83 Zone 17W)		Elevation
	Easting	Northing	
CV-7	564232	7915429	529.5
CV-6	564282	7914299	438.3
CV-5	564090	7913854	399.0
CV-4	563708	7913694	357.0
CV-3	563592	7913518	332.4
CV-2	563324	7913320	300.5
CV-1	563139	7912797	260.5
KM 106.5 check dam	Tote Road km 106.5		
KM 108.5 check dam	Tote Road km 108.5		

Water/Waste Containment Structure Inspections

In addition to freshet monitoring programs and in accordance with Part E Item 11 of the Type 'A' Water Licence, weekly inspections of structures designed to contain, withhold, divert or retain Waters or Wastes during periods of flow are carried out at the Mine Site and Milne Port. Table 7 provides a list of structures at the Mine Site and Milne Port which are inspected during periods of flow. A copy of each weekly Water and Wastewater containment structure inspection will be submitted to CIRNAC following the inspection.

Table 7: Mine Site and Milne Port Water and Wastewater Containment Structures

Water/Waste Containment Structure	Location (UTM; NAD83 Zone 17W)	
Mine Site	**Easting**	**Northing**
Hazardous Waste Berm (HWB):		
HWB 1	558205	7914554
HWB 2	558192	7914561
HWB 3	558278	7914539
HWB 4	558295	7914532
HWB 5	558152	7914553
HWB 6	558508	7914709
HWB 7	558307	7914479
Polishing Waste Stabilization Pond (PWSP):		
PWSP 1 (MS-MRY-4A)	558470	7914237
PWSP 2 (MS-MRY-4B)	558470	7914237
PWSP 3 (MS-MRY-4C)	558470	7914237
Ore Stockpile Pond MS-06	561475	7913000
Waste Rock Stockpile West Pond MS-08	563492	7916273
Bulk Fuel Storage Facility MS-03	561258	7913304
Landfill	560862	7912599
Generator Fuel Berm	558083	7914416
Milne Port		
Hazardous Waste Berm (HWB):		
HWB 1	503901	7976293
HWB 2	503732	7975968
HWB 3	503559	7975962
HWB 4	503573	7975949
Bulk Fuel Storage Facility MP-03	503638	7976272
Landfarm Facility MP-04	503710	7975574
Contaminated Snow Facility MP-04A	503862	7975482
PWSP MP-01A	503625	7976015
Ore Stockpile Sedimentation Pond (East) MP-05	503469	7976383
Ore Stockpile Settling Pond (West) MP-06	503125	7976364

Tote Road Monitoring Program

In addition to freshet monitoring programs, the Tote Road Monitoring Program was developed and implemented to assess surface water quality associated with water crossings (culverts, bridges) on the Milne Inlet Tote Road, with a primary focus on monitoring total suspended solids (TSS) concentrations upstream and downstream of Tote Road water crossings. Complete details on the Tote Road Monitoring Program are outlined in Appendix D of the Roads Management Plan (BAF-PH1-830-P16-0023).

Water crossings monitored under the TRMP have been selected to give a geographically representative sample set of water crossings for each given watershed intersected by the Tote Road (Phillips Creek, Ravn River, Mary River). In selecting the Tote Road water crossings within each watershed, the following factors were considered:

a) Key depositional habitats downstream of the Tote Road (e.g. fish habitat);
b) Areas historically prone to sedimentation events;
c) Historical borrow source locations; and,
d) Existing monitoring locations and programs.

Using the factors and criteria listed above, the following 20 Tote Road water crossings, presented in Table 8, were identified as monitoring locations. During freshet, these locations are monitoring at least once per week, with monitoring frequency decreasing to once per month following freshet. Results of the monitoring are documented in the QIA/NWB Annual Report for Operations.

Table 8 – Water Crossings Monitored under TRMP

Water Crossing	Watershed	Approximate Tote Road Chainage
CV167	Phillips Creek	6
CV154	Phillips Creek	9
CV128*	Phillips Creek	17
CV129	Phillips Creek	17
CV115	Phillips Creek	27
CV112	Phillips Creek	31
CV106	Phillips Creek	33
CV099*	Phillips Creek	37
CV093*	Phillips Creek	41
CV078*	Phillips Creek	51
CV072	Phillips Creek	54
CV060	Phillips Creek	58
BG50*	Ravn River	62
CV040*	Ravn River	72
BG32	Ravn River	78
CV217*	Ravn River	80
BG30	Ravn River	84
BG24*	Mary River	87
CV001	Mary River	94
CV223	Mary River	97

Notes: Water crossing with an asterisk (*) are HADD fish bearing water crossings.

Appendix A

Figures

LEGEND

- Freshet Monitoring Location
- Project Development Area

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MARY RIVER PROJECT

Mine Haul Road Culvert and Check Dam Monitoring Locations

Projection: NAD 1983 UTM ZONE 17N.

Source: © Her Majesty the Queen in rights of Canada Department of Natural Resources (2009). All rights reserved.

0 0.075 0.15 0.3 0.45 0.6 km

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FIGURE 2

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LEGEND

- Freshet Monitoring Location
- Project Development Area

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Milne Port Monitoring Locations

Projection: NAD 1983 UTM ZONE 17N.

Source: © Her Majesty the Queen in rights of Canada Department of Natural Resources (2009). All rights reserved.

0 0.05 0.1 0.2 0.3 0.4 km

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ᑎᑎᕋᐅᓯᒪᔪᑦ **FIGURE** 2

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LEGEND

- Freshet Monitoring Location
- Project Development Area

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Mine Site Monitoring Locations

Projection: NAD 1983 UTM ZONE 17N.
Base Map: © 2019 Digital Globe, Inc.
Imagery is representative as of August 2019.

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Meters

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ᑎᑎᕋᐅᓯᖏᓐᓄᑦ FIGURE 3

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