5 August, 2021

Assol Kubeisinova
Technical Advisor, NWB
P.O. Box 119
Gjoa Haven, NU X0B 1J0

RE: Response to Comments
Modification Request No. 13 – Mine Site Water Management
Mary River Project, Type 'A' Water Licence - 2AM-MRY1325 - Amend. No. 1

Baffinland Iron Mines Corporation (Baffinland) provides the attached responses to comments received from the Qikiqtani Inuit Association (QIA)[1] and Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC)[2] regarding Water Licence Modification Request No. 13 for the Mine Site Water Management Plan.

We trust that the attached responses provide additional clarification on the proposed work and infrastructure changes at the Project. Please do not hesitate to contact the undersigned should you have any remaining questions or comments.

Regards,

Connor Devereaux
Environmental Superintendent

Attachments:
Attachment 1: Baffinland Responses to Comments
Attachment 2: Hydrology Memo
Attachment 3: Updated Modification Request Components

Cc: Karén Kharatyan (NWB)
Chris Spencer, Hugh Karpik (QIA)
Miriame Giroux-Paniloo, Sarah Forte, Bridget Campbell (CIRNAC)
Megan Lord-Hoyle, Lou Kamermans, Tim Sewell, Christopher Murray, Kendra Button (Baffinland)

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[1] QIA (2021) Re: Modification No. 13 – Mine Site Water Management Plan; Mary River Project, Water Licence 2AM-MRY1325. Letter dated 16 July, 2021.
[2] CIRNAC (2021) Re: Crown-Indigenous Relations and Northern Affairs Canada Review of the Baffinland Mary River Mine Site Water Management Plan Modification No. 13, Type A Water Licence No. 2AM-MRY1325. Letter dated 21 July, 2021.

Attachment 1

Baffinland Responses to Comments

Table 1 - Responses to QIA Comments

Comment #	Reviewer Comment	Baffinland Response
QIA-1	Given the scope of the proposed changes, QIA is concerned with the level of detail provided prior to the proposed commencement of construction activities. Construction activities are proposed to occur prior to the finalization of designs for all water management infrastructure. Further, Baffinland has not committed to prompt information sharing during the construction phase. If the Nunavut Water Board (NWB) is considering the application as is, QIA would strongly recommend implementing the following reporting requirements (see below). These requirements will ensure QIA and other intervenors are able to review progress and provide advice on a timely basis.	Baffinland acknowledges that the phased approach to construction of the water management infrastructure means we are unable to provide detailed design for all components described in the modification. However, we are committed to providing issued for construction (IFC) drawings and associated design briefs prior to the construction of the infrastructure components described in the Modification Request, at least 30 days prior to construction in alignment with the Type A Water Licence 2AM-MRY1325 (the Licence). In addition, Baffinland will provide an updated construction status summary with each IFC submission to the NWB and QIA, that will outline which infrastructure is in active construction, pending further design, or has been completed. As-Built documentation will be provided within 90 days of construction completion, in accordance with the Licence.
QIA-1a	Milestone reporting: i. Baffinland classifies the KM105 Sedimentation Pond dams as “significant” consequence structures. A proper dam breach analyses is needed to verify this classification prior to the initiation of construction. ii. Foundation approval documented by the supervising Engineer prior to fill placement. iii. Prompt submission of Design briefs with Issued for Construction (IFC) as well as As-Built documentation iv. Update with results of verification sampling for total suspended solids (TSS). v. Update when sedimentation and erosion mitigation measures are implemented.	i. A conservative dam classification of "High" has been assumed and incorporated into the embankment designs in the absence of a dam breach analysis. Completion of a dam breach analysis is not required based on the more conservative design criteria used. It would be required if Baffinland wished to rationalize a less conservative dam classification, and may be further evaluated for the design of subsequent infrastructure at KM104. ii. The engineer of record will review all material placement, and documentation will be provided in the signed and stamped Construction Summary Report submitted to the NWB and QIA in accordance with the Licence and the Commercial Lease. iii. The signed and stamped Construction Summary Report submitted to the NWB and QIA in accordance with the Licence and the Commercial Lease. iv. Construction monitoring, as well as regular SNP monitoring will be reported monthly, consistent with the terms of the Licence. Post-construction monitoring will be completed in accordance with the SNP monitoring program and the Freshwater Supply, Sewage and Waste Water Management Plan. v. Implementation of sediment and erosion controls during construction will be conducted on an as-needed basis. This will be documented in the Construction Summary Report, and the on-Site QIA Environmental Monitors will be able to observe and review implementation of mitigation measures as they are implemented.
QIA-1b	Weekly reporting during construction of the Sedimentation Pond, including but not limited to: i. Use of fill material. ii. Condition of safety berms along the pond embankment. iii. Lined embankments and abutments and lined / covered natural slopes. iv. Spillway performance. v. Water removal system.	Baffinland will not be able to provide weekly updates on the progress of construction or the requested indicators here. The engineer of record will review all aspects related to fill placement, conditions of berms and embankments and performance of the structure. Any deficiencies will be identified and documented in the Construction Summary Report, with corresponding corrective actions as required. The on-Site QIA Environmental Monitors will be able to observe the construction of the Sedimentation Pond.
QIA-1c	Reporting at end of construction season: i. Photos taken before, during and after for new infrastructure. ii. Updates on the geosynthetics Quality Control program. iii. Updates on conducting the Quality Control testing and inspections required on all placed and compacted fill materials. iv. Updates on new monitoring stations added to relevant management / monitoring plans, including the Fresh Water Supply, Sewage and Wastewater Management Plan, and the Surface Water and Aquatic Ecosystems Management Plan. v. Submission of environmental inspection forms by Baffinland and/or contractors. vi. Inspections of earthworks and geological and hydrological regimes	This information will be presented in the Construction Summary Report with as-built drawings. The relevant management plans will be updated following commissioning of each facility, including any new water quality monitoring locations, including those under the SNP monitoring program.

Table 1 - Responses to QIA Comments

Comment #	Reviewer Comment	Baffinland Response
QIA-2	Baffinland notes that TSS monitoring will only being performed downstream. QIA recommends that upstream monitoring be completed wherever feasible.	Baffinland does not believe that monitoring upstream will provide meaningful input on the construction water quality monitoring. As the construction activities will be a known source of disturbance and there is an increased potential for sedimentation issues, Baffinland will only monitor downstream of these activities and will assume that any exceedances identified are the result of mine related activities and take the appropriate action to mitigate potential impacts.
QIA-3	QIA is concerned that the active mine area and the waste rock facility are excluded from the Mine Site Water Management Plan. QIA requests Baffinland provide justification for the exclusion of these project components.	The Waste Rock Facility (WRF) and it's associated water management infrastructure is an approved facility under the Water Licence. Water within the active mining area is managed in the WRF pond, consistent with the Freshwater Supply, Sewage and Waste Water Management Plan, and the Surface Water and Aquatic Ecosystems Management Plan. Any changes to the WRF will be subject to a separate modification request.
QIA-4	In Table 1 of the NWB submission (Table 1 – Proposed Water Management Facilities), Baffinland states that the design of the KM105 Pond does not meet the proposed design criteria. Additional infrastructure that has not yet been designed is required. a. Why was this issue not rectified during the design phase of the KM105 Pond? b. Why proceed with construction of the KM105 Pond if the current design does not meet the design criteria?	The design capacity of the KM105 pond, while greater than the current Mary River Project Design Criteria based on a 1:10 year, 24 hour storm event, is less than the new proposed project design criteria of 1:50 year, 3 day snowmelt plus rainfall event (116 mm). The initial design of this pond was intended to meet the new proposed design criteria, however through geotechnical investigation in spring 2021 and evaluation of the CDA dam criteria, it was determined that the initial design would not be feasible. In an effort to mitigate these issues and still be able to initiate construction in 2021, a smaller KM105 pond was designed as presented, acknowledging that subsequent design and construction of additional infrastructure would be required to meet the new proposed design criteria. Baffinland is committed to meeting the design criteria through expansion, and the possible options for expansion to meet the design criteria are described in Section 4.3 of the WMP. Baffinland has chosen to establish initial water management infrastructure in 2021, so as to not delay taking action on sedimentation issues at the site, and construct the selected expansion option in 2022.

Table 2 - Responses to CIRNAC Comments

Comment #	Reviewer Comment	Reviewer Recommendation	Baffinland Response
CIRNAC-1	**Discharging KM105 sedimentation pond water into SDLT-1** The KM105 Sedimentation Pond Design Brief specifies that the pond will be discharged into Sheardown Lake Tributary #1 (SDLT-1), at a design flow for discharge of 900 m3/hr. The lower reaches of this tributary are fish bearing according to the information provided in the Hydrology Assessment. The Hydrology Assessment discusses the impact of proposed changes to mean annual unit runoff, but does not address changes on shorter time scales. Fisheries and Oceans Canada's 2013 Framework for Assessing the Ecological Flow Requirements to Support Fisheries in Canada states that "cumulative flow alterations <10% in amplitude of the actual (instantaneous) flow in the river relative to a "natural flow regime" have a low probability of detectable impacts to ecosystems…". It is not clear what impact adding 900m3/hr to the flow of SDLT-1 during decant will have on the instantaneous flow and stream ecology.	(R-01) CIRNAC recommends the licensee provide information on typical instantaneous flows in SDLT-1, how the proposed decant flows compare to these, and if impacts of the decant flows need to be considered.	The 900 m3/h pumping rate was identified as the pumping capacity required to empty a full pond in a reasonable time frame should the design flood event occur that fills the pond. Under most circumstances, the discharge rate will be well below this. An updated Hydrology Assessment is provided as Attachment 2 that describes the typical discharge event relative to the natural flow regime, with comments regarding the potential to affect fish and fish habitat.
CIRNAC-2	**Diversion Berms** Diversion berms are proposed in the Mine Site Water Management Plan for both areas 1 (Mary River) and 2 (Sheardown Lake and tributaries). As drawn on the plans, it appears the berms divert water but also collect water. This was not discussed in the text and requires clarification. Specifically, on Figure 4.2 Plan – Option C has a berm with a shallow angle, which would cause water to accumulate behind it, and on Figure 5.1 the diversion berm crosses a valley and stream, which would also cause water to pond.	(R-02) CIRNAC recommends the licensee confirm if the proposed diversion berms will collect water and clarify how it will be managed.	The diversion berms shown on Figures 4.2 and 5.1 are conceptual only and require design. The intent is to maintain positive drainage so that the berms do not collect water.
CIRNAC-3	**Sediment traps** One of the proposed types of infrastructure in the Mine Site Water Management Plan are sediment traps. Section 3.4.3 specifies "Traps may be formed through excavation, above ground embankments, or a combination of the two". Excavations in permafrost areas can lead to permafrost disturbance, particularly if water ponds in the excavation. The plan does not include any details on approximate dimensions of sediment traps or what measures would be taken to protect permafrost in the ground below the traps.	(R-03) CIRNAC recommends the licensee provide more details on the sediment traps including what measures would be taken to prevent permafrost degradation below the traps.	Measures to prevent permafrost degredation will need to be incorporated into the design of sediment traps (lined, emptied and don't hold water). In most cases, sediment traps will be constructed above ground and in existing low areas. Where the ground surface is already highly disturbed, sediment traps may be excavated.
CIRNAC-4	**Discharge criteria for proposed sump in quarry QMR2** Table 2 in the Modification Request proposed four new Surveillance Network Program (SNP) Monitoring Stations and is followed by a discussion of which effluent quality discharge limits would be used for the different stations. A small sedimentation pond is proposed for the QMR2 quarry though no SNP station is proposed for this location and effluent quality discharge criteria are not discussed. The Mine Site Water Management Plan states there may be potential water quality issues at this pond. CIRNAC agrees with the assessment, particularly with regards to nitrogen compounds from blast residue.	(R-04) CIRNAC recommends that the Mine Site Water Management Plan include an SNP station for proposed QMR2 sedimentation pond and discuss what water quality effluent criteria will be used for discharge.	Acknowledged that a SNP station should be established for the future sedimentation pond in Quarry QMR2. An updated Figure 1 and Table 2 is provided as Attachment 3 with this response.

Baffinland

Table 2 - Responses to CIRNAC Comments

Comment #	Reviewer Comment	Reviewer Recommendation	Baffinland Response
CIRNAC-5	**Incorporation of plan in water licence** The Mine Site Water Management Plan is a new plan and is therefore not in the list of plans included in water licence 2AM-MRY1325. In order for it to become binding, it would have to be added as an annex to an existing plan.	(R-05) CIRNAC recommends that the Mine Site Water Management Plan be added as an annex to a plan already approved in the water licence.	The Mine Site WMP will no longer be relevant once detailed engineering design has been completed and facilities constructed. Baffinland has instead proposed to update the Fresh Water Supply, Sewage and Wastewater Management Plan, Surface Water and Aquatic Ecosystem Management Plan and Environmental Protection Plan as appropriate to reflect the measures implemented as the result of the WMP and subsequent design.

Attachment 2

Hydrology Memo

Knight Piésold
CONSULTING

Management System Certified by: bsi ISO 9001 ISO 14001 ISO 45001 CERTIFIED

MEMORANDUM

Date:	August 5, 2021	**File No.:**	NB102-00181/71-A.01
		Cont. No.:	NB21-00726
To:	Mr. Christopher Murray		
Copy To:	Mr. Connor Devereaux, Mr. Allan Knowlton, Mr. Emmanuel Ocran		
From:	Toby Perkins		
Re:	**Mary River Project - Updated Hydrology Assessment - Effects of Proposed Mine Site Water Management Measures on Flows in Sheardown Lake Tributary 1**		

1.0 INTRODUCTION

Baffinland Iron Mines Corporation (Baffinland) recently submitted Modification Request No. 13 to the Nunavut Water Board (Baffinland, 2021) seeking approval of a Mine Site Water Management Plan (WMP; KP, 2021a) under its Type A Water Licence 2AM-MRY1325 for the Mary River Project. Supporting the modification request was the WMP and two additional documents prepared by Knight Piésold (KP):

- Design brief and issued for construction (IFC) drawings for the first major component of the WMP, the KM105 Sedimentation Pond (KP, 2021b)
- Hydrology Assessment (KP, 2021c)

The Hydrology Assessment calculated the expected changes to flows in Sheardown Lake Tributary 1 (SDLT-1) downstream of the KM105 Pond resulting from construction of the pond, relative to baseline flows and predicted impacts in the Final Environmental Impact Statement (FEIS; Baffinland, 2012). That assessment determined that once the open pit has been fully developed, the proposed water management at KM105 Pond would reduce flows in SDLT-1 by 5% relative to baseline conditions. This is considerably less than the 27% annual reduction in flows predicted in the FEIS. Thus, the proposed water management measures will result in an improvement relative to that of the Approved Project on an annual basis.

From a request for comment on the modification request issued by the Nunavut Water Board (NWB), comments were received from the Qikiqtani Inuit Association (QIA, 2021) and Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC, 2021).

This updated hydrology assessment addresses CIRNAC's first comment, as follows:

> *1. Discharging KM105 sedimentation pond water into SDLT-1*
>
> *The KM105 Sedimentation Pond Design Brief specifies that the pond will be discharged into Sheardown Lake Tributary #1 (SDLT-1), at a design flow for discharge of 900 m^3/hr. The lower reaches of this tributary are fish bearing according to the information provided in the Hydrology Assessment.*
>
> *The Hydrology Assessment discusses the impact of proposed changes to mean annual unit runoff, but does not address changes on shorter time scales. Fisheries and Oceans Canada's 2013 Framework for Assessing the Ecological Flow Requirements to Support Fisheries in Canada states that "cumulative flow alterations <10% in amplitude of the actual (instantaneous) flow in the river relative to a "natural flow regime" have a low probability of detectable impacts to ecosystems…".*

It is not clear what impact adding 900m^3/hr to the flow of SDLT-1 during decant will have on the instantaneous flow and stream ecology.

(R-01) CIRNAC recommends the licensee provide information on typical instantaneous flows in SDLT-1, how the proposed decant flows compare to these, and if impacts of the decant flows need to be considered.

The design brief stated a design flow of 900 m^3/h for discharging water from the pond into the SDLT-1 drainage. This pumping capability was specified so that the KM105 Pond could be drained in about 8 days if a storm event approaching the design flood event occurred (i.e., the recommended maximum pumping capacity). However, the pond will not be drained down at this pumping rate under normal circumstances.

To answer CIRNAC's question and recommendation, operating scenarios were established using relevant hydrology data to predict changes in stream flows over time, and the resultant effects on stream ecology, if any. This included the following steps:

- Review existing streamflow data for hydrometric station H11 located on SDLT-1
- Identify the following scenarios for modelling pond inflows and pumping:
  - The driest year on record
  - The wettest year on record
  - A potential design storm event (1 in 10-year, 72-hour storm)
- Establish nodes for analyzing changes to stream flow in SDLT-1
- Develop synthetic hydrographs for each of the scenarios that model baseline conditions (pre-pond development) and pond operation based on proposed pumping rates
- Evaluate the effects of increased flow in SDLT-1 from pond operation on stream ecology

An outcome of this analysis has been to establish proposed pumping rates based on pond inflows and stored volumes.

Prior to outlining our analysis, the proposed water management measures have been summarized in Section 2.

2.0 PROPOSED WATER MANAGEMENT MEASURES

The measures currently proposed in the WMP (KP, 2021a) are expected to impact the magnitude and timing of flow at the outlet of SDLT-1 catchment differently than those predicted in the FEIS (Baffinland, 2012). Key water management features that will affect streamflow in SDLT-1 are summarized in Table 1.

The pre-project (baseline) SDLT-1 catchment area is shown on Figure 1 along with sub-catchments upstream of the areas of potential fish use. Areas affected by the water management plan are shown on Figure 2. The following sub-catchments of SDLT-1 north tributary are identified on Figure 2:

- Sheardown A - Reports to the lower reaches of the stream
- Sheardown B - Upstream of fish habitat that will not report to the future KM105 Pond
- Sheardown C - Upstream of fish habitat that will report to the future KM105 Pond
- Sheardown D - Runoff upstream the MHR that will be diverted from the Mary River catchment into the future KM105 Pond
- Sheardown E - Runoff from the SDLT-1 south tributary that will report to a future SDLT-1 Pond that will be pumped to the Mary River (no longer providing flow to the SDLT-1 system)

Table 1 Proposed Water Management Features

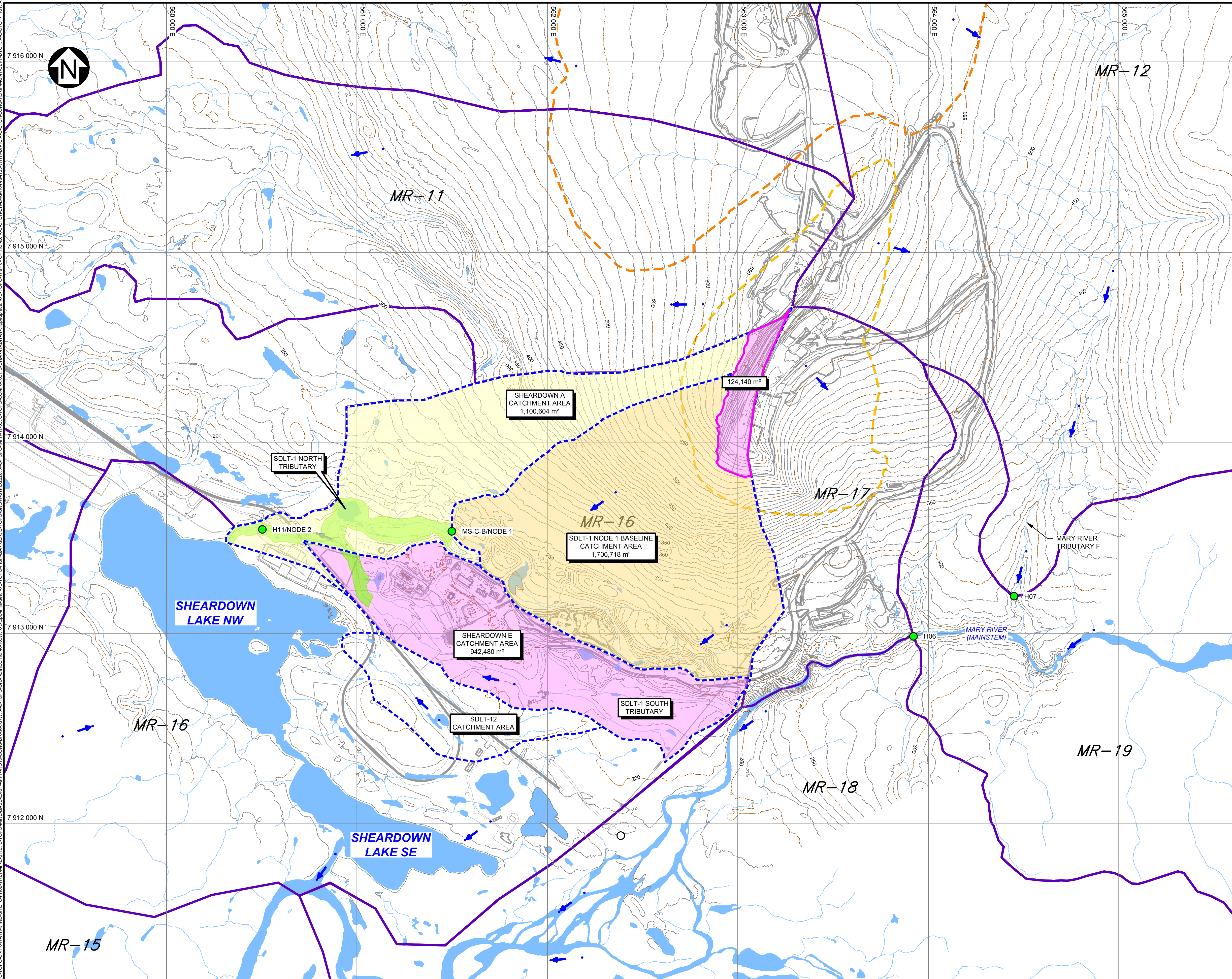
Infrastructure /Measure	Description	Change to SDLT-1
Open Pit	A portion of the open pit is within the SDLT-1 catchment.	Water collected within the open pit is diverted to Tributary F of the Mary River via the East Pond and will reduce flows in SDLT-1.
MHR Ditch	A ditch on the inside of the MHR will convey runoff to KM105 Pond. The ditch will be lined with non-woven geotextile and riprap to avoid erosion. Existing culverts under the MHR will be removed or plugged.	The catchment of non-contact water upgradient the MHR that currently reports to the Mary River will be diverted to KM105 Pond and will be discharged to SDLT-1. This will result in an increase in flows to SDLT-1.
KM105 Pond	Sedimentation ponds will be constructed downstream MHR ditch and collect upstream runoff. Each pond will be sized to retain the design flood and provide the retention time required to settle sediment. The pond will be equipped with a pump and pipeline system to drain the pond and release the water to the environment once settling has been achieved.	The pond will attenuate part of the SDLT-1 catchment as well as additional water diverted from the MHR. How water is released from the KM105 Pond will affect downstream flows in SDLT-1. This is evaluated in Section 5.
Mine Infrastructure Area	Runoff from this area will report to the proposed SDLT-1 Sedimentation Pond. The SDLT-1 Sedimentation Pond will discharge to the Mary River.	Water collected in the SDLT-1 Sedimentation Pond will be diverted to Mary River and will reduce flows in SDLT-1.

Once the KM105 Pond has been constructed, approximately 59% of the pre-project SDLT-1 catchment area reporting to SDLT-1 at the upstream extend of fish habitat (Sheardown B; 1.01 km^2) will bypass the KM105 Pond, while 38% of the catchment (Sheardown C; 0.65 km^2) will report to the pond before being discharged to SDLT-1. Additional catchment from the MHR (Sheardown D; 1.77 km^2) will also report to the KM105 Pond. The MHR catchment (Sheardown D) is at its greatest extent (and therefore will provide the highest flows to KM105 Pond) when the pond is first constructed, and its contributions will be reduced as the open pit extents grow to the ultimate pit outline shown on Figure 2.

3.0 STREAMFLOW DATA AND HABITAT INFORMATION

Baffinland has operated hydrometric station H11 located within the lower reach of SDLT-1 for more than 10 years. Average daily streamflow data for the period of 2011 to 2020 is presented in Table A.1 and on Figure A.1 in Appendix A.

Baffinland has also operated hydrometric station MS-C-B at the location of a fish barrier within the upper reach of SDLT-1 since about 2015. A 10-year hydrograph for MS-C-B, based on prorated flows from H11 (having a longer record), is presented on Figure A.2 in Appendix A.



LEGEND:

- WATER / ESTIMATED POND EXTENTS
- FISH HABITAT WITHIN SDLT-1
- SHEARDOWN A CATCHMENT
- SDLT-1 NODE 1 BASELINE CATCHMENT
- AREA DIVERTED OUT OF THE SDLT-1 CATCHMENT
- DRAINAGE DIRECTION
- SDLT-1 AND SDLT-12 CATCHMENT BOUNDARY
- PRE-MINE WATERSHED
- ULTIMATE DEPOSIT NO. 1 PIT LIMITS
- ULTIMATE WASTE ROCK STOCKPILE LIMITS
- HYDROMETRIC MONITORING STATION / ASSESSMENT NODE

CATCHMENT AREAS

DESCRIPTION	AREA (m²)
SDLT-1 NODE 1 BASELINE CATCHMENT AREA	1,706,718
SHEARDOWN A CATCHMENT AREA	1,100,604
SHEARDOWN E CATCHMENT AREA	942,480

NOTES:

1. COORDINATE GRID IS UTM NAD83, ZONE 17.
2. DETAILED WATER FROM EAGLE MAPPING (2005). CONTOUR PROVIDED BY BAFFINLAND (2019) INTERVAL IS 10 m.
3. CURRENT MINE AREA FROM THE WASTE DUMP TO THE CRUSHER PAD, AND DITCHES ALONG THE HAUL ROAD PROVIDED BY BIM (MARCH 12, 2018).
4. MINE HAUL ROAD AS-BUILT PROVIDED BY BAFFINLAND IRON MINES CORPORATION (MAY 2021).
5. ALL OTHER SITE INFRASTRUCTURE PROVIDED BY HATCH (AUGUST 2, 2016) AND SIMPLIFIED BY KP STAFF (JANUARY 2018).
6. LOCATIONS AND DETAILS OF PROPOSED WATER MANAGEMENT MEASURES TO BE CONFIRMED BASED ON ACTUAL SITE CONDITIONS.
7. HISTORIC CATCHMENTS BASED ON INFORMATION PROVIDED IN THE 2012 FINAL ENVIRONMENTAL IMPACT STATEMENT.

SCALE A 200 100 0 200 400 600 800 1000 m

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

SDLT-1 BASELINE CATCHMENTS

Knight Piésold CONSULTING

P/A NO.	REF NO.
NB102-181/71	NB21-00726

FIGURE 1 REV 0

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	05AUG'21	ISSUED WITH MEMO	JJD	AS	RAC

SAVED: I:\102\00181\71\A\Acad\FIGS\B24 R0, 8/5/2021 2:23:07 PM , ASIMPSON PRINTED: 8/5/2021 2:24:21 PM, FIG 1, ASIMPSON ACAD VERSION: 23.1S (LMS TECH)

For this analysis, the H11 flow record was used to present hydrographs for two locations on SDLT-1:

- Node 1 - The most upstream location on the SDLT-1 north tributary determined to be fish habitat
- Node 2 - The location of stream gauge H11 in the lower reach of SDLT-1

These locations are shown on Figure 2.

At Node 1, the streamflow record for H11/Node 2 was prorated based on catchment area to develop a synthetic flow record. KP compared the 2019 hydrographs for H11/Node 2 and MS-C-B/Node 1 presented by Environmental Applications Group (2020a,b) which suggest a close match.

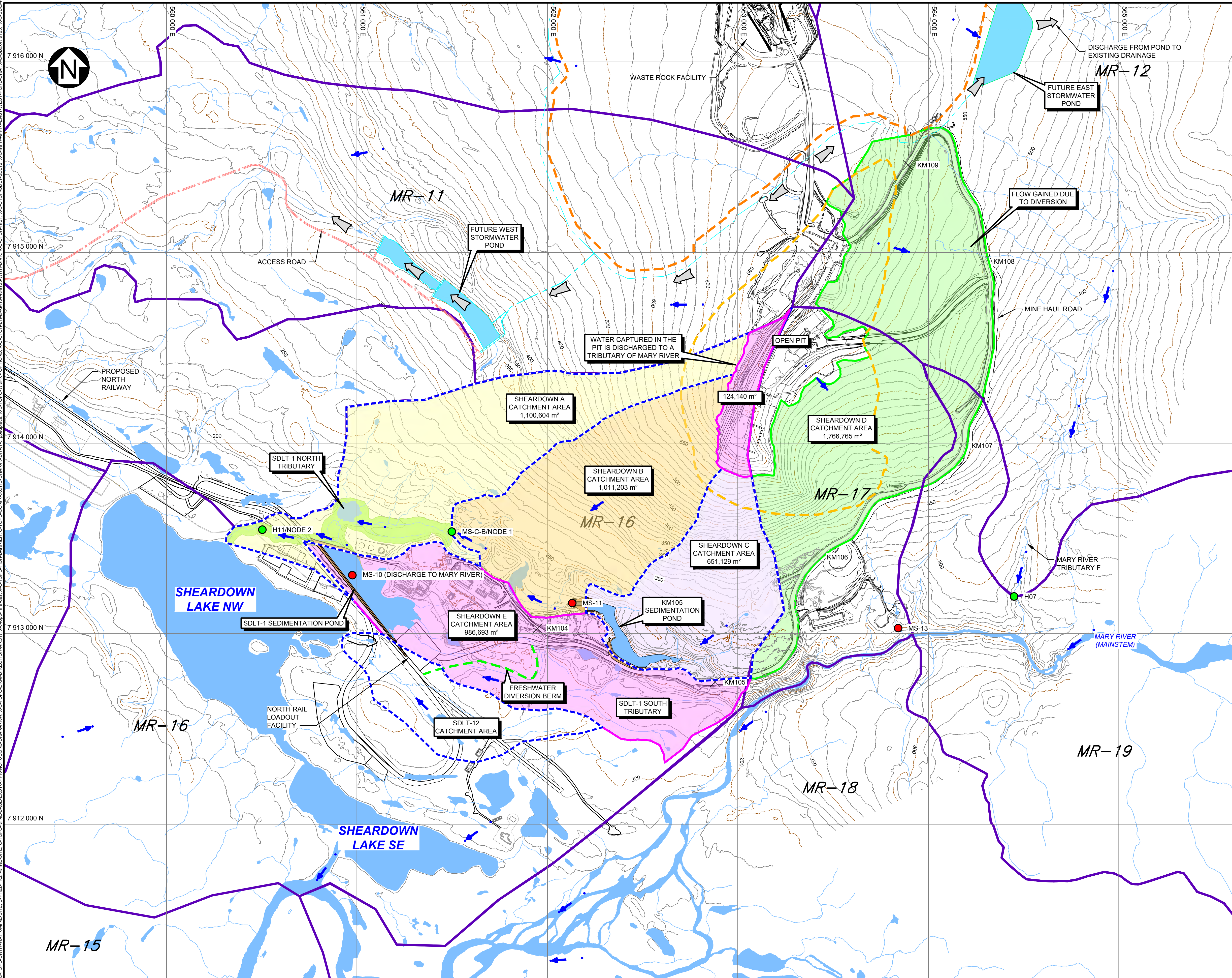
Ten years of streamflow data indicate that flows within SDLT-1 vary significantly over time and from year to year. The average daily flow and total measured volume of water recorded at H11 over the 10-year record is presented in Table 2. It is worth noting that the beginning of freshet is not captured by the seasonal stream gauges, which need to be installed in an ice-free channel to ensure representative data is collected.

Table 2 Annual Flows and Volumes Measured at Hydrometric Station H11

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Average Daily Flow (m^3/s)	0.025	0.074	0.094	0.094	0.046	0.081	0.076	0.110	0.062	0.045
Total Measured Volume (m^3/y)	181,583	475,786	591,391	651,035	304,347	504,169	486,167	753,924	538,336	371,775

Average daily flows have ranged from 0.025 m^3/s in 2011 to 0.110 m^3/s in 2018, a factor of more than four. Total measured volumes also varied by more than a factor of four for those same two years. It is likely that fish habitat conditions within SDLT-1 varies considerably over this range of flows, with little available habitat during years as dry as 2011.

The flow path of water discharged from the KM105 Pond to the SDLT-1 north tributary is shown on Figure 2. Water discharged from the north embankment flows overland and subsurface through a vegetated boulder field to a natural pond north of KM104, where a potential "KM104 Pond" has been under consideration (Photo 1). The outflow of this pond is through a narrow rock-filled valley (Photo 2). Flow is subsurface through the valley, and then daylights downstream as shown on Photo 3. A fish barrier exists at the location shown on Photo 3 under nearly all flow conditions; North/South Consultants Inc. (NSC) identified two fish reaching the small pond in the foreground of Photo 3 on one occasion during high water conditions (Michael Johnson, pers. comm.). Baseline habitat information for four reaches of SDLT-1 extracted from Appendix 4.1-1 of NSC (2012) (presented in Appendix 7C of the Final Environmental Impact Statement; Baffinland, 2012) is included an Appendix B of this memo.



LEGEND:

- WATER / ESTIMATED POND EXTENTS
- SEDIMENTATION POND EMBANKMENT (APPROXIMATE)
- AREA DIVERTED OUT OF THE SDLT-1 CATCHMENT
- SHEARDOWN A CATCHMENT
- SHEARDOWN B CATCHMENT
- SHEARDOWN C CATCHMENT
- SHEARDOWN D CATCHMENT (AREA DIVERTED INTO THE SDLT-1 CATCHMENT)
- FISH HABITAT WITHIN SDLT-1
- PRE-MINE WATERSHED
- SDLT-1 AND SDLT-12 CATCHMENT BOUNDARY
- DRAINAGE DIRECTION
- ULTIMATE DEPOSIT NO. 1 PIT LIMITS
- ULTIMATE WASTE ROCK STOCKPILE LIMITS
- PROPOSED EFFLUENT DISCHARGE LOCATION
- HYDROMETRIC MONITORING STATION / ASSESSMENT NODE

CATCHMENT AREAS

DESCRIPTION	AREA (m²)
SDLT-1 NODE 1 BASELINE CATCHMENT AREA (SEE FIGURE 1)	1,706,718
SHEARDOWN A CATCHMENT AREA	1,100,604
SHEARDOWN B CATCHMENT AREA	1,011,203
SHEARDOWN C CATCHMENT AREA	651,129
SHEARDOWN D CATCHMENT AREA	1,766,765
SHEARDOWN E CATCHMENT AREA	986,693

NOTES:

1. COORDINATE GRID IS UTM NAD83, ZONE 17.
2. DETAILED WATER FROM EAGLE MAPPING (2005). CONTOUR PROVIDED BY BAFFINLAND (2019) INTERVAL IS 10 m.
3. CURRENT MINE AREA FROM THE WASTE DUMP TO THE CRUSHER PAD, AND DITCHES ALONG THE HAUL ROAD PROVIDED BY BIM (MARCH 12, 2018).
4. MINE HAUL ROAD AS-BUILT PROVIDED BY BAFFINLAND IRON MINES CORPORATION (MAY 2021).
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SCALE A 200 100 0 200 400 600 800 1000 m

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

SDLT-1 CATCHMENT CHANGES DUE TO PROPOSED WATER MANAGEMENT PLAN

Knight Piésold CONSULTING

P/A NO. NB102-181/71 | REF NO. NB21-00726

FIGURE 2 | REV 0

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	05AUG'21	ISSUED WITH MEMO	JJD	AS	RAC

SAVED: I:\1\02\00181\71\Acad\FIGS\B22 R0, 8/5/2021 2:24:46 PM , ASIMPSON PRINTED: 8/5/2021 2:25:27 PM, FIG 2, ASIMPSON ACAD VERSION: 23.1S (LMS TECH)

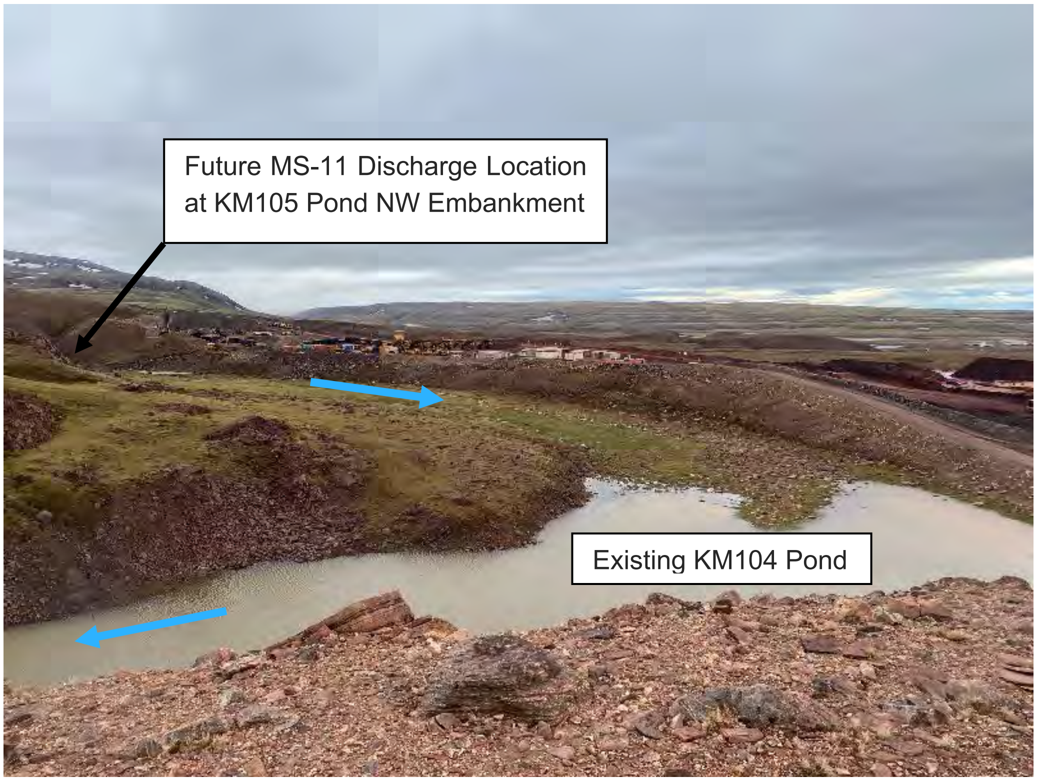

Photo 1 Flow Path from KM105 Pond to KM104 Pond

Photo 2 Subsurface flow through the rock valley immediately downstream KM104 Pond

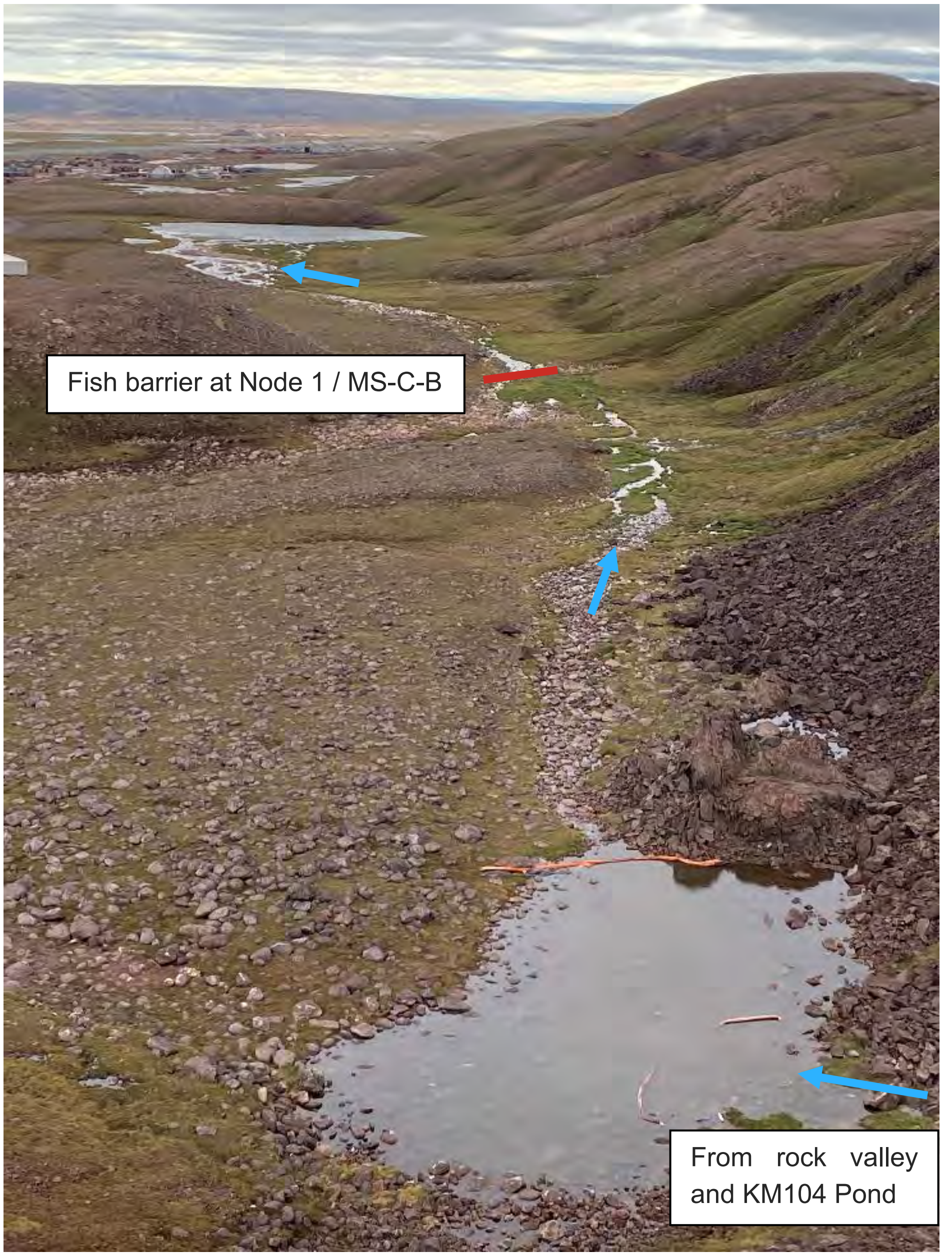

Photo 3 SDLT-1 downstream of KM104 Pond and rock valley

4.0 ANNUAL WATER BALANCES

4.1 ANNUAL WATER BALANCE FROM PREVIOUS HYDROLOGY ASSESSMENT

KP's previous hydrology assessment (KP, 2021c) presented an annual water balance that established an annual flow reduction of 5% will occur from construction of the KM105 Pond and the MHR ditch (KP, 2021c). This calculation was based on the open pit being at its ultimate extent, which is the lowest flow scenario.

4.2 ANNUAL WATER BALANCE FOR CURRENT HYDROLOGY ASSESSMENT

The current assessment considers whether discharges from the KM105 Pond may alter baseline flows in a way that is detrimental to stream ecology. This potential effect will occur when the catchment contributing to KM105 Pond is at its greatest, which is the current extent of mining. This is the opposite of the previous hydrology assessment.

In this scenario, the proposed water management plan would result in 1.11 km^2 of catchment being diverted out (SDLT-1 south tributary and the active mining area) and 1.73 km^2 added into the SDLT-1 catchment for a net increase in contributing area of 0.66 km^2 (17%) to the SDLT-1 catchment. The changes in catchment reporting to Node 1 and Node 2 are presented in Table 3.

Table 3 Catchment Changes at Nodes 1 and 2 on SDLT-1 Pre- and Post-Construction

Location	Description	Sheardown Subcatchment Areas (km^2)					
		A	B	C	D	E	Total
Node 1	Baseline		1.01	0.65			1.66
	Change				1.77		+1.77
	Operation		1.01	0.65	1.77		3.43
Node 2	Baseline	1.10	1.01	0.65		1.11	3.87
	Change				1.77	-1.11	+0.66
	Operation	1.10	1.01	0.65	1.77		4.53

NOTES:

1. SHEARDOWN SUBCATCHMENTS AREA B AND C REPORT TO NODE 1 AS A SINGLE UNIT PRIOR TO THE CONSTRUCTION OF THE KM105 POND. AFTER THE CONSTRUCTION OF THE KM105 POND, SUBCATCHMENT C REPORT TO THE KM105 POND, WHICH IN TURN REPORTS THROUGH NODE 1.

5.0 SDLT-1 NORTH TRIBUTARY FLOW CHANGES FROM KM105 POND DISCHARGES

To evaluate potential changes to flows in SDLT-1 north tributary due to pond operation, baseline hydrographs were developed for Nodes 1 and 2 as follows:

- **Dry year** - represented by the flow record for 2011
- **Wet year** - represented by the flow record for 2018
- **Design storm during freshet** - represented by superimposing the design storm during freshet onto the 2012 flow record, as an average year

Pond discharge operating rules were developed through an iterative process by adding pond discharges to the baseline flows at Nodes 1 and 2 to establish hydrographs representing pond operation. The pond discharge operating rules are presented in Table 4. Graphs showing the baseline and operations hydrographs at Nodes 1 and 2 for the three scenarios listed above are included in Appendix C.

Table 4 Pond Discharge Operating Rules

KM105 Pond Water Elevation (m)	Maximum Pumping Rate (m^3/hr)	Notes
208.4	30	This rate does not achieve three-day retention time for Pond elevations less than 209.5 m, but inflows are low and sediment concentration are assumed to be minor.
210.6	120	This rate achieves a 24-hour retention period.
212.0	345	This rate achieves a 24-hour retention period.
214.0	645	This rate achieves a 24-hour retention period.
214.0	300	This rate achieves a 24-hour retention period. This pumping rate is assumed to be discharging directly to the Mary River Tributary to manage surge flow into the SDLT-1 Tributary. The addition of this surge pump creates the capacity required to drawdown the KM105 Pond in a reasonable time as stated in the design brief.
220.5	Varies	Emergency spillway

In developing the pond discharge operating rules, three factors are at play that compete against each other:

- **Near-continuous discharge to regulate downstream flows** - An effort was made to smooth out discharge peaks and troughs to minimize rapid changes in flow at the study nodes.
- **Pond water elevation** - the pond is designed to operate empty (with dead storage only) to the extent possible; storage of large volumes of water avoided to the extent practicable since this:
  - Reduces the effective available storage of the pond
  - Adds heat to the surrounding frozen ground
- **Settling time** - The pond design considered a 3-day settling time; this is generally difficult to achieve without affecting one of the first two factors.

In the current analysis, five pumping rates were applied (each being additive of the pumping rates above):

- A small baseline flow pump to empty the pond during period of low flow.
- A second baseline pump will empty the pond during low flows of average and wet years.
- A third rainfall pump to dewater the pond during small peak flow storm events for any given years.
- A fourth pump to manage wet year storm event inflow surges.
- A fifth pump to manage the design storm (1 in 10-year, 72-hour storm event), which is expected to discharge to either the Mary River or to the SDLT-1 Pond freshwater diversion berm (which will convey flows to SDLT-12 and Sheardown Lake NW) to minimize Node 1 and Node 2 flow surges.

Further study could result in the same outcome with a different combination of pumps. For example, if pump 5 was turned on before pump 4, water would be diverted out of the SDLT-1 system earlier, which may help mitigate peak flows in SDLT-1.

The Pond also has an emergency spillway discharge in the event of design storm larger than the 1 in 10-year, 72-hour storm event which directly reports through Node 1 and 2. The pumping operational rules presented in Table 4 were assumed for this assessment but are subject to revision as site specific sediment settling data is acquired.

Table 5 presents the predicted changes in average daily flow rates at each node for each scenario.

Table 5 Predicted Changes in Average Daily Flow Rates at Nodes 1 and 2

Scenario	Description	Node 1		Node 2	
Dry Year	Baseline	0.010	m^3/s	0.025	m^3/s
	Operation	0.022	m^3/s	0.029	m^3/s
	Change	115	%	15	%
Wet Year	Baseline	0.045	m^3/s	0.110	m^3/s
	Operation	0.091	m^3/s	0.123	m^3/s
	Change	100	%	11	%
Design Storm Event during Average Year	Baseline	0.050	m^3/s	0.104	m^3/s
	Operation	0.095	m^3/s	0.120	m^3/s
	Change	89	%	16	%

Pond discharges are predicted to double the average daily flow rate at Node 1 under all three scenarios. At Node 2, the influence of the pond is muted considerably because Sheardown A Catchment is added to streamflow and Sheardown E Catchment is removed (Figure 2).

Table 6 presents the changes in peak flow for each scenario.

Table 6 Predicted Changes in Peak Flow at Nodes 1 and 2

Scenario	Description	Node 1		Node 2	
Dry Year	Baseline	0.039	m^3/s	0.096	m^3/s
	Operation	0.118	m^3/s	0.143	m^3/s
	Change	202	%	49	%
Wet Year	Baseline	0.255	m^3/s	0.620	m^3/s
	Operation	0.341	m^3/s	0.519	m^3/s
	Change	34	%	-16	%
Design Storm Event during Average Year	Baseline	0.923	m^3/s	1.325	m^3/s
	Operation	0.648	m^3/s	0.822	m^3/s
	Change	-30	%	-38	%

The effect of pond discharges on peak flows varies considerably at Node 1 for each scenario, with a 200% increase during a dry year, 34% increase during a wet year, and a dampening of peak flows (-30%) during the design storm. The latter occurs because a portion of the flows are redirected out of the SDLT-1 north tributary catchment during the design storm. At Node 2, peak flows increase by almost 50% during a dry year but are buffered by additional flows from Sheardown A catchment during the wet year (-16%) and design storm (-38%).

6.0 POTENTIAL EFFECTS TO STREAM ECOLOGY IN SDLT-1

The changes in streamflow at the two nodes on SDLT-1 north tributary are described in the previous section. Effects on stream ecology are described separately below for Nodes 1 and 2. The existence of the KM105 Pond and the additional catchment directed to the pond send more water through the entire SLDT-1 north tributary. With respect to changes to instantaneous flows in the stream, such increases in flow will be greatest at the upstream Node 1. With additional catchment reporting to Node 2, pond discharges will have less influence on instantaneous flows. The effects to peak flows will transition between the two nodes.

CIRNAC raised its question in relation to DFO's (2013) framework for the assessment of the ecological flow requirements supporting fish, which focuses primarily on reductions in streamflow due to abstractions. It is of limited utility for framing this assessment, which involves increases in flow.

6.1 EFFECTS AT NODE 1

Based on the assessment completed using the proposed operating rules and pumping rates, (as described in Section 5), the effects of pond discharges are of the greatest magnitude at Node 1, which is the most upstream extent of fish habitat. In terms of total flow (as represented by the average daily flow in Table 5), pond discharges will increase flows at Node 1 by up to 115% during a dry year. Peak flows will be up to 200% of baseline during a dry year, but well within the range of what is experienced during wetter years. Thus, pond discharges only improve conditions during drier years.

During a wet year, pond discharges will increase average daily flows by up to 100%, and peak flows will increase by up to 34%. The 34% increase in peak flows was predicted to occur over several days during one storm event based on the 2018 wet year hydrograph (Figure C.5 in Appendix C). Additionally, such summer storm events do not typically occur every year. According to the hydrographs for hydrometric station H11 presented on Figure A.1 in Appendix A, four of the 10 years on record had similarly large summer storms. Even when such summer storms occur, the increased flow remains within the range of natural variability for most of the year. Improvements to the pumping rules may be able to reduce peak flows; for example, if pump 5 (discharging outside of the SDLT-1 catchment) was operated before pump 4 (which discharges to SDLT-1).

Potential effects to stream ecology from this increased flow could include the following:

- Increased wetted width (habitat) and improvements to fish movement due to higher flow volumes
- Short-term interruptions in fish passage due to higher peak flows
- Potential for bank erosion, scouring of channel beds, and deposition
- Potential stranding of fish if water levels decrease quickly

Overall, the increased flow is expected to provide increased wetted stream habitat and will help offset lower flows that can restrict movement by fish through the tributary. It is expected that this effect will be apparent between Node 1 and the large pond located approximately 500 m downstream. Further downstream of the large pond, these effects will transition into the effects described below for Node 2.

Photos 4 through 7 show SDLT-1 starting downstream but close to Node 1, and moving further downstream to the large pond. There is potential that at the more upstream location (Photo 4) that flow could exceed the existing channel capacity during the highest peak flows. However, the channel capacity may already be exceeded at certain times and years. Further downstream (Photo 5) the capacity of the channel increases. In both areas, the surrounding banks are well vegetated and are expected to be resistant to erosion.

Photo 4 SDLT-1 Downstream of Node 1

Photo 5 SDLT-1 Further Downstream of Node 1

Photo 6 **SDLT-1 Further Downstream of Node 1 (Facing Upstream)**

Photo 7 **SDLT-1 Upstream of Large Pond (Facing Downstream)**

Further downstream approaching the large pond (Photos 6 and 7), the stream transitions to a delta environment that is already highly dynamic with erosional and depositional areas. Higher flows could increase the erosion and deposition that is already occurring.

With respect to the potential for stranding of fish, flows will decrease when one or more pumps are turned off. However, these changes are expected to be muted because of the presence of the natural pond at KM104.

6.2 EFFECTS AT NODE 2

As with Node 1, additional flow will report to Node 2 under all flow conditions. This will be particularly beneficial in the lower reach of SDLT-1 where a flat streambed with cobbles can limit fish passage under low flow conditions. Given that Node 2 receives additional runoff from unaffected catchment, pond discharges reduce peak flows by extending the duration of higher flows. (Figure C.4). As such, operation of the KM105 pond will improve habitat conditions (wetted width), particularly during low flow conditions, within the lower half of the SDLT-1 north tributary.

7.0 CONCLUSION

Operation of the KM105 Pond will improve downstream water quality by settling total suspended solids. The pond will also alter flows downstream. Pond discharge operating rules have been developed to minimize these effects. Following these rules, increased flow will occur within SDLT-1 north tributary under all flow conditions, due to additional MHR catchment that will report to the pond. This is expected to provide benefit in terms of additional fish habitat and will help offset low flows that occur periodically in SDLT-1.

The upper half of SLDT-1 will experience increases in peak flows that will mostly remain within natural conditions, except for during summer storms when peak flows could increase by approximately one-third. These higher peak flows do not occur every year and last several days. Further mitigation of the higher peak flows may be possible by further optimizing pond discharges. Exceedance of channel capacities and increased erosion and deposition (both of which already occur) may occur during these higher peak flows.

The increased flows and reduced peak flows in the lower half of the tributary is expected to bring a benefit through increased habitat and mobility within the stream.

Further work will be undertaken during the development of the Operation, Maintenance and Surveillance (OMS) Manual to effectively manage risk and develop site-specific discharge considerations.

8.0 REFERENCES

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9.0 CLOSING

We trust this meets with your present requirements. Please do not hesitate to contact the undersigned with questions.

Yours truly,
Knight Piésold Ltd.

Prepared:		Reviewed:	
	Jessy Dessault, P.Eng. Project Engineer		Richard Cook, P.Geo. (Ltd.) Specialist Environmental Scientist | Associate

Approval that this document adheres to the Knight Piésold Quality System:

Attachments:

Appendix A	Baseline Stream Hydrographs
Appendix B	SDLT-1 Fish Habitat Information
Appendix C	KM105 Pond Discharge Hydrographs

APPENDIX A

Baseline Stream Hydrographs

(Pages A-1 to A-3)

Knight Piésold CONSULTING

TABLE A.1

BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT

UPDATED HYDROLOGY ASSESSMENT
AVERAGE DAILY DISCHARGE AT HYDROMETRIC STATION H11 ON SHEARDOWN LAKE TRIBUTARY 1

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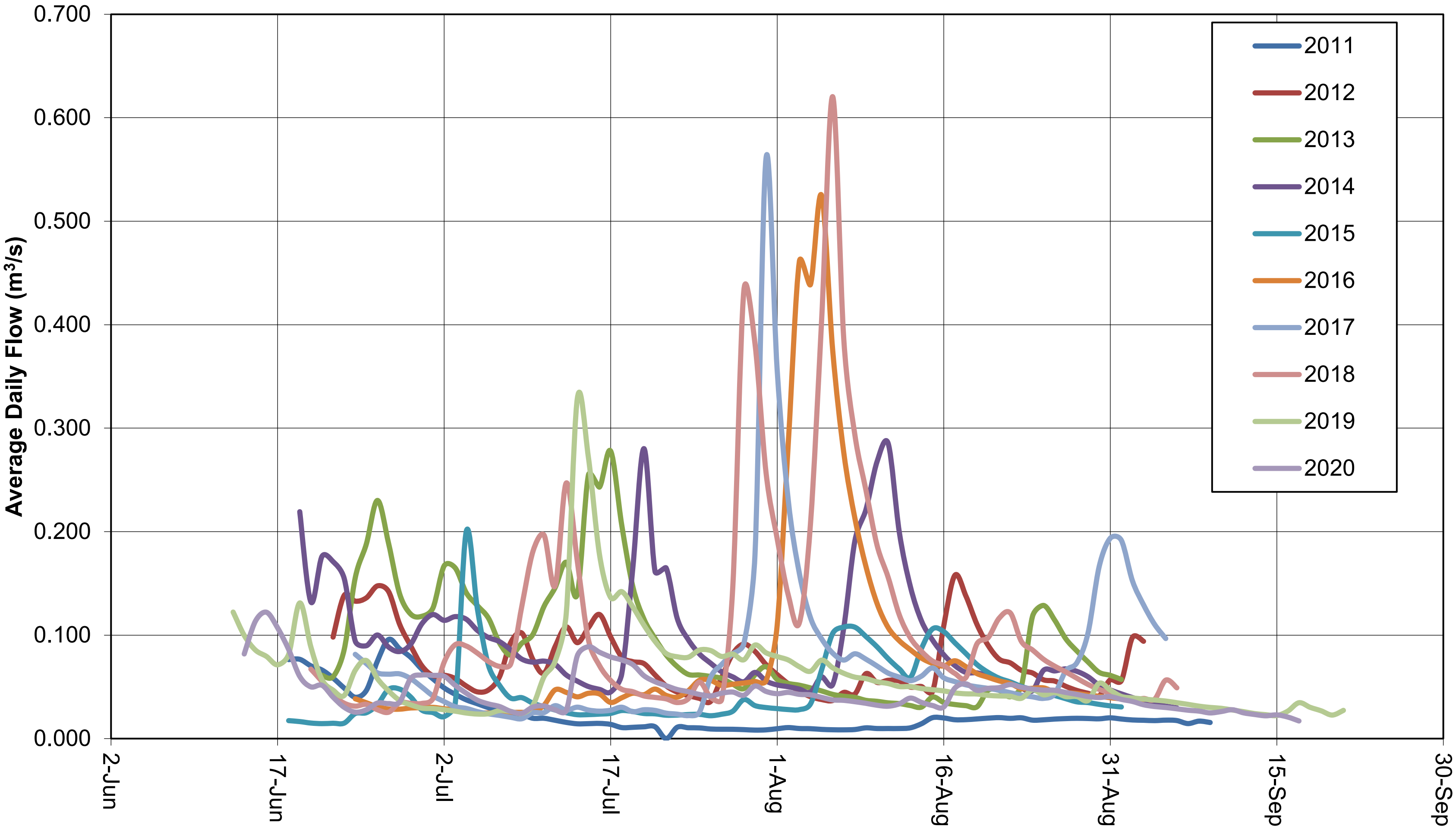
Day of Year	Average Daily Discharge (m^3/s)									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
13-Jun									0.122	
14-Jun									0.100	0.082
15-Jun									0.086	0.113
16-Jun									0.079	0.122
17-Jun									0.071	0.107
18-Jun	0.076				0.017				0.081	0.086
19-Jun	0.077			0.219	0.016				0.131	0.060
20-Jun	0.070			0.132	0.015			0.067	0.089	0.050
21-Jun	0.066		0.061	0.176	0.014			0.055	0.057	0.052
22-Jun	0.059	0.098	0.060	0.171	0.015			0.042	0.047	0.040
23-Jun	0.049	0.138	0.086	0.155	0.015			0.034	0.042	0.030
24-Jun	0.040	0.133	0.156	0.094	0.024	0.038	0.081	0.031	0.066	0.026
25-Jun	0.047	0.136	0.188	0.090	0.025	0.035	0.072	0.033	0.075	0.028
26-Jun	0.075	0.148	0.230	0.100	0.033	0.031	0.064	0.028	0.058	0.034
27-Jun	0.096	0.142	0.189	0.088	0.048	0.029	0.062	0.025	0.046	0.034
28-Jun	0.087	0.110	0.140	0.084	0.048	0.028	0.063	0.035	0.037	0.035
29-Jun	0.078	0.089	0.120	0.091	0.040	0.030	0.058	0.034	0.033	0.058
30-Jun	0.067	0.070	0.118	0.111	0.028	0.030	0.050	0.034	0.029	0.061
1-Jul	0.058	0.061	0.126	0.120	0.025	0.030	0.041	0.039	0.029	0.061
2-Jul	0.049	0.061	0.167	0.114	0.021	0.029	0.036	0.074	0.028	0.060
3-Jul	0.043	0.058	0.165	0.118	0.034	0.028	0.031	0.091	0.027	0.051
4-Jul	0.037	0.051	0.141	0.115	0.200	0.027	0.029	0.089	0.025	0.044
5-Jul	0.034	0.045	0.129	0.105	0.125	0.025	0.026	0.083	0.024	0.037
6-Jul	0.030	0.047	0.116	0.098	0.071	0.025	0.024	0.075	0.024	0.033
7-Jul	0.027	0.060	0.092	0.094	0.051	0.025	0.022	0.070	0.027	0.031
8-Jul	0.024	0.093	0.081	0.086	0.039	0.025	0.021	0.072	0.026	0.026
9-Jul	0.023	0.102	0.092	0.077	0.040	0.025	0.019	0.128	0.024	0.024
10-Jul	0.020	0.076	0.101	0.074	0.034	0.026	0.025	0.181	0.032	0.030
11-Jul	0.020	0.063	0.128	0.075	0.031	0.032	0.025	0.197	0.060	0.032
12-Jul	0.018	0.089	0.146	0.072	0.028	0.047	0.032	0.148	0.075	0.028
13-Jul	0.016	0.108	0.170	0.061	0.025	0.045	0.027	0.247	0.121	0.027
14-Jul	0.014	0.093	0.140	0.056	0.023	0.040	0.030	0.171	0.329	0.080
15-Jul	0.014	0.107	0.255	0.050	0.023	0.044	0.028	0.095	0.272	0.089
16-Jul	0.015	0.120	0.243	0.048	0.024	0.043	0.027	0.070	0.178	0.083
17-Jul	0.014	0.098	0.278	0.045	0.024	0.035	0.027	0.056	0.136	0.079
18-Jul	0.011	0.079	0.206	0.062	0.027	0.039	0.030	0.048	0.142	0.076
19-Jul	0.011	0.074	0.147	0.165	0.026	0.044	0.026	0.045	0.127	0.071
20-Jul	0.011	0.072	0.116	0.280	0.024	0.042	0.028	0.041	0.110	0.061
21-Jul	0.011	0.062	0.097	0.162	0.024	0.048	0.027	0.040	0.094	0.055
22-Jul	0.011	0.051	0.081	0.165	0.023	0.042	0.025	0.038	0.082	0.051
23-Jul	0.011	0.045	0.070	0.116	0.023	0.040	0.024	0.035	0.079	0.047
24-Jul	0.011	0.042	0.062	0.096	0.023	0.046	0.022	0.039	0.079	0.045
25-Jul	0.010	0.039	0.061	0.082	0.023	0.056	0.026	0.055	0.086	0.043
26-Jul	0.009	0.036	0.060	0.073	0.022	0.056	0.059	0.040	0.085	0.041
27-Jul	0.009	0.059	0.058	0.065	0.024	0.051	0.072	0.038	0.079	0.044
28-Jul	0.009	0.082	0.053	0.060	0.026	0.053	0.082	0.146	0.082	0.045
29-Jul	0.009	0.091	0.048	0.055	0.038	0.054	0.092	0.433	0.076	0.042
30-Jul	0.008	0.084	0.062	0.064	0.032	0.055	0.178	0.382	0.090	0.051
31-Jul	0.008	0.071	0.069	0.056	0.030	0.056	0.561	0.257	0.083	0.046
1-Aug	0.010	0.062	0.057	0.052	0.029	0.109	0.356	0.193	0.079	0.043
2-Aug	0.011	0.053	0.053	0.050	0.028	0.285	0.230	0.139	0.076	0.045
3-Aug	0.010	0.046	0.052	0.048	0.028	0.461	0.160	0.112	0.069	0.043
4-Aug	0.010	0.041	0.049	0.045	0.034	0.439	0.117	0.208	0.065	0.042
5-Aug	0.009	0.038	0.046	0.060	0.066	0.525	0.096	0.404	0.076	0.040
6-Aug	0.009	0.037	0.043	0.052	0.102	0.376	0.083	0.620	0.068	0.037
7-Aug	0.008	0.045	0.041	0.107	0.108	0.276	0.076	0.386	0.063	0.037
8-Aug	0.009	0.043	0.040	0.191	0.108	0.213	0.082	0.294	0.059	0.036
9-Aug	0.010	0.063	0.037	0.221	0.099	0.166	0.077	0.240	0.058	0.034
10-Aug	0.010	0.054	0.036	0.268	0.089	0.130	0.070	0.187	0.055	0.032
11-Aug	0.010	0.056	0.035	0.285	0.077	0.107	0.063	0.156	0.053	0.031
12-Aug	0.010	0.056	0.034	0.200	0.067	0.095	0.059	0.120	0.050	0.034
13-Aug	0.010	0.050	0.032	0.147	0.059	0.086	0.056	0.097	0.050	0.039
14-Aug	0.014	0.050	0.030	0.114	0.087	0.078	0.060	0.084	0.048	0.035
15-Aug	0.020	0.046	0.040	0.095	0.106	0.073	0.068	0.075	0.047	0.032
16-Aug	0.020	0.109	0.035	0.081	0.103	0.070	0.059	0.071	0.046	0.031
17-Aug	0.018	0.158	0.033	0.071	0.093	0.075	0.055	0.063	0.044	0.049
18-Aug	0.018	0.138	0.032	0.064	0.082	0.069	0.052	0.059	0.043	0.053
19-Aug	0.019	0.110	0.031	0.063	0.072	0.063	0.050	0.092	0.043	0.047
20-Aug	0.020	0.090	0.047	0.061	0.064	0.059	0.049	0.098	0.042	0.049
21-Aug	0.020	0.077	0.047	0.058	0.058	0.056	0.047	0.116	0.041	0.049
22-Aug	0.020	0.073	0.040	0.054	0.055	0.053	0.044	0.121	0.041	0.052
23-Aug	0.020	0.066	0.051	0.049	0.050	0.048	0.042	0.094	0.039	0.050
24-Aug	0.018	0.063	0.118	0.046	0.047	0.049	0.040	0.086	0.047	0.048
25-Aug	0.018	0.057	0.129	0.066	0.044	0.049	0.039	0.077	0.042	0.047
26-Aug	0.019	0.056	0.114	0.065	0.042	0.045	0.043	0.070	0.044	0.047
27-Aug	0.019	0.050	0.096	0.067	0.039	0.044	0.066	0.064	0.041	0.045
28-Aug	0.020	0.047	0.085	0.065	0.036	0.044	0.073	0.058	0.041	0.043
29-Aug	0.019	0.044	0.074	0.060	0.035	0.042	0.102	0.052	0.037	0.041
30-Aug	0.019	0.041	0.064	0.052	0.033	0.041	0.166	0.048	0.053	0.040
31-Aug	0.020	0.057	0.061	0.047	0.032	0.039	0.194	0.044	0.047	0.041
1-Sep	0.019	0.056	0.057	0.043	0.031	0.038	0.192	0.041	0.041	0.038
2-Sep	0.018	0.098		0.040		0.039	0.152	0.037	0.039	0.036
3-Sep	0.018	0.094		0.036		0.038	0.129	0.039	0.038	0.033
4-Sep	0.017			0.034			0.110	0.038	0.037	0.031
5-Sep	0.018			0.031			0.097	0.057	0.036	0.030
6-Sep	0.017			0.030				0.049	0.035	0.029
7-Sep	0.015								0.033	0.027
8-Sep	0.017								0.031	0.027
9-Sep	0.016								0.030	0.025
10-Sep									0.029	0.026
11-Sep									0.028	0.028
12-Sep									0.026	0.025
13-Sep									0.024	0.023
14-Sep									0.023	0.022
15-Sep									0.022	0.023
16-Sep									0.027	0.021
17-Sep									0.035	0.017
18-Sep									0.030	
19-Sep									0.027	
20-Sep									0.023	
21-Sep									0.027	
22-Sep										
Average Daily Flow (m^3/s)	0.025	0.074	0.094	0.094	0.046	0.081	0.076	0.110	0.062	0.045
Total Measured Volume (m3/y)	181,583	475,786	591,391	651,035	304,347	504,169	486,167	753,924	538,336	371,775

I:\1\02\00181\71\A\Correspondence\NB21-00726 - Updated Hydrology Assessment\Appendix A - H11 Avg Daily Discharge Data\[Table A.1 H11 avg daily discharge_ALDR.xlsx]Table A.1

NOTES:
1. STREAM FLOW DATA PROVIDED BY BAFFINLAND ON JULY 26, 2021.

0	05AUG'21	ISSUED WITH MEMO NB21-00726	JJD	RAC
REV	DATE	DESCRIPTION	PREP'D	RVW'D



0	05AUG'21	ISSUED WITH MEMO	JJD	RAC
REV	DATE	DESCRIPTION	PREP'D	RVW'D

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

HYDROLOGY STATION H11
BASELINE FLOW 2011-2020

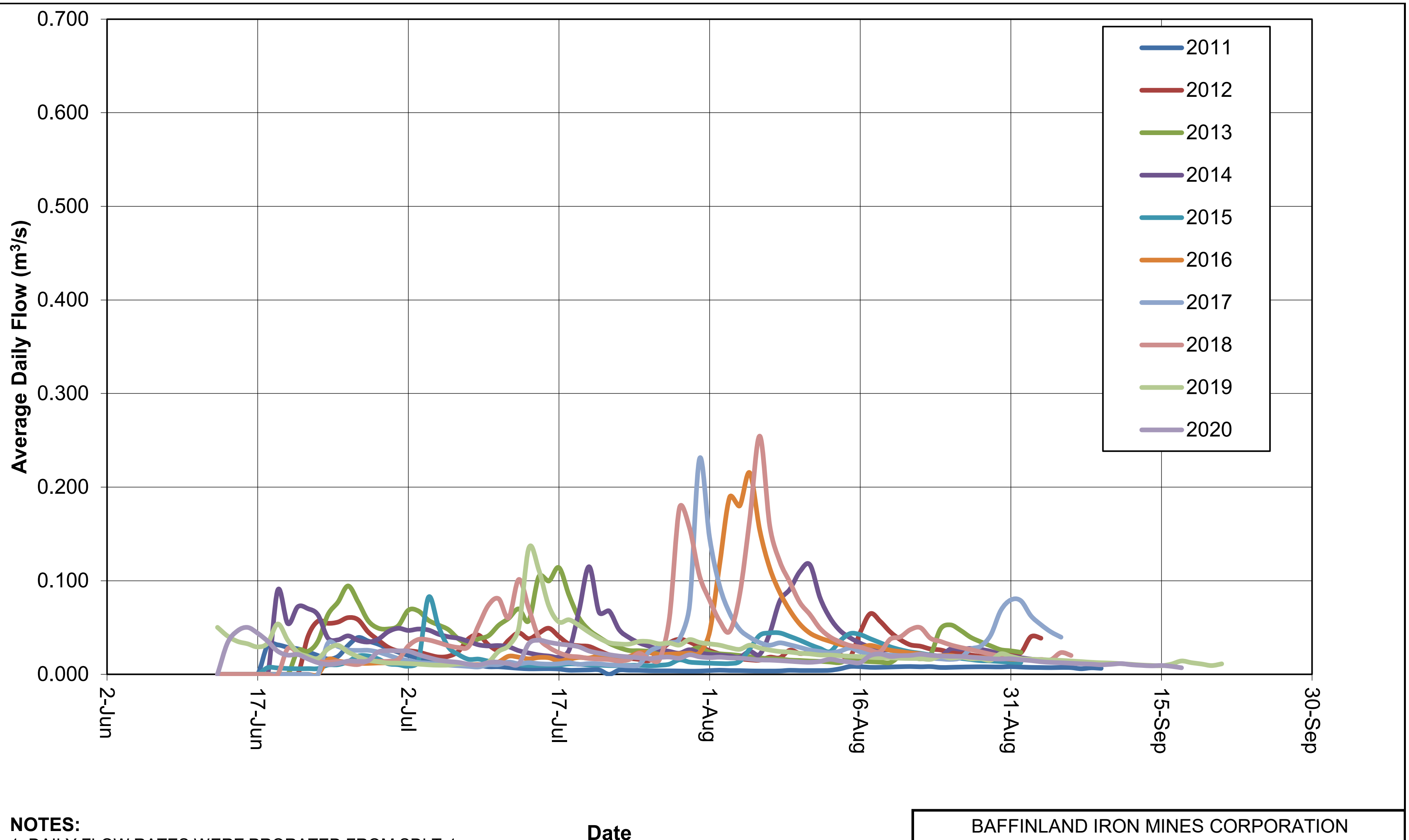
Knight Piésold CONSULTING

P/A NO. NB102-181/71

REF. NO. NB21-00726

FIGURE A.1

REV 0



NOTES:
1. DAILY FLOW RATES WERE PRORATED FROM SDLT-1 CATCHMENT.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	05AUG'21	ISSUED WITH MEMO	JJD	RAC

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

NODE 2 - PRORATED BASELINE FLOW 2011-2020

Knight Piésold CONSULTING

P/A NO. NB102-181/71

REF. NO. NB21-00726

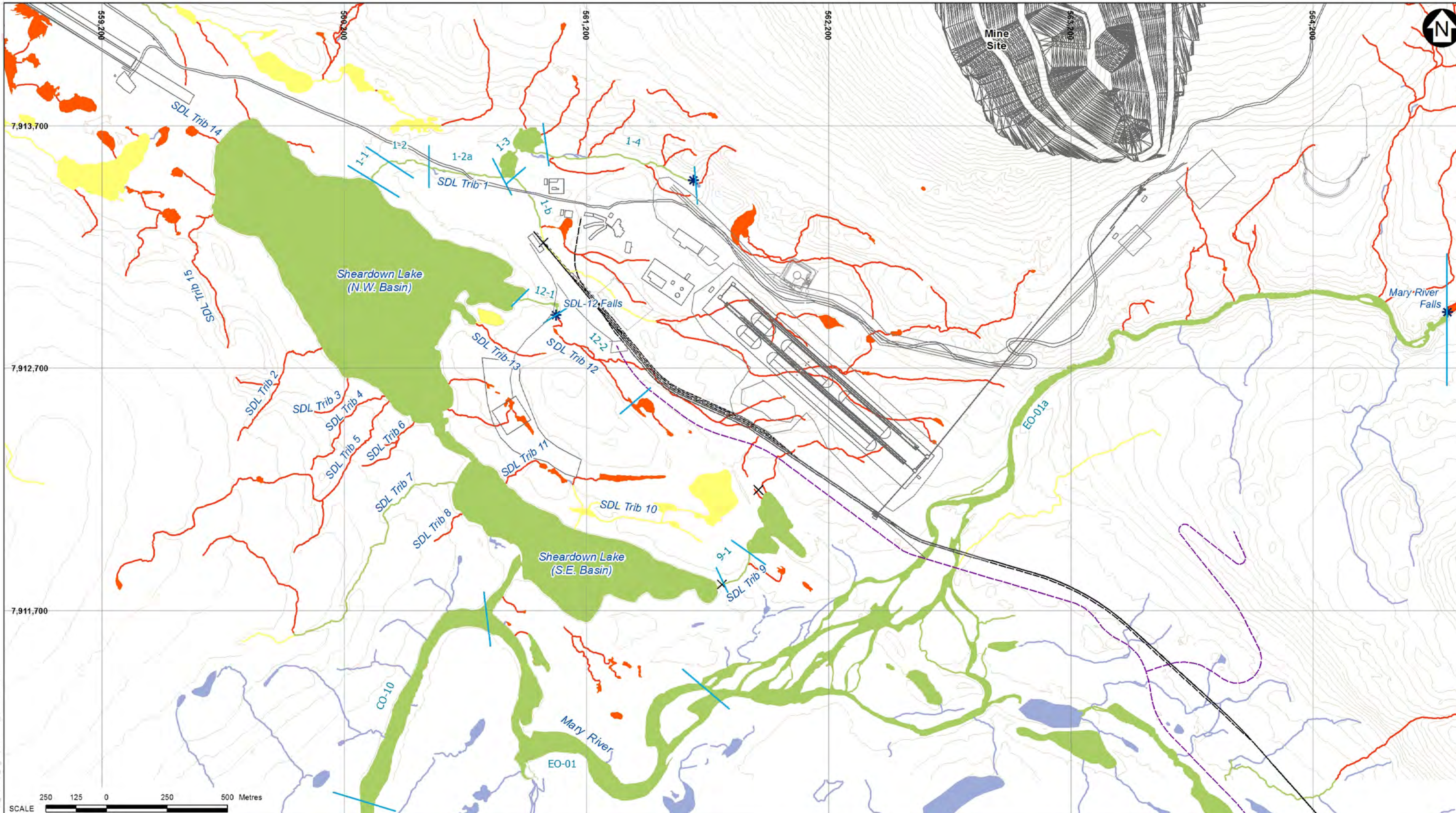
FIGURE A.2

REV 0

APPENDIX B

SDLT-1 Fish Habitat Information

(Pages B-1 to B-11)



LEGEND:

STATUS OF ARCTIC CHAR

- PRESENT
- PROBABLE
- NOT PRESENT
- UNKNOWN

- FISH BARRIER
- FALLS
- REACH BOUNDARIES
- MILNE INLET TOTE ROAD (EXISTING)
- CONSTRUCTION ACCESS ROAD (PROPOSED)
- RAILWAY ALIGNMENT (PROPOSED)
- INFRASTRUCTURE

-	DDMMM'10	ISSUED FOR —	-	-	-	-
REV	01/09/2010	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D

NOTES:

1. BASE MAP: (1:50,000) © HER MAJESTY THE QUEEN IN RIGHTS OF CANADA. DEPARTMENT OF NATURAL RESOURCES (2009.) ALL RIGHTS RESERVED.
2. TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
3. PROPOSED RAILWAY CONSTRUCTION ACCESS ROAD ALIGNMENT PROVIDED BY CANRAIL CONSULTANTS INC. DRAWING NO.: RAILWAY ALIGNMENT AND CONSTRUCTION ACCESS RD - MARY RIVER STEENSBY 2010 -12AUG2010.dwg
4. MINE SITE INFRASTRUCTURE PROVIDED BY AMEC DRAWING NO.: MINE SITE - CONSTRUCTION PHASE - 01 -MAR 09 2009.dwg
5. CONTOUR INTERVAL IS 50 M AND IS IN METRES.

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

PRESENCE AND ABSENCE OF ARCTIC CHAR IN SHEARDOWN LAKE BASIN TRIBUTARIES

North/South Consultants Inc.
Aquatic Environment Specialists

P/A NO.	REF NO.
-	-
DATE: 01/09/2010	REV -

Path: G:\MARYRIV_GDB\EIS_GDB\EIS_Figures_2010EIS_Figures\MXD\MR_Stream Habitat\

Mine Site Aquatic Habitat Assessment

Location

Watercourse Name:	Sheardown Lake Tributary #1	**UTM:**	17W 560305 7913483
Site:	Reach 1	**Dates Surveyed:**	25-Jun-07, 30-Jul-07, 1-Sep-07

Site Description/Physical Characteristics

Confinement: Partial

Channel Gradient: 2˚

Hydrology

	Spr	Sum	Fall
Bankfull Width (m):	8.43	8.43	8.43
Wetted Width (m):	6.60	6.60	5.10
Riffle-Crest Depth (m):	0.24	0.10	0.20
Pool Depth (m):	NA	0.10	0.10
D (m):	0.02	0.02	0.02
D_{95} (m):	0.74	0.74	0.74
Point Velocities (m/s)			
Riffle:	0.33	0.23	0.46
Pool:	NA	NA	NA
Behind a rock:	< 0.01	NM	0.07

Stream/Riparian Habitat

Channel Morphology: 100% riffle

Substrate Composition: 80% cobble, 15% boulder, 5% gravel

Stream Cover: 15% boulders

Aquatic Vegetation: Periphyton

Riparian Vegetation: Grasses and moss

Barriers Present (Y/N): N
Location: NA

Lakes Present (Y/N): Y
Location: DS – Sheardown L.

L/R Bank Characteristics

	Spr	Sum	Fall
Bank Height (L/R; m):	0.30/0.30	0.25/0.25	0.25/0.25
Bank Stability:	High	High	High
Erosion Potential:	Low	Low	Low

Water Quality

	Spr	Sum	Fall
Specific Conductance (μS/cm):	93.7	164.6	188
TDS (g/l):	0.06	0.11	NM
DO (mg/l)	13.53	11.10	12.40
%DO:	109.3	99.7	101.0
Water Temp (˚C):	5.0	10.5	6.0

Fish Habitat

	Spr	Sum	Fall
Spawning:	ARCH - N NNST - N	ARCH - N NNST - L	ARCH - N NNST - N
Feeding:	ARCH - L NNST - L	ARCH - H NNST - L	ARCH - H NNST - L
Migration:	ARCH - M NNST - M	ARCH - H NNST - H	ARCH - H NNST - H

Baffinland Iron Mines
Mary River Project

North/South Consultants Inc.
Aquatic Environment Specialists

Figure 1.View upstream from habitat assessment in reach 1 of Sheardown Lake Tributary 1 during spring (a), summer (b), and fall (c).

Figure 2.View downstream from habitat assessment in reach 1 of Sheardown Lake Tributary 1 during spring (a), summer (b), and fall (c).

Figure 3.View across the habitat assessment site in reach 1 of Sheardown Lake Tributary 1 during spring (a), summer (b), and fall (c).

Mine Site Aquatic Habitat Assessment

Location

Watercourse Name: Sheardown Lake Tributary #1
Site: Reach 2

UTM: 17W 560383 7913550
Dates Surveyed: 26-Jun-07, 29-Jul-07, 31-Aug-07

Site Description/Physical Characteristics

Confinement: Partial

Channel Gradient: 1˚

Hydrology

	Spr	Sum	Fall
Bankfull Width (m):	11.88	11.88	11.88
Wetted Width (m):	3.36	0.94	1.20
Riffle-Crest Depth (m):	0.20	0.20	0.20
Pool Depth (m):	0.40	0.31	0.36
D (m):	0.02	0.02	0.02
D_{95} (m):	0.44	0.44	0.44
Point Velocities (m/s)			
Riffle:	0.85	0.36	0.38
Pool:	0.34	0.16	0.16
Behind a rock:	0.06	NM	NM

Stream/Riparian Habitat

Channel Morphology: 65% riffle, 35% pool

Substrate Composition: 40% sand, 20% gravel, 20% cobble, 20% boulder

Stream Cover: 20% boulder, 10% undercut banks, 10% deep pools

Aquatic Vegetation: Periphyton, submerged RV

Riparian Vegetation: Grasses and willows

Barriers Present (Y/N): N
Location: NA

Lakes Present (Y/N): Y
Location: DS – Sheardown L.

L/R Bank Characteristics

	Spr	Sum	Fall
Bank Height (L/R; m):	0.10/0.10	0.05/0.05	0.05/0.05
Bank Stability:	Mod	Mod	Mod
Erosion Potential:	Mod	Mod	Mod

Water Quality

	Spr	Sum	Fall
Specific Conductance (µS/cm):	90.0	163.0	187.0
TDS (g/l):	0.58	0.11	NM
DO (mg/l)	13.62	10.82	12.35
%DO:	105.8	101.5	100.3
Water Temp (˚C):	4.5	9.9	7.0

Fish Habitat

	Spr	Sum	Fall
Spawning:	ARCH - N NNST - N	ARCH - N NNST - H	ARCH - N NNST - N
Feeding:	ARCH - M NNST - M	ARCH - H NNST - H	ARCH - H NNST - M
Migration:	ARCH - M NNST - M	ARCH - H NNST - M	ARCH - H NNST - M

Baffinland Iron Mines
Mary River Project

North/South Consultants Inc.
Aquatic Environment Specialists

Figure 1.View upstream from habitat assessment in reach 2 of Sheardown Lake Tributary 1 during spring (a), summer (b), and fall (c).

Figure 2.View downstream from habitat assessment in reach 2 of Sheardown Lake Tributary 1 during spring (a), summer (b), and fall (c).

Figure 3.View across the habitat assessment site in reach 2 of Sheardown Lake Tributary 1 during spring (a), summer (b), and fall (c).

Mine Site Aquatic Habitat Assessment

Location

Watercourse Name: Sheardown Lake Tributary #1
Site: Reach 3

UTM: 17W 560891 7913500
Dates Surveyed: 26-Jun-07, 29-Jul-07, 31-Aug-07

Site Description/Physical Characteristics

Confinement: Unconfined

Channel Gradient: 1˚

Hydrology

	Spr	Sum	Fall
Bankfull Width (m):	35.65	35.65	35.65
Wetted Width (m):	35.65	25.32	29.25
Riffle-Crest Depth (m):	NA	NA	NA
Pool Depth (m):	0.49	0.37	0.56
D (m):	< 0.01	< 0.01	< 0.01
D_{95} (m):	0.93	0.93	0.93
Point Velocities (m/s)			
Riffle:	NA	NA	NA
Pool:	< 0.01	< 0.01	0.01
Behind a rock:	NA	NA	NA

Stream/Riparian Habitat

Channel Morphology: 100% pool

Substrate Composition: 90% silt, 5% sand, 5% boulder

Stream Cover: 5% boulder

Aquatic Vegetation: Periphyton, submerged RV

Riparian Vegetation: Grasses and moss

Barriers Present (Y/N): N
Location: NA

Lakes Present (Y/N): Y
Location: DS – Sheardown L.

L/R Bank Characteristics

	Spr	Sum	Fall
Bank Height (L/R; m):	0.10/0.10	0.20/0.20	0.10/0.10
Bank Stability:	Low	Low	Low
Erosion Potential:	High	High	High

Water Quality

	Spr	Sum	Fall
Specific Conductance (µS/cm):	87.4	156.0	201.0
TDS (g/l):	0.06	0.10	NM
DO (mg/l)	12.50	11.67	12.93
%DO:	108.6	113.7	105.5
Water Temp (˚C):	8.0	9.9	8.0

Fish Habitat

	Spr	Sum	Fall
Spawning:	ARCH - N NNST - N	ARCH - N NNST - H	ARCH - N NNST - N
Feeding:	ARCH - L NNST - L	ARCH - H NNST - M	ARCH - H NNST - L
Migration:	ARCH - L NNST - L	ARCH - H NNST - L	ARCH - H NNST - L

Baffinland Iron Mines
Mary River Project

North/South Consultants Inc.
Aquatic Environment Specialists

Figure 1.View upstream from habitat assessment in reach 3 of Sheardown Lake Tributary 1 during spring (a), summer (b), and fall (c).

Figure 2.View downstream from habitat assessment in reach 3 of Sheardown Lake Tributary 1 during spring (a), summer (b), and fall (c).

Figure 3.View across the habitat assessment site in reach 3 of Sheardown Lake Tributary 1 during spring (a), summer (b), and fall (c).

Mine Site Aquatic Habitat Assessment

Location

Watercourse Name: Sheardown Lake Tributary #1
Site: Reach 4

UTM: 17W 561653 7913452
Dates Surveyed: 26-Jun-07, 29-Jul-07

Site Description/Physical Characteristics

Confinement: Partial

Channel Gradient: 1˚

Hydrology

	Spr	Sum	Fall
Bankfull Width (m):	9.14	9.14	NA
Wetted Width (m):	4.26	4.55	NA
Riffle-Crest Depth (m):	0.09	0.08	NA
Pool Depth (m):	0.25	0.08	NA
D (m):	0.02	< 0.01	NA
D_{95} (m):	1.12	1.12	NA
Point Velocities (m/s)			
Riffle:	0.25	NM	NA
Pool:	0.09	NM	NA
Behind a rock:	0.08	NA	NA

Stream/Riparian Habitat

Channel Morphology: 50% pool (spr), 50% riffle (spr) Under boulders (sum)

Substrate Composition: 50% boulder, 30% cobble, 10% gravel, 10% silt

Stream Cover: 50% boulder

Aquatic Vegetation: Periphyton

Riparian Vegetation: Grasses and moss

Barriers Present (Y/N): Y
Location: US ~ 25m

Lakes Present (Y/N): Y
Location: DS – Sheardown L.

L/R Bank Characteristics

	Spr	Sum	Fall
Bank Height (L/R; m):	0.17/0.17	0.40/0.40	NA
Bank Stability:	Low	Low	NA
Erosion Potential:	High	High	NA

Water Quality

	Spr	Sum	Fall
Specific Conductance (µS/cm):	57.5	113.0	NA
TDS (g/l):	0.36	0.07	NA
DO (mg/l)	14.26	12.02	NA
%DO:	110.6	96.0	NA
Water Temp (˚C):	4.5	5.0	NA

Fish Habitat

	Spr	Sum	Fall
Spawning:	ARCH - N NNST - N	ARCH - N NNST - N	ARCH - N NNST - N
Feeding:	ARCH - L NNST - N	ARCH - L NNST - N	ARCH - N NNST - N
Migration:	ARCH - N NNST - N	ARCH - N NNST - N	ARCH - N NNST - N

Baffinland Iron Mines
Mary River Project

North/South Consultants Inc.
Aquatic Environment Specialists

Mine Site Aquatic Habitat Assessment

Figure 1.View upstream from habitat assessment in reach 4 of Sheardown Lake Tributary 1 during spring (a) and summer (b).

Figure 2.View downstream from habitat assessment in reach 4 of Sheardown Lake Tributary 1 during spring (a) and summer (b).

Figure 3.View across the habitat assessment site in reach 4 of Sheardown Lake Tributary 1 during spring (a) and summer (b).

Mine Site Aquatic Habitat Assessment

Location

Watercourse Name:	Sheardown Lake Tributary #1	**UTM:**	17W 561568 7913498
Site:	Reach 4b	**Dates Surveyed:**	29-Jul-07, 31-Aug-07

Site Description/Physical Characteristics

Confinement: Partial

Channel Gradient: 1˚

Hydrology

	Spr	Sum	Fall
Bankfull Width (m):	NA	1.10	1.10
Wetted Width (m):	NA	0.50	0.60
Riffle-Crest Depth (m):	NA	0.07	0.08
Pool Depth (m):	NA	0.26	0.23
D (m):	NA	0.02	0.02
D_{95} (m):	NA	1.12	1.12
Point Velocities (m/s)			
Riffle:	NA	0.55	0.25
Pool:	NA	0.06	0.15
Behind a rock:	NA	< 0.01	NM

Stream/Riparian Habitat

Channel Morphology:	60% riffle, 40% pool
Substrate Composition:	70% cobble, 20% boulder, 10% gravel
Stream Cover:	20% boulder, 80% undercut banks
Aquatic Vegetation:	Periphyton, submerged RV
Riparian Vegetation:	Grasses, mosses, wildflowers, willows
Barriers Present (Y/N):	Y
Location:	US ~ 75m
Lakes Present (Y/N):	Y
Location:	DS – Sheardown L.

L/R Bank Characteristics

	Spr	Sum	Fall
Bank Height (L/R; m):	NA	0.12/0.12	0.16/0.08
Bank Stability:	NA	Low	Low
Erosion Potential:	NA	High	High

Water Quality

	Spr	Sum	Fall
Specific Conductance (µS/cm):	NA	113.0	150.0
TDS (g/l):	NA	0.07	NM
DO (mg/l)	NA	12.02	12.60
%DO:	NA	96.0	97.0
Water Temp (˚C):	NA	5.3	5.0

Fish Habitat

	Spr	Sum	Fall
Spawning:	ARCH - N NNST - N	ARCH - N NNST - N	ARCH - N NNST - N
Feeding:	ARCH - L NNST - N	ARCH - M NNST - N	ARCH - L NNST - N
Migration:	ARCH - N NNST - N	ARCH - N NNST - N	ARCH - N NNST - N

Baffinland Iron Mines
Mary River Project

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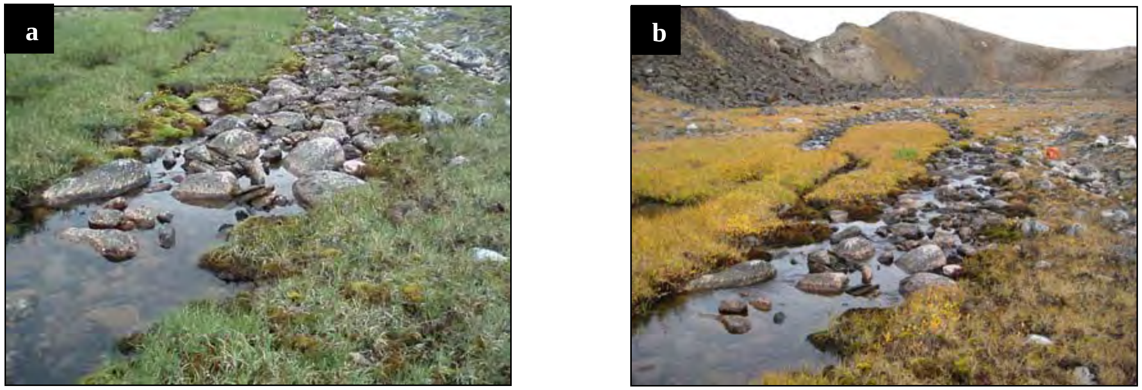


Figure 1.View upstream from habitat assessment in reach 4b of Sheardown Lake Tributary 1 during summer (a) and fall (b).

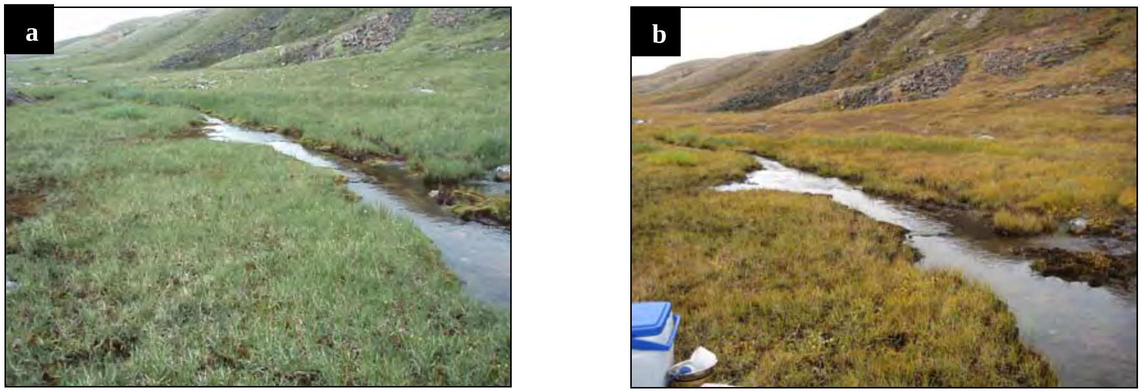


Figure 2.View downstream from habitat assessment in reach 4b of Sheardown Lake Tributary 1 during summer (a) and fall (b).

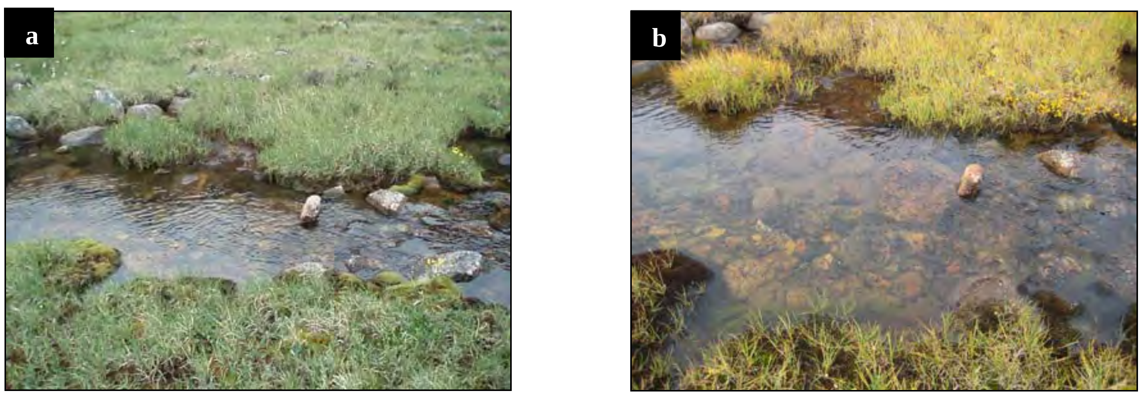
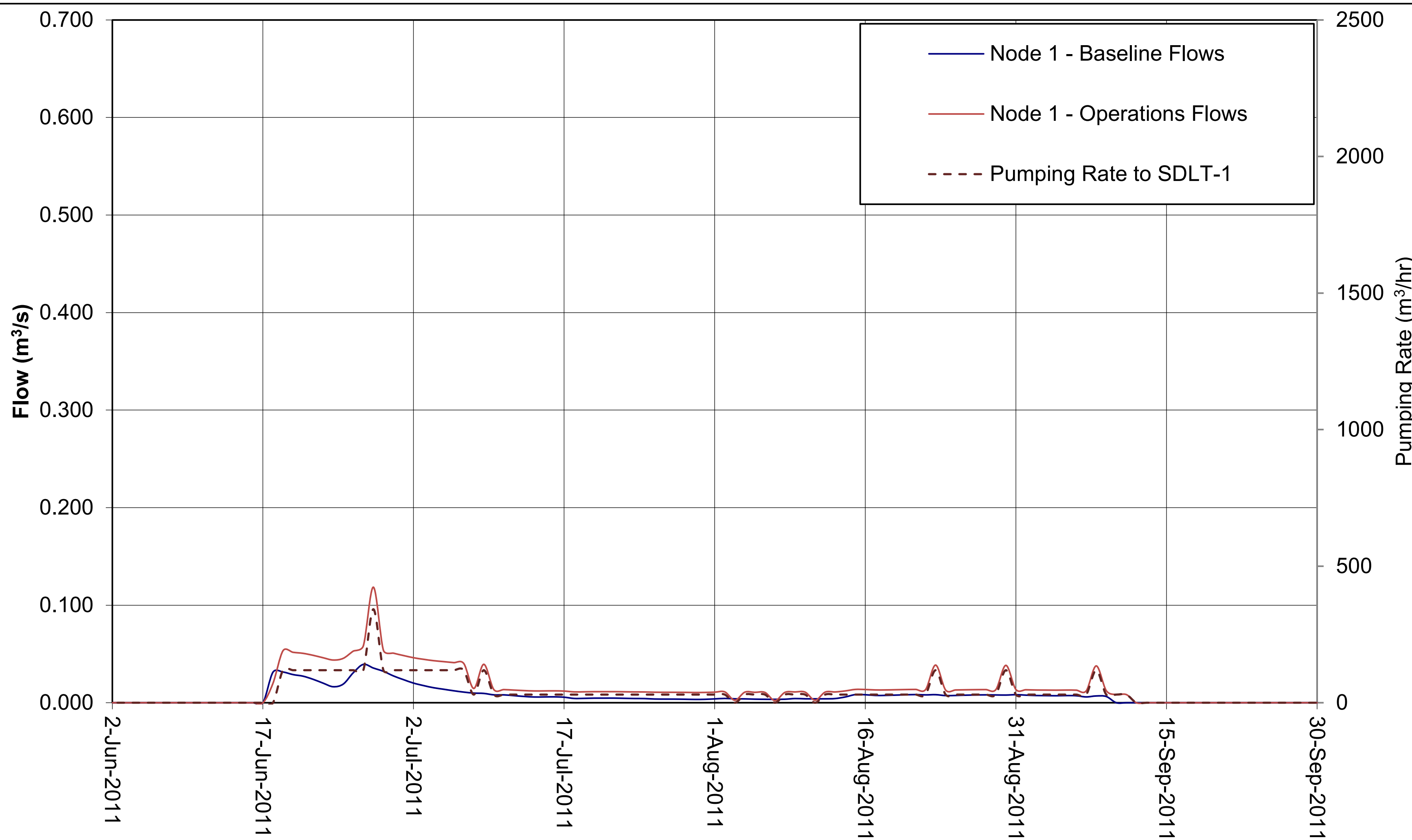


Figure 3.View across the habitat assessment site in reach 4b of Sheardown Lake Tributary 1 during summer (a) and fall (b).

APPENDIX C

KM105 Pond Discharge Hydrographs

(Pages C-1 to C-6)



NOTES:
1. OPERATIONS FLOWS ARE INCLUSIVE OF PUMPED FLOW RATES FROM THE KM105 POND.
2. PUMPING RATES CAN BE RED ON BOTH THE PRIMARY AND SECONDARY AXIS.
3. AT NO POINT IS THERE A NEED TO DISCHARGE OUT OF THE SDLT-1 TRIBUTARY.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	05AUG'21	ISSUED WITH MEMO	JJD	RAC

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

NODE 1 - BASELINE VS OPERATIONS FOR THE 2011 YEAR (DRY YEAR)

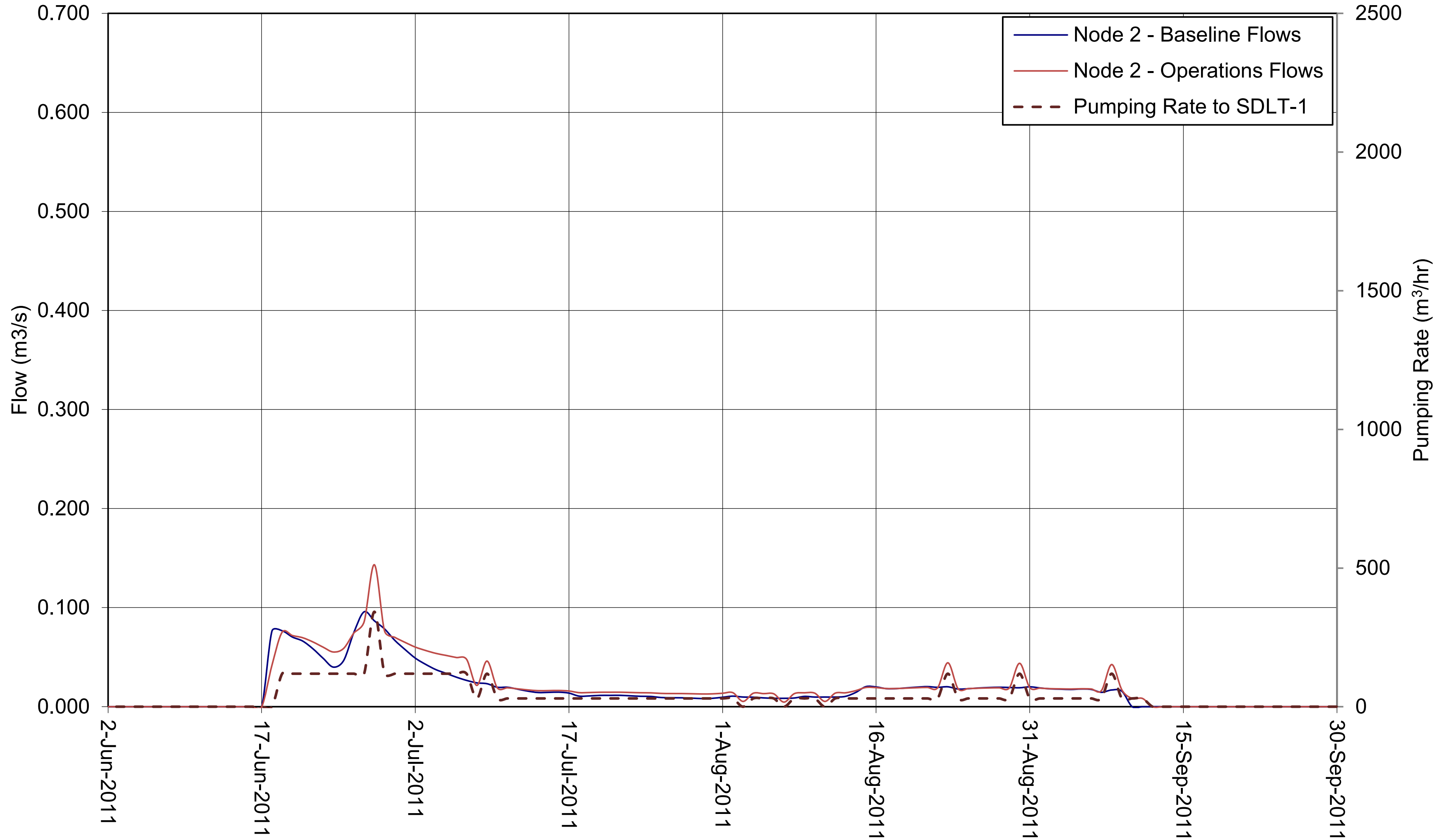
Knight Piésold CONSULTING

P/A NO. NB102-181/71

REF. NO. NB21-00726

FIGURE C.1

REV 0



NOTES:
1. OPERATIONS FLOWS ARE INCLUSIVE OF PUMPED FLOW RATES FROM THE KM105 POND.
2. PUMPING RATES CAN BE RED ON BOTH THE PRIMARY AND SECONDARY AXIS.
3. AT NO POINT IS THERE A NEED TO DISCHARGE OUT OF THE SDLT-1 TRIBUTARY AREA.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	05AUG'21	ISSUED WITH MEMO	JJD	RAC

BAFFINLAND IRON MINES CORPORATION

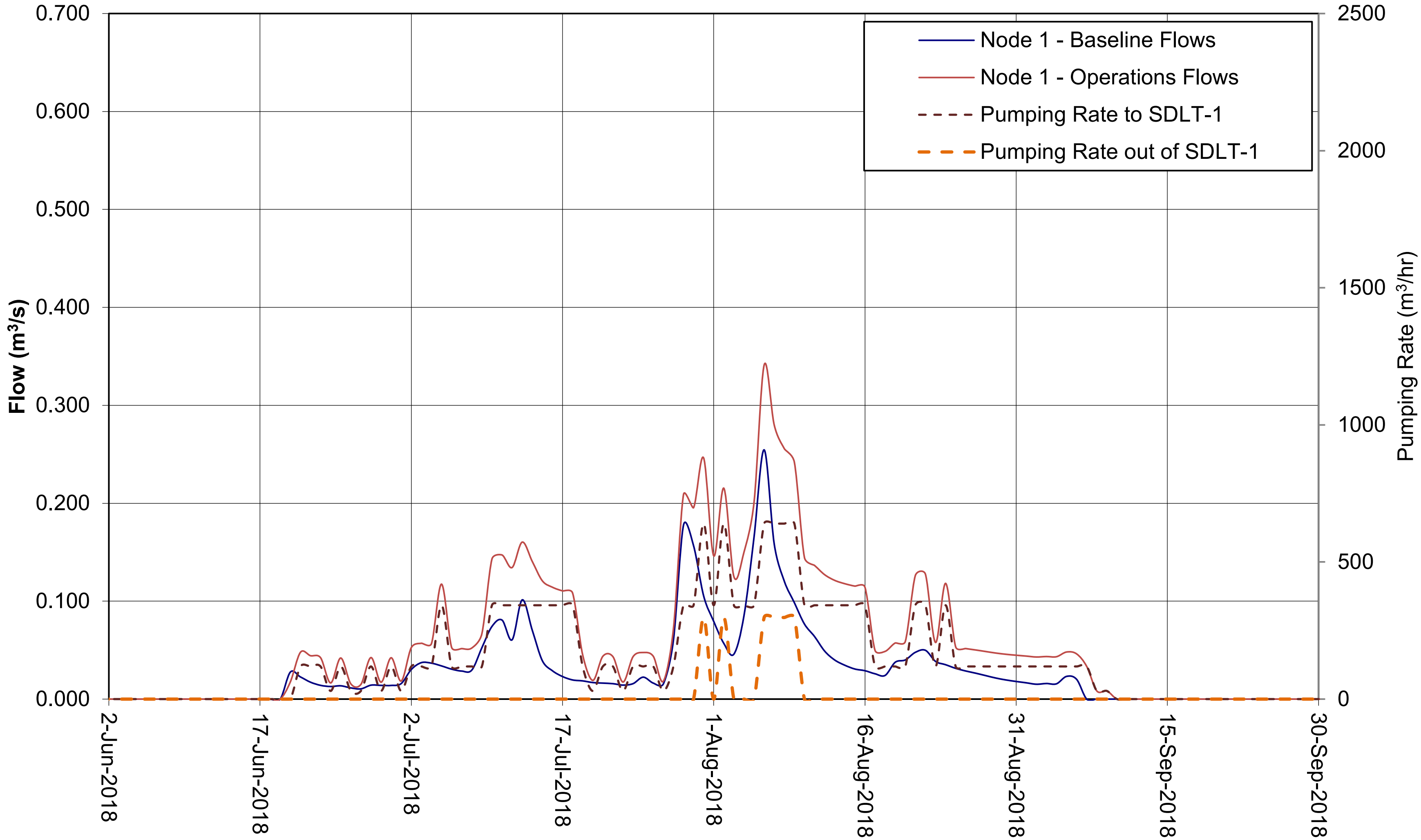
MARY RIVER PROJECT

NODE 2 - HYDROLOGY STATION H11
BASELINE VS OPERATIONS (DRY YEAR)

Knight Piésold CONSULTING

P/A NO.	REF. NO.
NB102-181/71	NB21-00726

FIGURE C.2 REV 0



NOTES:
1. OPERATIONS FLOWS ARE INCLUSIVE OF PUMPED FLOW RATES FROM THE KM105 POND.
2. PUMPING RATES CAN BE RED ON BOTH THE PRIMARY AND SECONDARY AXIS.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	05AUG'21	ISSUED WITH MEMO	JJD	RAC

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

NODE 1 - BASELINE VS OPERATIONS FOR THE 2018 YEAR (WET YEAR)

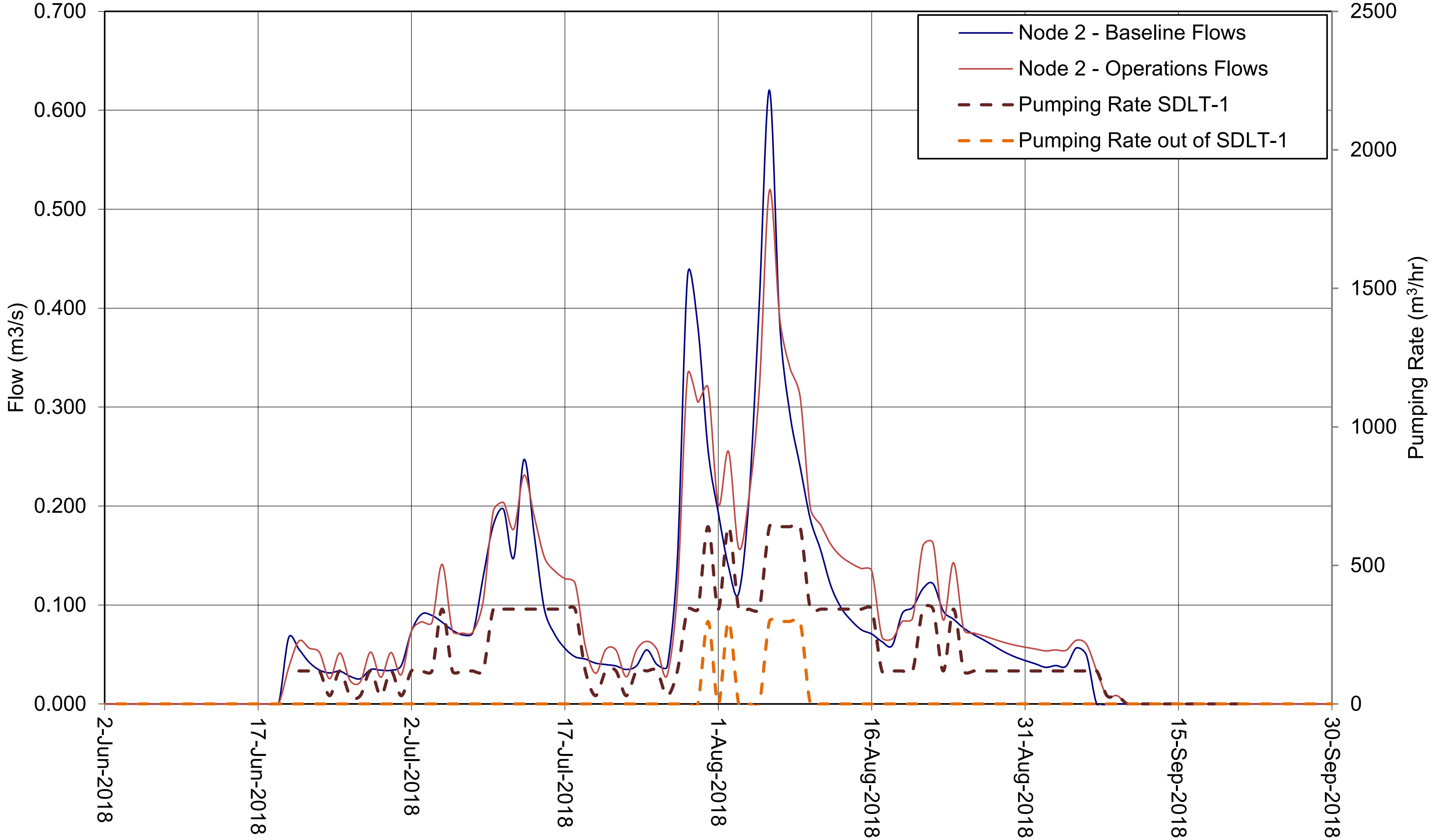
Knight Piésold CONSULTING

P/A NO. NB102-181/71

REF. NO. NB21-00726

FIGURE C.3

REV 0



NOTES:

1. OPERATIONS FLOWS ARE INCLUSIVE OF PUMPED FLOW RATES FROM THE KM105 POND.
2. PUMPING RATES CAN BE RED ON BOTH THE PRIMARY AND SECONDARY AXIS.

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

NODE 2 - HYDROLOGY STATION H11
BASELINE VS OPERATIONS (WET YEAR)

Knight Piésold CONSULTING

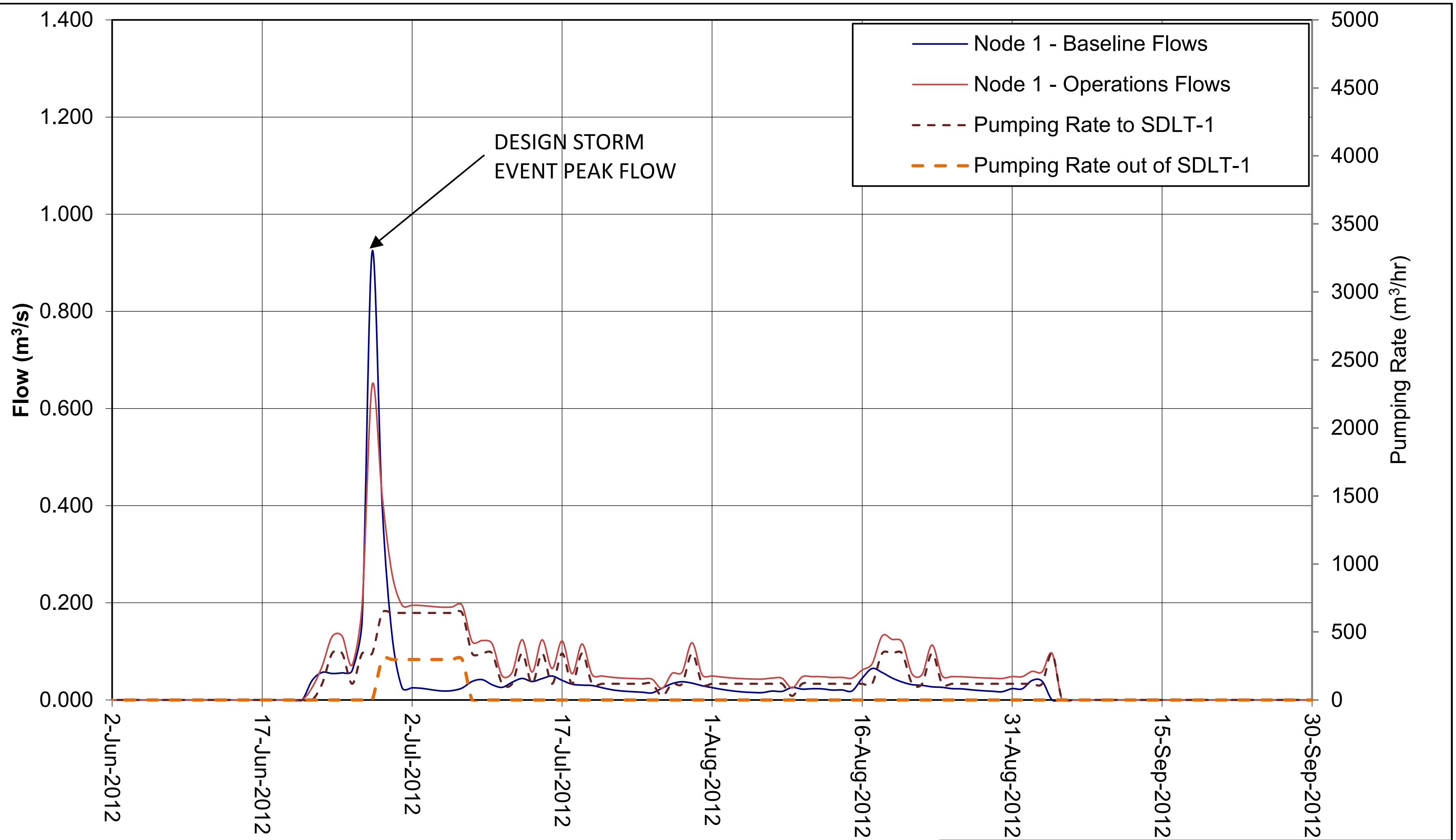
0	05AUG'21	ISSUED WITH MEMO	JJD	RAC
REV	DATE	DESCRIPTION	PREP'D	RVW'D

P/A NO. NB102-181/71

REF. NO. NB21-00726

FIGURE C.4

REV 0



NOTES:
1. OPERATIONS FLOWS ARE INCLUSIVE OF PUMPED FLOW RATES FROM THE KM105 POND.
2. PUMPING RATES CAN BE RED ON BOTH THE PRIMARY AND SECONDARY AXIS.

0	05AUG'21	ISSUED WITH MEMO	JJD	RAC
REV	DATE	DESCRIPTION	PREP'D	RVW'D

BAFFINLAND IRON MINES CORPORATION

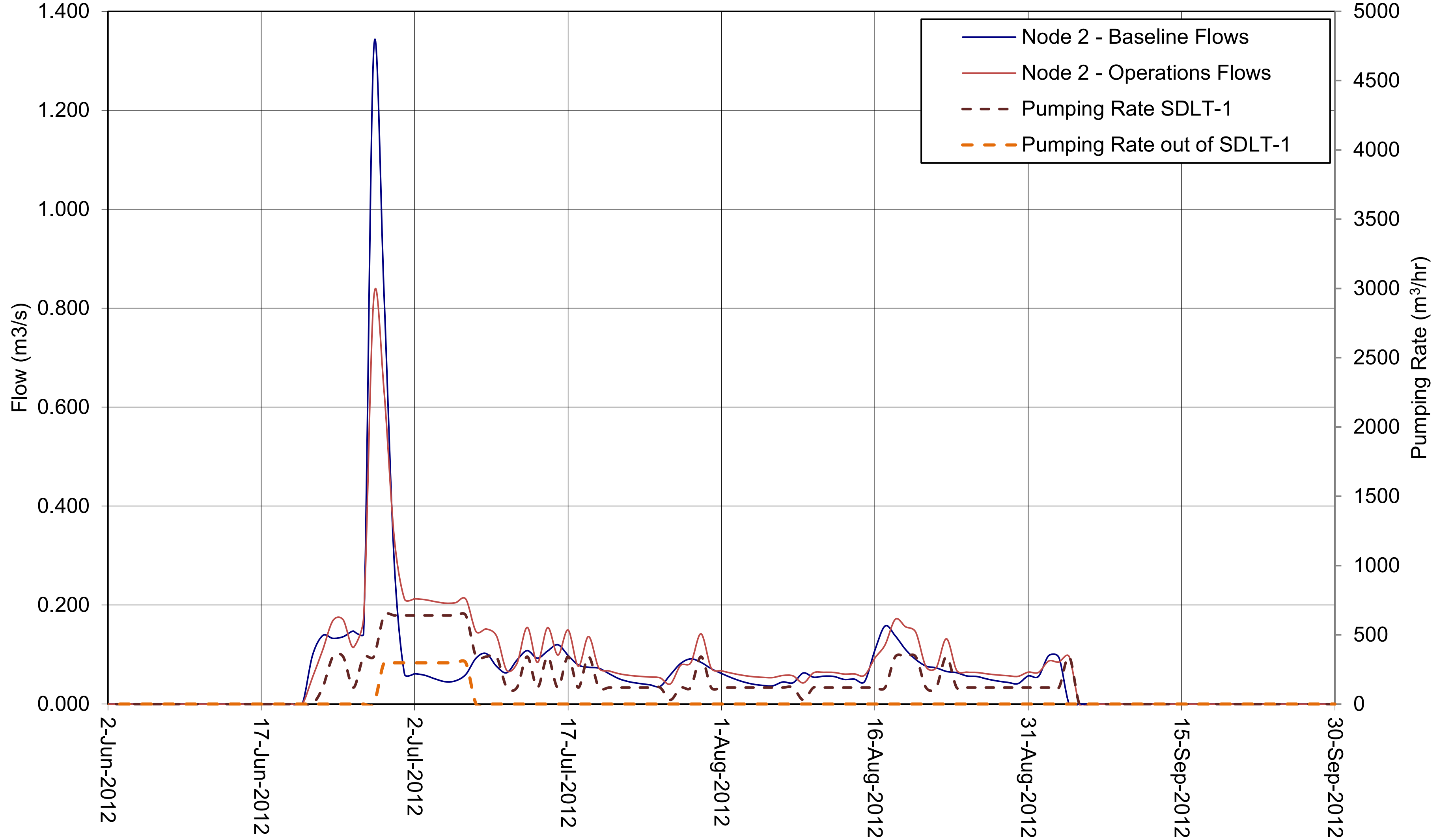
MARY RIVER PROJECT

NODE 1 - BASELINE VS OPERATIONS FOR THE 2012 YEAR (AVG. YEAR) WITH 10-YEAR, 3 DAYS DESIGN STORM

Knight Piésold CONSULTING

P/A NO. NB102-181/71 | REF. NO. NB21-00726

FIGURE C.5 REV 0



NOTES:
1. OPERATIONS FLOWS ARE INCLUSIVE OF PUMPED FLOW RATES FROM THE KM105 POND.
2. PUMPING RATES CAN BE RED ON BOTH THE PRIMARY AND SECONDARY AXIS.

0	05AUG'21	ISSUED WITH MEMO	JJD	RAC
REV	DATE	DESCRIPTION	PREP'D	RVW'D

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

NODE 2 - BASELINE VS OPERATIONS FOR THE 2012 YEAR (AVG. YEAR) WITH 10-YEAR, 3 DAYS DESIGN STORM

Knight Piésold CONSULTING

P/A NO. NB102-181/71

REF. NO. NB21-00726

FIGURE C.6

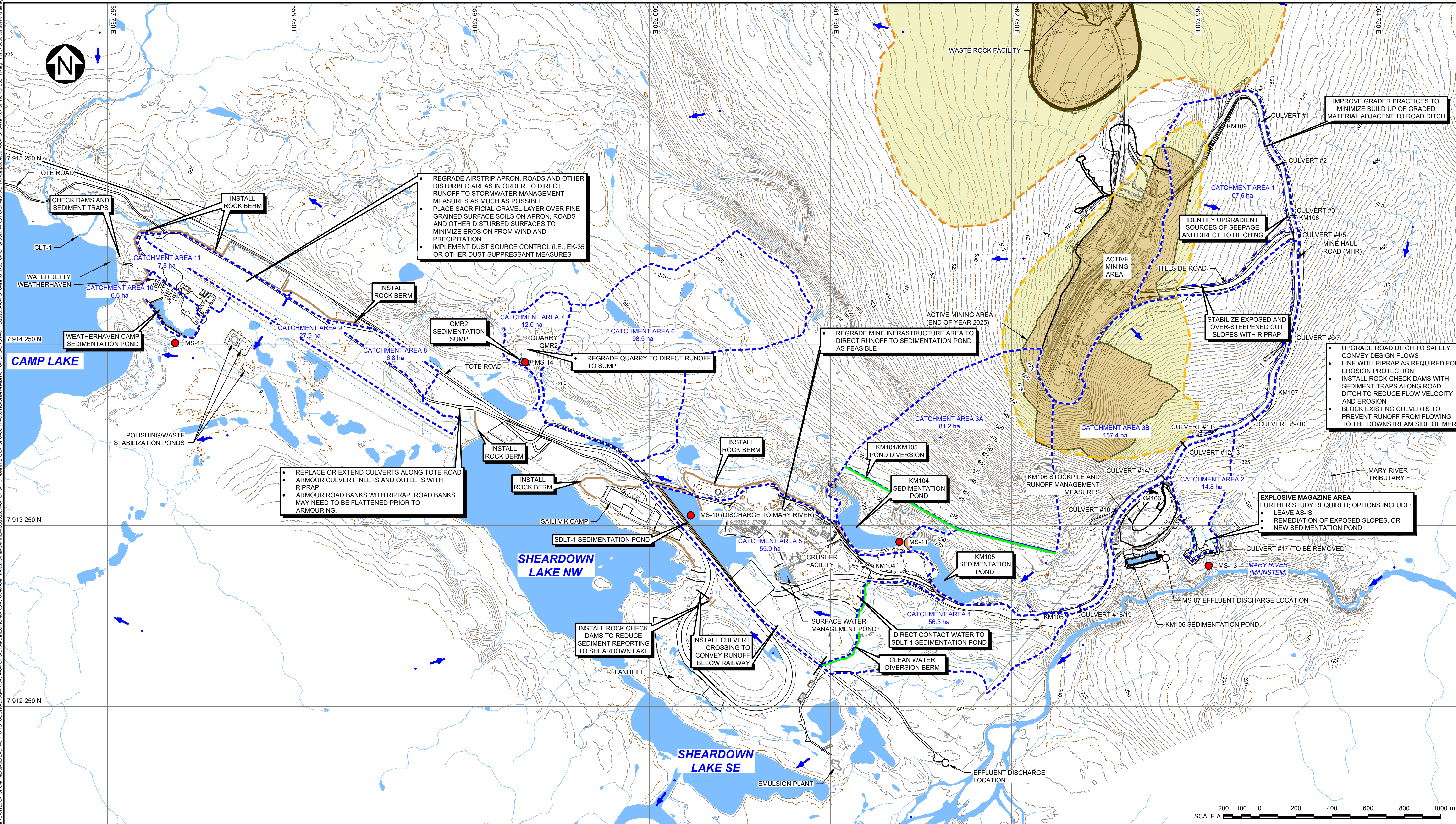
REV 0

Attachment 3

Updated Modification Request Components

Table 3 – Updated Modification Request Components

Station	Description	Project Phases	Monitoring Parameters	Frequency	Applicable Discharge Limits
MS-10	SDLT-1 Pond Ore Stockpile Stormwater	Operation	Groups 1 and 7	Monthly during summer	Table 10
			Group 3	Annually	
MS-11	KM105 Pond Stormwater	Operation	Groups 1 and 8	Monthly during summer	Table 11
MS-12	Weatherhaven Camp Stormwater	Operation	Groups 1 and 8	Monthly during summer	Table 11
MS-13	Explosives Magazine Pond (if constructed)	Operation	Groups 1 and 8	Monthly during summer	Table 11
MS-14	Quarry QMR2 Pond/Sump	Operation	Groups 1, 3 and 8	Monthly during summer	Table 11



LEGEND:

- CURRENT
- ULTIMATE
- WATER / ESTIMATED POND EXTENTS
- SEDIMENTATION POND EMBANKMENT (APPROXIMATE)
- DRAINAGE DIRECTION
- WATER MANAGEMENT PLAN CATCHMENT (APPROXIMATE)
- ULTIMATE DEPOSIT NO. 1 PIT LIMITS
- ULTIMATE WASTE ROCK STOCKPILE LIMITS
- ROCK BERM
- CULVERT (APPROXIMATE)
- EXISTING EFFLUENT DISCHARGE LOCATION
- PROPOSED EFFLUENT DISCHARGE LOCATION

NOTES:

1. COORDINATE GRID IS UTM NAD83, ZONE 17.
2. DETAILED WATER FROM EAGLE MAPPING (2005). CONTOUR PROVIDED BY BAFFINLAND (2019) INTERVAL IS 5 m.
3. CURRENT MINE AREA FROM THE WASTE DUMP TO THE CRUSHER PAD, AND DITCHES ALONG THE HAUL ROAD PROVIDED BY BIM (MARCH 12, 2018).
4. MINE HAUL ROAD AS-BUILT PROVIDED BY BAFFINLAND IRON MINES CORPORATION (MAY 2021).
5. ALL OTHER SITE INFRASTRUCTURE PROVIDED BY HATCH (AUGUST 2, 2016) AND SIMPLIFIED BY KP STAFF (JANUARY 2018).
6. LOCATIONS AND DETAILS OF PROPOSED WATER MANAGEMENT MEASURES TO BE CONFIRMED BASED ON ACTUAL SITE CONDITIONS.

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	30JUL'21	ISSUED WITH TRANSMITTAL	RAC	AS	SRA

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

PROPOSED MINE SITE WATER MANAGEMENT FACILITIES

Knight Piésold CONSULTING

P/A NO.	REF NO.
NB102-181/71	NB21-00734

FIGURE 1 REV 0