APPENDIX E

Hydrological Assessment of Water Withdrawals

(Pages E-1 to E-64)

Prepared for
Baffinland Iron Mines Corporation
360 Oakville Place Drive
Suite 300
Oakville, Ontario
Canada L6H 6K8

Prepared by
Knight Piésold Ltd.
200-1164 Devonshire Avenue
North Bay, ON P1B 6X7
Canada

NB102-181/94-1

MARY RIVER PROJECT
WATER WITHDRAWAL NOTIFICATION AND HYDROLOGICAL ASSESSMENT - STEENSBY COMPONENT

Rev	Description	Date
0	Issued in Final	November 28, 2023

Knight Piésold CONSULTING

EXECUTIVE SUMMARY

Baffinland Iron Mines Corporation (Baffinland) currently operates the Mary River Project (the Project) under Type A Water Licence No. 2AM-MRY1325 (herein referred to as, the Licence) (NWB, 2015). Part A of the Licence describes the scope of the Approved Project, which includes the 4.2 million tonnes per annum (Mtpa) "Early Revenue Phase" (ERP) operation currently underway, as well as the 18 Mtpa Steensby Component of the Project, inclusive of the Steensby Railway and Steensby Port. Baffinland is proposing to initiate construction of the Steensby Component of the Project in late 2024.

Minimal changes to water use are proposed from what was assessed in the Final Environmental Impact Statement (FEIS) (Baffinland, 2012). These changes include the following:

- The length of all-season construction access road that is separate from the railway has been reduced in favour of building construction access into the railway embankment and using winter roads (which were previously contemplated) to stage camps, equipment, and materials at key work fronts.
- Winter road alignments have been confirmed, as well as the associated water use for their construction.
- Minor increases in domestic water requirements, and the use of the 3 Km Lake water source into the operation phase. The operation phase water source (10 Km Lake) will continue to be carried forth as an alternate water source, if needed.
- Sewage will be treated in package sewage treatment plants at rail construction camps. Previously, sewage was going to be trucked to the Mine Site or Steensby Port for treatment in facilities at these locations. A modification request is being prepared as separate submission for this change.
- Changes to the Steensby Port layout have been proposed within the previously identified Potential Development Area (PDA).

Baffinland has refined its water needs for the Steensby Component of the Project, and proposed changes to the Project's water use include:

- Administrative and volumetric changes to the domestic and industrial water uses during construction
- Additional water withdrawals for winter road construction
- Additional dust suppression water withdrawal sites along the Steensby Railway

The overall maximum daily and annual limits of the current Licence will remain unchanged.

This document serves as notification under Part E, Item 9 of the Licence, which states:

> *The Licensee shall notify the Inspector and the Board at least ten (10) days in advance of using Water from any sources not identified in the Application or requiring approval as per Part E, Item 8.*

This document also provides the information required under Part E, Item 14 of the Licence, which states:

> *14. The Licensee shall, where the use of Water of a sufficient volume would likely result in the drawdown of the source Water body involved or dewatering of the specific Water body is anticipated, submit the following for the approval of the Board in writing:*
>
> *a. the volume of Water required;*
>
> *b. a hydrological overview of the Water body;*

c. details of impact; and

d. Proposed mitigation measures.

Proposed changes to water withdrawals are summarized in below.

Water Station	Waterbody Name	Domestic and Industrial Use		Dust Suppression	
		Camps	Winter Road	Daily Maximum Volume	Maximum Pumping Rate
		(m^3/day)	(m^3/season)	(m^3/day)	(m^3/min)
MS-MRY-1	Camp Lake	657.5	70,000	160	n/a
BR-0-1	Mary River	-	-	300	5.7
BR-25-1	Unnamed River	-	-	300	3.2
Ravn Camp Lake	Unnamed lake ("Ravn Camp Lake")	245.2	40,000	160	n/a
BR-37-1/CV-R21	Ravn River	-	-	300	5.7
BR-46-1	Unnamed stream	-		300	5.7
Mid-Rail Camp Lake	Unnamed lake ("Nivek Lake")	100	-	160	n/a
BR-95-1	Cockburn Lake	-	200,000	160	n/a
Cockburn tunnels camp		212.5		160	n/a
South Cockburn camp				160	n/a
BR-137-1	ST352 outlet stream	-	-	300	5.7
ST352 Lake	Unnamed lake	-	150,000	-	n/a

Note(s):

1. Streams are shaded green and lakes are shaded blue.

Assessments were completed to determine if the proposed water withdrawals will comply with Fisheries and Oceans Canada (DFO) guidance regarding water extraction from streams and lakes beneath ice cover (DFO, 2010a and 2013a) and thresholds for withdrawals from lakes during open water established in the FEIS (Baffinland, 2012). All proposed water withdrawals are within applicable thresholds, except for an exceedance of the 10% threshold during June at the Ravn Camp Lake water station arising from winter water withdrawals. Considering several other factors, including that most of June flows occur in the second half of the month, and that fish do not start moving out of lakes into local streams until the end of June, this threshold exceedance is judged not to represent a significant effect to fish and fish habitat.

Withdrawals from other water stations in the Licence not assessed in this notification remain unchanged.

The potential impacts of flow withdrawal on fish and fish habitat can be assessed by understanding the mechanisms and stressors that cause effects in the aquatic environment. Water withdrawal has the potential to impact fish and fish habitat through the following mechanisms (DFO, 2010b):

- Placement of structures in water
- Entrainment in pumps / impingement on screens
- Use of industrial equipment near fish-bearing waters (i.e., risk of spills and inadvertent sedimentation and/or erosion)
- Oxygen depletion, loss of over-wintering habitat, and/or reductions in littoral habitat during winter water withdrawal from ice-covered waterbodies
- Changes in flow volumes or timing, duration, and frequency of flow

The following plans describe the mitigation measures Baffinland implements to protect fish and fish habitat during water withdrawals:

- Environmental Protection Plan (EPP; Baffinland, 2021a)
- Fresh Water Supply, Sewage and Wastewater Management Plan (FWSSWMP; Baffinland, 2018)
- Surface Water and Aquatic Ecosystems Management Plan (SWAEMP; Baffinland, 2021b)
- Spill Contingency Plan (SCP; Baffinland, 2021c)

The latest versions of these plans are found on Baffinland's online Document Portal:: https://baffinland.com/document-portal/.

The assessment determined that these proposed withdrawals are within applicable thresholds, with the exception of an exceedance of the 10% threshold during June at the Ravn Camp Lake water station. Considering several factors, including that most June flows occur in the second half of the month due to the timing of spring freshet, and that fish do not start moving out of lakes into local streams until the lake temperatures increase around the end of June, this threshold exceedance is judged not to represent a significant effect to fish and fish habitat.

TABLE OF CONTENTS

PAGE

TABLES

FIGURES

APPENDICES

Abbreviations

the Project	Mary River Project
Baffinland	Baffinland Iron Mines Corporation
BCLOs	Baffinland Community Liaison Officers
CIRNAC	Crown-Indigenous Relations and Northern Affairs Canada
DFO	Fisheries and Oceans Canada
EHS	Environmental, Health and Safety
EPP	Environmental Protection Plan
ERP	Early Revenue Phase
FDC	Flow Duration Curve
FEIS	Final Environmental Impact Statement
FWSSWMP	Fresh Water Supply, Sewage and Wastewater Management Plan
GIS	Geographical Information System
HTO	The Hunters and Trappers Organization
IQ	Inuit Qaujimajatuqangit
KP (“KP 95”)	Kilometre post
MAD	Mean Annual Discharge
MAUD	Mean Annual Unit Discharge
MEWG	Marine Environment Working Group
MRIKS	Mary River Inuit Knowledge Study
Mtpa	Million tonnes per annum
NIRB	Nunavut Impact Review Board
NPC	Nunavut Planning Commission
NSC	North/South Consultants Inc.
NuPPAA	*Nunavut Planning and Project Assessment Act*
OHWM	Operational High Water Mark
PDA	Potential Development Area
QIA	Qikiqtani Inuit Association
SEMC	Socio-Economic Monitoring Report
SEMWG	Socio-Economic Environment Working Group
SWAEMP	Surface Water and Aquatic Ecosystems Management Plan
the Licence	Type A Water Licence No. 2AM-MRY1325
TEWG	Terrestrial Environment Working Group
Tote Road	Milne Inlet Tote Road
WSC	Water Survey of Canada

1.0 INTRODUCTION

Baffinland Iron Mines Corporation (Baffinland) currently operates the Mary River Project (the Project) under Type A Water Licence No. 2AM-MRY1325 (herein referred to as, the Licence) (Nunavut Water Board [NWB], 2015). Part A of the Licence describes the scope of the Approved Project, which includes the 4.2 million tonnes per annum (Mtpa) "Early Revenue Phase" operation currently underway, as well as the 18 Mtpa Steensby Component of the Project, inclusive of the Steensby Railway and Steensby Port. Baffinland is proposing to initiate construction of the Steensby Component of the Project in late 2024.

Part E of the Licence describes conditions applying to water use and management, including approved water sources, and site-specific, daily, and annual withdrawal limits.

Baffinland has refined its water needs for the Steensby Component of the Project, as described in this document. Proposed changes to the Project's water use include:

- Administrative and volumetric changes to the domestic and industrial water uses during construction, as identified in Part E, Item 3 and Table 2 of the Licence
- Additional industrial water use for winter road construction, as contemplated in Part E, Item 3 of the Licence
- Additional dust suppression water withdrawal sites along the south railway, keeping with the overall daily and annual limits identified in Part E, Item 25, and Table 2-3 of the Licence

Each of these are described further in Section 2.

This document serves as notification under Part E, Item 9 of the Licence, which states:

> *The Licensee shall notify the Inspector and the Board at least ten (10) days in advance of using Water from any sources not identified in the Application or requiring approval as per Part E, Item 8.*

This document also provides the information required under Part E, Item 14 of the Licence, which states:

> *14. The Licensee shall, where the use of Water of a sufficient volume would likely result in the drawdown of the source Water body involved or dewatering of the specific Water body is anticipated, submit the following for the approval of the Board in writing:*
>
> *a. the volume of Water required;*
>
> *b. a hydrological overview of the Water body;*
>
> *c. details of impact; and*
>
> *d. Proposed mitigation measures.*

The following information is provided in this document:

- Section 2 - the volume of water required
- Section 3 - relevant community engagement and Inuit knowledge work
- Section 4 - hydrological assessment
- Section 5 - mitigation measures
- Section 6 - an assessment of effects following the implementation of mitigation measures

2.0 PROJECT DESCRIPTION

2.1 PROPOSED CHANGES TO THE STEENSBY COMPONENT

The Steensby Railway construction phase layout is presented on Figure 2.1, and the Steensby Port layout is presented on Figure 2.2. Minimal changes are proposed from what was assessed in the Final Environmental Impact Statement (FEIS; Baffinland, 2012). These changes include the following:

- The length of all-season construction access road that is separate from the railway has been reduced in favour of building construction access into the railway embankment and using winter roads (which were previously contemplated) to stage camps, equipment, and materials at key work fronts.
- Winter road alignments have been confirmed, as well as the associated water use for their construction.
- Minor increases in domestic water requirement, including the use of the 3 Km Lake water source into the operation phase. The operation phase water source (10 Km Lake) will continue to be carried forth as an alternate water source, if needed.
- Sewage will be treated in package sewage treatment plants at rail construction camps. Previously, sewage was going to be trucked to the Mine Site or Steensby Port for treatment in facilities at these locations. A modification request is being prepared as separate submission for this change.
- Changes to the Steensby Port layout have been proposed within the previously identified Potential Development Area (PDA).

This notification focuses on proposed changes to water withdrawals, including for domestic and industrial water uses and for dust suppression.

2.2 DOMESTIC AND INDUSTRIAL WATER USE

2.2.1 CONSTRUCTION CAMPS

Temporary construction camps will be constructed at kilometre post (KP) 35 (north of the Ravn River crossing), near the existing Mid-Rail Camp, east of the tunnels along Cockburn Lake, at the south end of Cockburn Lake, and at Steensby Port. Equipment maintenance and storage depots will be established at KP 81.6 and KP 130.

Water for temporary camps will be extracted from nearby water sources without permanent infrastructure in the same manner as water is extracted from Km 32 Lake for Milne Port. A permanent water intake/jetty will be constructed in 3 Km Lake at Steensby Port for the pioneering construction camp and permanent accommodation facility.

The proposed domestic and industrial water uses for camps are presented in Table 2.1. Several administrative changes are proposed as summarized in the notes following Table 2.1. Increased domestic and industrial water withdrawals are proposed at Ravn Camp Lake and Mid-Rail camp, and thus these are assessed in Section 4.

SAVED: I:\1\02\00181\94\A\Acad\FIGS\B01 R0, 11/28/2023 1:09:08 PM , ASIMPSON PRINTED: 11/28/2023 1:10:57 PM, FIG 2.1, ASIMPSON ACAD VERSION: 24.2S (LMS TECH) ACAD VERSION: 24.2S (LMS TECH)
XREF FILE(S): INUIT OWNED LANDS - SURFACE AND SUBSERFACE - 01 - MAR 05 2009; TOPO - 01 - MAR 06 2009; KP_PD_FIG_BOUNDARIES; X-C-PDAx-POTE-DEVE-AREA; X-C-QUAR-LOCA; RAILWAY ALIGNMENT AND CONST ACCESS RD - MARY RIVER STEENSBY 2010 -12AUG2010; X-C-INFR-OTHR; X-C-INFR-RAIL-SOUT; X-C-INFR-STEE-PORT; X_Bridges; X-C-INFR-MINE IMAGE FILE(S): Baffinland logo-big corp

555 000 E
570 000 E
585 000 E
600 000 E
615 000 E
7 905 000 N
7 890 000 N
7 875 000 N
7 860 000 N
7 845 000 N
7 830 000 N
7 815 000 N

MINE SITE
BR-0-1
BR-8-1
BR-8-2
BR-11-1
BR-25-1
Q25+500
Q31+500
Q35+000
Q35+500
BR-35-1
BR-36-1
RAVN RIVER BRIDGE
BR-37-1
RAVN RIVER CAMP AREA
IPARQAK FORD
BR-44-1
BR-46-1
Q50+000
BR-51-1
MID-RAIL CAMP
Q53+700
BR-57-1
BR-59-1
Q67+200
SHARED OR INTEGRAL ACCESS ROAD (WITH EXCEPTIONS)
PROPOSED RAILWAY ALIGNMENT
BR-75-1
BR-76-1
BR-76-2
BR-76-3
BR-78-1
KP81.6 MAINTENANCE DEPOT
Q85+200
Q88+800
Q92+000
NORTH COCKBURN LAKE
COCKBURN LAKE BRIDGE
BR-95-1
BR-96-2
TUNNEL #1
COCKBURN LAKE
TUNNEL # 2
NORTH COCKBURN CAMP
Q116+800
BR-123-1
BR-123-2
BR-124-1
BR-124-2
SOUTH COCKBURN CAMP
QTR19
Q127+800
KP130 MAINTENANCE DEPOT
Q128+000
Q131+100
Q133+500
BR-138-1
BR-137-1
Q138+100
Q139+600
BR-141-1
BR-142-2
STEENSBY PORT
BR-146-1

MARY RIVER
MARY LAKE
RAVN RIVER
ANGIJURJUK LAKE
NINA BANG LAKE
STEENSBY INLET
PINGIMAJUQ RIDGE
COCKBURN RIVER

N

SCALE A 3 1.5 0 5 10 15 km

LEGEND:

- WATER
- RIVER/STREAM/DRAINAGE
- PROPOSED TEMPORARY ACCESS ROADS
- POTENTIAL DEVELOPMENT AREA (PDA)
- INUIT OWNED LAND - SURFACE ONLY EXCLUDING MINERALS
- INUIT OWNED LAND - SURFACE AND SUBSURFACE INCLUDING MINERALS
- STEENSBY RAILWAY
- PROPOSED QUARRY
- PROPOSED BRIDGE

NOTES:

1. BASE MAP: © HER MAJESTY THE QUEEN IN RIGHTS OF CANADA, DEPARTMENT OF NATURAL RESOURCES (2004). ALL RIGHTS RESERVED.
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
3. CONTOURS ARE IN METRES. CONTOUR INTERVAL VARIES.
4. STREAM CROSSINGS ARE SHOWN ON PLAN AND PROFILE DRAWINGS BY SYSTRA CANADA.

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	28NOV'23	ISSUED WITH REPORT	GMJ	AS	RAC

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

STEENSBY RAILWAY CONSTRUCTION PHASE LAYOUT

Knight Piésold CONSULTING

P/A NO. NB102-181/94

REF NO. 1

FIGURE 2.1

REV 0

SAVED: I:\1\02\00181\94\A\Acad\FIGS\B04 R0, 11/28/2023 4:44:56 PM , ASIMPSON PRINTED: 11/28/2023 4:45:36 PM, FIG 2.2, ASIMPSON ACAD VERSION: 24.2S (LMS TECH) ACAD VERSION: 24.2S (LMS TECH)
XREF FILE(S): X-C-INFR-OTHR; X-C-STEENSBY PORT AREA_01- APRIL 22 2008; POTENTIAL DEVELOPMENT AREAS; X-C-HABT-FISH-NSCx; X-C-INFR-RAIL-SOUT; X-C-INFR-STEE-PORT; X-C-INFR-MINE; X-C-INFR-INTK-10KM-LAKE-OTHR IMAGE FILE(S):

593,750 E
595,000 E
596,250 E
597,500 E
598,750 E

7,806,000 N
7,804,750 N
7,803,500 N
7,802,250 N
7,801,000 N
7,799,750 N
7,798,500 N

10 KM LAKE (ST347)
3 KM LAKE (ST353)
STEENSBY INLET

FRESH WATER PUMPHOUSE
ACCESS ROAD TO KM10 LAKE WATER INTAKE
POTENTIAL DEVELOPMENT AREA (PDA)
TEMPORARY AIRSTRIP
LAND FARM
LANDFILL
ACCESS ROAD
AIRSTRIP
ACCESS ROAD ALONG RAIL
TEMPORARY CONSTRUCTION CAMP
CULVERT
POND
PERMANENT CAMP PAD
LAYDOWN AREA
RAIL CAR DUMPER AREA
FUEL STORAGE
GENERAL FREIGHT RAIL YARD
LAYDOWN AREA
LAYDOWN AREAS
SEDIMENTATION POND
CAUSEWAY
FRESH WATER PUMPHOUSE
CULVERT
TEMPORARY FUEL BARGE AREA
RAILWAY
ACCESS ROAD
SEDIMENTATION POND
CONSTRUCTION DOCK
STOCKPILE / RECLAIM AREA PAD
SEDIMENTATION POND
ACCESS ROAD
EXPLOSIVES STORAGE FACILITY
ORE DOCK PAD

250 125 0 250 500 750 1000 1250 m
SCALE A

LEGEND:

- WATER
- WETLAND
- RIVER/STREAM/DRAINAGE
- INFRASTRUCTURE
- POTENTIAL DEVELOPMENT AREA (PDA)

NOTES:

1. COORDINATE GRID IS UTM NAD83, ZONE 17.
2. STEENSBY INFRASTRUCTURE PROVIDED BY AUSENCO (OCT 13, 2023).
3. CONTOUR INTERVAL IS 5 METRES.
4. TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
5. POTENTIAL DEVELOPMENT AREA (PDA) PROVIDED BY AUSENCO, (NOV 7, 2023).

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	28NOV'23	ISSUED WITH REPORT	AMB	AS	RAC

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

STEENSBY PORT LAYOUT

Knight Piésold CONSULTING

P/A NO. NB102-181/94 | REF NO. 1

FIGURE 2.2 | REV 0

Table 2.1 Revisions to Domestic and Industrial Water Use During the Construction Phase

Site	Source	Approved (m^3/day)	Proposed (m^3/day)	Change
Milne Port	Phillips Creek (summer)	367.5	367.5	No change; see Note 1
	Km 32 Lake (summer and winter)			
Mine Site	Camp Lake	657.5	657.5	No change
Steensby Port	10 Km Lake (ST347)	435.8	435.8	No change
	3 Km Lake (ST353)			
Ravn Camp	Camp Lake	145.2	-	Increase; see Note 2
	Ravn Camp Lake	-	245.2	
Mid-Rail Camp	Ravn Camp Lake (winter)	79.5		Increase; see Note 3
	Nivek Lake (summer)	79.5	100	
Cockburn North (Tunnels Camp)	Cockburn Lake	101.4	212.5	No change; see Note 4
Cockburn South Camp		111.1		
Daily Limit (m^3/day)		1,888	1,888	No change
Annual Limit (m^3/year)		689,000	689,000	No change

Note(s):

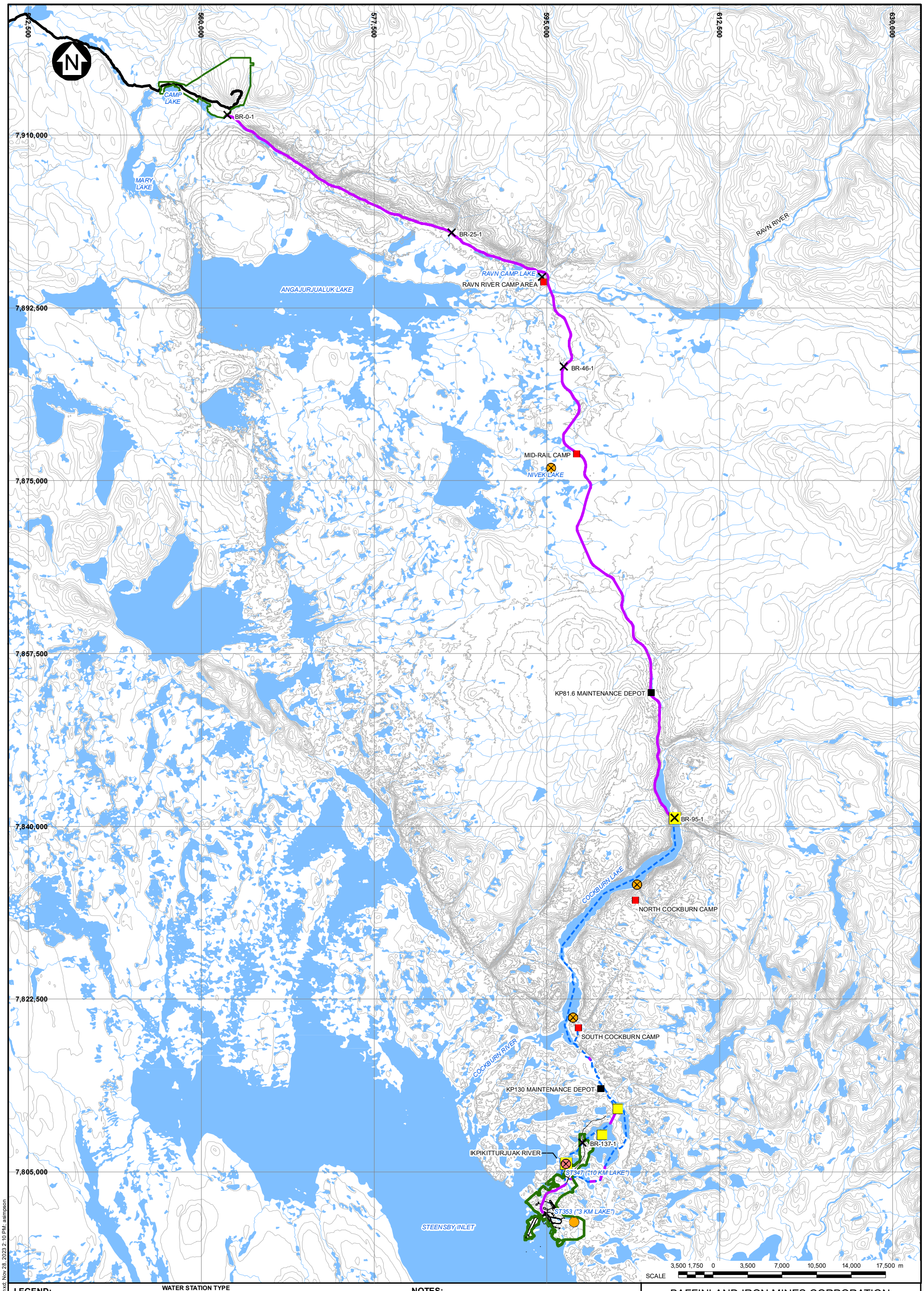
1. In practice, water withdrawals occur year-round from Km 32 lake, not only during summer. Winter withdrawals from Km 32 Lake were assessed in the FEIS.
2. The FEIS assessed and the original licence application proposed water withdrawals from an adjacent Unnamed ("Ravn") Lake. We believe reference to Camp Lake is a typographic error in the current Licence.
3. Withdrawals from Nivek Lake will increase from the approved 79.5 m^3/day to 100 m^3/day during open water conditions (summer), and from Ravn Camp Lake during ice cover conditions (winter). The total withdrawal from Ravn Camp Lake is 145.2 m^3/day in the summer, and 145.2 + 100 = 245.2 m^3/day in the winter.
4. Specifying a single maximum daily limit for the water body is preferred to provide flexibility regarding the volume of water each camp can withdraw.

2.2.2 WINTER ROADS

A construction access road will be constructed alongside the rail embankment, providing access to work fronts as construction of the embankment progresses. Winter roads will be used to provide early access to camps and work fronts as shown on Figure 2.3.

Winter roads will be constructed starting in November 2024, and annually throughout the construction phase. This will occur from the north (via the Mine Site) and the south (via Steensby Port). From the north, the winter road will parallel the railway alignment. A winter road will not be required where the construction access road has already been constructed.

The on-land portions of the winter road will be constructed by compacting the snow and applying water using the same approach used to construct winter roads elsewhere in Nunavut and the Northwest Territories.



LEGEND:

- POTENTIAL DEVELOPMENT AREA (PDA)
- WATER
- RIVER/STREAM/DRAINAGE
- PROPOSED WINTER ROAD ON ICE
- PROPOSED WINTER ROAD OVER LAND
- PROPOSED CONSTRUCTION CAMP
- PROPOSED MAINTENANCE DEPOT

WATER STATION TYPE

- DUST SUPPRESSION
- DOMESTIC AND INDUSTRIAL USE
- WINTER ROAD CONSTRUCTION
- DUST SUPPRESSION & DOMESTIC AND INDUSTRIAL USE & WINTER ROAD CONSTRUCTION

NOTES:

1. BASE MAP AND CONTOURS PROVIDED BY EAGLE MAPPING (2008).
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
3. CONTOURS ARE IN METRES. CONTOUR INTERVAL VARIES.
4. RAILWAY ALIGNMENT PROVIDED BY SYSTRA (NOV 13, 2023).
5. STEENSBY INFRASTRUCTURE PROVIDED BY AUSENCO, (NOV 7, 2023).
6. MINE RAIL LOOP PROVIDED BY SYSTRA, (NOV 8, 2023).

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	28NOV'23	ISSUED WITH REPORT	GMJ	AS	RAC

SAVED: I:\1\02\00181\94\AG\SIF\gis\B02 R0.mxd: Nov 28, 2023 2:10 PM: asimpson

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

CONSTRUCTION PHASE WATER STATIONS

Knight Piésold CONSULTING

P/A NO.	REF NO.
NB102-181/94	1

FIGURE 2.3 REV 0

Water withdrawals for winter road construction will not exceed the total authorized use up to 1,888 m^3 of water per day, to a maximum of 689,000 m^3 of water annually. An application rate of approximately 2,000 m^3 of water per kilometer of winter road was used to estimate the water withdrawal requirements for overland winter road construction.

The following winter roads are proposed:

- **Mine to Cockburn Lake (KP 0 to KP 95) -** A winter road will be constructed within the railway right-of-way along segments where the construction access road has not already been constructed. Water to construct this portion of the road will be sourced from Camp Lake, the unnamed lake next to the Ravn River Camp, and Cockburn Lake.
- **Cockburn Lake (KP 95 to KP 125) -** The winter road will cross the lake. An allowance has been made for water withdrawals to strengthen the ice road, or to strengthen work areas at bridge BR-95-1 or at the tunnels.
- **Cockburn Lake to Steensby Port (KP 125 to KP 149) -** A winter road will be constructed across the ice in Steensby Inlet, travelling over inland lakes with small overland portages. Various potential winter road route options have been identified to access the KP 130 Maintenance Depot (Figure 2.4). These routes will be subject to additional ground truthing before a preferred route is selected. An allowance has been made in the Cockburn Lake water withdrawals should the winter road be constructed from north to south (i.e., from KP 125 at the south end of Cockburn Lake to KP 149 at Steensby Port).

The estimated water requirements from the identified water sources are summarized in Table 2.2. These water withdrawals are assessed in Section 4.

Table 2.2 Annual Water Requirements for Winter Road Construction

Construction Front	Winter Road Segment	Water Station	Distance (km)	Withdrawal Volumes (m^3) [1]
Mine to Cockburn Lake	Rail KP 0 to KP 35	Camp Lake	35	70,000
	Rail KP 35 to KP 55	Unnamed (“Ravn”) Lake	20	40,000
	Rail KP 55 to KP 95	Cockburn Lake	40	200,000
Cockburn Lake	Rail KP 95 to KP 125		30	
South Cockburn Lake to Port	Rail KP 125 to KP 149		24	
Steensby to KP 130 Depot	KP130 Depot Winter Road	ST352 Lake	9	50,000
		10 Km Lake (ST347) Lake	9	50,000
		Option 2 Unnamed Lake	12	150,000
			Daily Limit (m^3/day)	1,888
			Annual Total (m^3/year)	610,000

Note(s):

1. Winter road withdrawal volumes are a total for the winter season. Daily withdrawal volumes will vary depending on winter road construction progress and proximity to water sources.

595,000
595,000
600,000
7,815,000
7,810,000
7,805,000
7,800,000
COCKBURN LAKE
KP130 MAINTENANCE DEPOT
BR-137-1
ST352
OPTION 2
OPTION 1
IKPIKITTURJUAK RIVER
IKPIKITTURJUAK BAY
ST347
("10 km LAKE")
ST176
STEENSBY INLET
ST353
("3 km LAKE")
600 300 0 600 1,200 1,800 2,400 3,000 m
SCALE

LEGEND:
- POTENTIAL DEVELOPMENT AREA (PDA)
- WATER
- RIVER/STREAM/DRAINAGE
- PROPOSED WINTER ROAD ON ICE
- PROPOSED WINTER ROAD OVER LAND
- STEENSBY RAILWAY
- PROPOSED MAINTENANCE DEPOT

WATER STATION TYPE
- DUST SUPPRESSION
- DOMESTIC AND INDUSTRIAL USE
- WINTER ROAD CONSTRUCTION
- DUST SUPPRESSION & DOMESTIC AND INDUSTRIAL USE & WINTER ROAD CONSTRUCTION

NOTES:
1. BASE MAP AND CONTOURS PROVIDED BY EAGLE MAPPING (2008).
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
3. CONTOURS ARE IN METRES. CONTOUR INTERVAL VARIES.
4. RAILWAY ALIGNMENT PROVIDED BY SYSTRA (NOV 13, 2023).
5. STEENSBY INFRASTRUCTURE PROVIDED BY AUSENCO, (NOV 7, 2023).
6. MINE RAIL LOOP PROVIDED BY SYSTRA, (NOV 8, 2023).

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	28NOV'23	ISSUED WITH REPORT	GMJ	AS	RAC

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

STEENSBY AREA WINTER ROADS

Knight Piésold CONSULTING

P/A NO. NB102-181/94 | REF NO. 1

FIGURE 2.4 | REV 0

SAVED: I:\1\02\00181941\A\GIS\Figs\B03 R0.mxd: Nov 28, 2023 2:10 PM: asimpson

2.3 DUST SUPPRESSION

Water will be used to reduce dust during rail and port construction. The period of water withdrawal for dust control is approximately mid-June to mid-September. Five new stream water sources and five lake water sources have been identified for dust suppression withdrawals along the Steensby Railway. The proposed dust suppression water stations are listed in Table 2.3.

Table 2.3 Proposed Dust Suppression Water Stations

Water Station	Waterbody	Coordinates		Proposed Water Withdrawal
		Northing	Easting	m^3/day^3
MS-MRY-1	Camp Lake	577,778	7,914,721	160
BR-0-1	Mary River	562,686	7,911,959	300
BR-25-1	Unnamed stream	585,393	7,900,037	300
Ravn Camp Lake	Unnamed lake (“Ravn Camp Lake”)	594,844	7,895,670	160
BR-37-1/CV-R21	Ravn River	595,444	7,894,058	300
BR-46-1	Unnamed stream	596,729	7,886,540	300
Mid-Rail Camp Lake	Unnamed lake (“Nivek Lake”)	594,451	7,876,250	160
BR-95-1	Cockburn Lake	592,388	7,818,370	160
Cockburn tunnels camp				160
South Cockburn camp				160
BR-137-1	Outlet stream of ST352	598,662	7,807,979	300
			Daily Limit (m^3/day)	1,500
			Annual Limit (m^3/year)	547,500

Note(s):

1. Streams are shaded green, and lakes are shaded blue.
2. Dust suppression is considered an open water withdrawal and may occur between June 15 and September 15 (93 days).
3. All water stations will not be drawn from daily, so this should not be considered a cumulative water withdrawal volume.

The proposed daily water withdrawals presented in Table 2.4 represent a maximum daily draw associated with each of the water stations. All water stations will not be drawn from daily, so this should not be considered a cumulative water withdrawal volume. The trucks will draw from the closest approved water source up to a daily limit of 1,500 m^3/day and an annual limit of 547,000 m^3/year, as specified in Part E, Item 25 of the Licence. These daily and annual limits are shared with the approved dust suppression withdrawals associated with the Milne Inlet Tote Road (Tote Road) water stations. These water withdrawals are assessed in Section 4.

2.4 SUMMARY OF NEW WATER WITHDRAWALS

Table 2.4 summarizes the cumulative water withdrawals for domestic and industrial uses, winter road construction, and dust suppression. These cumulative totals are assessed in Section 4.

Table 2.4 Summary of Proposed New Water Withdrawals

Water Station	Waterbody Name	Domestic and Industrial Use		Dust Suppression	Description of Change(s)
		Camps	Winter Road		
		(m^3/day)	(m^3/season)	(m^3/day)	
MS-MRY-1	Camp Lake	657.5	70,000	160	• No change to camp use (remains at 657.5 m^3/day) • New winter road construction withdrawal • Dust suppression volume increased from 86 to 160 m^3/day
BR-0-1	Mary River	-	-	300	• New dust suppression site
BR-25-1	Unnamed River	-	-	300	• New dust suppression site
Ravn Camp Lake	Unnamed lake (“Ravn Camp Lake”)	245.2	40,000	160	• Camp water withdrawal increased from 145.2 m^3/day to 245.2 m^3/day • New winter road construction withdrawal • Dust suppression volume increased from 86 to 160 m^3/day
BR-37-1/CV-R21	Ravn River	-	-	300	• New dust suppression site
BR-46-1	Unnamed stream	-		300	• New dust suppression site
Mid-Rail Camp Lake	Unnamed lake (“Nivek Lake”)	100	-	160	• Camp water withdrawal increased from 79.5 to 100 m^3/day • New dust suppression withdrawal of 160 m^3/day
BR-95-1	Cockburn Lake	-	200,000	160	• No overall change to camp water withdrawal • New winter road construction withdrawal • New dust suppression site
Cockburn tunnels camp		212.5		160	
South Cockburn camp				160	

Water Station	Waterbody Name	Domestic and Industrial Use		Dust Suppression	Description of Change(s)
		Camps	Winter Road		
		(m^3/day)	(m^3/season)	(m^3/day)	
BR-137-1	ST352 outlet stream	-	-	300	• New dust suppression site
ST352 Lake	Unnamed lake	-	50,000	-	• New winter road construction withdrawal site
10 Km Lake	Unnamed lake	-	50,000	-	• New winter road construction withdrawal site
Option 2 Unnamed Lake	Unnamed lake	-	50,000	-	• New winter road construction withdrawal site

3.0 COMMUNITY ENGAGEMENT AND INUIT KNOWLEDGE

3.1 HISTORIC CONSULTATION

Consultation activities related to the Project have been ongoing since 2005, leading to the FEIS (Baffinland, 2012). Volume 2, Appendix 2A of the 2012 FEIS presents the consultation record up to 2012. Additionally, Inuit Qaujimajatuqangit (IQ) collected through interviews and workshops was incorporated in the Steensby Railway and Steensby Port designs and presented in the 2012 FEIS. Feedback expressed by communities and Inuit organizations during the Nunavut Impact Review Board (NIRB) review are summarized in the Final Hearing Report (NIRB, 2012).

There has been continuous engagement for the project since the Project was approved by the NIRB. The summary of engagement activities where the rail was discussed post-FEIS is provided in Table 3.1.

Table 3.1 Summary of Engagement related to the Rail between January 2015 and October 2023

Activity	Description
Public Meetings	23+ Meetings / Open Houses
IQ Workshops	8 in Pond Inlet and 2 in Arctic Bay
Community Group Meetings	80+ Meetings with The Hunters and Trappers Organization's (HTO's) and Hamlets, and others
Nunavut Tunngavik Inc. (NTI) and Qikiqtani Inuit Association (QIA) Meetings	16+ Meetings
Working Groups	21+ Meetings with the Terrestrial Environment Working Group (TEWG), Marine Environment Working Group (MEWG), Socio-Economic Monitoring Report (SEMC), and Socio-Economic Environment Working Group (SEMWG)
Site Visits	Workshops and Community Member Site Visits to the Mary River Project Site 1 Trip to Nain, Labrador 1 Community Risk Assessment Workshop in Trois- Rivières, Québec 2 Community Risk Assessment and IQ Workshops at the Mine Site 1 crossing rail workshop at the Mary River Mine 1 community site visit to the Mary River Mine
Survey	205 Community Members Surveyed
Baffinland Community Liaison Officers (BCLOs)	1 Staffed in each North Baffin Community

3.2 RECENT COMMUNITY CONSULTATION

In 2023, Baffinland reintroduced the Steensby component of the Approved Project to stakeholders, with the following events:

- Community updates on Steensby, Hamlet Councils and HTOs, February 14 to March 30, 2023.
- Steensby Railway and Fisheries Habitat Offsetting Workshop, Hamlet Council Members and HTAs in Igloolik and Sanirajak, May 9-18, 2023.
- Steensby Railway and Steensby Port Workshop, QIA representatives, June 15-16, 2023.
- Steensby Railway and Fisheries Habitat Offsetting Workshop Pond Inlet, Hamlet Council Members, MHTO, and QIA, July 11-12, 2023.
- Steensby Railway and Steensby Port Fisheries Habitat Offsetting Verification Workshops, Mittimatalik HTO and Igloolik and Sanirajak HTAs, October 3-6, 2023.

Fisheries impacts and offsetting has been a focal point for recent engagement. However, this is tied to water use. One theme that emerged from these meetings was that the communities do not want to see natural habitats disturbed unnecessarily as part of offsetting. Also, they wish to see some community benefit accrue from this Project.

3.3 QIA'S 2019-2021 TUSAQTAVUT STUDIES

To understand the potential impacts of the Mary River Project on land use and the Inuit way of life, the QIA worked with the communities of Pond Inlet, Iglulik, Sanirajak, Arctic Bay, and Clyde River to conduct a series of studies (the Tusaqtavut Studies) of Inuit land use. Between 2019 and 2021, 137 community members from these five communities were interviewed. Fishing and freshwater were identified as valued components in the studies.

Figure 3.1 presents the fishing and freshwater valued identified from the interviews during this study. The specific locations of the identified values have been randomized within a 1 km buffer. However, it does suggest that fishing and freshwater values were identified around the Steensby Port, and possibly on the Cockburn River.

3.4 BAFFINLAND'S 2006-2010 INUIT KNOWLEDGE STUDIES

The Mary River Inuit Knowledge Study (MRIKS) was conducted by Baffinland from 2006 through 2010 (KP, 2014). Objectives of the study included obtaining local knowledge of wildlife, land use, and areas of cultural significance to support Project decision-making and the environmental assessment process.

The study included individual interviews with 46 knowledge holders in the three communities of Arctic Bay, Igloolik, and Pond Inlet, and workshops in seven communities: Arctic Bay, Clyde River, Sanirajak, Igloolik, Pond Inlet, Cape Dorset, and Kimmirut. The results of Inuit knowledge studies were incorporated to the FEIS report (Baffinland, 2012) and FEIS Addendum report (Baffinland, 2013) for the ERP. A database was eventually assembled that consists of research agreements, interview questions, audio recordings of interviews, written interview transcripts in Inuktitut and English, and the keyword summaries and maps that were the main products of the study (KP, 2014).

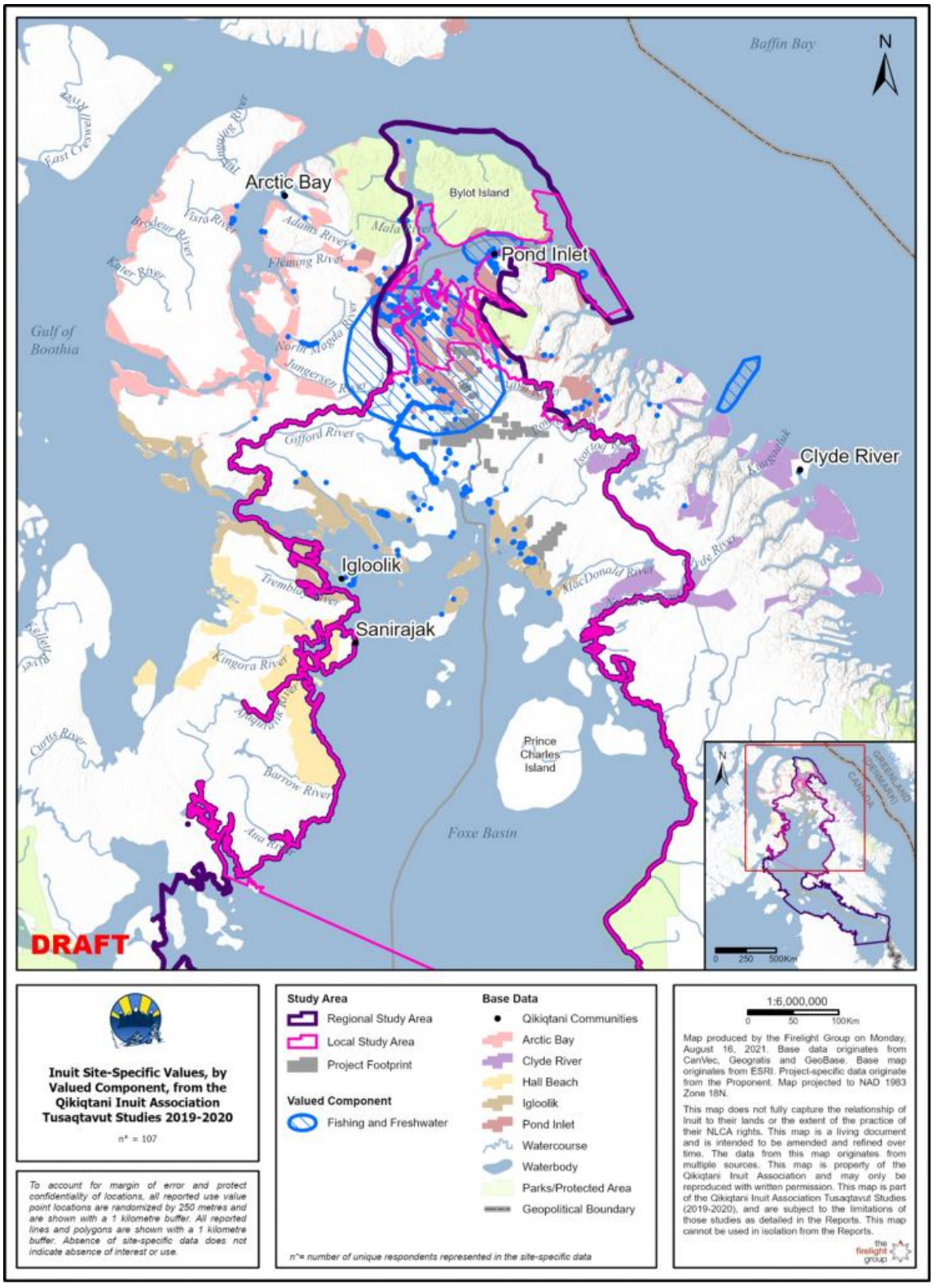


Figure 3.1 Fishing and Freshwater Values Identified in Tusaqtavut Studies

Several interview questions produced information on areas of importance to Inuit. This included questions regarding travel routes and camps, water, and areas important for fishing.

Relevant figures presenting the above information are included in Appendix A, as follows:

- Figure 1.4 Travel Routes - Project Study Area (Interview Results)
- Figure 1.8 Camping Locations - Project Study Area (Workshop Results)
- Figure 1.12 Special Places - Project Study Area (Interview Results)
- Figure 3.20 Water and Ice Features - Project Study Area (Interview Results)
- Figure 5.2 Fish Locations - Project Study Area (Interview Results)

The results of the review are provided below.

3.4.1 THE IMPORTANCE OF WATER

Several study participants stated that good drinking water was of primary importance for well-being, and water is also an important source of food (fish).

> *It's vitally important you get some water for drinking purposes. But lakes are also important because when I go fishing to a lake and I stay there for a long time and when I become thirsty I can drink the water from the lake. Yea, there are a whole lot of lakes in this area here. For example, the residents of Pond Inlet we go to this lake to go fishing. (PI-03, Pond Inlet)*

Several elders emphasized the need to have a good water source near to camp sites.

> *We made sure to camp nearby water sources such as lakes, rivers and streams so we had water nearby our camp… This has always been one of the case for all time, when choosing a camp site, we had to be sure to have a water source nearby… Lakes and rivers are all important as we camp or live around those for our water source and we fish off the lakes and rivers during the run… Having water is essential to us and water keeps us alive. (Elijah Panipakoocho, Pond Inlet)*
>
> *We have always had to live nearby lakes for our water source and we even use it as storage or deep freeze with our meat supplies. This lake is where the river runs from where we fish. … These lakes are very, very important to me. Some campers camp where there are no lakes, and in early fall they have no water source at all, so it is important to live or camp nearby lakes. (Ikey Kigutikkarrjuk, Arctic Bay)*

While out on the land, hunters and travellers consume water from ice, snow, lakes and rivers. In winter, snow is relied upon as a water source. Water from glaciers was identified by many study participants as the best available water.

> *Only when you have good drinking water are you more livelily and when you don't have good drinking water it is unpleasant and you always look for a source of good drinking water… When you're at Qaurnak in the summertime and the icebergs arrive you have an excellent source of drinking water… When we were camping out there we had excellent drinking water. Water is very important to our livelihood. (Jochabed Katsak, Pond Inlet)*
>
> *Our waters are frozen for longer periods of time. There is a lot of snow that we can also use for water. They are clean as they are frozen more than half the time. Outside of the community there are lakes that have clean water. Lakes up here freeze often and there is an abundance of it to be used for*

drinking. There is a lot of that in our environment. We can get our water anywhere. We can either use ice or snow. (AB-13, Arctic Bay)

The lakes and rivers are an important source of food, fish are caught from their depths and mammals are hunted from the water. During the open water period, major rivers are generally preferred over smaller watercourses, and in particular, rivers with a gravel bottom, with an awareness that smaller streams or streams with finer substrate (and hence lower flow) are more likely to contain harmful bacteria. Inuit commonly observe the water to see if it is foggy or murky, since it is believed that clear water is the best water to consume.

After there's no longer some ice we didn't just fetch water from ordinary streams but major rivers seemed to have better drinking water source and also rivers have little germs… we were discouraged from drinking from small streams or lakes. Only we were told to drink water from major rivers such as if the river had gravel bottom. That's a very good drinking water and everyone has known that for a long time… if it's for making tea then you can easily identify if it's poor source of drinking water and the tea tends to turn black and you can tell that it is not good drinking water by sampling the tea you can notice it right away so tea is an excellent source of identifying the quality of drinking water because they tend to turn black and then you know. (Jochabed Katsak, Pond Inlet)

Tea is said to be a good indicator of water quality. Also, nowadays people reportedly boil their water before consuming.

3.4.2 INUIT USE OF WATER ALONG STEENSBY RAILWAY AND STEENSBY PORT

Based on review of the IQ study figures in Appendix A, travel routes exist alongside the first 37 km of railway from the mine to the Ravn River. The Ravn River crossing (BR37-1) area is where trails connect the Mary River area to destinations to the east and northeast towards Clyde River (Figure 1.4 in Appendix A). From this point south, several crossings were identified between the Ravn River (KP 37) and the north end of Cockburn Lake (KP 95), and then again between the south end of Cockburn Lake (KP 125) and Steensby Port (KP 149). Few camps were identified along the length of the railway (Figure 1.8 in Appendix A). No waters of importance were identified along the railway during the study (Figure 3.20), though Cockburn Lake and River are known to support fish populations (Figure 5.2 in Appendix A).

There are, however, several camps identified on the coast in the vicinity of Steensby Port (Figure 1.8 in Appendix A). The remains of an old camp belonging to an Iglulingmiut are located adjacent to the port area.

The 100 m long Ikpikitturjuak River within the port area was identified as a river of importance on Figure 3.20 in Appendix A). The Ikpikitturjuak River connects the unnamed lake identified as ST347 or 10KM Lake in the water licence with the ocean. This river and lake support an anadromous char population and was studied in the 1980s for its potential as a commercial fishery (North/South Consultants Inc. [NSC], 1987). The Steensby Port coastal area was identified as a camp location and a collection area for significant resources (Figure 1.12 in Appendix A).

It is acknowledged that the results of the study show patterns of land use and local knowledge of the land, and that the information collected, and maps are not a complete representation of what is known.

4.0 HYDROLOGICAL ASSESSMENT

4.1 OVERVIEW

Withdrawal of water will affect quantity by reducing the volume of the waterbody as well as the downstream flow.

Volume reduction is of particular importance during winter when lake surfaces are frozen and water levels are below the outlet; withdrawal will lower the surface elevation, potentially causing dewatering and stranding of fish. In lakes used by Arctic char for spawning, there is a potential for ice to freeze or smother eggs in shallow spawning beds.

In spring, outflow will not occur until the lake has refilled and the water surface rises above the outlet. This refilling will delay outflows from the lake. Once it starts, outflow will continue as it would naturally, reduced only by the rate of any summer withdrawals.

Reduction in summer outflow may also affect downstream fish biota, including a reduction in fish habitat, through changes to substrate conditions and stranding of previous habitat, a reduction in benthic invertebrate transport, or the prevention of fish passage.

4.2 WATERBODY CATCHMENTS

Geographical Information System (GIS) was used to delineate catchments for both lakes and streams that were identified as potential sources of water for the Project. The catchment boundaries for those waterbodies identified for use in this plan are presented on figures in Appendix B.

4.3 AVAILABLE STREAMFLOW DATA

The hydrological assessment relies on streamflow data collected by Baffinland and the Water Survey of Canada (WSC) since 2006. The Project's hydrometric stations and regional stations are listed in Table 4.1 and are shown on Figure 4.1.

A hydrology baseline analysis for the Mary River Project was completed previously (KP, 2012). The analysis used the Project streamflow data collected over the period of 2006 to 2011, which included data from up to 16 stations on smaller river/creek systems and from four stations on larger systems. The 16 stations on smaller river/creek systems were operated by Baffinland during the open water season. Four stations on larger systems were operated year-round for four years (2006-2009) by WSC. Since 2012, Baffinland has continued to operate seven hydrometric stations. The hydrology at these seven stations (H01, H02, H04, H05, H06, H07 and H11) was reviewed and updated based on data available to the end of 2021.

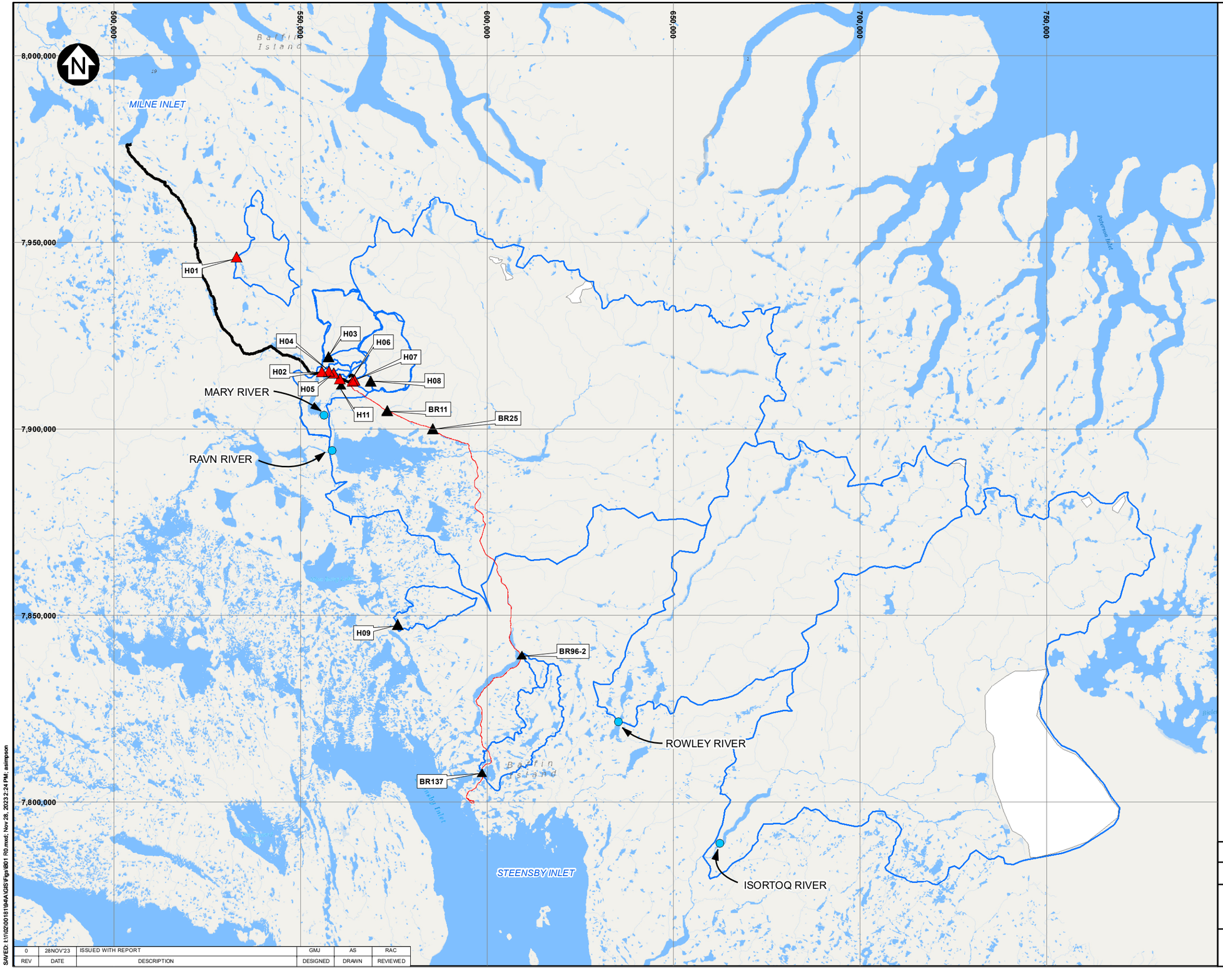
Table 4.1 Project Hydrometric Stations

Station No.	Waterbody	Catchment Area	Years of Operation	Mean Annual Unit Runoff
		(km^2)		($L/s/km^2$)
H01	Phillips Creek northern tributary	250	2006-08, 2011-23	10.1
H02	Tom River	210	2006-08, 2010-23	17.5
H04	Camp Lake tributary 2 (CLT-2)	8.3	2006-08, 2010-23	10.7
H05	Camp Lake tributary CLT-1, branch L1	5.3	2006-08, 2010-23	10.6
H06	Mary River mainstem	240	2006-08, 2010-23	17.3
H07	Mary River Tributary F	14.7	2006-08, 2010-11, 2017-23	15.3
H08	Upper Mary River	208	2006-2008	2.1
H09	Southern Access Route	158	2006-2008	5.0
H11	Sheardown Lake Tributary SDLT-1	3.6	2011-23	6.3
Mary River	Mary River	690	2006-2009	12.3
BR11	Unnamed River	53	2008	16.9
BR25	Unnamed River	113	2008	15.1
Ravn River	Ravn River	8220	2006-2009	11.2
BR96-2	Cockburn River	31	2008	11.1
Rowley River	Rowley River	3500	2006-2009	12.1
BR137	Unnamed River	314	2008, 2010	8.9
Isortoq River	Isortoq River	7170	2006-2009	17.3

Note(s):

1. Source: Detailed Water Withdrawal Plan - Mary River Project (KP, 2021).
2. Source: Hydrology Baseline Report (KP, 2012).

The mean monthly and mean annual unit runoff values for these seven stations are presented in Table 4.2. Flow values with a 10-year return period were calculated for the seven stations and a normal distribution was used to develop the 10-year wet and 10-year dry events for each station. Ratios were developed between the mean monthly discharge and return period discharge for each station. The average of the three stations with the largest catchment areas (H01, H02 and H06) was used to be apply to the mean monthly discharge at the selected water withdrawal stations to derive 10-year dry monthly and annual discharge values. The average of the three largest catchment areas was used as the catchment areas for the selected water withdrawal stations have large catchment areas and therefore it is anticipated to be more applicable.



LEGEND:

- FORMER WATER SURVEY OF CANADA REGIONAL HYDROMETRIC STATION
- ACTIVE PROJECT HYDROMETRIC STATION
- FORMER PROJECT HYDROMETRIC STATION
- MILNE INLET TOTE
- STEENSBY RAILWAY
- EXISTING INFRASTRUCTURE
- RIVER/STREAM/DRAINAGE
- WATER
- CATCHMENT BOUNDARY
- GLACIER

NOTES:

1. GLACIER COVERAGE IS TAKEN FROM NTS 1:50,000 SCALE AND IS ONLY SHOWN WITHIN CATCHMENT BOUNDARIES.
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
3. WATER SURVEY OF CANADA (WSC) STATIONS OBTAINED FROM ENVIRONMENT CANADA.
4. RAILWAY ALIGNMENT PROVIDED BY SYSTRA (NOV 13, 2023).

SCALE 10 5 0 10 20 30 40 50 km

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

PROJECT AND REGIONAL HYDROMETRIC STATIONS

Knight Piésold CONSULTING

P/A NO. NB102-181/94 | REF NO. 1 | REV 0

FIGURE 4.1

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	28NOV'23	ISSUED WITH REPORT	GMJ	AS	RAC

SAVED: I:\1\02\00181\94A\GIS\Figs\001 R0.mxd; Nov 28, 2023 2:24 PM; asimpson

Table 4.2 Estimated Long-Term Mean Streamflow

Station	Mean Unit Runoff (l/s/km^2)							
	Jan - May	Jun	Jul	Aug	Sept	Nov - Dec	MAUD	10-Year Dry Annual Flow
H01	0	58.0	34.8	17.7	11.0	0	10.1	6.1
H02	0	110.3	59.2	24.7	16.0	0	17.6	11.5
H04	0	59.0	34.3	20.8	14.0	0	10.7	3.6
H05	0	59.7	31.7	22.0	13.5	0	10.6	4.1
H06	0	103.4	62.1	23.4	18.3	0	16.9	10.5
H07	0	95.5	57.2	19.7	10.8	0	14.8	9.6
H11	0	19.9	20.4	23.0	11.9	0	6.3	3.7

Note(s):

1. MAUD is mean annual unit discharge.

Different methods were used to assess water withdrawals from streams and lakes. These are discussed further in Sections 4.4 and 4.5, respectively.

4.4 HYDROLOGICAL ASSESSMENT - STREAMS

Streams will provide water for dust suppression during the open water period.

The methodology to assess potential impacts on fish habitat in streams involves comparing mean daily flows calibrated to site hydrology stations with watersheds of similar size for which long-term hydrological data are available to determine the percentage of time that the withdrawal rate meets or exceeds the threshold of 10% in amplitude of the instantaneous flow in the river relative to a “natural flow regime” suggested by DFO in the *Framework for Assessing the Ecological Flow Requirements to Support Fisheries in Canada* (DFO, 2013a).

When determining the impact of flow alteration in fisheries, the National Technical Guidance (Appendix 1 of DFO, 2013a) is as follows:

- *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 that support commercial, recreational or Aboriginal fisheries.*
- *Cumulative flow alterations that result in instantaneous flows <30% of the mean annual discharge (MAD) have a heightened risk of impacts to fisheries.*
- *For cumulative water use >10% of instantaneous discharge or that results in flows <30% of the mean annual discharge (MAD), a more rigorous level of assessment is recommended to evaluate potential impacts on ecosystem functions which support fisheries.*

Because only one of the proposed water withdrawal sites (BR-0-1) has real-time flow data, hydrologic estimates were developed for each of the other candidate sites based on drainage area proration from representative hydrometric stations. The streams selected for water withdrawals have catchments ranging from 116 to 5,538 km^2. Thus, historical streamflow data from hydrometric station H06 (catchment area of 240 km^2) for the periods of 2006-08 and 2010-2022 was used to predict streamflow conditions at the water withdrawal locations. This station was selected as it represents the southernmost station with the largest catchment area and longest dataset.

Monthly and annual flow duration curves (FDCs) for H06 is shown on Figure 4.2. The FDCs are useful in understanding the seasonal nature of low flows; flows rise from no-flow in late May or early June and the nival (snowmelt) freshet occurs in late June. Flows then fall through July and August but are sustained by rainfall events. Flows continue to fall through September as air temperature drops and precipitation falls as snow, until streamflow ceases in late September or early October.

Flow duration curves were developed for each of the selected water stations based on pro-rating the watershed of interest against the representative gauging record of H06. Only the period of mid-June to mid-September was used as this represents the period when water will be extracted for dust suppression purposes.

Fifteen (15) candidate streams were identified along the Steensby Railway. The FDCs for these streams are presented on Figure 4.3

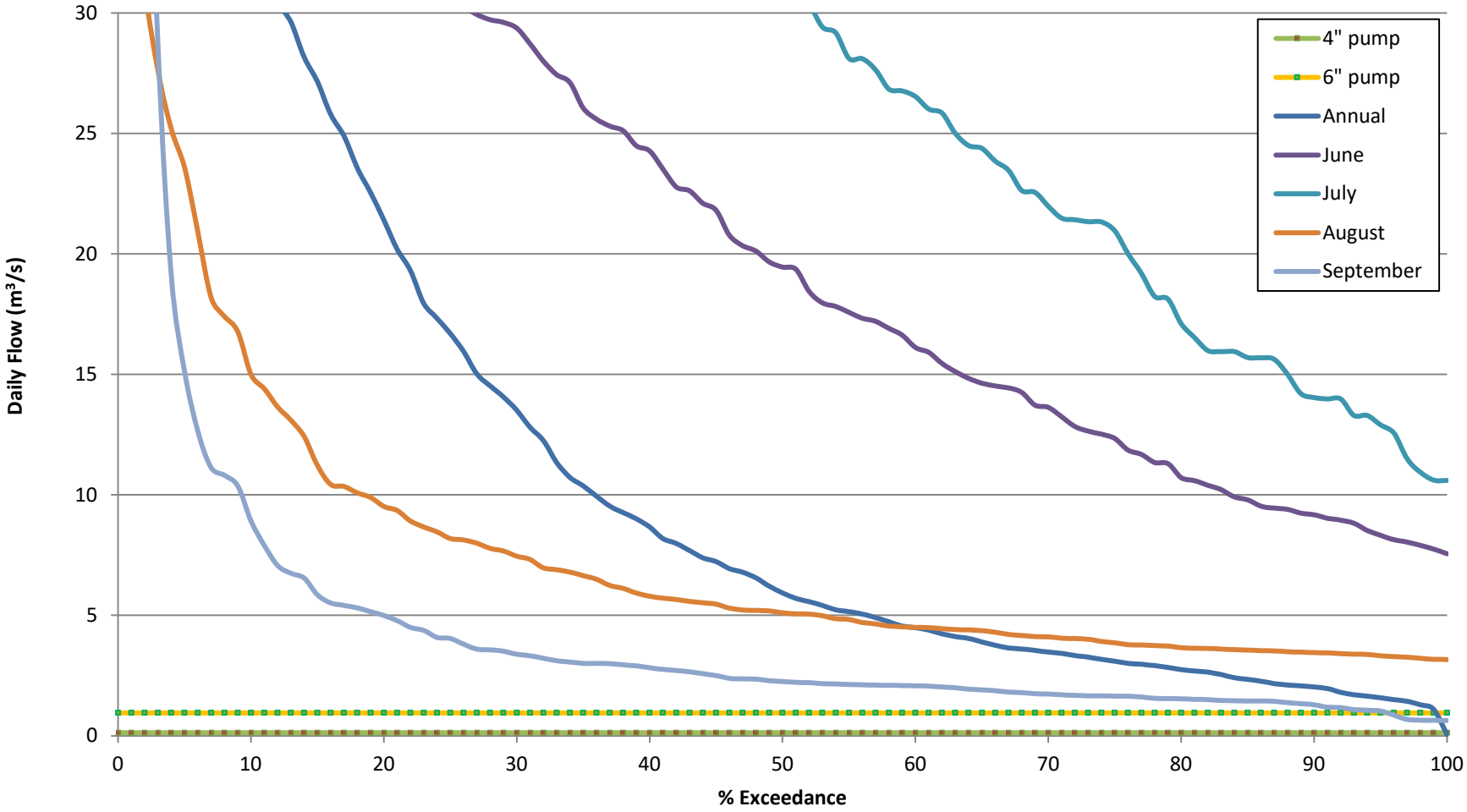
Five of the 15 streams have sufficient flows to meet the 10% of flows threshold, based on their flow duration curves presented on Figure 4.4. Based on the pro-rated flow duration curves, water can be withdrawn from these stations at the maximum pumping rate (5.7 m^3/min) at any time between approximately mid-June to mid-September without exceeding 10% of the instantaneous flow, except for BR-25-1. The maximum pumping rate at BR-25-1 is estimated to be 3.2 m^3/min. The results are summarized in Table 4.3.

Table 4.3 Proposed Stream Water Stations for Dust Suppression Water Withdrawals

Water Station	Waterbody Name	Proposed Daily Maximum Withdrawal	Maximum Pumping Rate
		(m^3/day)	(m^3/min)
BR-0-1	Mary River	300	5.7
BR-25-1	Unnamed River	300	3.2
BR-37-1/CV-R21	Ravn River	300	5.7
BR-46-1	Unnamed River	300	5.7
BR-137-1	Unnamed River	300	5.7

Note(s):

1. Proposed daily withdrawals represent a maximum daily draw associated with each water station.
2. All water stations will not be drawn from daily, so this should not be considered a cumulative water withdrawal volume.



NOTES:

1. CATCHMENT AREA AT HYDROLOGY STATION H06 IS 240 km^2.
2. BASED ON MEASURABLE FLOWS MID-JUNE TO MID-SEPTEMBER.
3. 4" PUMP HAS A MAXIMUM PUMPING RATE OF 0.125 M3/S, 6" PUMP HAS A MAXIMUM PUMPING RATE OF 0.95 m^3/s.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	28NOV'23	ISSUED WITH REPORT	GMJ	RAC

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

HYDROLOGY STATION H06 ANNUAL AND MONTHLY FLOW DURATION CURVES

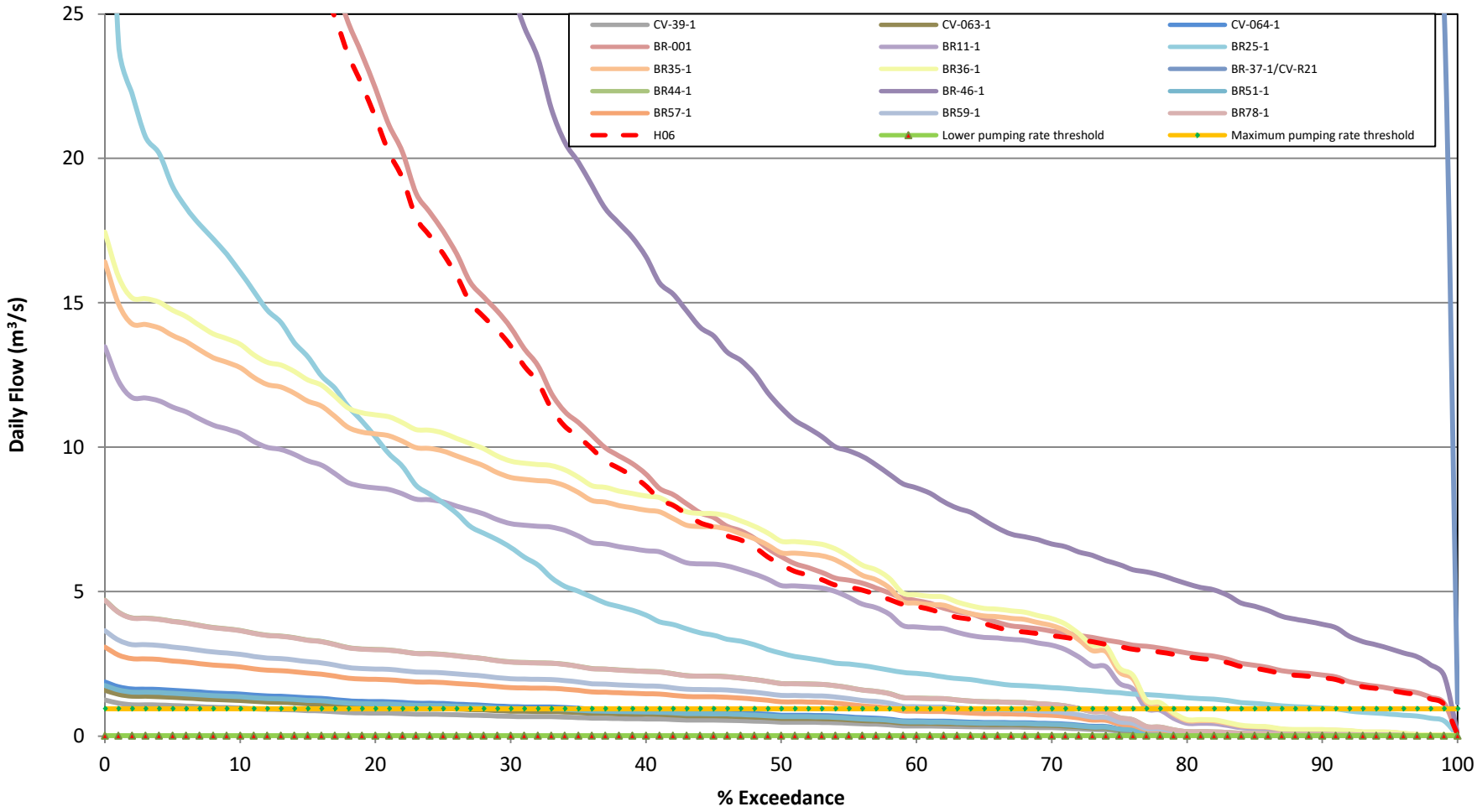
Knight Piésold CONSULTING

P/A NO. NB102-181/94

REF. NO. 1

FIGURE 4.2

REV 0



NOTES:

1. CATCHMENT AREA AT HYDROLOGY STATION H06 IS 240 km^2.
2. BASED ON MEASURED FLOWS MID-JUNE TO MID-SEPTEMBER.
3. THE THRESHOLD IDENTIFIED BY THE LOWER PUMPING RATE IS BASED ON A PUMPING RATE OF 0.75 m^3/min (0.0125 m^3/s) ASSUMING IT REPRESENTS 10% OF THE TOTAL FLOW IN THE STREAM. THE UPPER PUMPING RATE IS 5.7 m^3/min (0.095 m^3/s), SO THE MAXIMUM PUMPING RATE THRESHOLD IS SET AT 0.95 m^3/s.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	28NOV'23	ISSUED WITH REPORT	GMJ	RAC

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

FLOW DURATION CURVES FOR 15 CANDIDATE STREAMS

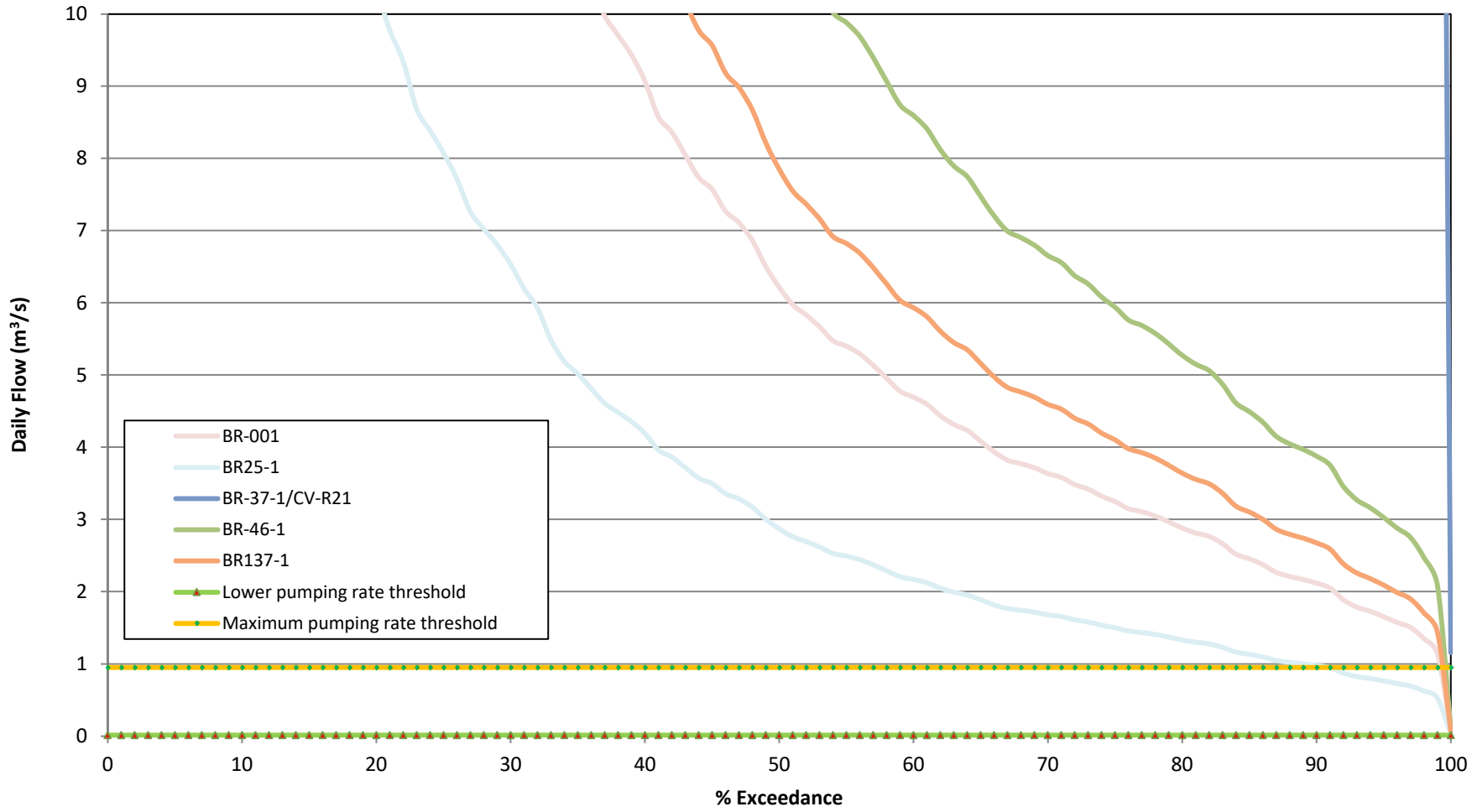
Knight Piésold CONSULTING

P/A NO. NB102-181/94

REF. NO. 1

FIGURE 4.3

REV 0



NOTES:

1. CATCHMENT AREA AT HYDROLOGY STATION H06 IS 240 km^2.
2. BASED ON MEASURED FLOWS MID-JUNE TO MID-SEPTEMBER.
3. THE THRESHOLD IDENTIFIED BY THE LOWER PUMPING RATE IS BASED ON A PUMPING RATE OF 0.75 m^3/min (0.0125 m^3/s) ASSUMING IT REPRESENTS 10% OF THE TOTAL FLOW IN THE STREAM. THE UPPER PUMPING RATE IS 5.7 m^3/min (0.095 m^3/s), SO THE MAXIMUM PUMPING RATE THRESHOLD IS SET AT 0.95 m^3/s.

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	28NOV'23	ISSUED WITH REPORT	GMJ	RAC

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

FLOW DURATION CURVES FOR STREAMS MEETING DFO'S THRESHOLD

Knight Piésold CONSULTING

P/A NO. NB102-181/94

REF. NO. 1

FIGURE 4.4

REV 0

4.5 HYDROLOGICAL ASSESSMENT - LAKES

As discussed in Section 2, water withdrawals are proposed from lakes along the Steensby Railway and Steensby Port for several purposes:

- Domestic and industrial uses at camps (previously assessed and approved under the Licence)
- Dust suppression during open water
- Winter road construction during winter

The effect of a single water take from these sources is very small; however, repeated water takes have the potential to lower lake levels and reduce lake outflows.

Lake water withdrawals are identified in Table 4.4.

These lake water withdrawals are assessed in two ways:

- Winter water withdrawals are compared to a DFO (2010a) threshold of 10% of the under-ice lake volume, or for lakes without bathymetric survey volumes, the lake surface area was used to estimate the drawdown over a winter period.
- The combined effects of winter water withdrawals (i.e., drawdown) and open water withdrawals are compared to monthly lake outflows, applying a 10% threshold.

These are described further below.

4.5.1 WITHDRAWALS DURING ICE COVER

Water withdrawals will occur during winter, as described in Section 2.2. These withdrawals are assumed to occur between mid-September and mid-June.

The winter water withdrawal protocol states that the total water withdrawal from a single waterbody over one ice-covered season is not to exceed 10% of the available water under ice, assuming an ice thickness of 2 m (DFO, 2010a). This threshold was applied to the assessment of winter water withdrawals, for those waterbodies for which bathymetry is available. The water withdrawal volumes from these lakes are for domestic and industrial uses at each location, which is inclusive of water for winter road construction.

For the lakes with bathymetry, the proposed winter water withdrawal represents less than 10% of the total under-ice water volume (Table 4.4).

Winter road construction may involve extraction of a small volume of water from an additional lake (Option 2 Unnamed Lake), for which bathymetry is not available. The proposed extraction volumes were related to the lake surface area to estimate the potential drawdown. The proposed extraction represents a drawdown of approximately 1.6 cm (Table 4.4).

Winter withdrawals also have the potential to reduce or delay lake outflows during spring. This is considered in the assessment of withdrawals during open water (Section 4.5.2).

Table 4.4 Assessment of Winter Water Withdrawals

Water Station(s)	Waterbody Name	Winter Road Volumes	Camp Water Volumes [1]	Total Winter Withdrawal	Under Ice Water Volume	Winter Drawdown [2]	Lake Surface Area	Winter Drawdown
		(m^3)	(m^3)	(m^3)	(m^3)	(%)	(m^2)	(cm)
MS-MRY-1	Camp Lake	70,000	179,498	249,498	22,606,000	1.1%	2,112,361	11.8
Ravn Camp Lake	Unnamed lake (“Ravn Camp Lake”)	40,000	61,343	101,343	23,445,148	0.4%	1,899,275	5.6
BR-95-1 Cockburn Tunnels Camp South Cockburn Camp	Cockburn Lake	200,000	58,013	258,013	1,659,517,028	0.02%	37,659,938	0.7
Option 1 Winter Road Station 1	Unnamed lake (ST352)	50,000	-	50,000	197,579,010	0.025%	9,742,858	0.51
Option 1 Winter Road Station 2	Unnamed lake (ST347)	50,000	-	50,000	20,686,000	0.24%	11,532,662	0.43
Option 2 Winter Road	Option 2 Unnamed Lake	150,000	-	150,000	n/a	-	3,820,000	3.9

Note(s):

1. Camp water volumes based upon the daily water withdrawals identified in Table 2.2, extracted over 273 days (Sept 15 to June 15).
2. Measured as a percent of under ice volume.

4.5.2 WITHDRAWALS DURING OPEN WATER

Open water withdrawals were assumed to occur between mid-June to mid-September. For lakes that have been subject to water withdrawals during the winter, the winter drawdown is included in the quantity of water considered extracted during the month of June, as winter withdrawals could potentially delay lake outflows in the spring.

Regarding the evaluation of open water withdrawals, the FEIS identified the reduction in lake outflow of 10% as a commonly applied threshold value (FEIS Volume 7, Page 19; Baffinland, 2012). Water can be withdrawn from a lake without further evaluation, providing that the monthly water withdrawal volume did not exceed 10% of the mean monthly lake outflow volume. The 10% threshold was also applied to the annual 10-year return period dry year. This methodology has been carried forward into the current assessment.

The four lakes that will be subject to increases in water withdrawals were included in this assessment, including Camp Lake, Ravn Camp Lake, Mid-Rail Lake (“Nivek Lake”), and Cockburn Lake. The results are presented in Table 4.5.

The proposed withdrawal volumes did not exceed a 10% reduction in the monthly or 10-year return period dry outflow at any of the lake withdrawal locations, except during June at the Ravn Camp Lake.

The Ravn Camp Lake will experience a flow reduction of 15% for the month of June. During the month of June, the outflow typically begins in the second half of the month, and thus most of June flows occurs over a shorter timeframe. The overwinter water withdrawals at Ravn Lake result in a minor depth reduction of approximately 5.6 cm, which is within the range of natural water level variations and/or ice thickness. Additionally, recent assessments have demonstrated that the migration of fish during freshet does not occur until the water temperature reach approximately 5-7ºC, with most of the fish movement being noted during at the end of June/early July (KP, 2023). Thus, the impact of the proposed water withdrawal is unlikely to affect fish movement in and out of the lake.

Table 4.5 Assessment of Water Withdrawals from Lakes During Open Water

Water Station	Waterbody Name	Proposed Withdrawals During Open Water		Winter Withdrawals	Reduction in Mean Monthly Discharge During Open Water (%)				
		Domestic /Industrial	Dust Suppression	(Recovered in late June)	June	July	August	September	10-Year Dry Flow
		(m^3/day)	(m^3/day)	(m^3/year)					
MS-MRY-1	Camp Lake	657.5	160	249,498	9.9%	1.2%	1.9%	2.5%	8.2%
Ravn Camp Lake	Unnamed Lake ("Ravn Camp Lake")	245.2	160	101,343	15.2%	1.3%	1.5%	2.1%	8.1%
Mid-Rail Camp Lake	Unnamed Lake ("Nivek Lake")	100	160	-	1.36%	1.07%	1.24%	3.56%	1,74%
BR-95-1	Cockburn Lake	-	160	258,013	0.18%	0.01%	0.02%	0.04%	0.07%
Cockburn Tunnels Camp		212.5	160						
South Cockburn Camp			160						

Note(s):

1. Open water withdrawals may occur between 15 June and 15 September (93 days).
2. Cells highlighted in red are reductions in mean monthly discharge greater than 10%.

5.0 MITIGATION OF IMPACTS TO FISH AND FISH HABITAT

5.1 EFFECTS OF WATER WITHDRAWAL

The potential impacts of water withdrawal on fish and fish habitat can be assessed by understanding the mechanisms and stressors that cause effects in the aquatic environment. DFO has created Pathway of Effect diagrams to illustrate the type of cause-effect relationships that are known to exist for developments in or near water; water withdrawal has the potential to impact fish and fish habitat through the following mechanisms (DFO, 2010b):

- Placement of structures in water
- Entrainment in pumps / impingement on screens
- Use of industrial equipment near fish-bearing waters (i.e., risk of spills and inadvertent sedimentation and/or erosion)
- Oxygen depletion, loss of over-wintering habitat, and/or reductions in littoral habitat during winter water withdrawal from ice-covered waterbodies
- Changes in flow volumes or timing, duration, and frequency of flow

Potential effects and mitigation measures for these mechanisms, as well as residual effects, are described below.

5.2 RELEVANT MANAGEMENT PLANS

Baffinland has developed and implemented comprehensive environmental and socio-economic environmental management plans and monitoring programs to manage the environmental and socio-economic effects of the Mary River Project. The Company intends to apply its experience and these environmental management plans and monitoring programs to manage the construction and operation of the Steensby Railway, in addition to developing additional measures as required to address site-specific issues.

Baffinland's current Environmental Management Plan is its Environmental, Health and Safety (EHS) Management System Framework Standard, developed in 2010 (Baffinland, 2010). The EHS Standard is accompanied by the Hazard Identification and Risk Assessment Standard.

The following plans describe the mitigation measures Baffinland will implement to protect fish and fish habitat during water withdrawals:

- Environmental Protection Plan (EPP; Baffinland, 2021a)
- Fresh Water Supply, Sewage and Wastewater Management Plan (FWSSWMP; Baffinland, 2018)
- Surface Water and Aquatic Ecosystems Management Plan (SWAEMP; Baffinland, 2021b)
- Spill Contingency Plan (SCP; Baffinland, 2021c)

The latest versions of these plans are found on Baffinland's online Document Portal: https://baffinland.com/document-portal/.

5.3 CURRENT WATER LICENCE

Baffinland will continue to abide by the conditions in Part E of the Licence applying to water use and management, including the use of approved water sources, and the respective total daily and annual withdrawal limits.

5.4 PLACEMENT OF STRUCTURES IN WATER

Structures placed in water could result in:

- Changes in channel morphology or shoreline morphometry through removal of instream and riparian vegetation, resulting in loss or alteration of habitat and reduced channel stability.
- Constriction of flow due to instream structures that may change hydraulic characteristics, resulting in a change in substrate composition (scour and deposition).
- Obstruction or interference with the movement and migration of fish.

The water withdrawal activity will not result in changes in channel morphology or shoreline morphometry. Baffinland uses either a 4” or 6” Gorman-Rupp pump to fill the water trucks; the pumps are located on the top of the bank; the only structure placed in the water is the hose and screened intake. Examples of the pumps used are shown in Figure 5.1.

Figure 5.1 Baffinland Water Pumps

The hose and screened intake will not result in a constriction of flow or interfere with fish passage. The hose and intake are fitted with a cam lock 4” or 6” fish screen; an example of the instream hose and intake is shown in Figure 5.2. The hose and screened intake are submerged near the stream bottom and have a minimal footprint. The stream channels at the intake sites will have sufficient wetted width and depth to allow placement of the hose and pump with full submergence, allowing water to flow over the hose rather than around it.

Figure 5.2 Example Water Intake at Site CV-128

No residual effects are anticipated on fish and fish habitat from the footprint of the pumps at the top of bank or the hose and screened intake in the wetted channel.

The following environmental protection measures outlined in the EPP (Baffinland, 2021a) will be followed to minimize potential impacts:

- Plan in water works, undertakings or activities to respect timing windows to protect fish and fish habitat.
- Conduct in-water works, undertakings and activities during periods of low flow.
- Limit the duration of in-water works, undertakings and activities so that it does not diminish the ability of fish to carry out one or more of their life processes (e.g., spawning, rearing, feeding, migrating).
- Employ fish exclusion netting (up and downstream) to isolate the work site if fish are observed in the vicinity of the works, undertakings, and activities.
- Maintain an appropriate depth and flow (i.e., base flow and seasonal flow of water) for the protection of fish.
- Maintain fish passage during the works, undertakings, and activities.
- Avoid changing flow or water level.
- Avoid obstructing and interfering with the movement and migration of fish.
- Use only clean materials (e.g., rock, coarse gravel, wood, steel, snow) for works, undertakings, and activities.
- Install effective erosion and sediment control measures prior to beginning works, undertakings, and activities in order to stabilize all erodible and exposed areas.
- Develop and implement an erosion and sediment control plan to avoid the introduction of sediment into any water body during all phases of the works, undertakings, and activities.
- Schedule work to avoid wet, windy and rainy periods and heed weather advisories.
- Regularly inspect and maintain the erosion and sediment control measures and structures during all phases of the works, undertakings, and activities.
- Regularly monitor the watercourse for signs of sedimentation during all phases of the works, undertakings and activities and take corrective action if required.
- Use biodegradable erosion and sediment control materials whenever possible.

- Keep the erosion and sediment control measures in place until all disturbed ground has been permanently stabilized.
- Remove all sediment control materials once site has been stabilized.
- Dispose of, and stabilize, all excavated material above the operational high water mark (OHWM) or top of bank of nearby.
  waterbodies and ensure sediment re-entry to the watercourse is prevented.

5.5 ENTRAINMENT IN PUMPS / IMPINGEMENT ON SCREENS

Water extraction can result in entrainment (when a fish is drawn into a water intake) or impingement (when an entrapped fish is held in contact with the intake screen). Baffinland has committed to following the interim code of practice for designing, installing, maintaining, and cleaning small end-of-pipe water intake fish screens (DFO, 2020). The interim code of practice applies to small-scale water intakes, where the water intake flow rate is up to 0.150 m^3/s and to fish that have a minimum fork length of 25 mm, requiring that the design opening of the screen material does not exceed 2.54 mm.

The average field capacity of the 4” Gorman-Rupp pump is 0.75 m^3/minute (0.0125 m^3/s). For the 6” pump, manufacturer published operating discharge rates vary from 0.025 m^3/s to 0.095 m^3/s, depending on total head and suction lift.

Additional mitigation measures outlined in the interim code of practice that will be followed include:

- Siting intakes with low concentrations of fish throughout the year.
- Placing screens a minimum of 30 cm above the bottom of the watercourse to prevent the entrainment of sediment and benthos.
- Avoid withdrawing water from the littoral zone when possible.
- Avoid withdrawing water, or reducing the rate of water withdrawal, during critical timing windows to diminish the likelihood of entraining eggs and larval fish.

A qualified professional will identify the exact intake locations at each site, based on suitability of fish habitat.

The critical timing windows during which instream activities should be avoided to reduce the risk of harm to fish and fish habitat in Nunavut are determined by the location of a project (one of two zones) and whether fish species present spawn in the spring or fall (DFO, 2013b). The Mary River Project is in Fish Timing Zone 1, and the spawning period for Arctic char is in the fall. The critical timing window (when work should be avoided) in areas containing Arctic char spawning habitat is September 1 to June 30. A qualified professional will determine if water withdrawal is allowed at each site during the critical timing window, based on suitability of spawning habitat.

No residual effects are expected from entrainment or impingement with the implementation of these measures and following the interim code of practice for fish screens.

5.6 USE OF INDUSTRIAL EQUIPMENT

Baffinland uses 4” or 6” Gorman-Rupp pumps, and the pumps remain at the top of the stream or lake bank; therefore, there will not be any direct mortality of fish or eggs from physical disruption or bank erosion from the pump. The intake hose and screen will not be placed on any Arctic char reeds or in areas where spawning is observed.

Surface water runoff from areas of intense vehicular activity is susceptible to contamination from minor hydrocarbon spills and/or leakage of machinery and equipment. Additionally, machinery and equipment can cause inadvertent sedimentation and/or erosion. As such, the following mitigation measures described in the Surface Water and Aquatic Ecosystems Management Plan (Baffinland, 2021b) will be implemented will be followed to minimize potential impacts:

- Machinery will arrive at site in a clean condition and free of fluid leaks, invasive species and noxious weeds.
- Erosion and sediment control measures will be implemented prior to the start of any construction and maintained until all disturbed ground has been permanently stabilized.
- Low vegetative cover within 100 metres of a waterbody will be preserved unless effective erosion and sediment control measures are in place to protect water quality.
- Measures for managing water flowing onto the site, as well as water being pumped/diverted from the site, will be implemented such that sediment is filtered out prior to the water entering the waterbody (e.g., by discharging water to a vegetated area or to an area further from a waterbody).
- No waste material resulting from work activities will be left in a manner such that it can enter the water.
- Machinery will be refuelled and serviced, and fuel and other materials will be stored at least 31 m from the high water mark.
- Limit fording of the watercourses by machinery to a one-time event (i.e., over and back), and only if no alternative crossing method is available. If repeated crossings of the watercourse are required, a temporary crossing structure will be constructed.

In addition, environmental protections measures relating to fuel storage and handling outlined in the EPP (Baffinland, 2021a) will also be implemented, such as:

- Fuel storage containers will be stored in secondary containment and shall not be placed within 31 m of the OHWM of any water body.
- All mobile equipment will be serviced and fueled on land at least 31 m above the OHWM of any waterbody. No petroleum or chemical product will be allowed to spread to surrounding lands or into waterbodies.

5.7 CHANGES IN FLOW VOLUMES OR TIMING, DURATION, AND FREQUENCY OF FLOW

Water withdrawal could result in increased water temperature and decreased dissolved oxygen concentrations; and dewatering of downstream areas, causing desiccation of incubating eggs, fish stranding, and fish passage obstruction, as well as reduction in littoral habitat and riparian vegetation. The assessment of hydrological changes (timing, duration, and frequency) from water withdrawals are discussed in Section 4.

Environmental protections measures relating to water use outlined in the EPP (Baffinland, 2021a) will also be implemented, such as:

- Only approved water sources can be used for Project activities (Appendix E of the EPP) and submitted to the Environment Department on a weekly basis.
- Water supply facilities are to be maintained to the satisfaction of the Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) Inspector.

- Total volumes of water withdrawn by truck from any water body must be recorded on the Water Collection Log (Appendix E of the EPP) and submitted to the Environment Department on a weekly basis.
- Streams or water bodies cannot be used as a water source unless authorized and approved by the NWB.
- If water is required from a source that may be drawn down (small lake or stream), Baffinland shall submit a request for approval to the NWB prior to withdrawing the water.

6.0 NIRB SELF-ASSESSMENT OVERVIEW

While this Notification complies with Items 9 and 14 of Part E of the Licence, which outline the process for adding new water sources, and the scope of the Approved Project and the Type A Water Licence 2AM-MRY1325 remain unchanged, KP has nonetheless reviewed NIRB's process for completing a self-assessment to determine whether the proposed changes constitute a "significant modification" to the Project.

Table 6.1 presents an evaluation relative to NIRB's self-assessment criteria, and Table 6.2 presents a review of NIRB's significance criteria.

Table 6.1 Self Assessment of Proposed Amendment to Approved Project

Self-Assessment Criteria	Proponent Self Assessment
A sufficiently detailed scope of project components and activities to be undertaken during the proposed modification, contrasted with the scope of the original project as previously considered by the Nunavut Planning Commission (NPC), the NIRB and/or the NWB.	A description of the proposed water withdrawal activities is presented in Section 2.0.
Information demonstrating the proponent has considered the significance of the potential impacts associated with the proposed modification using the factors for determining significance as set out in s. 90 of the *Nunavut Planning and Project Assessment Act* (NuPPAA) reflecting any other guidance or information requirements of the NPC, the NIRB and/or the NWB to evaluate the significance of the proposed modification.	The significance of potential impacts has been considered relative to the significance criteria outlined in Section 90 of NuPPAA (Table 6.2).
The proponent should also identify whether any new or modified permits, licenses or other approvals are anticipated to be necessary for the proposed works or activities.	New permits are not required, and the new water withdrawals remain within the overall daily and annual limits of the current Licence.
For proposed modifications to approved projects with a NIRB Project Certificate, information should also be provided as to whether the grounds for a reconsideration of the existing Project Certificate terms and conditions have been met.	The proposed changes do not represent a modification to the Approved Project, and the scope of the Project (and the Water Licence) remain unchanged. This Notification complies with Items 9 and 14 of Part E of the Licence, which outline the process for adding new water sources.

Table 6.2 Change in Factors Related to Section 90 (NuPPAA) Significance Criteria

NuPPAA Section 90 Significance Criteria	Change in Factors Related to Significance of Impacts
Size of Geographic Area and Wildlife Habitats Likely to be Affected	**No change.** The activity (water withdrawals for Steensby Component) remains confined entirely within the PDA for the Approved Project. Therefore, no changes are predicted for any VEC with respect to the size of the geographic area and wildlife habitats likely to be affected.
Ecosystemic Sensitivity of the Area	**No change.** The activity remains within the existing PDA; no new environmental sensitivities have been identified for the freshwater aquatic environment and associated VECs.
Historical, Cultural, and Archaeological Significance of Area	**No change.** See Section 3.0. The activity remains confined to the existing PDA; no new features of historical, cultural or archaeological significance will be affected.
Size of Human and Animal Populations Likely to be Affected	**No change.** The activity is not predicted to more adversely affect any human or animal populations.
Nature, Magnitude, and Complexity of Impacts	**No change.** The activity may result in incremental changes for the freshwater aquatic environment and associated VECs included in the scope of the assessment; however, these effects are consistent with the Approved Project and will not exceed any significance thresholds or change the determination of significance.
Probability of Impacts Occurring	**No change.** The effects of the water withdrawals are consistent with the Approved Project and will not exceed any significance thresholds or change the determination of significance, including the probability of an impact occurring.
Frequency and Duration of Impacts	**No change.** The effects of the water withdrawals are consistent with the Approved Project and will not exceed any significance thresholds or change the determination of significance, including the frequency or direction of an impact occurring.
Reversibility or Irreversibility of Impacts	**No change.** The effects of the water withdrawals are consistent with the Approved Project and will not result in irreversible environmental effects.
Cumulative Impacts	**No change.** There are no other activities that will act cumulatively with the proposed water withdrawals.
Any Other Factor that the Board Considers Relevant	Baffinland is not aware of any other factor that NIRB considers relevant to the assessment of the significance of environmental effects.

7.0 CONCLUSIONS

Proposed changes to water withdrawals are summarized in Table 7.1.

Table 7.1 Proposed Water Stations

Water Station	Waterbody Name	Domestic and Industrial Use		Dust Suppression	
		Camps	Winter Road	Daily Maximum Volume	Maximum Pumping Rate
		(m^3/day)	(m^3/season)	(m^3/day)	(m^3/min)
MS-MRY-1	Camp Lake	657.5	70,000	160	n/a
BR-0-1	Mary River	-	-	300	5.7
BR-25-1	Unnamed River	-	-	300	3.2
Ravn Camp Lake	Unnamed lake (“Ravn Camp Lake”)	245.2	40,000	160	n/a
BR-37-1/CV-R21	Ravn River	-	-	300	5.7
BR-46-1	Unnamed stream	-		300	5.7
Mid-Rail Camp Lake	Unnamed lake (“Nivek Lake”)	100	-	160	n/a
BR-95-1	Cockburn Lake	-	200,000	160	n/a
Cockburn tunnels camp		212.5		160	n/a
South Cockburn camp				160	n/a
BR-137-1	ST352 outlet stream	-	-	300	5.7
ST352 Lake	Unnamed lake	-	150,000	-	n/a

Note(s):

1. Streams are shaded green and lakes are shaded blue.

The assessment determined that these proposed withdrawals are within applicable thresholds, with the exception of an exceedance of the 10% threshold during June at the Ravn Camp Lake water station. Considering several factors, including that most June flows occur in the second half of the month due to the timing of spring freshet, and that fish do not start moving out of lakes into local streams until the lake temperatures increase around the end of June, this threshold exceedance is judged not to represent a significant effect to fish and fish habitat.

Withdrawals from other water stations in the Licence not assessed in this notification remain unchanged.

8.0 REFERENCES

Baffinland Iron Mines Corporation (Baffinland), 2010. *Environmental, Health and Safety Management System - Appendix 10A 1 - Environmental, Health and Safety Management System Framework Standard.* December. Document No. SD-STD-001.

Baffinland Iron Mines Corporation (Baffinland), 2012. *Final Environmental Impact Statement*. February.

Baffinland Iron Mines Corporation (Baffinland), 2013. *Mary River Project - Addendum to the Final Environmental Impact Statement for the Early Revenue Phase*. June.

Baffinland Iron Mines Corporation (Baffinland), 2018. *Fresh Water Supply, Sewage and Wastewater Management Plan*.

Baffinland Iron Mines Corporation (Baffinland), 2021a. *Environmental Protection Plan*. April 30. Ref. No. BAF-PH1-P16-0008, Rev 2.

Baffinland Iron Mines Corporation (Baffinland), 2021b. *Surface Water and Aquatic Ecosystems Management Plan.* March 31. Ref. No. BAF-PH1-830-P16-0026, Rev 7.

Baffinland Iron Mines Corporation (Baffinland), 2021c. *Spill Contingency Plan.* February 28. Ref. No. BAF-PH1-830-P16-0036, Rev 6.

Fisheries and Oceans Canada (DFO), 2010a. *DFO Protocol for Winter Water Withdrawal from Ice-covered Waterbodies in the Northwest Territories and Nunavut*. June 21.

Fisheries and Oceans Canada (DFO), 2010b. *Pathways of Effects - Water Extraction*. Retrieved from: https://www.dfo-mpo.gc.ca/pnw-ppe/pathways-sequences/extraction-eng.html. (accessed March 2021).

Fisheries and Oceans Canada (DFO), 2013a. *Framework for Assessing the Ecological Flow Requirements to Support Fisheries in Canada*. Canadian Science Advisory Secretariat. Science Advisory Report 2013/017.

Fisheries and Oceans Canada (DFO), 2013b. *Nunavut Restricted Activity Timing Windows for the Protection of Fish and Fish Habitat*. Retrieved from: https://www.dfo-mpo.gc.ca/pnw-ppe/timing-periodes/nu-eng.html. (accessed March 2021).

Fisheries and Oceans Canada (DFO), 2020. *Interim code of practice: End-of-pipe fish protection screens for small water intakes in freshwater*. Retrieved from: https://www.dfo-mpo.gc.ca/pnw-ppe/codes/screen-ecran-eng.html. (accessed August 2023).

Knight Piésold Ltd. (KP), 2012. *Mary River Project, Baseline Hydrology Report*. January 4. North Bay, Ontario. Ref. No. NB102-181/30-7, Rev 1.

Knight Piésold Ltd. (KP), 2014. Letter to: Oliver Curran, Baffinland Iron Mines Corporation. Re: *Baffinland Iron Mines Corporation - Mary River Project Inuit Knowledge Study Database*. February 5. Ref. No. NB14-00411 (NB102-181/35).

Knight Piésold Ltd. (KP), 2021. *Mary River Project, Detailed Water Withdrawal Plan*. September 3. North Bay, Ontario. Ref. No. NB102-181/65-1, Rev 0.

Knight Piésold Ltd. (KP), 2023. Letter to: Mrs. Elisabeth Luther, Baffinland Iron Mines Corporation. Re: *South Railway Crossings Fish Passage Assessment*. August 31. North Bay, Ontario. Ref. No. NB23-00919 (NB102-00181/86).

North/South Consultants Inc. (NSC), 1987. *Report on the Test Fishery for Arctic Charr, Salvelinus alpinus, in the Steensby Inlet Area, Northwest Territories*, *1985-86*.

Nunavut Impact Review Board (NIRB), 2012. *Final Hearing Report Mary River Project Baffinland Iron Mines Corporation*. September. NIRB File No. 08MN053.

Nunavut Water Board (NWB), 2015. *Type A Water Licence No. 2AM-MRY1325 - Amendment 1.* July 30.

9.0 CERTIFICATION

This report was prepared and reviewed by the undersigned.

Prepared:

Amber Blackwell, P.Geo.
Project Geoscientist

Reviewed:

Richard Cook, P.Geo. (Limited)
Specialist Environmental Scientist | Associate

REGISTERED PROFESSIONAL ENGINEER
S.R. AIKEN
LICENSEE
2023-11-28
NWT/NU

PERMIT TO PRACTICE
KNIGHT PIESOLD LTD.
Signature
Date 2023-11-28
PERMIT NUMBER: P 547
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

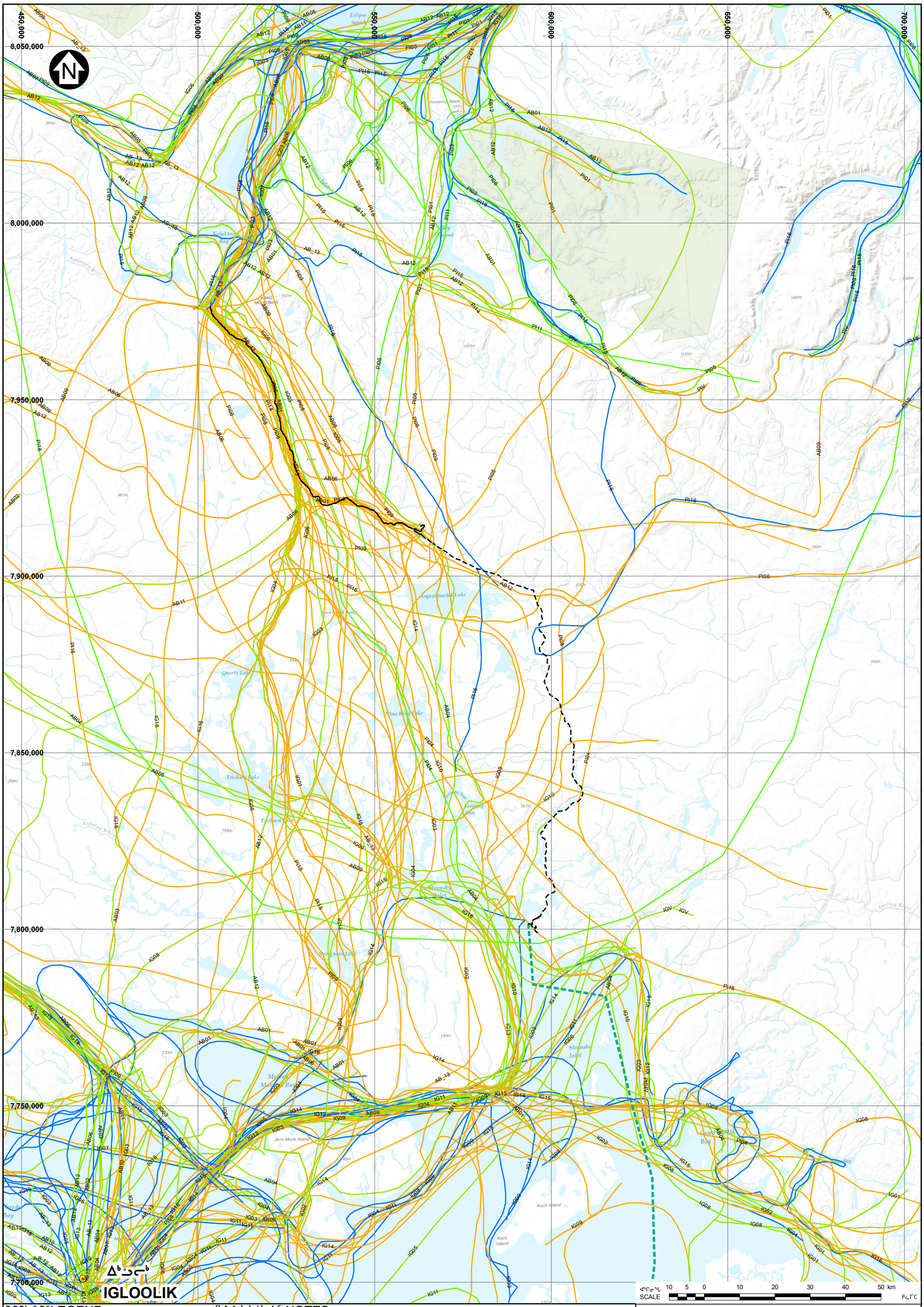
Approval that this document adheres to the Knight Piésold Quality System:

APPENDIX A

Previously Issued IQ Study Maps

(Pages A-1 to A-5)

Figure No.	Rev No.	Description
Figure 1.4	0	Travel Routes - Project Study Area (Interview Results)
Figure 1.8	0	Camping Locations - Project Study Area (Workshop Results)
Figure 1.12	0	Special Places - Project Study Area (Interview Results)
Figure 3.20	0	Water and Ice Features - Project Study Area (Interview Results)
Figure 5.2	0	Fish Locations - Project Study Area (Interview Results)



LEGEND:

- TRAVEL ROUTE
- TRAVEL ROUTE USED IN THE PAST
- SEA ICE MAIN TRAVEL ROUTE
- MILNE INLET TOTE ROAD
- PROPOSED RAILWAY ALIGNMENT
- NOMINAL SHIPPING ROUTE

NOTES:

1. IMAGERY: © ESRI DATA & MAPS [ONLINE] (2014). REDLANDS, CA: ENVIRONMENTAL SYSTEMS RESEARCH INSTITUTE. ALL RIGHTS RESERVED.
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
3. THIS MAP WAS PRODUCED FROM INFORMATION COLLECTED DURING INUIT QAUJIMAJATUQANGIT INTERVIEWS WITH LOCAL RESIDENTS. THIS INFORMATION SHOWS PATTERNS OF LAND USE AND LOCAL KNOWLEDGE OF THE LAND. THE MAP IS NOT INTENDED TO BE A COMPLETE REPRESENTATION OF WHAT IS KNOWN.

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

TRAVEL ROUTES - PROJECT STUDY AREA (INTERVIEW RESULTS)

Knight Piésold CONSULTING

P/A NO.	REF NO.	REV
NB102-181/35	NB14-00411	0

FIGURE 1.4

SAVED: I:\1\02\00181\35\A\GIS\Figs\Figures_IQIB04_r0.mxd; Oct 23, 2014 10:40 AM; asimpson

450,000
500,000
550,000
600,000
650,000
700,000
8,050,000
8,000,000
7,950,000
7,900,000
7,850,000
7,800,000
7,750,000
7,700,000
N
Eclipse Sound
Tremblay Sound
Milne Inlet
Eskimo Inlet
Koluktoo Bay
Tay Sound
Angajurjualuk Lake
Quartz Lake
Nina Bang Lake
Erichsen Lake
Tariujaq
Steensby Inlet
Neergaard Lake
Gifford Fjord
Murray Maxwell Bay
Jens Munk Island
Koch Island
Eqe Bay
Neerlonakto Island
Quilliam Bay
Hoare Bay
Kukaluk River
Robertson River
KRAG MOUNTAINS
IGLOOLIK
Iglolik
Family camping
Family camping
Old and current camping routes
Clyde River, Pond Inlet, Arctic Bay and Igloolik people would all meet here and camp in this area while on inland caribou hunt - Aug-Sept
Old camping sites throughout
Clyde River, Igloolik, Pond Inlet and Arctic Bay people meet here and camp in this area.
NOTE: Almost anywhere there is a camp site, there is a cache site. Caches can be found anywhere on the land and on the coast. After a hunt, hunters would travel to the closest location they could to cache food.
People travel all this area for caribou hunting - camps throughout & places where people would sleep & pile rocks around them to protect them
People traditionally camped all along this area
DIO outpost camp
Re-supply route (Camp to community)
Hunting and camping travel route
Hunting and camping travel route - Dec-May
Hunting & re-supply the camps
Hunting and camping travel route
SCALE 10 5 0 10 20 30 40 50 km

LEGEND:

PLACES THAT YOU HAVE CAMPED IN YOUR LIFETIME
PLACES THAT YOU KNOW YOUR FAMILY AND FRIENDS HAVE CAMPED IN THE PAST
CAMPS THAT WERE OCCUPIED SO LONG AGO THAT YOU DON'T KNOW WHO CAMPED THERE
MILNE INLET TOTE ROAD
PROPOSED RAILWAY ALIGNMENT

NOTES:

1. IMAGERY: © ESRI DATA & MAPS [ONLINE] (2014). REDLANDS, CA: ENVIRONMENTAL SYSTEMS RESEARCH INSTITUTE. ALL RIGHTS RESERVED.
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
3. (2008), HALL BEACH (JULY 8-9, 2008), IGLOOLIK (JULY 10-12, 2008) AND POND INLET (JULY 15-17 AND SEPTEMBER 4, 2008). THIS INFORMATION SHOWS PATTERNS OF LAND USE AND LOCAL KNOWLEDGE OF THE LAND. THE MAP IS NOT INTENDED TO BE A COMPLETE REPRESENTATION OF WHAT IS KNOWN.

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

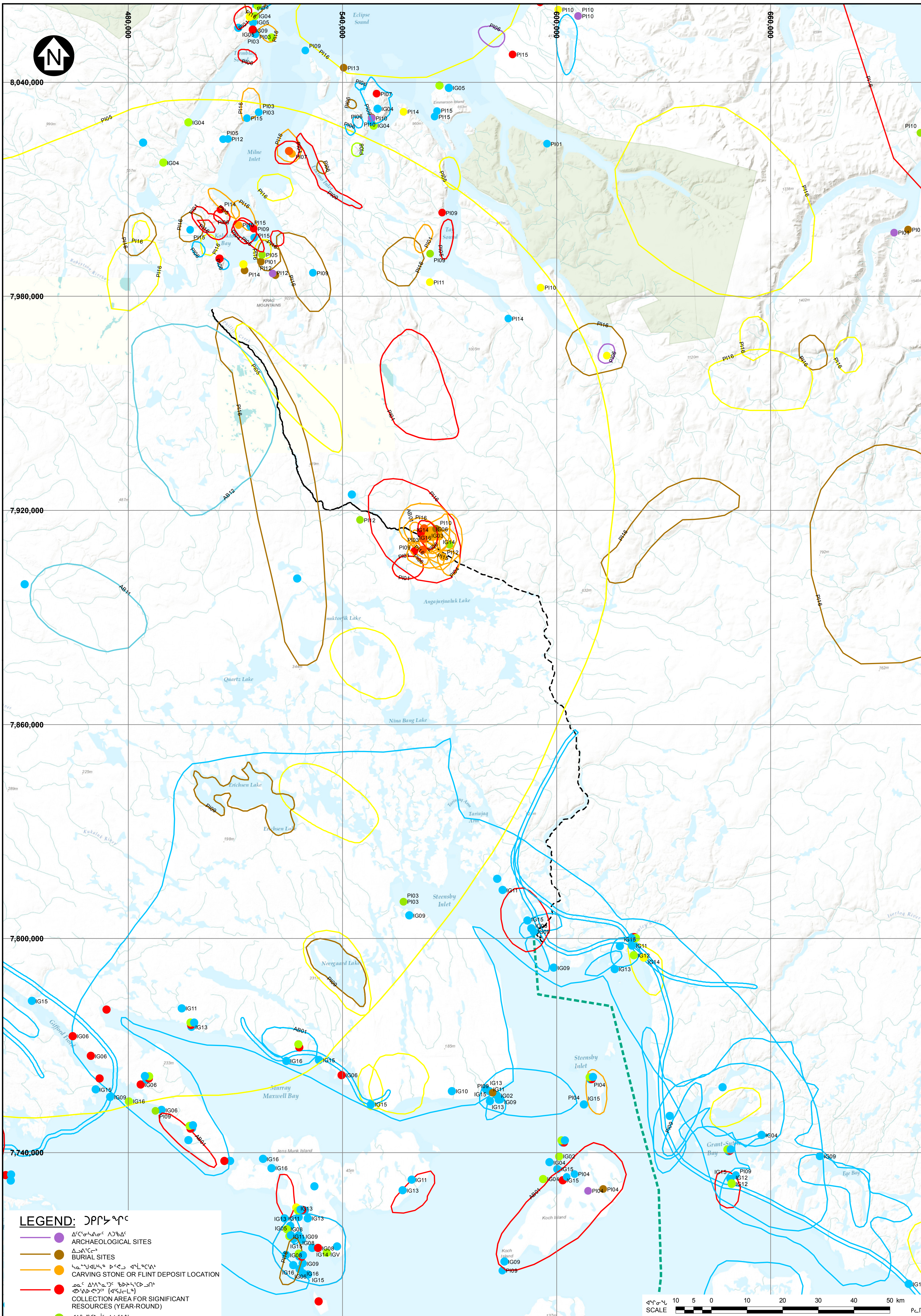
CAMPING LOCATIONS - PROJECT STUDY AREA (WORKSHOP RESULTS)

Knight Piésold CONSULTING

P/A NO.	REF NO.	REV
NB102-181/25	NB14-00411	0

FIGURE 1.8

SAVED: I:\1\02\00181\35\A\GIS\Figs\Figures_IQ\B08_r0.mxd; Sep 04, 2014 3:23 PM; asimpson



LEGEND: ᑐᑭᓯᒋᐊᕐᑎ

ᐃᑦᑕᕐᓂᓴᕕᓂᑦ ᐱᕋᖃᐃᑦ
ARCHAEOLOGICAL SITES

ᐃᓗᕕᕐᑕᓕᒃ
BURIAL SITES

ᓴᓇᙳᐊᒐᒃᓴᖅ ᐅᑉᐸᓗ ᐊᒻᒪᕐᑕᕕᒃ
CARVING STONE OR FLINT DEPOSIT LOCATION

ᓄᓇᑦ ᐃᒃᐱᙵᕐᑐᑦ ᖃᐅᔨᓴᕐᑕᐅᓗᑎᒃ ᐊᔾᔨᐅᙱᑦᑐᑦ (ᐊᕐᕌᒍᓕᒫᖅ)
COLLECTION AREA FOR SIGNIFICANT RESOURCES (YEAR-ROUND)

ᐊᐱᕐᓱᕐᑕᐅᔪᑦ ᐃᓅᕕᖓ
CONSULTANT'S BIRTH LOCATION

ᐊᐱᕐᓱᕐᑕᐅᔪᑦ ᑕᕐᒪᕕᕕᓂᖓ ᐊᒻᒪ ᐊᑐᕐᑕᐅᓚᐅᖅᑐᕕ ᓄᑦ ᑕᕐᒪᕕᑦ ᐊᕐᕌᒍᓕᒫᒥᑦ ᐊᑐᕐᑕᐅᔪᓂᒃ
CONSULTANT'S CAMP LOCATION AND MAJOR YEAR-ROUND CAMPS

ᐊᓂᕐᓇᔅᓴᐅᓪᓚᕆᒃᑐᑦ ᓄᓇᐃᑦ ᑕᕝᕙᓂ
SPECIAL AREAS

ᕿᒧᒃᓯᓂ ᐊᖁᑎ ᐅᓯᒃᑕᕐᕕᒃ
MILNE INLET TOTE ROAD

ᓄᓇᓯᐅᑎᑯᑦ ᐊᖁᑎᓂᐊᕐᑕᖓ
PROPOSED RAILWAY ALIGNMENT

ᐃᒡᓗᓂᒃ ᐅᒥᐊᔪᐊᓂᒃ ᐊᖁᑕᐅᕙᕐᓂᐊᕐᑐᖅ
NOMINAL SHIPPING ROUTE

ᖃᐅᔨᒪᔭᒃᓴᐃᑦ NOTES:

1. ᓄᓇᙳᐊᖅ ᐊᑐᐊᕐᑕᐅᔪᖅ: ᑯᐃᓐ ᑲᓇᑕᒥ
BASE MAP: © HER MAJESTY THE QUEEN IN RIGHTS OF CANADA, DEPARTMENT OF NATURAL RESOURCES (2004). ALL RIGHTS RESERVED.
2. ᓄᓇᙳᐊᑦ ᑎᑎᕋᓂᖓ ᒪᓕᒃᑐᖅ UTM (NAD83) ZONE 17 AND IS IN METRES.
COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
3. THIS MAP WAS PRODUCED FROM INFORMATION COLLECTED DURING INUIT QAUJIMAJATUQANGIT INTERVIEWS WITH LOCAL RESIDENTS. THIS INFORMATION SHOWS PATTERNS OF LAND USE AND LOCAL KNOWLEDGE OF THE LAND. THE MAP IS NOT INTENDED TO BE A COMPLETE REPRESENTATION OF WHAT IS KNOWN.

BAFFINLAND IRON MINES CORPORATION

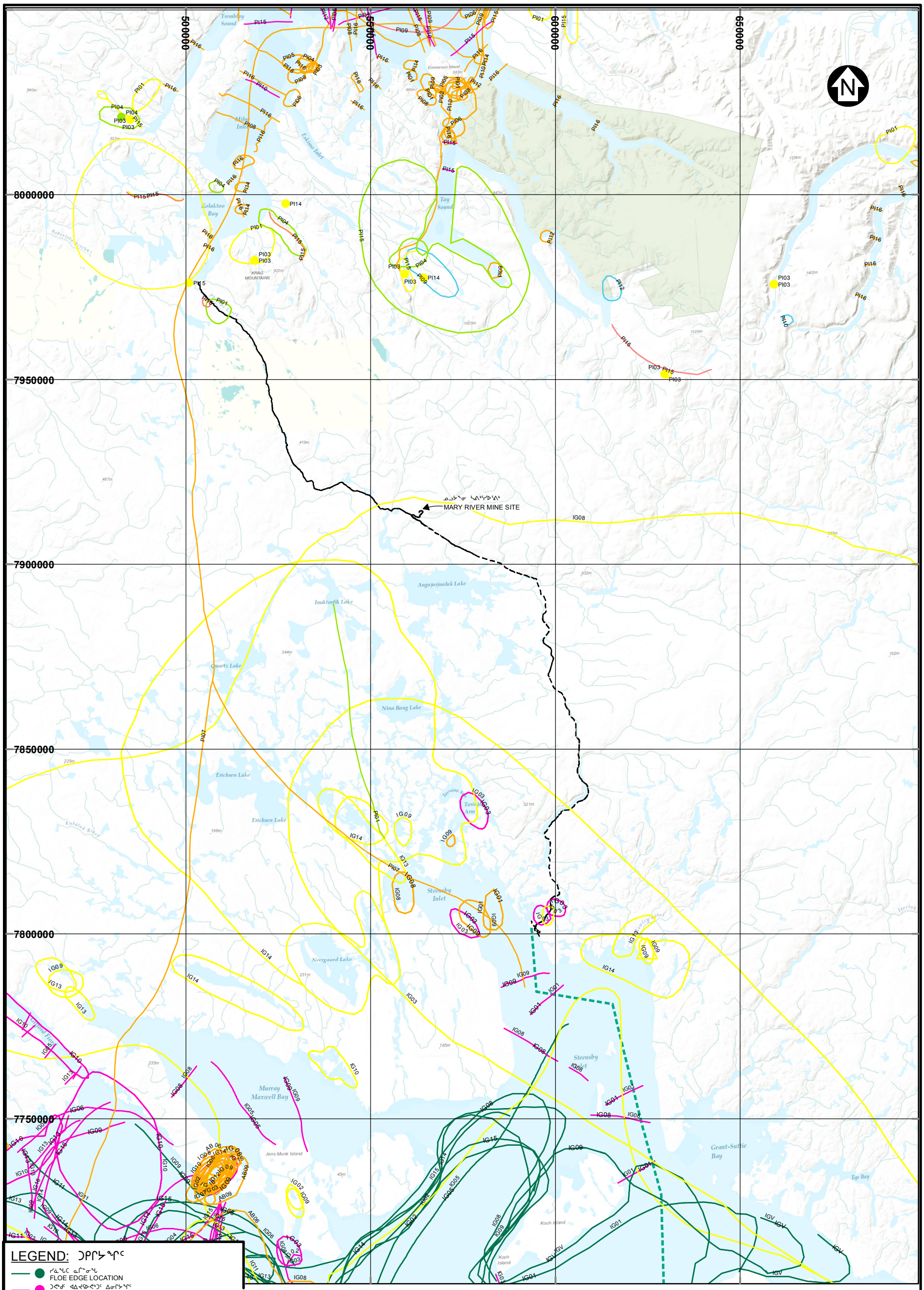
ᓄᓗᔾᔭᓂ ᐅᔭᕋᒃᓯᐅᕐᑐᑦ — MARY RIVER PROJECT

SPECIAL PLACES - PROJECT STUDY AREA (INTERVIEW RESULTS)

Knight Piésold CONSULTING

P/A NO.	REF NO.	REV
NB102-181/35	NB14-00411	0

FIGURE 1.12



LEGEND:

- FLOE EDGE LOCATION
- SEA-ICE LEADS LOCATION
- SEA-ICE OPEN YEAR ROUND
- LAKES AND RIVERS OF IMPORTANCE
- BAD FLOOD OR EXTREMELY HIGH TIDE LOCATION
- SEASONAL WATER QUALITY CHANGE LOCATION
- GENERAL WATER QUALITY CHANGE LOCATION
- MILNE INLET TOTE ROAD
- PROPOSED RAILWAY ALIGNMENT
- NOMINAL SHIPPING ROUTE

NOTES:

1. IMAGERY: © ESRI DATA & MAPS [ONLINE] (2014). REDLANDS, CA: ENVIRONMENTAL SYSTEMS RESEARCH INSTITUTE. ALL RIGHTS RESERVED.
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
3. THIS MAP WAS PRODUCED FROM INFORMATION COLLECTED DURING INUIT QAUJIMAJATUQANGIT INTERVIEWS WITH LOCAL RESIDENTS. THIS INFORMATION SHOWS PATTERNS OF LAND USE AND LOCAL KNOWLEDGE OF THE LAND. THE MAP IS NOT INTENDED TO BE A COMPLETE REPRESENTATION OF WHAT IS KNOWN.

SCALE 10 5 0 10 20 30 40 50 Km

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

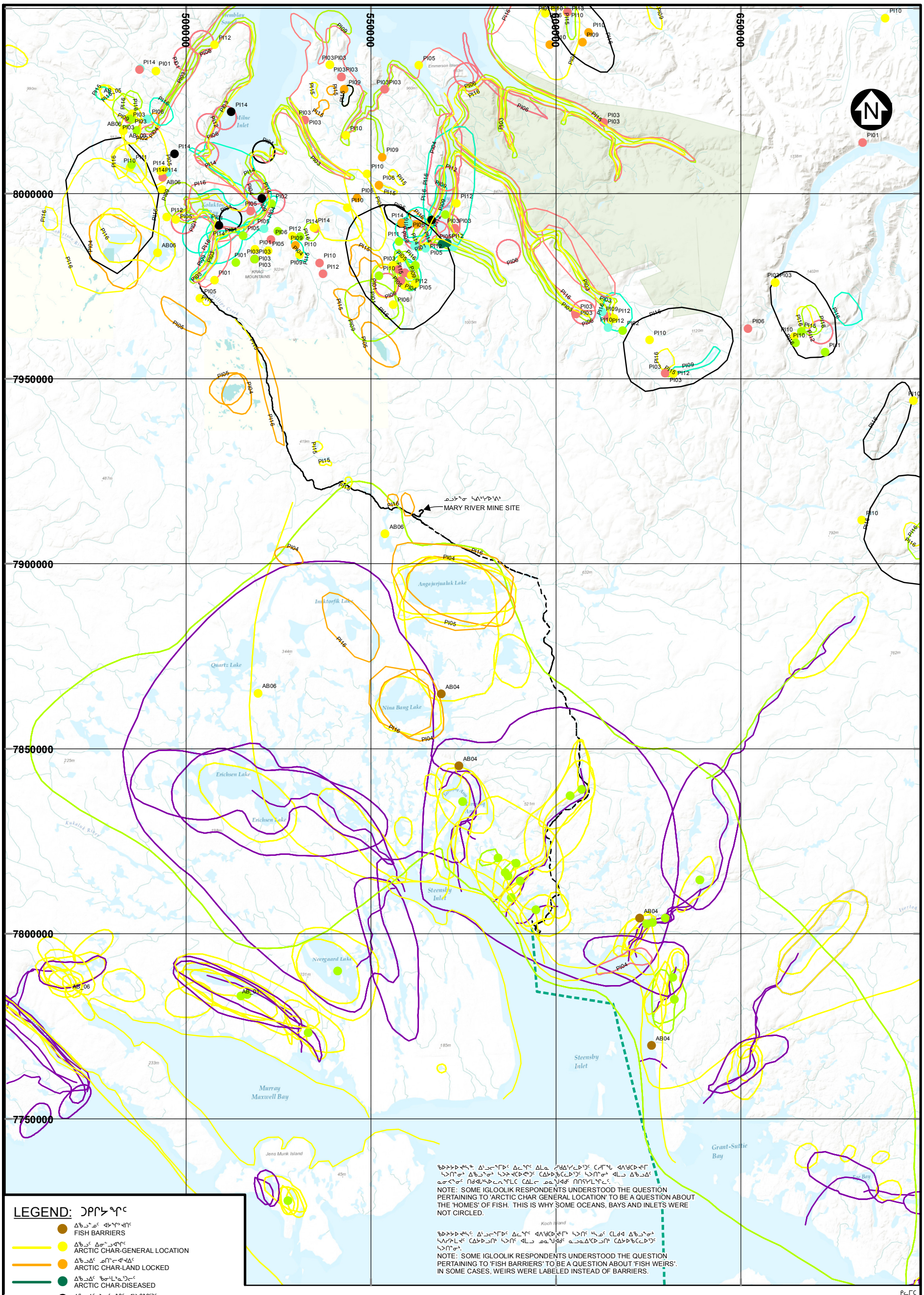
WATER AND ICE FEATURES - PROJECT STUDY AREA (INTERVIEW RESULTS)

Knight Piésold CONSULTING

P/A NO.	REF.	REV.
NB102-181/35	NB14-00411	0

FIGURE 3.20

SAVED: I:\1\02\00181\35A\GIS\Figs\Figures_IQIB34_r0.mxd; Sep 08, 2014 10:04 AM; asimpson

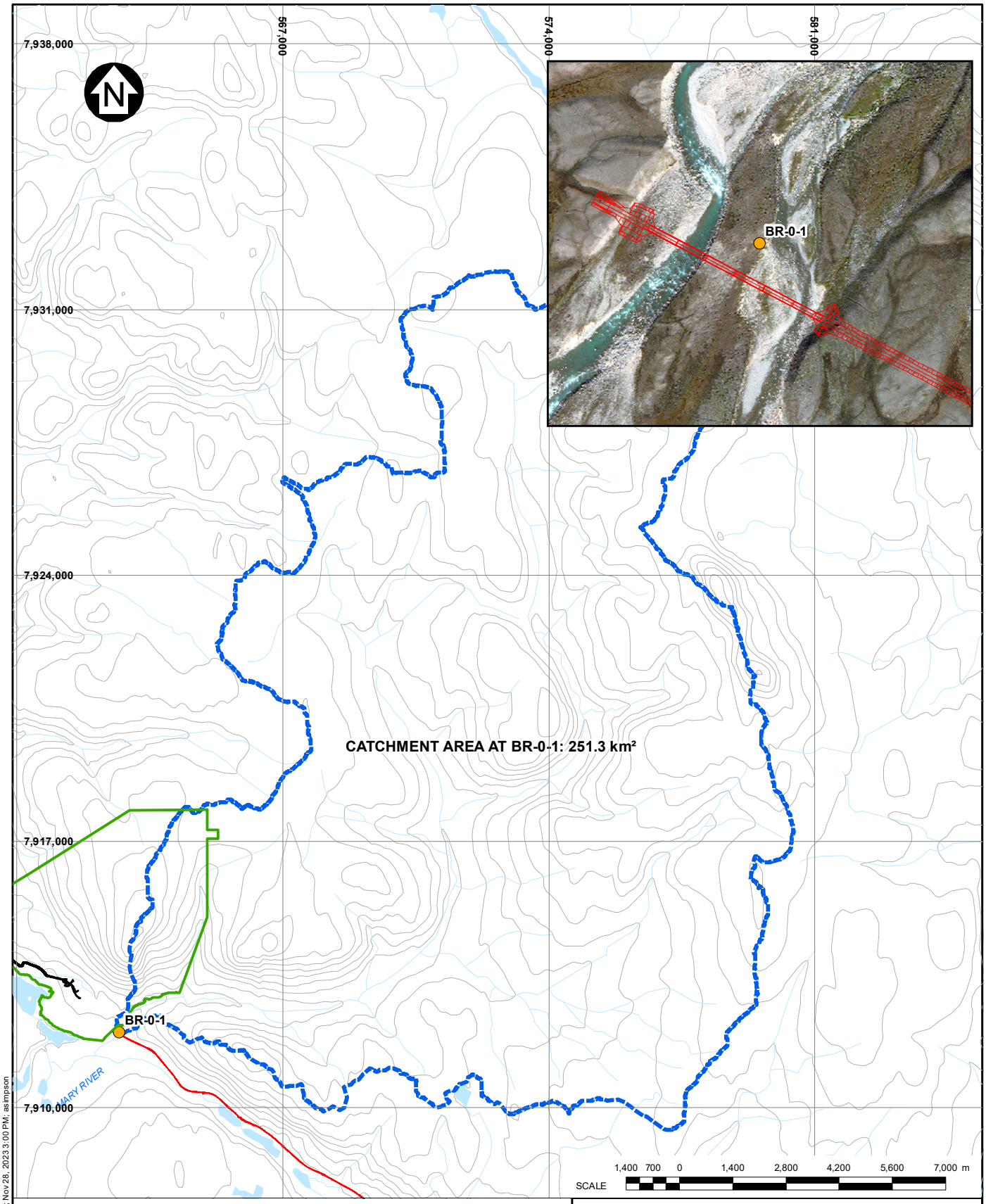

500000
550000
600000
650000
8000000
7950000
7900000
7850000
7800000
7750000
N
MARY RIVER MINE SITE
Milne Inlet
Koluktoo Bay
KRAG MOUNTAINS
Phillips Creek
Angajurjualuk Lake
Inuktorfik Lake
Quartz Lake
Nina Bang Lake
Erichsen Lake
Kukalak River
Steensby Inlet
Neergaard Lake
Murray Maxwell Bay
Jens Munk Island
Grant-Suttie Bay
Koch Island
NOTE: SOME IGLOOLIK RESPONDENTS UNDERSTOOD THE QUESTION PERTAINING TO 'ARCTIC CHAR GENERAL LOCATION' TO BE A QUESTION ABOUT THE 'HOMES' OF FISH. THIS IS WHY SOME OCEANS, BAYS AND INLETS WERE NOT CIRCLED.
NOTE: SOME IGLOOLIK RESPONDENTS UNDERSTOOD THE QUESTION PERTAINING TO 'FISH BARRIERS' TO BE A QUESTION ABOUT 'FISH WEIRS'. IN SOME CASES, WEIRS WERE LABELED INSTEAD OF BARRIERS.
LEGEND:
FISH BARRIERS
ARCTIC CHAR-GENERAL LOCATION
ARCTIC CHAR-LAND LOCKED
ARCTIC CHAR-DISEASED
ARCTIC CHAR-POPULATION FLUCTUATING
RIVER OF IMPORTANCE
FISHING LOCATION YEAR-ROUND
JIG AND NET FISHING LOCATION
OCEAN FISHING LOCATION
MILNE INLET TOTE ROAD
PROPOSED RAILWAY ALIGNMENT
NOMINAL SHIPPING ROUTE
NOTES:
1. IMAGERY: © ESRI DATA & MAPS [ONLINE] (2014). REDLANDS, CA: ENVIRONMENTAL SYSTEMS RESEARCH INSTITUTE. ALL RIGHTS RESERVED.
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
3. THIS MAP WAS PRODUCED FROM INFORMATION COLLECTED DURING INUIT QAUJIMAJATUQANGIT INTERVIEWS WITH LOCAL RESIDENTS. THIS INFORMATION SHOWS PATTERNS OF LAND USE AND LOCAL KNOWLEDGE OF THE LAND. THE MAP IS NOT INTENDED TO BE A COMPLETE REPRESENTATION OF WHAT IS KNOWN.
SCALE 10 5 0 10 20 30 40 50 Km
BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT
FISH LOCATIONS - PROJECT STUDY AREA
(INTERVIEW RESULTS)
Knight Piésold CONSULTING
P/A NO. NB102-181/35
REF. NB14-00411
REV. 0
FIGURE 5.2
SAVED: I:\1\02\00181\35A\GIS\Figs\Figures_IQIB38_r0.mxd; Sep 08, 2014 11:50 AM; asimpson

APPENDIX B

Catchment Boundaries

(Pages B-1 to B-9)

Figure No.	Rev No.	Description
Figure B.1	0	Water Station BR-0-1 Catchment
Figure B.2	0	Water Station BR-25-1 Catchment
Figure B.3	0	Water Station BR-37-1 Catchment
Figure B.4	0	Water Station BR-46-1 Catchment
Figure B.5	0	Water Station BR-137-1 and ST352 Catchment
Figure B.6	0	Water Station Ravn Camp Lake Catchment
Figure B.7	0	Water Station Mid-Rail Camp Lake Catchment
Figure B.8	0	Water Stations Cockburn Lake Catchments
Figure B.9	0	Water Station ST353 (3 km Lake) Catchment



LEGEND:

- WATER STATION
- STEENSBY RAILWAY
- POTENTIAL DEVELOPMENT AREA
- CATCHMENT BOUNDARY

NOTES:

1. COORDINATE GRID IS IN METRES. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N.
2. BASE MAP IMAGERY: c 2021 DIGITAL GLOBE, INC.
3. RAILWAY ALIGNMENT PROVIDED BY SYSTRA (NOV 13, 2023).

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	28NOV'23	ISSUED WITH REPORT	GMJ	AS	RAC

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

WATER STATION BR-0-1 CATCHMENT

Knight Piésold CONSULTING

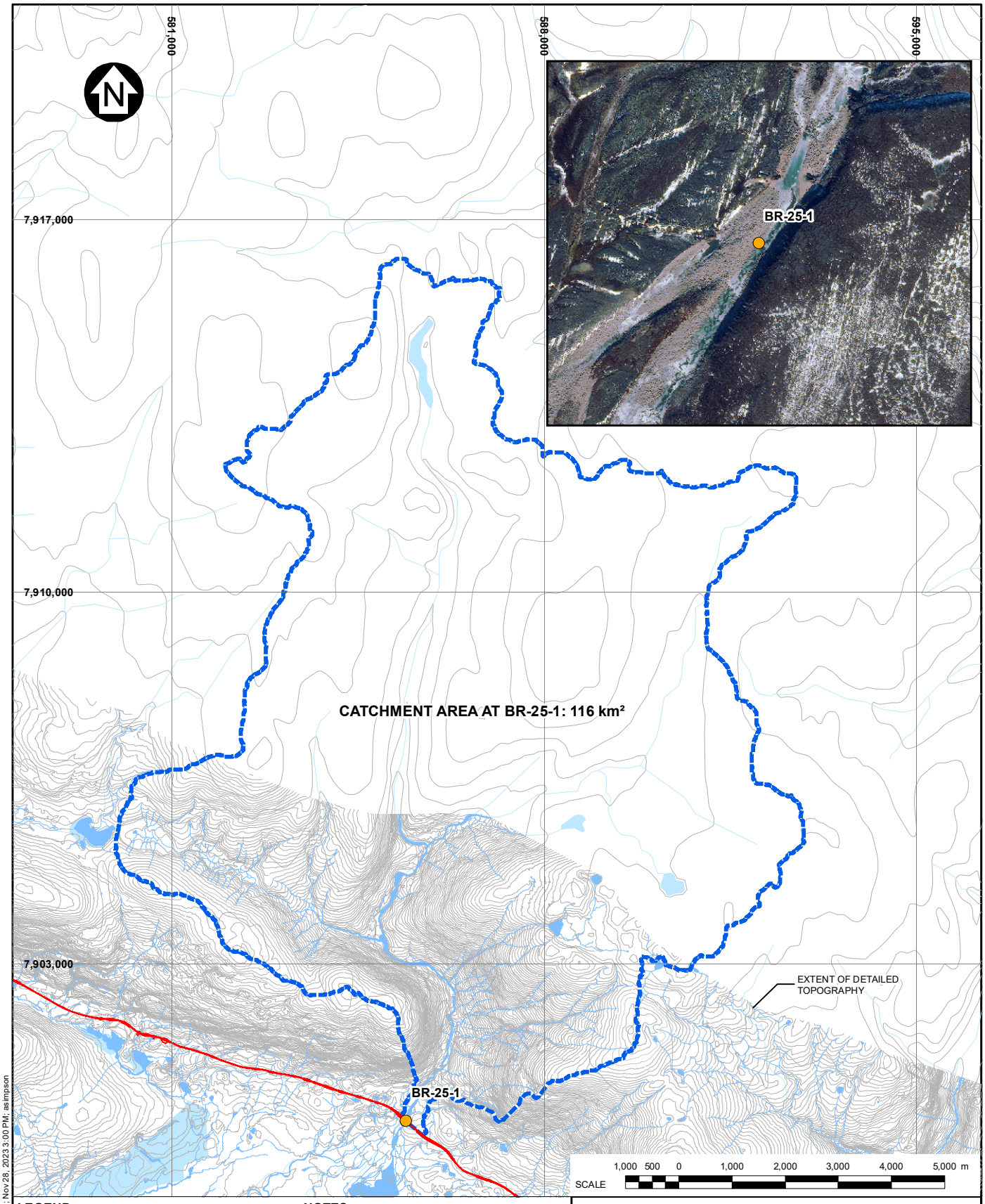
P/A NO. NB102-181/94

REF NO. 1

FIGURE B.1

REV 0

SAVED: I:\1\02\00181\94A\GIS\Figs\A06 R0.mxd; Nov 28, 2023 3:00 PM; asimpson



LEGEND:
- WATER STATION
- STEENSBY RAILWAY
- CATCHMENT BOUNDARY

NOTES:
1. COORDINATE GRID IS IN METRES. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N.
2. BASE MAP IMAGERY: c 2021 DIGITAL GLOBE, INC.
3. RAILWAY ALIGNMENT PROVIDED BY SYSTRA (NOV 13, 2023).

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	28NOV'23	ISSUED WITH REPORT	GMJ	AS	RAC

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

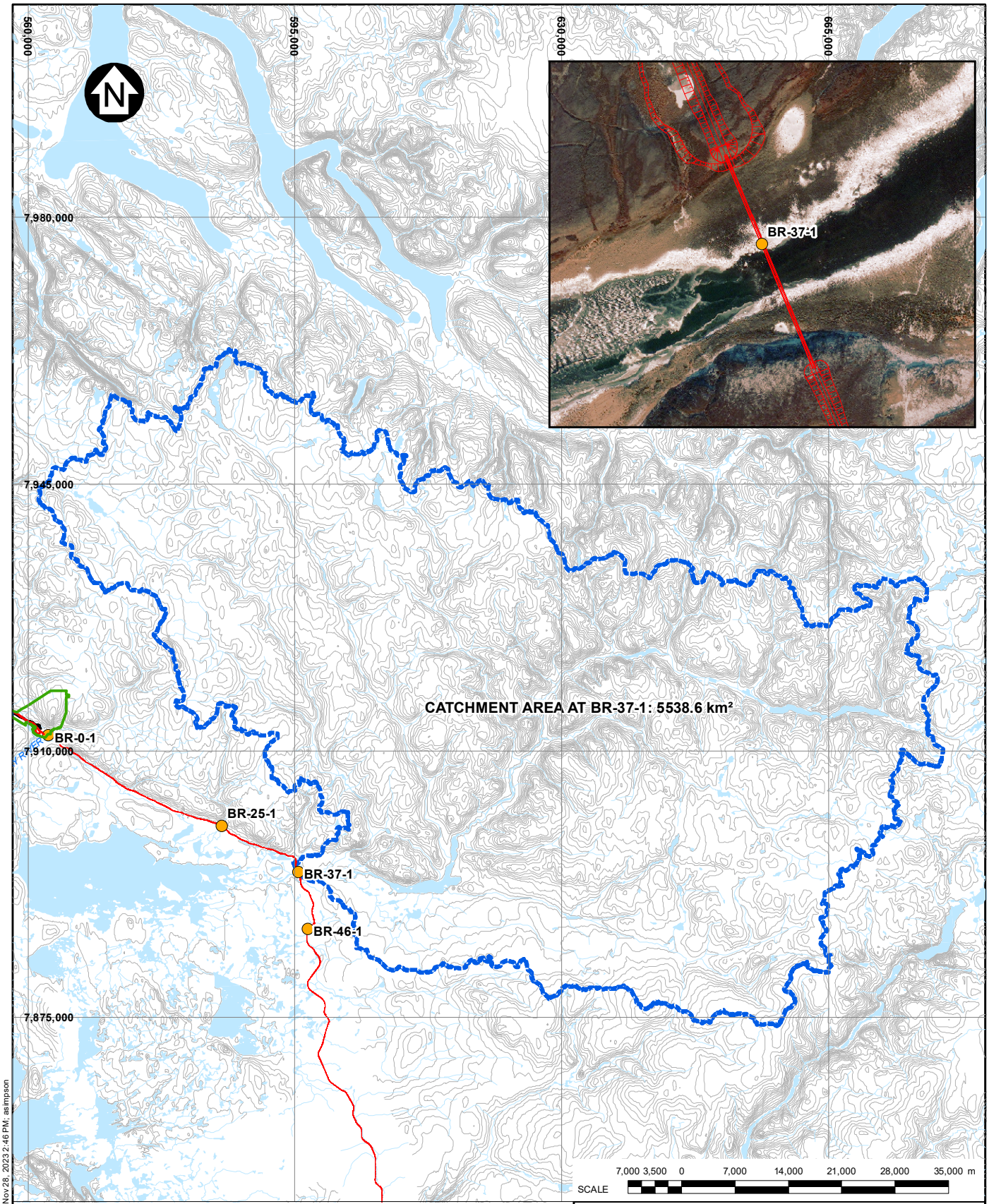
WATER STATION BR-25-1 CATCHMENT

Knight Piésold CONSULTING

P/A NO. NB102-181/94 | REF NO. 1

FIGURE B.2 | REV 0

SAVED: I:\1\02\00181\94A\GIS\Figs\A07 R0.mxd: Nov 28, 2023 3:00 PM: asimpson



LEGEND:

- WATER STATION
- STEENSBY RAILWAY
- POTENTIAL DEVELOPMENT AREA
- CATCHMENT BOUNDARY

NOTES:

1. COORDINATE GRID IS IN METRES. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N.
2. BASE MAP IMAGERY: c 2021 DIGITAL GLOBE, INC.
3. RAILWAY ALIGNMENT PROVIDED BY SYSTRA (NOV 13, 2023).

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	28NOV'23	ISSUED WITH REPORT	GMJ	AS	RAC

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

WATER STATION BR-37-1 CATCHMENT

Knight Piésold CONSULTING

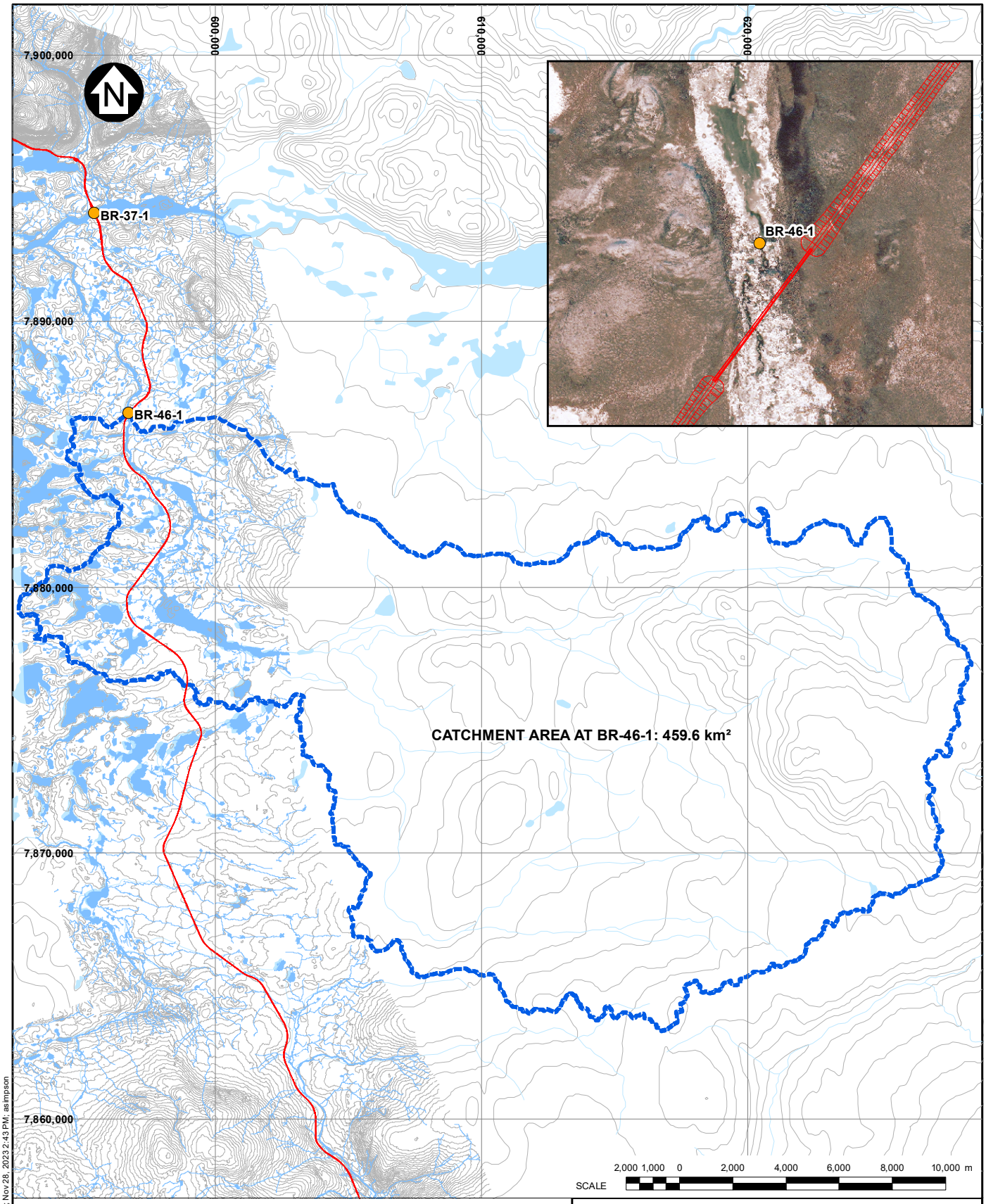
P/A NO. NB102-181/94

REF NO. 1

FIGURE B.3

REV 0

SAVED: I:\1\02\00181\94A\GIS\Figs\A08 R0.mxd; Nov 28, 2023 2:46 PM; asimpson



LEGEND:

- WATER STATION
- STEENSBY RAILWAY
- CATCHMENT BOUNDARY

NOTES:

1. COORDINATE GRID IS IN METRES. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N.
2. BASE MAP IMAGERY: c 2021 DIGITAL GLOBE, INC.
3. RAILWAY ALIGNMENT PROVIDED BY SYSTRA (NOV 13, 2023).

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	28NOV'23	ISSUED WITH REPORT	GMJ	AS	RAC

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

WATER STATION BR-46-1 CATCHMENT

Knight Piésold CONSULTING

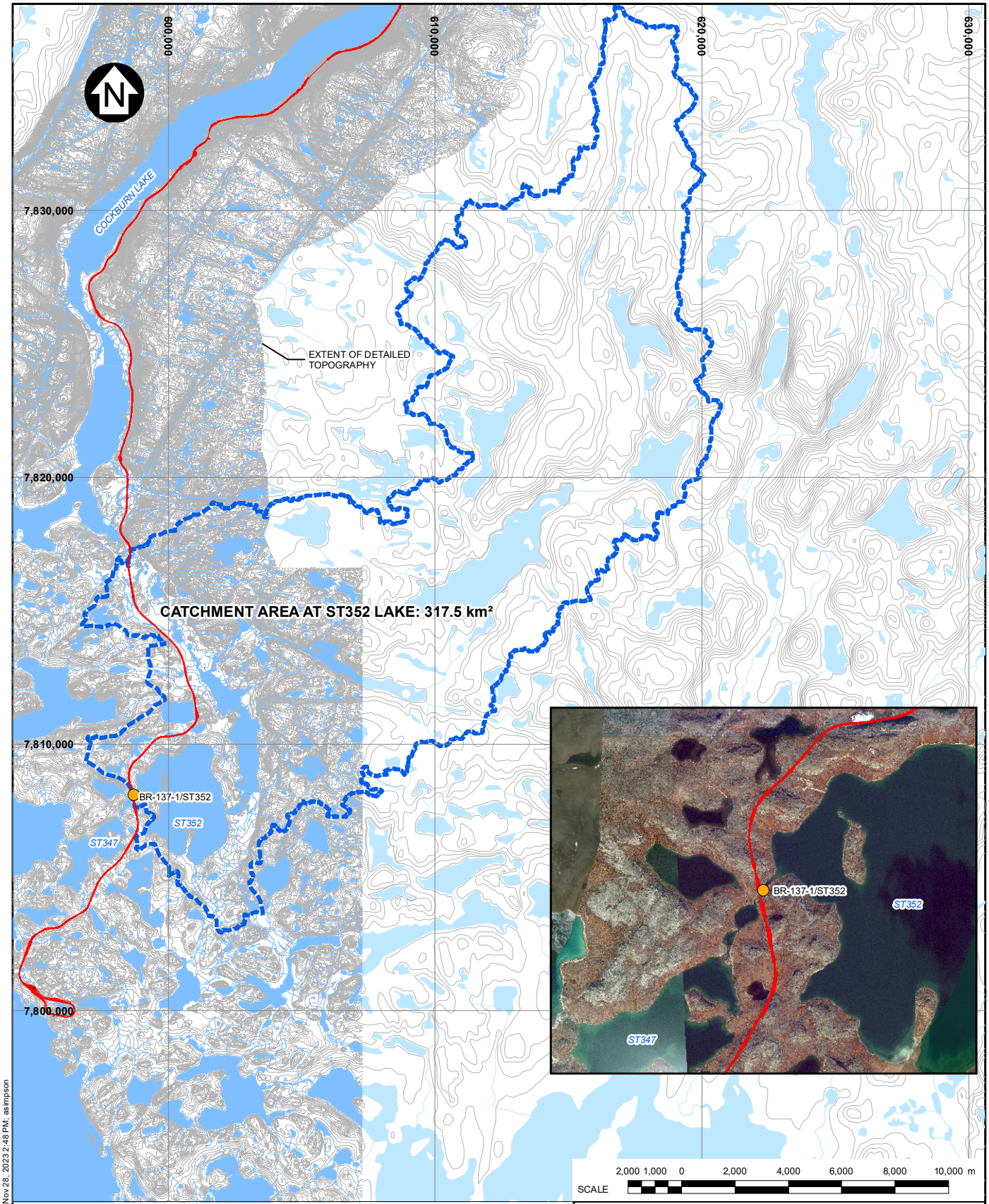
P/A NO. NB102-181/94

REF NO. 1

FIGURE B.4

REV 0

SAVED: I:\1\02\00181\94A\GIS\Figs\A09 R0.mxd; Nov 28, 2023 2:43 PM; asimpson



LEGEND:

- WATER STATION
- STEENSBY RAILWAY
- POTENTIAL DEVELOPMENT AREA
- CATCHMENT BOUNDARY

NOTES:

1. COORDINATE GRID IS IN METRES. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N.
2. BASE MAP IMAGERY: c 2021 DIGITAL GLOBE, INC.
3. RAILWAY ALIGNMENT PROVIDED BY SYSTRA (NOV 13, 2023).

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	28NOV'23	ISSUED WITH REPORT	GMJ	AS	RAC

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

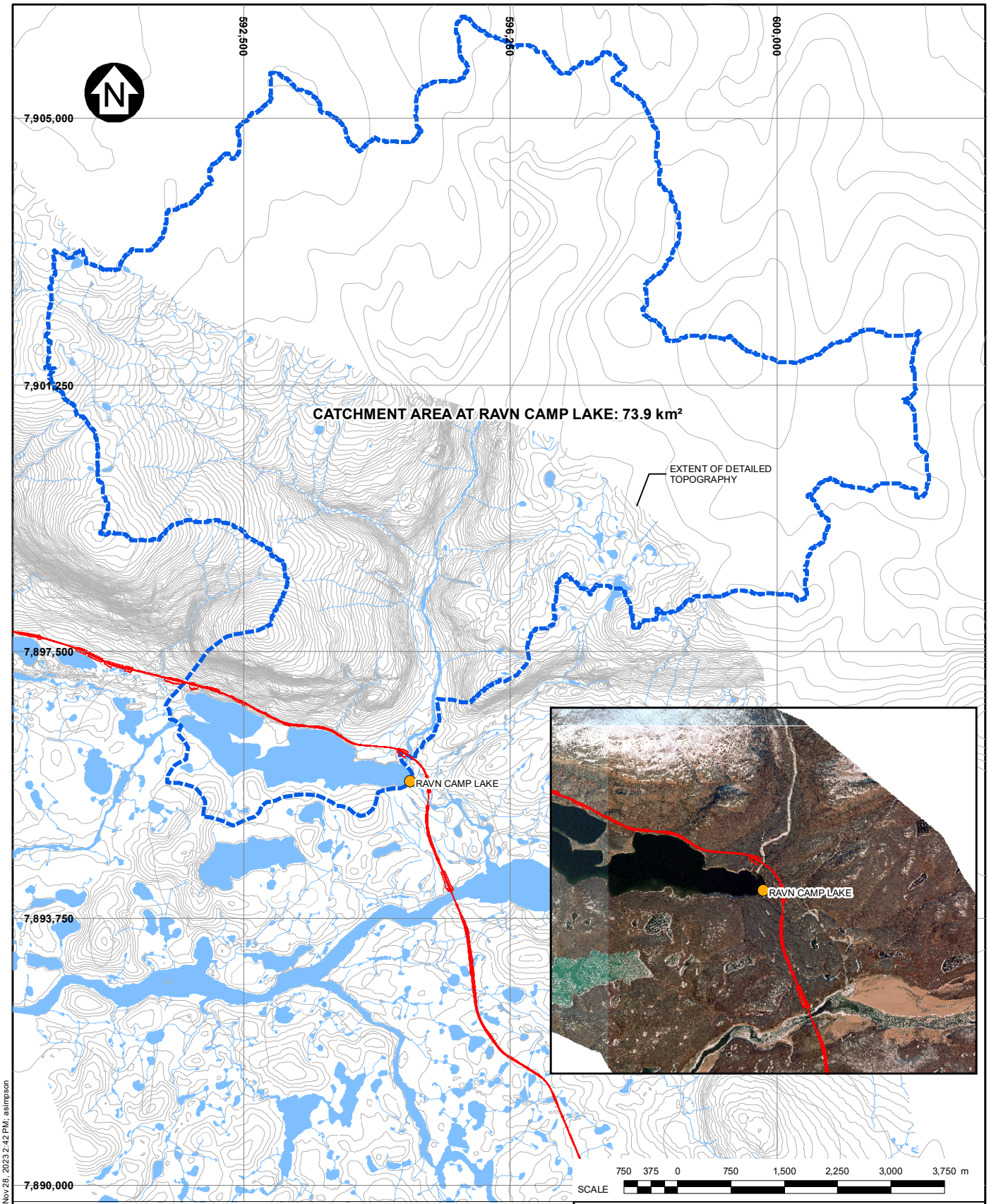
WATER STATIONS BR-137-1 AND ST352 CATCHMENT

Knight Piésold CONSULTING

P/A NO. NB102-181/94 | REF NO. 1

FIGURE B.5 | REV 0

SAVED: I:\1\02\00181\94A\GIS\Figs\A13 R0.mxd; Nov 28, 2023 2:48 PM; asimpson



LEGEND:

- WATER STATION
- STEENSBY RAILWAY
- CATCHMENT BOUNDARY

NOTES:

1. COORDINATE GRID IS IN METRES. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N.
2. BASE MAP IMAGERY: c 2021 DIGITAL GLOBE, INC.
3. RAILWAY ALIGNMENT PROVIDED BY SYSTRA (NOV 13, 2023).

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	28NOV'23	ISSUED WITH REPORT	GMJ	AS	RAC

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

WATER STATION RAVN CAMP LAKE CATCHMENT

Knight Piésold CONSULTING

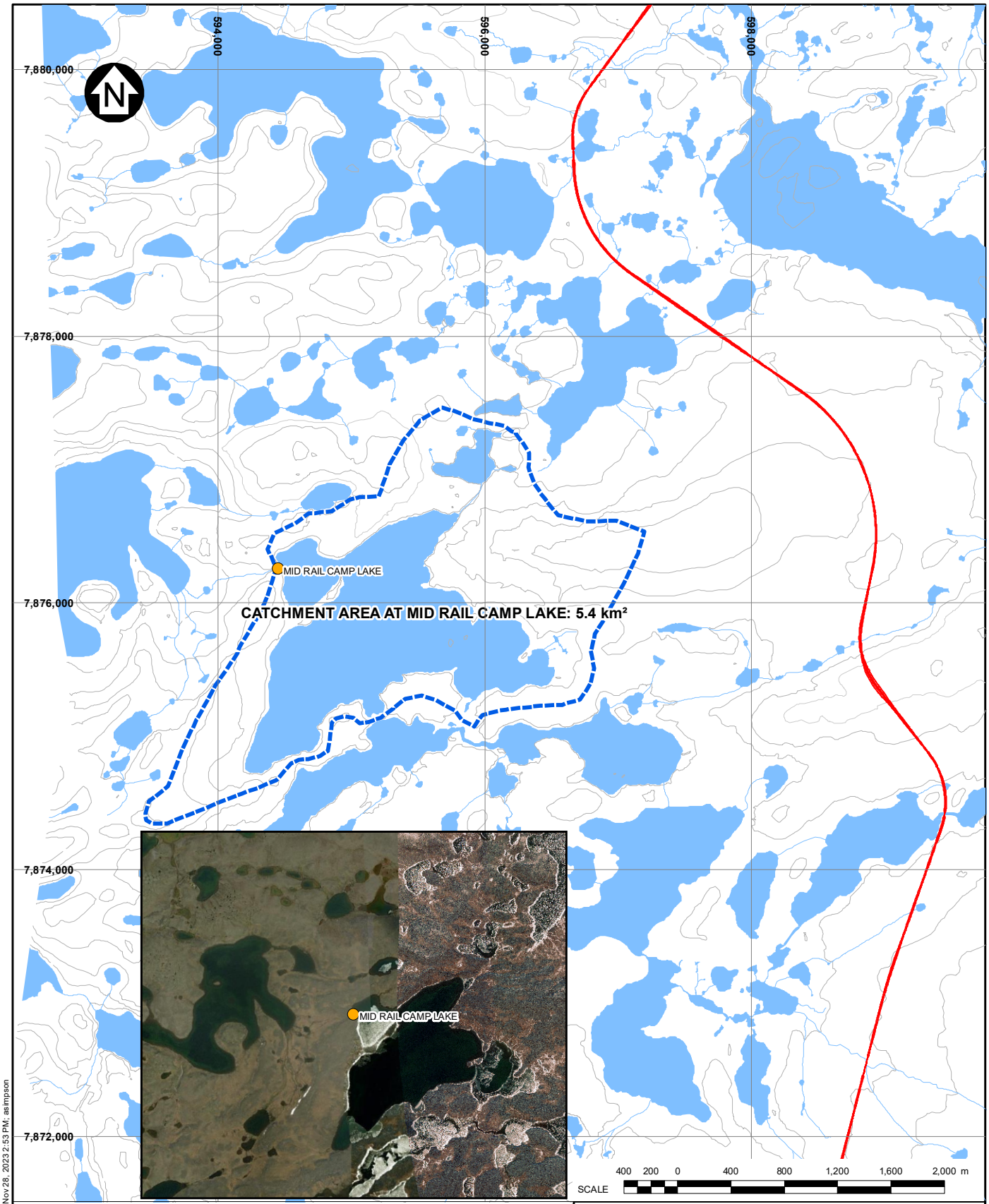
P/A NO. NB102-181/94

REF NO. 1

FIGURE B.6

REV 0

SAVED: I:\1\02\00181\94A\GIS\Figs\A11 R0.mxd: Nov 28, 2023 2:42 PM: asimpson



LEGEND:

- WATER STATION
- STEENSBY RAILWAY
- CATCHMENT BOUNDARY

NOTES:

1. COORDINATE GRID IS IN METRES. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N.
2. BASE MAP IMAGERY: c 2021 DIGITAL GLOBE, INC.
3. RAILWAY ALIGNMENT PROVIDED BY SYSTRA (NOV 13, 2023).

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	28NOV'23	ISSUED WITH REPORT	GMJ	AS	RAC

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

WATER STATION MID-RAIL CAMP LAKE CATCHMENT

Knight Piésold CONSULTING

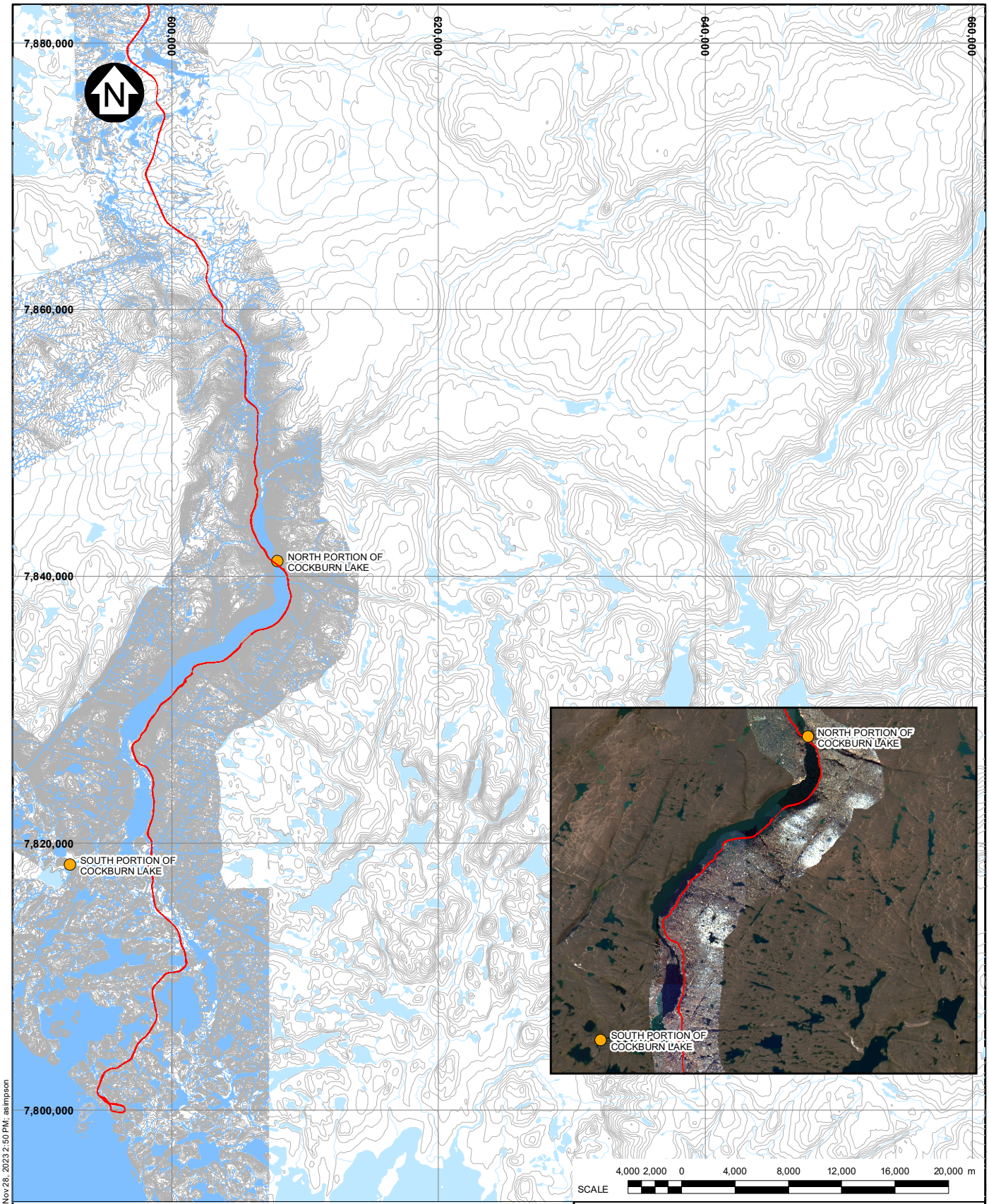
P/A NO. NB102-181/94

REF NO. 1

FIGURE B.7

REV 0

SAVED: I:\1\02\00181\94A\GIS\Figs\A10 R0.mxd; Nov 28, 2023 2:53 PM; asimpson



LEGEND:

- WATER STATION
- STEENSBY RAILWAY
- POTENTIAL DEVELOPMENT AREA
- CATCHMENT BOUNDARY

NOTES:

1. COORDINATE GRID IS IN METRES. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N.
2. BASE MAP IMAGERY: c 2021 DIGITAL GLOBE, INC.
3. RAILWAY ALIGNMENT PROVIDED BY SYSTRA (NOV 13, 2023).

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	28NOV'23	ISSUED WITH REPORT	GMJ	AS	RAC

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

WATER STATIONS COCKBURN LAKE CATCHMENTS

Knight Piésold CONSULTING

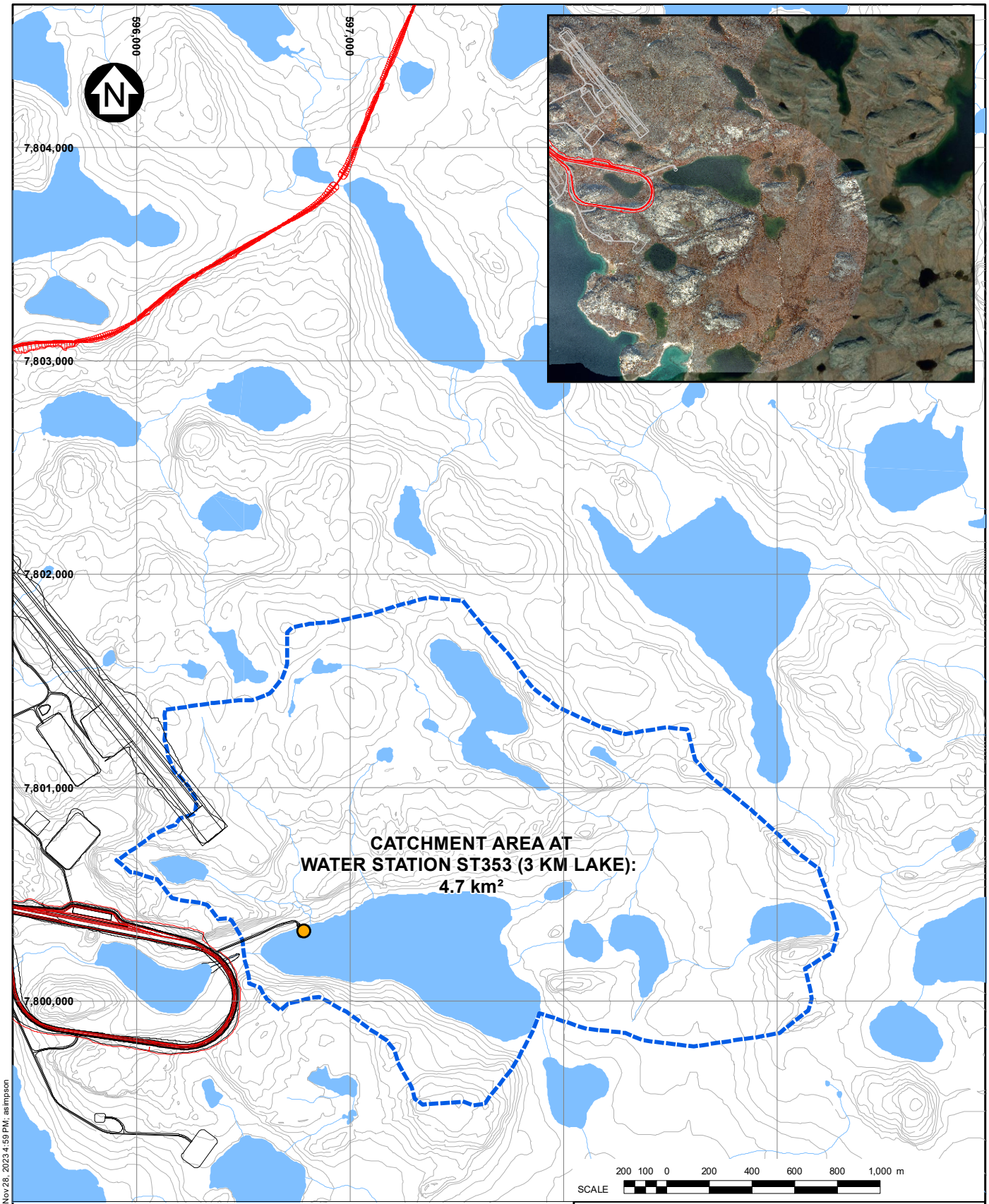
P/A NO. NB102-181/94

REF NO. 1

FIGURE B.8

REV 0

SAVED: I:\1\02\00181\94A\GIS\Figs\A12 R0.mxd; Nov 28, 2023 2:50 PM; asimpson



LEGEND:

- WATER STATION
- STEENSBY RAILWAY
- POTENTIAL DEVELOPMENT AREA
- CATCHMENT BOUNDARY

NOTES:

1. COORDINATE GRID IS IN METRES. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N.
2. BASE MAP IMAGERY: c 2021 DIGITAL GLOBE, INC.
3. RAILWAY ALIGNMENT PROVIDED BY SYSTRA (NOV 13, 2023).
4. STEENSBY INFRASTRUCTURE PROVIDED BY AUSENCO (NOV 7, 2023).

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	28NOV'23	ISSUED WITH REPORT	GMJ	AS	RAC

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

WATER STATION ST353 (3 KM LAKE) CATCHMENT

Knight Piésold CONSULTING

P/A NO. NB102-181/94 | REF NO. 1

FIGURE B.9 | REV 0

SAVED: I:\1\02\00181\94A\GIS\Figs\A14 R0.mxd: Nov 28, 2023 4:59 PM; asimpson