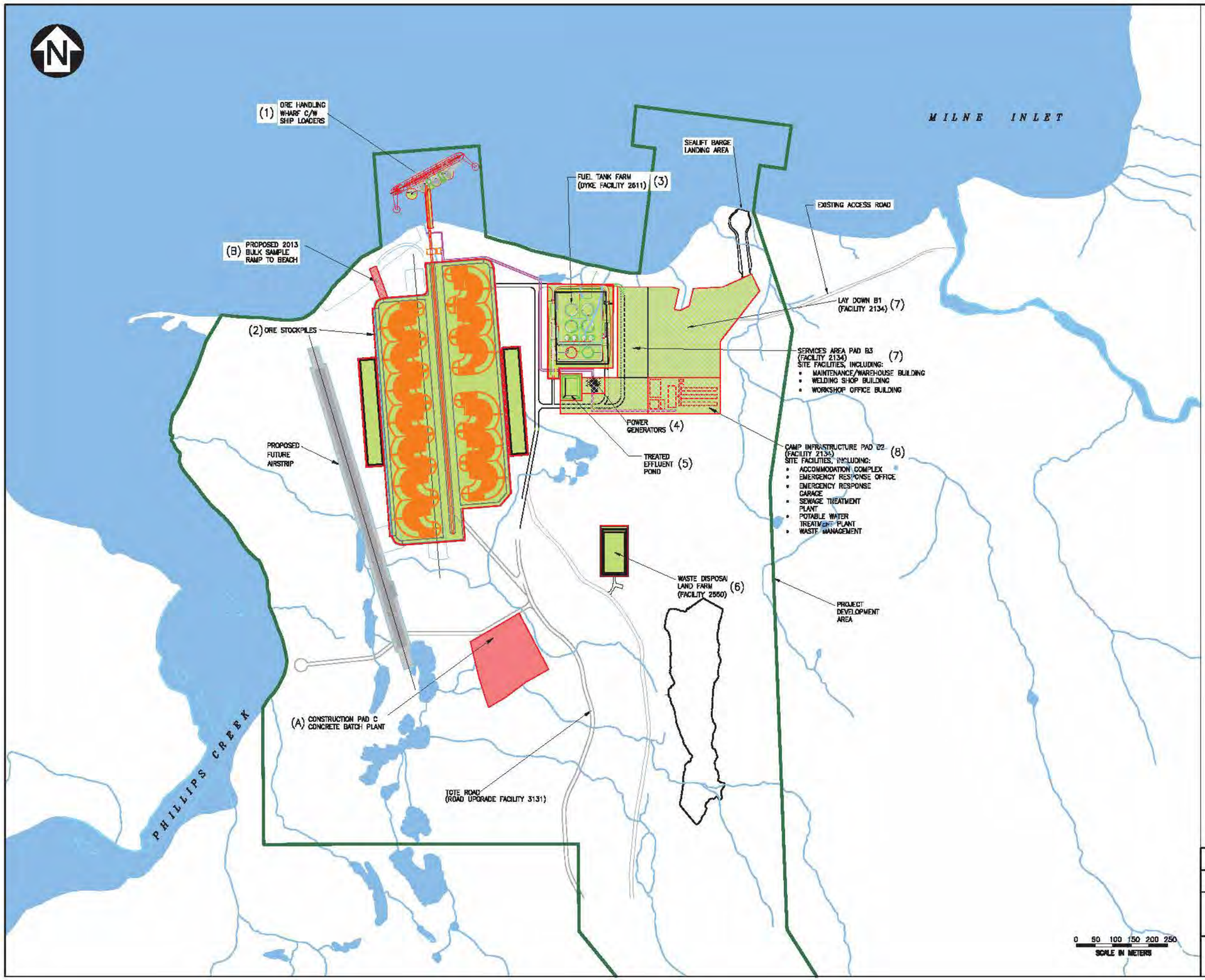
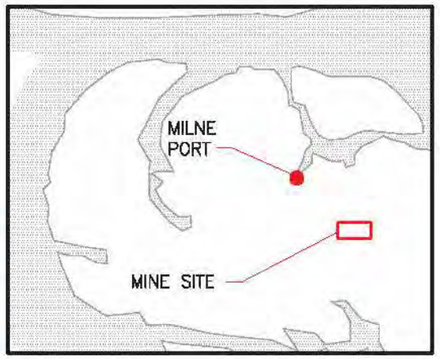
Baffinland Iron Mines Corporation

BIM-5200-PLA-0026 APPENDIX A - LIFE OF MINE SITE LAYOUTS

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RECLAMATION AREA - AFTER CONSTRUCTION

AREA ID	m²
A	31,597
B	1,835
TOTAL	33,432

RECLAMATION AREA - AFTER OPERATION

AREA ID	m²
1	4600
2	267,770
3	42,630
4	2,760
5	4,450
6	10,500
7	116,730
8	20,000
TOTAL	451,460

LEGEND:

( ) RECLAMATION AREA ID

RECLAMATION AREA - AFTER CONSTRUCTION

RECLAMATION AREA - AFTER OPERATION

BAFFINALND IRON MINES CORPORATION

MARY RIVER PROJECT

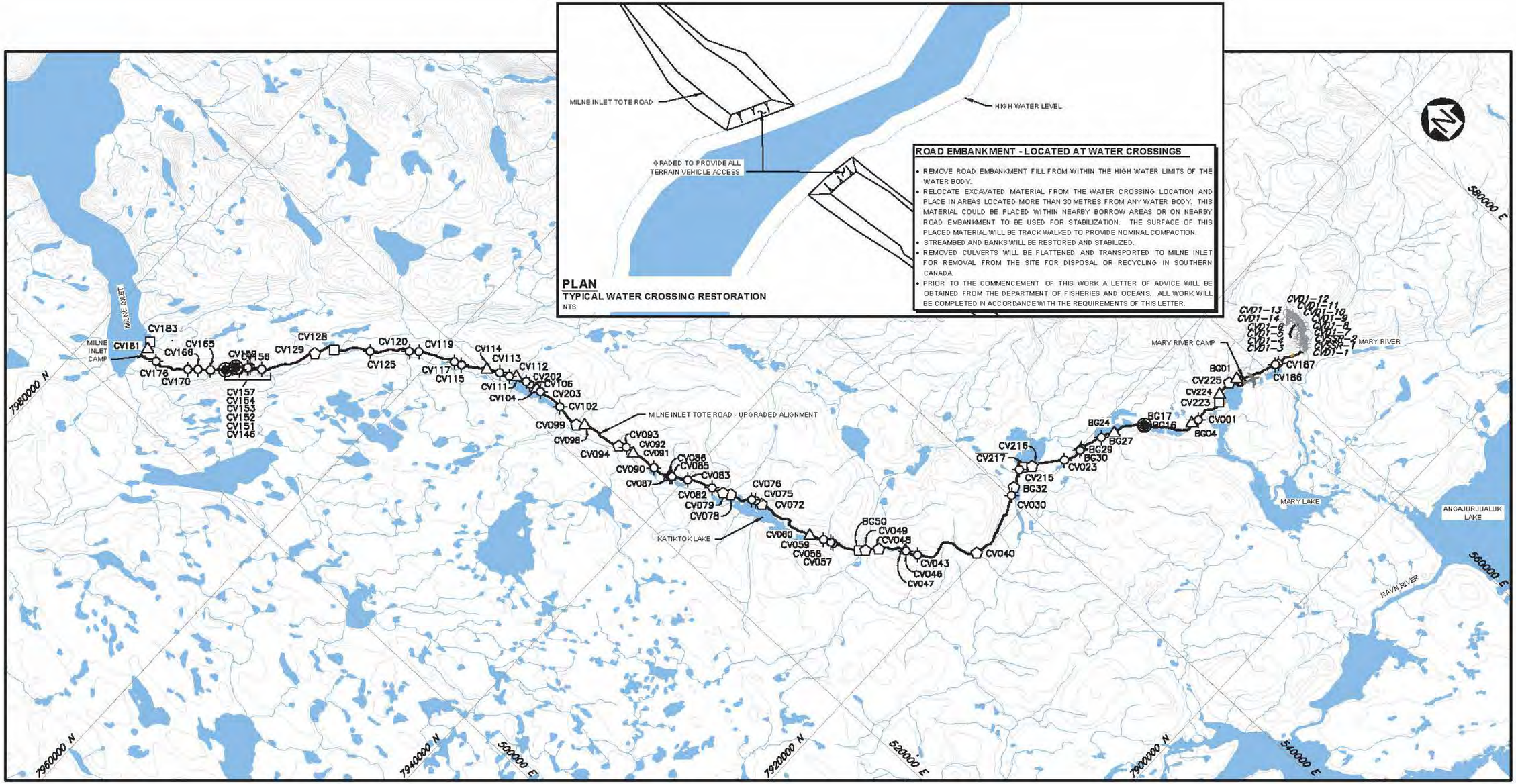
AREAS OF RECLAMATION - MILNE PORT LAYOUT

Baffinland

REF NO. BIL_ARP_CAD_001

FIGURE NO. E346660-2668-87-014-0001

REV 0



LEGEND:

- WATER
- MILNE INLET TOTE ROAD - UPDATED ALIGNMENT
- AIRSTRIP
- EXPLORATION CAMP LOCATION
- CULVERT LOCATION
- EXTRA SMALL CROSSING
- SMALL CROSSING
- MEDIUM CROSSING
- LARGE CROSSING
- EXTRA LARGE CROSSING

NOTES:

1. COORDINATE GRID IS UTM (NAD83) ZONE 17.
2. BASE MAP: © HER MAJESTY THE QUEEN IN RIGHTS OF CANADA, DEPARTMENT OF NATURAL RESOURCES, (2004). ALL RIGHTS RESERVED.
3. CONTOURS ARE IN METRES. CONTOUR INTERVAL VARIES.
4. MILNE INLET TOTE ROAD ALIGNMENT SURVEY PROVIDED BY GENIVAR (SURVEY COMPLETED IN JULY 2008).
5. NOT FOR CONSTRUCTION.

SCALE A 3 1.5 0 5 10 15 km

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

MILNE INLET TOTE ROAD WATER CROSSING RESTORATION

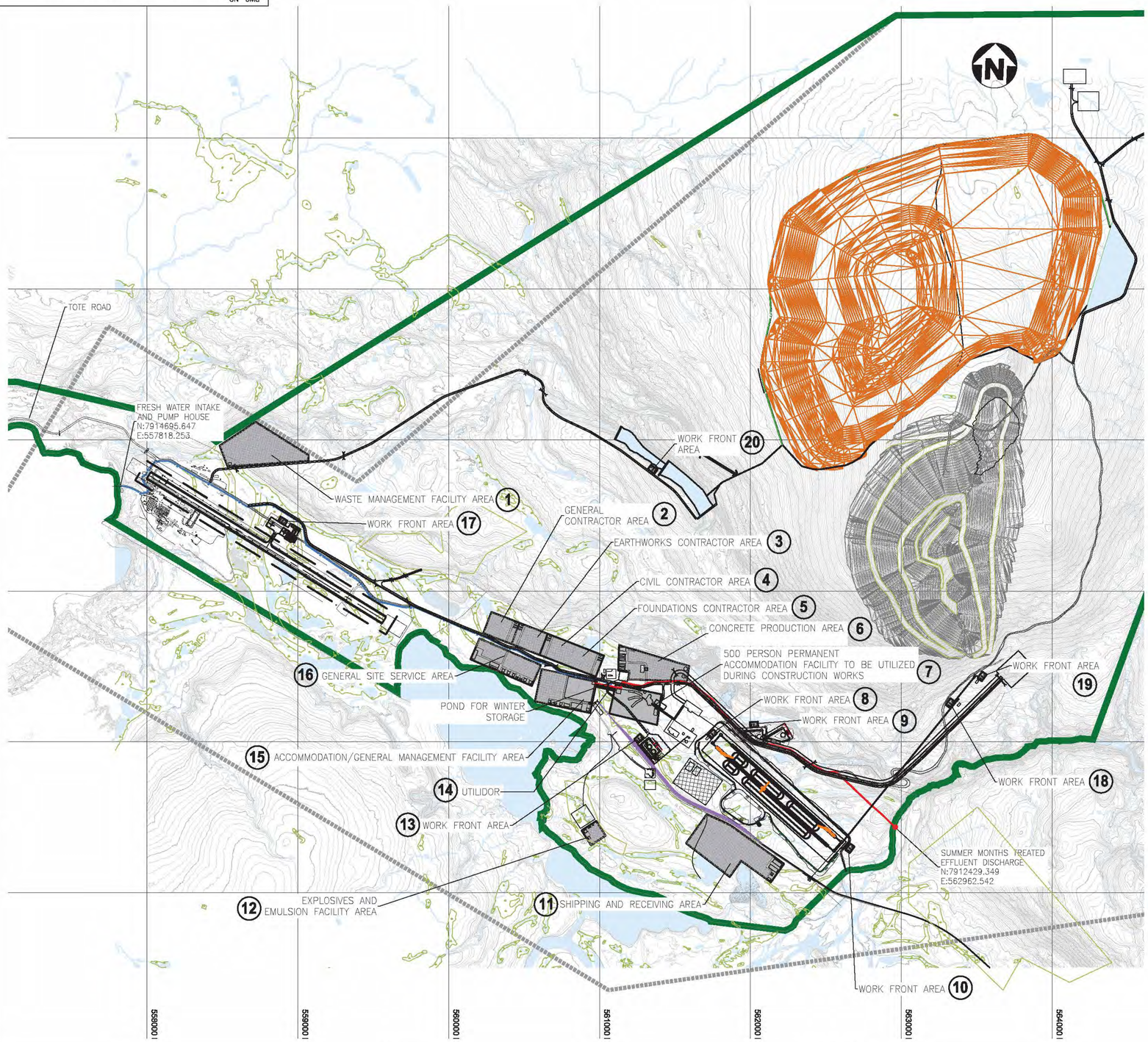
Knight Piésold CONSULTING

P/A NO. NB102-181/29 | REF NO. 1

FIGURE 8.10 | REV 0

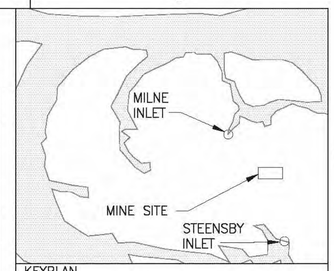
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XREF Files: Base Map_Milne Access_borrow and pit_Genivar_Dec_2008_Edited with Large Crossings_Revised.dwg

DWG. NO. H337697-4210-07-012-0001



RECLAMATION AREA - AFTER CONSTRUCTION

AREA	m²
1	102,610
2	30,000
3	30,000
4	30,000
5	30,000
6	71,540
7	63,380
8	1,860
9	1,860
10	1,860
11	133,540
12	132,30
13	1,860
14	2,800
15	81,160
16	66,400
17	1,860
18	1,860
19	1,860
20	1,860
TOTAL	**669,540**



KEYPLAN

LEGENDS:

- RECLAMATION AREA AFTER CONSTRUCTION
- WATER
- WETLAND
- CONSTRUCTION WORKS LAYDOWN AREA
- RIVER/STREAM/DRAINAGE
- RAILWAY ALIGNMENT
- TREATED EFFLUENT PIPELINE
- FRESHWATER PIPELINE
- ACCESS ROAD
- POTENTIAL DEVELOPMENT AREA
- BAFFINLAND'S COMMERCIAL LEASE ON INUIT OWNED LAND

NOTES:

1. TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
3. CONTOURS ARE IN METRES. CONTOUR INTERVAL IS 10 METRES.
4. MINE SITE AS-CONSTRUCTED INFORMATION PROVIDED BY GENIVAR.
5. PROPOSED PERMANENT WORKS LAYOUT SHOWN FOR REFERENCE PURPOSES ONLY. DO NOT USE FOR CONSTRUCTION.

SCALE 300 150 0 500 1000 1500 mm

SCALE 1:15,000

DRAWING NO.	DRAWING TITLE
REFERENCE DRAWINGS	

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
A	ISSUED FOR INFORMATION				
REVISIONS					

REV.	ISSUE FOR	AUTH. BY	DATE
A	ENVIRONMENTAL PERMITTING		
ISSUE AUTHORIZATION			

HATCH

DESIGNED BY A. GRZEGORCZYK DATE	DRAWN BY M. LU DATE
CHECKED BY T. HO DATE	DISCIP. ENGR. J. BINNS DATE
PROJ. DES. COORD. DATE	PROJ. ENGR. DATE
PROJ. MGR. DATE	

Baffinland Iron Mines Corporation

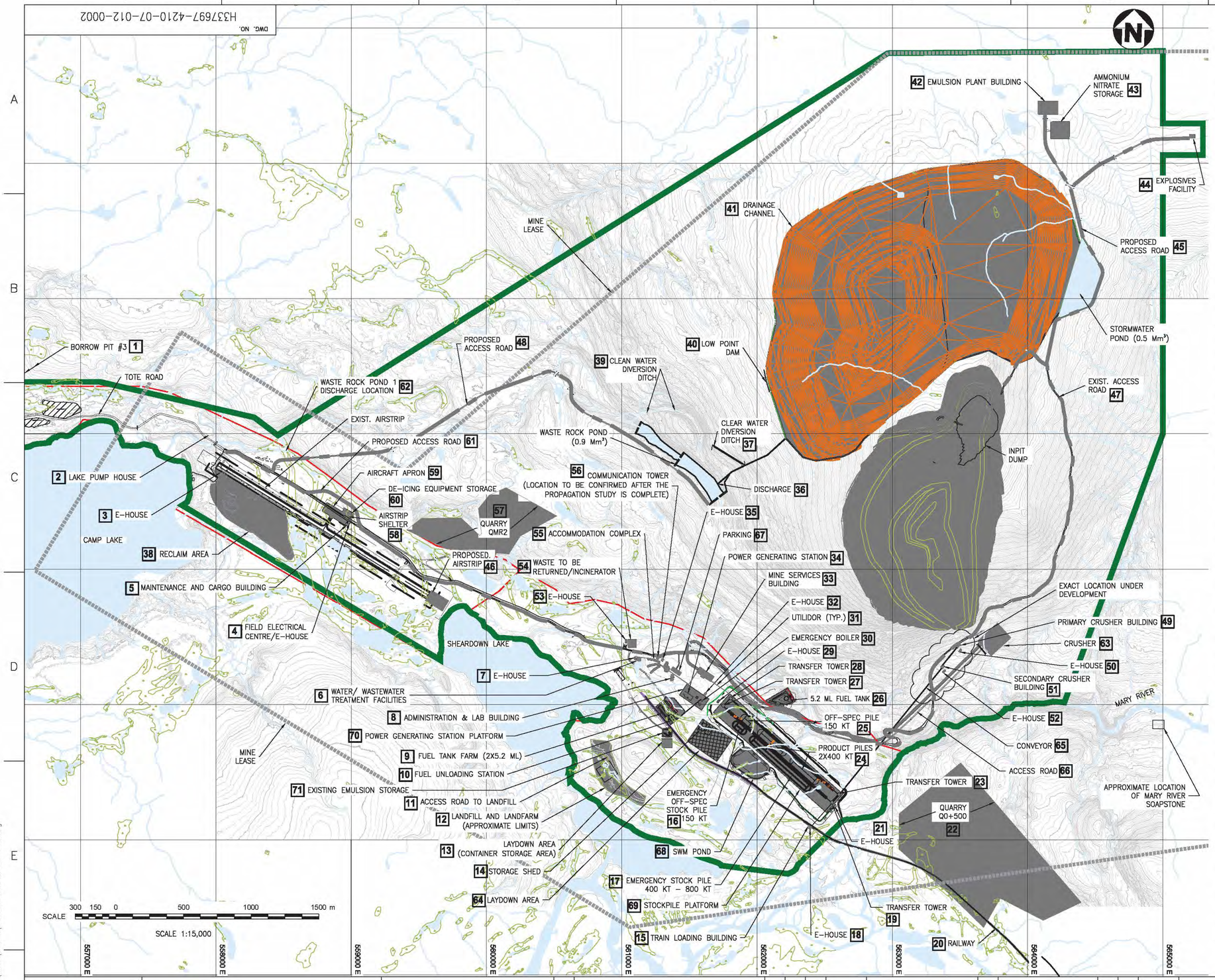
MARY RIVER PROJECT

PRELIMINARY MINE CLOSURE AND RECLAMATION PLAN
MINE SITE CONSTRUCTION PHASE

SCALE	DWG. NO.	REV.
OR AS NOTED	H337697-4210-07-012-0001	A

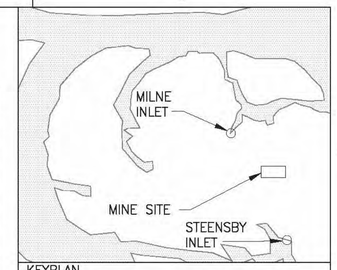
Oct 31, 2011 - 4:03pm Login name: fun51283 Layout: MINE SITE
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DWG. NO. H337697-4210-07-012-0002



RECLAMATION AREA - AFTER OPERATION

AREA	m²
1	38,850
2	20
3	290
4	40
5	230
6	870
7	290
8	940
9	24,190
10	600
11	4,900
12	76,300
13	4,420
14	4,320
15	370
16	5,760
17	31,450
18	140
19	200
20	26,750
21	140
22	817,690
23	200
24	28,000
25	5,760
26	16,340
27	200
28	200
29	290
30	380
31	2,000
32	290
33	5,750
34	2,550
35	250
36	700
37	800
38	175,780
39	2,400
40	3,300
41	5,080,000
42	14,260
43	17,380
44	1,020
45	27,900
46	13,500
47	56,800
48	34,560
49	500
50	290
51	350
52	290
53	290
54	870
55	5,740
56	220
57	260,310
58	510
59	14,620
60	890
61	41,500
62	500



KEYPLAN

LEGENDS:

- RECLAMATION AREA AFTER OPERATION
- WATER
- EXISTING BORROW AREA
- TEMPORARY LAYDOWN AREA
- ACCESS ROAD
- RIVER/STREAM/DRAINAGE
- POTENTIAL DEVELOPMENT AREA
- BAFFINLAND'S COMMERCIAL LEASE ON INUIT OWNED LAND
- COMMUNICATION TOWER

NOTES:

1. TOPOGRAPHY PROVIDED BY TERRAPOINT CANADA INC.
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
3. CONTOURS ARE IN METRES. CONTOUR INTERVAL IS 2 METRES.
4. MINE SITE INFRASTRUCTURE IS BASED ON EIS AND AMEC DRAWINGS ADDITIONAL DETAILS PROVIDED IN DRAWINGS : A1-164512-6120-121-0100 A1-165926-6000-121-GAD-0100 A1-159952-6020-121-0200
5. MATERIAL HANDLING AND PROCESSING LAYOUT WAS REVISED BASED ON AKER KVAERNER DRAWING DWG-2000-M-0003, REV C.
6. MINE SITE AS-CONSTRUCTED INFORMATION PROVIDED BY GENIVAR, SURVEYED AS OF JAN. 2009.

AREA	m²
63	30,000
64	48,500
65	3,460
66	58,300
67	3,400
68	43,600
69	133,670
70	16,800
71	6,570
TOTAL	**7,200,570**

Nov 03 , 2011 , 9:03am Login name: fun51283
Drawing Name: P:\289980 – Mary River\CAD\Civil\Roads\Reclaim\H337697-4210-07-012-0002.dwg Layout: Reclaim

DRAWING NO.	DRAWING TITLE
REFERENCE DRAWINGS	

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
A	ISSUED FOR INFORMATION				
REVISIONS					

REV.	ISSUE FOR	AUTH. BY	DATE
A	ENVIRONMENTAL PERMITTING		
ISSUE AUTHORIZATION			

HATCH™

DESIGNED BY A. GREGORCZYK	DRAWN BY M. LU
DATE	DATE
CHECKED BY T. HO	DISCIP. ENGR. J. BINNS
DATE	DATE
PROJ. DES. COORD.	PROJ. ENGR.
DATE	DATE
PROJ. MGR.	
DATE	

Baffinland Iron Mines Corporation

MARY RIVER PROJECT

PRELIMINARY MINE CLOSURE AND RECLAMATION PLAN
MINE SITE FINAL CLOSURE PHASE

SCALE	DWG. NO.	REV.
OR AS NOTED	H337697-4210-07-012-0002	A

DWG. NO. H337697-2000-07-012-0001

570000 E | 585000 E | 600000 E | 615000 E

7905000 N | 7890000 N | 7875000 N | 7860000 N | 7845000 N | 7830000 N | 7815000 N | 7800000 N

MINE SITE

BR-MN-1 AND BR-MN-2

Q0+500 | 0+00 | Q4+100 | Q7+500 | Q8+500 | 10+00 | Q10+250 | Q14+500 | Q18+100 | 20+00 | Q22+500 | Q25+500 | Q28+400 | BR-25-1 | 30+00 | Q35+000 | Q35+500 | Q38+700 | 40+00 | Q42+000 | Q44+300 | Q44+000 | Q45+000 | Q45+800 | 45+450.15 | Q48+000 | Q50+000 | 50+00 | Q53+700 | Q56+750 | 57+100 | 60+00 | Q61+400 | Q64+400 | Q67+200 | 70+00 | Q71+000 | Q74+200 | Q77+200 | 79+206.38 | Q79+600 | 80+00 | Q82+700 | Q85+200 | Q89+600 | QA11 | 90+00 | 90+350.00 | Q92+000 | QA12 | QA13 | Q95+400 | Q96+100 | Q96+700 | BR-95-1 | QA1 | QA2 | QTR6 | 100+00 | QA3 | QA4 | QA14 | TUNNEL # 2 | Q110+200 | QTR7 | QA5 | QA7 | QA6 | QTR8 | 110+00 | Q114+600 | QTR9 | Q116+800 | 120+00 | QA8 | QTR4A | QA9 | 130+00 | Q127+800 | 130+00 | Q128+000 | Q131+100 | Q133+500 | QA10 | BR-138-1 | Q139+600 | 140+00 | QS2

AREA 1

AREA 2

END OF AREA 1
START 0F AREA 2

ᑎᑎᕋᐅᓕᖅᑕᒪᓐᓇᖅ 3-2.5
FIGURE 3-2.5

ᑎᑎᕋᐅᓕᖅᑕᒪᓐᓇᖅ 3-2.6
FIGURE 3-2.6

ᑎᑎᕋᐅᓕᖅᑕᒪᓐᓇᖅ 3-2.7
FIGURE 3-2.7

ᑎᑎᕋᐅᓕᖅᑕᒪᓐᓇᖅ 3-2.8
FIGURE 3-2.8

ᑎᑎᕋᐅᓕᖅᑕᒪᓐᓇᖅ 3-2.9
FIGURE 3-2.9

ᐅᓂᒃᑳᖅᓯᒪᔪᖅ
MARY RIVER

ᐅᓂᒃᑳᖅᓯᒪᔪᖅ ᑕᕐᖏᓐ
MARY LAKE

ᐃᓕᓴᕐᔪᐊᓗᒃ ᕕᖏᓐ
RAVN RIVER

ᐃᓕᓴᕐᔪᐊᓗᒃ ᕕᖏᓐ
RAVN RIVER

ᐊᖏᕐᔪᐊᔪᓐᓇᖅ ᑕᕐᖏᓐ
ANGAJURJUALUK LAKE

ᕕᒻᒥ ᖃᐅᓐ ᐅᓇᑦᑎᓂᓐ 200ᓂᓐ ᐃᓄᐃᑦᑎᓂᓐ ᐅᓇᑭᐅᒃᓴᓂᖅ
RAVN RIVER AREA 200 PERSON CAMP

ᓴᐃᓐ ᕕᑦᑎᓐ ᐃᑲᕐᓗᒃ
RAVN RIVER BRIDGE
BR-37-1

ᐃᓕᓴᕐᔪᐊᓗᒃ ᕕᖏᓐ
RAVN RIVER

ᐃᔨᐸᕐᓂᖅ
IPARQAK FORD

ᐊᐱᖓᓐᓂᖅ
PINGIMAJUQ RIDGE

ᐃᓕᐳᕐᔪᐊᓗᒃ ᕕᖏᓐ
COCKBURN RIVER

ᐅᓐᓴᐅᒃᑐᓂᖅ ᐊᑐᐊᓕᖅᑕᒪᓐᓇᖅ ᐊᑐᓂᒃ 200ᓂᓐ ᐃᓄᐃᑦᑎᓂᓐ
EXISTING MID-RAIL DRILL CAMP

ᑕᑯᓕᒥᐊᑎᒃᓴᖅ ᐊᑐᓂᒃ 200ᓂᓐ ᐃᓄᐃᑦᑎᓂᓐ
EXPANDED MID-RAIL AREA 200 PERSON CAMP

ᐅᖃᐅᓯᕐᓗᒃᑐᖅ ᐊᑐᕐᓗᒃ
SHARED OR INTEGRAL ACCESS ROAD (WITH EXCEPTIONS)

ᐅᖃᐅᓯᕐᓗᒃᑐᖅ ᐊᑐᕐᓗᒃ
PROPOSED RAILWAY ALIGNMENT

ᐃᓕᐳᕐᔪᐊᓗᒃ ᕕᖏᓐ
COCKBURN RIVER

ᓇᐃᓐ ᑲᖏᖅᓗᒃ
NINA BANG LAKE

ᐊᖏᕐᔪᐊᔪᓐᓇᖅ ᐊᑐᐊᓕᖅᑕᒪᓐᓇᖅ
CONSTRUCTION ACCESS ROAD

ᓄᓇᕗᒻᒥᐅᑦ ᑲᑎᒪᔨᖅ ᑲᓇᑕᒥ
NORTH COCKBURN LAKE

ᑕᕐᕿ ᑲᑎᓐ ᐃᓕᓴᕐᓗᒃ
COCKBURN LAKE BRIDGE

ᐃᓕᐳᕐᔪᐊᓗᒃ ᕕᖏᓐ
COCKBURN LAKE

ᓄᓇᕗᒻᒥᐅᑦ ᑲᑎᒪᔨᖅ ᑲᓇᑕᒥ
SOUTH COCKBURN LAKE

ᑕᕐᕿ ᑲᑎᓐ ᐃᓕᓴᕐᓗᒃ ᐃᓄᐃᑦᑎᓂᓐ ᐊᑐᓂᒃ 100ᓂᓐ ᐃᓄᐃᑦᑎᓂᓐ
COCKBURN TUNNELS AREA 100 PERSON CAMP

ᓄᓇᕗᒻᒥᐅᑦ ᑲᑎᒪᔨᖅ ᑲᓇᑕᒥ (400ᓂᓐ ᐃᓄᐃᑦᑎᓂᓐ)
SOUTH COCKBURN CAMP (400 PERSON)

ᑐᓴᕐᓗᒃ ᐃᓕᓴᕐᓗᒃ
STEENSBY INLET

ᐃᓕᓴᕐᔪᐊᓘᓐᓃᑦ ᑐᓴᕐᓂᓕᓐ (ᓱᓴᐅᑦᑎᓐᓇᖅ)
STEENSBY PORT

TUNNEL #1 — APR YEAR 2 - APR YEAR3
TUNNEL #2 — APR-AUG YEAR 2

MAJOR BRIDGE CONSTRUCTION

BR-MN-1	ABUTMENTS, FOUNDATIONS	SEP-NOV YEAR 1
	PIERS, PILES, MISC. STEEL WORKS	APR-JUN YEAR2
BR-MN-2	ABUTMENTS, FOUNDATIONS	OCT-DEC YEAR 1
	PIERS, PILES, MISC. STEEL WORKS	JUN-SEP YEAR2
BR-25-1	ABUTMENTS, FOUNDATIONS	MAY-JUN YEAR 2
	PIERS, PILES, MISC. STEEL WORKS	SEP-NOV YEAR 2
BR-37-1	ABUTMENTS, FOUNDATIONS	JUN-JUL YEAR 2
	PIERS, PILES, MISC. STEEL WORKS	APR-OCT YEAR 3
BR-95-1	ABUTMENTS, FOUNDATIONS	JUN-JUL YEAR 2
	PIERS, PILES, MISC. STEEL WORKS	NOV-SEP YEAR 3
BR-138-1	ABUTMENTS, FOUNDATIONS	OCT-NOV YEAR 1
	PIERS, PILES, MISC. STEEL WORKS	APR-NOV YEAR 2
SIGNALING WORKS (STARTING FROM THE PORT)		JUL-NOV YEAR 4
TRACK LAYING		APR-SEP YEAR 4

YEAR	YEAR 1	YEAR 2	YEAR 3	YEAR 4
CONSTRUCTION ACCESS ROAD				
RAILWAY EMBANKMENT				

ᐊᖏᕐᔪᐊ	ᐊᖏᕐᔪᐊ 1	ᐊᖏᕐᔪᐊ 2	ᐊᖏᕐᔪᐊ 3	ᐊᖏᕐᔪᐊ 4
ᐃᓕᓴᕐᓗᒃ ᐊᑐᐊᓕᖅᑕᒪᓐᓇᖅ				

ᑐᓴᕐᓗᒃ ᐃᓕᓴᕐᓗᒃ ᐊᑐᐊᓕᖅᑕᒪᓐᓇᖅ ᐊᑐᓂᒃ ᐊᖏᕐᔪᐊᓂᒃ

BR-MN-1	ᑐᓴᕐᓂᓕᓐ ᑐᓴᕐᓂᐊᕐᓇᓕ ᑐᖓᓂᖅ	ᓄᑎᐊᓂᓐᓄᐊᓕ ᐊᖏᕐᔪᐊ 1
		ᐃᓄᐊᓂᓐᓄᐊᓕ ᐊᖏᕐᔪᐊ 2
BR-MN-2	ᑐᓴᕐᓂᐊᕐᓇᓕ ᑐᓴᕐᓂᐊᕐᓇᓕ ᑐᖓᓂᖅ	ᐅᑐᐊᓂᓐᓄᐊᓕ ᐊᖏᕐᔪᐊ 1
		ᓴᓐᓄᑎᑎᓄᐊᓕ ᐊᖏᕐᔪᐊ 2
BR-25-1	ᑐᓴᕐᓂᐊᕐᓇᓕ ᑐᓴᕐᓂᐊᕐᓇᓕ ᑐᖓᓂᖅ	ᓯᐃᓐᓂ ᐊᖏᕐᔪᐊ 2
		ᓄᑎᐊᓂᓐᓄᐊᓕ ᐊᖏᕐᔪᐊ 2
BR-37-1	ᑐᓴᕐᓂᐊᕐᓇᓕ ᑐᓴᕐᓂᐊᕐᓇᓕ ᑐᖓᓂᖅ	ᓯᐃᓐᓂ ᐊᖏᕐᔪᐊ 2
		ᐃᓄᐊᓂᓐᓄᐊᓕ ᐊᖏᕐᔪᐊ 3
BR-95-1	ᑐᓴᕐᓂᐊᕐᓇᓕ ᑐᓴᕐᓂᐊᕐᓇᓕ ᑐᖓᓂᖅ	ᓯᐃᓐᓂ ᐊᖏᕐᔪᐊ 2
		ᓄᑎᐊᓂᓐᓄᐊᓕ ᐊᖏᕐᔪᐊ 3
BR-138-1	ᑐᓴᕐᓂᐊᕐᓇᓕ ᑐᓴᕐᓂᐊᕐᓇᓕ ᑐᖓᓂᖅ	ᓄᑎᐊᓂᓐᓄᐊᓕ ᐊᖏᕐᔪᐊ 1
		ᓄᑎᐊᓂᓐᓄᐊᓕ ᐊᖏᕐᔪᐊ 2
ᖃᐅᔨᓴᓂᖅᑐᖅ ᐃᓚᖓᑕᐅᓂᖅ (ᓱᓴᐅᑦᑎᓐᓇᖅ)		ᓴᓐᓄᑎᑎᓄᐊᓕ ᐊᖏᕐᔪᐊ 4
ᐊᖏᕐᔪᐊᓂᒃ ᓴᖅᑭᑐᓂᖓ		ᐊᑐᓂᓐᓄᐊᓕ ᐊᖏᕐᔪᐊ 4

ᐅᑉᐱᒃᖢᑎᒃ
LEGEND:

- ᐃᒥᖅ WATER
- ᑲᑎᒪᔨᖅ/ᑯᓚᓐᑐᖅ/ᑯᐃᐱᐅᓂᖅ RIVER/STREAM/DRAINAGE
- ᐅᑐᐊᓂᓐᓄᐊᓕᒃᑐᖅ ᑭᓚᓐᓂᐊᕐᓂᖅ POTENTIAL QUARRY
- ᓴᓐᓄᑎᑎᓄᐊᓕ ᐃᓕᓴᕐᓗᒃ SNOWMOBILE CROSSING LOCATIONS
- ᐃᓄᒋᑦᑎᓂᓐᓄᐊᓕᒃᑐᖅ ᑕᖓᒪᓐᓇᐃᓕᓐᓂᖅ ᐱᖓᓱᐃᑦᑐᖅ PROPOSED RAILWAY CONSTRUCTION CAMP LOCATION
- ᐃᓄᐃᑦ ᓄᓇᕗᑦᑎᓐᓂ - ᖃᓄᐃᓂ ᓴᓇᔨᓄᐃᑦ ᐱᖓᓱᐃᑦᑐᖅᓯᓂᑦ INUIT OWNED LAND - SURFACE ONLY EXCLUDING MINERALS
- ᐃᓄᐃᑦ ᓄᓇᕗᑦᑎᓐᓂ - ᖃᓄᐃᓂ ᐊᒋᓂᓗ ᐱᖓᓱᐃᑎᓕᑦ ᓴᓇᔨᓄᐃᑦᑐᖅᓯᓂᑦ INUIT OWNED LAND - SURFACE AND SUBSURFACE INCLUDING MINERALS

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 CANARAIL.

ᓄᓇᕗᑦᑎᓐᓂ ᐊᑐᐊᓕᖅᑕᒪᓐᓇᖅ: ᑯᐃᐧ ᖃᓇᑕᓗᒃ
ᓄᓇᕗᑦᑎᓐᓂ ᑎᑎᕋᐅᓕᖅᑕᒪᓐᓇᖅ ᒪᓕᓕᒃ UTM (NAD83) ZONE 17
ᑎᑎᕋᐅᓕᖅᑕᒪᓐᓇᖅ ᒥᑦ: ᐊᖏᔪᓂᕐᓂᑦ ᑭᖑᓪᓗᑎᑎᓂᑦ ᐊᑐᕐᓂᕐᓂᑦ
ᑯᓚᓐᓂᐊᕐᑐᓂᖅ ᐃᓕᓴᕐᓗᒃ ᓇᓗᓇᐃᕐᓂᕐᒪᑦ ᐸᐃᑉᑎᓂᖅ ᐊᒪᓗ ᑎᑎᕋᐅᓕᖅᑕᒪᓐᓇᖅᑐᓂᖅ Canarail

ᑲᑎᒪᔨᖅ ᐊᑐᐊᓕᖅᑕᒪᓐᓇᖅ
STEENSBY INLET

SCALE 350 175 0 700 1050 1400 m
SCALE 1:175,000

RECLAMATION AREA - AFTER OPERATION

RAILWAY

AREA	m²
1	260,450
2	1,242,170
TOTAL	1,502,620

ACCESS ROAD

AREA	m²
1	269,440
2	1,247,730
TOTAL	1,517,170

DRAWING NO.	DRAWING TITLE		DESCRIPTION	CHK'D	APP'D	DATE	REV.	ISSUE FOR	AUTH. BY	DATE
		A	ISSUED FOR INFORMATION							

REFERENCE DRAWINGS | REVISIONS | ISSUE AUTHORIZATION

HATCH™

DESIGNED BY / DATE	DRAWN BY M.L. / DATE
CHECKED BY / DATE	DISCIP. ENGR. / DATE
PROJ. DES. COORD. / DATE	PROJ. ENGR. / DATE
PROJ. MGR. / DATE	

Baffinland Iron Mines Corporation

MARY RIVER PROJECT

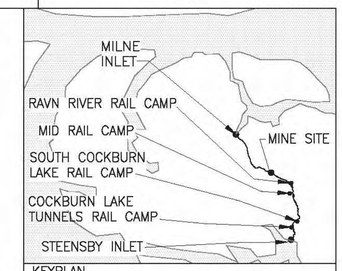
PRELIMINARY MINE CLOSURE AND RECLAMATION PLAN
RAILWAY ALIGNMENT

SCALE OR AS NOTED | DWG. NO. H337697-2000-07-012-0001 | REV. A

DWG. NO. H337697-7000-07-012-0002

RECLAMATION AREA - AFTER CONSTRUCTION

AREA	m²
1	80
2	1,300
3	58,160
4	56,240
5	7,740
6	320
7	70
8	250
9	70
10	130
11	12,000
12	100
13	1,300
14	70
15	15,210
TOTAL	**153,040**



KEYPLAN

595000 E

595500 E

7895500 N

7894000 N

1 FRESH WATER INTAKE AND PUMP HOUSE N:7895658.80 E:594610.99

2 FRESHWATER STORAGE TANK AND POTABLE WATER TREATMENT PLANT

3 EXPLOSIVES MAGAZINE

4 AVAILABLE LAYDOWN AREA APPROX. 56200m²

5 CAMP ACCESS ROAD

6 GENERAL COMPLEX/SITE SERVICES MAINTENANCE AND STORAGE

7 ERT OFFICE/DEBRIEF /COMMAND CENTER

8 ERT FACILITY

9 WASH CAR COMPLEX

10 LUNCHROOM FACILITY

11 200 PERSON CONSTRUCTION CAMP

12 INCINERATOR BUILDING

13 WASTE MANAGEMENT FACILITY

14 POWER GENERATOR FACILITY

15 ACCESS ROAD

CULVERT CROSSING

W.L. 164.7 ±
W.L. 140.8 ±
W.L. 146.2 ±
W.L. 140.0 ±
W.L. 149.4 ±
W.L. 144.3 ±
W.L. 140.7 ±
W.L. 139.4 ±
W.L. 139.7 ±
W.L. 133.9 ±
W.L. 134.3 ±
W.L. 132.6 ±
W.L. 133.6 ±
W.L. 139.5 ±
W.L. 138.2 ±
W.L. 135.5 ±

LEGENDS:

- RECLAMATION AREA AFTER CONSTRUCTION
- WATER
- WETLAND
- PRE-DEVELOPMENT LAYDOWN AREA
- RIVER/STREAM/DRAINAGE
- FUTURE RAILWAY ALIGNMENT

NOTE(S):

1. TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METERS.
3. CONTOURS ARE IN METERS. CONTOUR INTERVAL IS 10 METERS.

SCALE 100 50 0 100 200 300 400 500 m

SCALE 1:5,000

DRAWING NO.	DRAWING TITLE
REFERENCE DRAWINGS	

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
A	ISSUED FOR INFORMATION				
REVISIONS					

REV.	ISSUE FOR	AUTH. BY	DATE
A	ENVIRONMENTAL PERMITTING		
ISSUE AUTHORIZATION			

HATCH™

DESIGNED BY A. GRZEGORCZYK DATE	DRAWN BY D. FUNG DATE
CHECKED BY T. HO DATE	DISCIP. ENGR. J. BINNS DATE
PROJ. DES. COORD. DATE	PROJ. ENGR. DATE
PROJ. MGR. DATE	

Baffinland Iron Mines Corporation

MARY RIVER PROJECT

PRELIMINARY MINE CLOSURE AND RECLAMATION PLAN RAVN RIVER RAIL CAMP

SCALE	DWG. NO.	REV.
OR AS NOTED	H337697-7000-07-012-0002	A

Oct 28, 2011 - 2:44pm
Drawing Name: P:\289980 - Mary River\CAD\Civil\Roads\Reclaim\H337697-7000-07-012-0002 - Standard\H337697-7000-07-012-0002.dwg
Login name: fun51283
Layout: RAVN RIVER CAMP

DWG. NO. H337697-7000-07-012-0003

RECLAMATION AREA - AFTER CONSTRUCTION

AREA	m²
1	3,550
2	1,300
3	1,300
4	63,520
5	7,130
6	320
7	130
8	70
9	70
10	250
11	12,000
12	70
13	100
14	24,390
15	60,900
TOTAL	**175,100**

595500 E

598000 E

7876500 N

EXPLOSIVES MAGAZINE (15)

ACCESS ROAD (14)

200 PERSON CONSTRUCTION CAMP (11)

ERT FACILITY (10)

ERT OFFICE/DEBRIEF /COMMAND CENTER (9)

WASH CAR COMPLEX (8)

LUNCHROOM FACILITY (7)

GENERAL COMPLEX/SITE SERVICES MAINTENANCE AND STORAGE (6)

CAMP ACCESS ROAD (5)

(12) POWER GENERATOR FACILITY

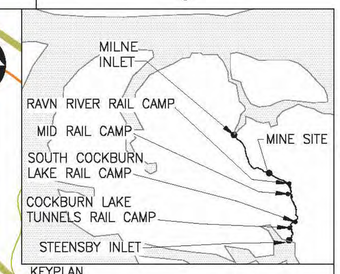
(13) INCINERATOR BUILDING

(1) FRESH WATER INTAKE AND PUMP HOUSE N:7876430.04 E:595602.59

(2) FRESHWATER STORAGE TANK AND POTABLE WATER TREATMENT PLANT

(3) WASTE MANAGEMENT FACILITY

(4) AVAILABLE LAYDOWN AREA



KEYPLAN

LEGENDS:

- RECLAMATION AREA AFTER CONSTRUCTION
- WATER
- WETLAND
- CONSTRUCTION WORKS LAYDOWN AREA
- RIVER/STREAM/DRAINAGE
- RAILWAY ALIGNMENT
- FRESHWATER PIPELINE

NOTE(S):

1. TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METERS.
3. CONTOURS ARE IN METERS. CONTOUR INTERVAL IS 10 METERS.

SCALE 100 50 0 100 200 300 400 500 m

SCALE 1:5,000

DRAWING NO.	DRAWING TITLE
REFERENCE DRAWINGS	

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
A	ISSUED FOR INFORMATION				
REVISIONS					

REV.	ISSUE FOR	AUTH. BY	DATE
A	ENVIRONMENTAL PERMITTING		
ISSUE AUTHORIZATION			

HATCH™

Baffinland Iron Mines Corporation

DESIGNED BY A. GRZEGORCZYK DATE	DRAWN BY Y. HUANG DATE
CHECKED BY T. HO DATE	DISCIP. ENGR. J. BINNS DATE
PROJ. DES. COORD. DATE	PROJ. ENGR. DATE
PROJ. MGR. DATE	

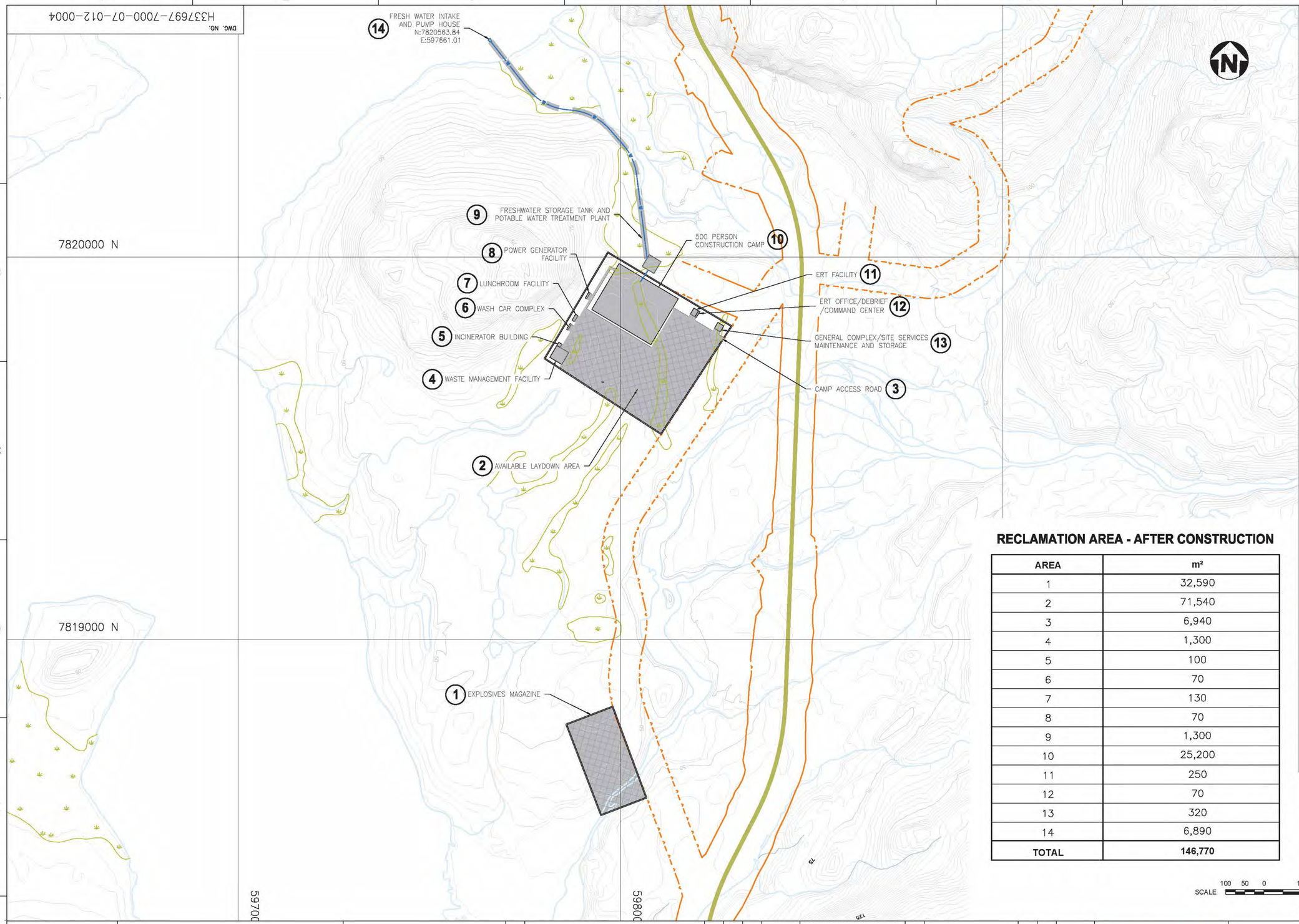
MARY RIVER PROJECT

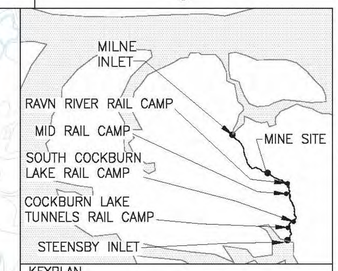
PRELIMINARY MINE CLOSURE AND RECLAMATION PLAN MID RAIL CAMP

SCALE	DWG. NO.	REV.
OR AS NOTED	H337697-7000-07-012-0003	A

Oct 28, 2011 - 3:46pm Login name: fun51283 Layout: Mid Rail Camp
Drawing Name: P:\289980 - Mary River\CAD\Civil\Roads\Reclaim\H337697-7000-07-012-0003 - Standard\H337697-7000-07-012-0003.dwg

DWG. NO. H337697-7000-07-012-0004





KEYPLAN

RECLAMATION AREA - AFTER CONSTRUCTION

AREA	m²
1	32,590
2	71,540
3	6,940
4	1,300
5	100
6	70
7	130
8	70
9	1,300
10	25,200
11	250
12	70
13	320
14	6,890
TOTAL	**146,770**

LEGENDS:

- RECLAMATION AREA AFTER CONSTRUCTION
- WATER
- WETLAND
- CONSTRUCTION WORKS LAYDOWN AREA
- RIVER/STREAM/DRAINAGE
- RAILWAY ALIGNMENT
- FRESHWATER PIPELINE

NOTE(S):

1. TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METERS.
3. CONTOURS ARE IN METERS. CONTOUR INTERVAL IS 10 METERS.

SCALE 100 50 0 100 200 300 400 500 m

SCALE 1:5,000

DRAWING NO.	DRAWING TITLE
REFERENCE DRAWINGS	

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
A	ISSUED FOR INFORMATION				
REVISIONS					

REV.	ISSUE FOR	AUTH. BY	DATE
A	ENVIRONMENTAL PERMITTING		
ISSUE AUTHORIZATION			

HATCH

DESIGNED BY A. GRZEGORCZYK DATE	DRAWN BY D. FUNG DATE
CHECKED BY T. HO DATE	DISCIP. ENGR. J. BINNS DATE
PROJ. DES. COORD. DATE	PROJ. ENGR. DATE
PROJ. MGR. DATE	

Baffinland Iron Mines Corporation

MARY RIVER PROJECT

PRELIMINARY MINE CLOSURE AND RECLAMATION PLAN SOUTH COCKBURN LAKE RAIL CAMP

SCALE	DWG. NO.	REV.
OR AS NOTED	H337697-7000-07-012-0004	A

Oct. 28, 2011 - 4:04pm Login name: fun51283
Drawing Name: P:\289980 - Mary River\CAD\Civil\Roads\Reclaim\H337697-7000-07-012-0004 - Standard\H337697-7000-07-012-0004.dwg
Layout: SOUTH COCKBURN LAKE CAMP

DWG. NO. H337697-4510-07-012-0001

FRESH WATER INTAKE AND PUMP HOUSE
N:7804826.580
E:596600.563

593000 E
594500 E
596000 E
597500
599000 E

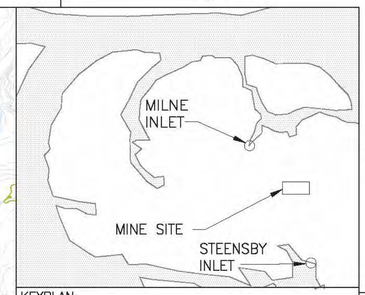
1 CONCRETE PRODUCTION AREA
2 GENERAL SITE SERVICE AREA
3 ACCOMMODATION/GENERAL MANAGEMENT FACILITY AREA
4 WORK FRONT AREA
5 WASTE MANAGEMENT FACILITY
6 WORK FRONT AREA
7 RAIL CONTRACTOR AREA
8 SHIPPING AND RECEIVING AREA
9 GENERAL CONTRACTOR AREA
10 EARTHWORKS CONTRACTOR AREA
11 FOUNDATIONS CONTRACTOR AREA
12 CIVIL CONTRACTOR AREA
13 WORK FRONT AREA
14 CIVIL AIRSTRIP CONTRACTOR AREA
15 WORK FRONT AREA
16 EXPLOSIVES AND EMULSION FACILITY AREA
17 MARINE CONTRACTOR AREA
18 WORK FRONT AREA
19 WORK FRONT AREA
20 2 x 150 MAN FLOATING CAMP
21 1 FUEL BARGE

TREATED EFFLUENT DISCHARGE
N:7801463.153
E:593427.722

3 Km LAKE

RECLAMATION AREA - AFTER CONSTRUCTION

AREA	m²
1	127,420
2	76,330
3	105,030
4	1,860
5	15,540
6	1,860
7	353,740
8	120,640
9	24,000
10	26,000
11	26,000
12	26,000
13	1,860
14	19,980
15	1,860
16	13,230
17	20,000
18	1,860
19	1,860
20	7,140
21	3,570
TOTAL	**975,780**



KEYPLAN

LEGENDS:

- RECLAMATION AREA AFTER CONSTRUCTION
- WATER
- WETLAND
- CONSTRUCTION WORKS LAYDOWN AREAS
- FORESHORE AREA
- RIVER/STREAM/DRAINAGE
- POTENTIAL DEVELOPMENT AREA
- FUTURE RAILWAY ALIGNMENT
- ACCESS ROAD
- TREATED EFFLUENT PIPELINE
- FRESHWATER PIPELINE

NOTE(S):

1. TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
3. CONTOURS ARE IN METRES. CONTOUR INTERVAL IS 5 METRES.
4. AS-CONSTRUCTED INFORMATION PROVIDED BY GENIVAR IN 2008.
5. PROPOSED PERMANENT WORKS LAYOUT SHOWN FOR REFERENCE PURPOSES ONLY. DO NOT USE FOR CONSTRUCTION.

SCALE 300 150 0 500 1000 1500 m

SCALE 1:15,000

DRAWING NO.	DRAWING TITLE

REFERENCE DRAWINGS

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
A	ISSUED FOR INFORMATION				

REVISIONS

REV.	ISSUE FOR	AUTH. BY	DATE
A	ENVIRONMENTAL PERMITTING		

ISSUE AUTHORIZATION

HATCH™

DESIGNED BY A. GRZEGORCZYK DATE	DRAWN BY D. FUNG DATE
CHECKED BY T. HO DATE	DISCIP. ENGR. J. BINNS DATE
PROJ. DES. COORD. DATE	PROJ. ENGR. DATE
PROJ. MGR. DATE	

Baffinland Iron Mines Corporation

MARY RIVER PROJECT

PRELIMINARY MINE CLOSURE AND RECLAMATION PLAN
STEENSBY PORT CONSTRUCTION PHASE

SCALE OR AS NOTED | DWG. NO. H337697-4510-07-012-0001 | REV. A

Oct 28, 2011 - 4:39pm Login name: fun51283
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Layout: STEENSBY INLET

DWG. NO. H337697-4510-07-012-0002

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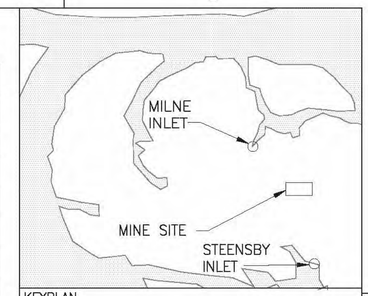
594500 E | 596000 E | 597500 E | 599000 E

7803500 N | 7802000 N | 7800500 N | 7799000 N | 7797500 N

55 LAKE PUMP HOUSE
56 E-HOUSE
54 E-HOUSE
53 ACCOMMODATION BUILDING
52 UTILDORS
51 RAIL & LIGHT VEHICLE MAINTENANCE BUILDING
50 SEWAGE TREATMENT BUILDING
49 CONTAINER STORAGE & VEHICLE PARKING
48 E-HOUSE
47 E-HOUSE
46 INSPECTION SHED
45 ACCESS ROAD
44 SOLID WASTE DISPOSAL & INCINERATOR SYSTEM
43 POWER PLANT BUILDING
42 UNHEATED STORAGE BUILDING
41 STORAGE SHEDS
40 PERMANENT LAYDOWN AREA
39 RAILWAY SPUR TRACKS
81 RAILWAY
38 TWIN ROTARY RAIL CAR DUMPER c/w LCR (6000MTPH)
37 UNIT SUBSTATION
36 RAIL RECLAIM CONVEYOR
35 SCREEN FEED BIN CONVEYOR
34 UNIT SUBSTATION
33 TRANSFER HOUSE
32 BARGE LOCATION
31 PRIMARY SCREENING STATION
30 OVERSIZE LUMP CONVEYOR
29 FINE STOCK PILE
28 FINES YARD CONVEYOR
27 FINES STACKER & TRIPPER
26 LUMP STOCK PILE
25 LUMP PRODUCT RECLAIMER
24 PORT SURGE BIN BUILDING
23 ORE DOCK OPERATIONS FACILITY
22 E-HOUSE
21 ORE LOADING DOCK
20 DRIVE HOUSE
19 SHIP LOADER FEED CONVEYOR
18 TRANSFER HOUSE
17 SHIP LOADER FEED CONVEYOR
16 UNIT SUBSTATION
15 LUMP STOCK PILE
14 LUMP PRODUCT YARD CONVEYOR
13 ORE STOCKPILE STORM WATER POND
12 LUMP STACKER/RECLAIMER & TRIPPER
11 TRANSFER HOUSE
10 TERTIARY CRUSHING STATION
9 TRANSFER HOUSE
8 LUMP CONVEYOR
7 FINE CONVEYOR
6 TERTIARY CRUSHER PRODUCT CONVEYOR
5 PERMANENT LAYOUT AREA
4 WASTE TRANSFER STATION
3 OPTIONAL RAILWAY SPUR
2 STORM WATER MANAGEMENT POND
1 FUEL STORAGE
71 AMMONIUM NITRATE STORAGE
80 EFFLUENT PIPELINE
LANDFILL 57
FRESHWATER PIPELINE 79
MOW MATERIAL STORAGE 58
ON HOLD FOR PROPAGATION STUDY
COMMUNICATION TOWER
E-HOUSE 59
FIRE PUMP HOUSE BUILDING 60
ADMINISTRATION, LAB & FIRST AID BUILDING 61
POTABLE WATER TREATMENT BUILDING 62
E-HOUSE 63
EMERGENCY BOILER HOUSE 64
E-HOUSE 65
66 E-HOUSE
67 AIR STRIP SHELTER
68 FIELD ELECTRICAL CENTRE
CARGO STORAGE BLD 69
DEICING EQUIPMENT STORAGE 70
RUNWAY
AIRSTRIP
HELICOPTER PAD 78
72 RAILWAY TO FREIGHT DOCK
73 UNIT SUBSTATION
74 PROPOSED FREIGHT DOCK & FUEL UNLOADING
ACCESS ROAD
ACCESS ROAD 77
DOCK OFFICE BUILDING 76
DOCK OFFICE BUILDING 75
STEENSBY INLET

RECLAMATION AREA - AFTER OPERATION

AREA	m²	AREA	m²
1	100,430	42	1,080
2	25,320	43	3,740
3	8,100	44	2,500
4	26,010	45	89,100
5	130,440	46	3,500
6	430	47	130
7	300	48	60
8	420	49	5,300
9	490	50	480
10	580	51	8,880
11	350	52	2,080
12	360	53	5,260
13	49,330	54	140
14	3,150	55	40
15	74,220	56	40
16	140	57	10,000
17	1,200	58	2,670
18	410	59	140
19	1,110	60	290
20	750	61	900
21	15,440	62	290
22	140	63	140
23	220	64	130
24	220	65	140
25	360	66	40
26	29,670	67	230
27	220	68	360
28	1,250	69	540
29	52,050	70	520
30	460	71	15,630
31	1,800	72	29,030
32	24,000	73	220
33	240	74	2,200
34	100	75	610
35	22,500	76	220
36	830	77	7,650
37	100	78	1,430
38	1,280	79	6,260
39	16,000	80	24,420
40	198,780	81	114,380
41	24,510	**TOTAL**	**1,154,480**



KEYPLAN

LEGENDS:

- RECLAIMED AREA AFTER OPERATION
- WATER
- WETLAND
- CONSTRUCTION WORKS LAYDOWN AREAS
- FORESHORE AREA
- RIVER/STREAM/DRAINAGE
- POTENTIAL DEVELOPMENT AREA
- FUTURE RAILWAY ALIGNMENT
- ACCESS ROAD
- TREATED EFFLUENT PIPELINE
- FRESHWATER PIPELINE

NOTE(S):

1. TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
3. CONTOURS ARE IN METRES. CONTOUR INTERVAL IS 5 METRES.
4. AS-CONSTRUCTED INFORMATION PROVIDED BY GENIVAR IN 2008.
5. PROPOSED PERMANENT WORKS LAYOUT SHOWN FOR REFERENCE PURPOSES ONLY. DO NOT USE FOR CONSTRUCTION.

SCALE 300 150 0 500 1000 1500 m

SCALE 1:15,000

DRAWING NO.	DRAWING TITLE
REFERENCE DRAWINGS	

ISSUED FOR USE

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
B	PDA BOUNDARY UPDATED	DF	SP	TH	07/02/12
A	ISSUEDE FOR INFORMATION	DF	AG	TH	11/09/11

REVISIONS

REV.	ISSUE FOR	AUTH. BY		DATE
B	ENVIRONMENTAL PERMITTING	SP	TH	07/02/12
A	ENVIRONMENTAL PERMITTING	SP	TH	11/09/11

ISSUE AUTHORIZATION

HATCH™

DESIGNED BY A. GRZEGORCZYK DATE	DRAWN BY D. FUNG DATE
CHECKED BY T. HO DATE	DISCIP. ENGR. J. BINNS DATE
PROJ. DES. COORD. DATE	PROJ. ENGR. DATE
PROJ. MGR. DATE	

Baffinland Iron Mines Corporation

MARY RIVER PROJECT

PRELIMINARY MINE CLOSURE AND RECLAMATION PLAN
STEENSBY PORT FINAL CLOSURE PHASE

SCALE OR AS NOTED | DWG. NO. H337697-4510-07-012-0002 | REV. B

Baffinland Iron Mines Corporation

BIM-5200-PLA-0026 APPENDIX B - CONCORDANCE TO REGULATORY INSTRUMENTS, REGULATIONS AND MINE CLOSURE PLANNING GUIDELINES

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1. CONCORDANCE TO REGULATORY INSTRUMENTS, REGULATIONS AND MINE CLOSURE PLANNING GUIDELINES BACKGROUND

The ICRP has been developed in accordance with the following guidelines, legislation, and lease requirements:

- Table B.1 Project Certificate No. 005
- Table B.2 Type A Water Licence 2AM-MRY2540
- Table B.3 Territorial Land Use Regulations, pursuant to the Territorial Lands Act
- Table B.4 Abandonment and Reclamation Policy for Inuit Owned Lands (QIA, 2024)
- Table B.5 EIS Guidelines issued to Baffinland by the Nunavut Impact Review Board
- Table B.6 Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories (MVLWB/AANDC, 2013)
- Table B.7 Mine Site Reclamation Guidelines for the Northwest Territories (AANDC, 2007)
- Table B.8 Mine Site Reclamation Policy for Nunavut (AANDC, 2002)
- Table B.9 Mine Reclamation in the Northwest Territories and Yukon (DIAND, 1992)
- Table B.10 Guidelines for Abandonment and Restoration Planning for Mines in the Northwest Territories (NWT Water Board, 1990)

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TABLE B.1 NIRB PROJECT CERTIFICATE TERM AND CONDITIONS RELEVANT TO TEMPORARY CLOSURE/CARE AND MAINTENANCE, CLOSURE AND POST-CLOSURE MONITORING - CONCORDANCE TABLE

Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post Closure Monitoring Program	IOL or Crown Land	ICRP Ref
2	Meteorology and Climate - Climate Change Validation and Studies	To provide feedback on the impacts that climate change might be having on the Project.	The Proponent shall provide the results of any new or revised assessments and studies done to validate and update climate change impact predictions for the Project and the effects of the Project on climate change in the Local Study Area and Regional Study Area as defined in the Proponent's Final Environmental Impact Statement.	1 - Climate Change	None planned at this time however any research conducted during Closure and Post-Closure Phases will be provided during Annual Reporting.	Both	Section 9.11
3	Meteorology and Climate - Green House Gas Emissions	To confirm that the Proponent is exploring and implementing concrete steps to reduce greenhouse gases.	The Proponent shall provide interested parties with evidence of continued initiatives undertaken to reduce greenhouse gas emissions.	1 - Climate Change	Air Quality Monitoring Program. Results of Closure Phase Air Quality Monitoring Program and any other initiatives taken to reduce greenhouse gas emissions during Closure and Post-Closure Phases will be provided during Annual Reporting.	Both	Section 9.11
4	Climate Change - Consultation on Climate	To promote public awareness and engagement of affected groups.	The Proponent shall endeavor to include the participation of Inuit from affected communities and other communities in Nunavut when undertaking climate-change related studies and research.	1 - Climate Change	Air Quality Monitoring Program Mine Closure Technical Advisory Group	Both	Section 2.4 Section 9.11
5	Meteorology and Climate - Weather Monitoring Data	To provide families of employees with up to date information.	The Proponent shall endeavour to explore and implement reasonable measures to ensure that weather-related information for the various Project sites is readily accessible to the public on a continual basis throughout the life of the Project.	2 - Air Quality	Air Quality Monitoring Program. Results of Closure Phase Air Quality Monitoring Program will be provided during Annual Reporting	Both	Section 9.11
6	Meteorology and Climate - Emissions	To provide feedback on the Project's emissions.	The Proponent shall provide the results of any emissions calculations conducted to determine the level of sulphur dioxide (SO_2) emissions, nitrogen oxide (NOX) emissions and greenhouse gases generated by the Project using fuel consumption or other relevant criteria as a basis.	2 - Air Quality	Air Quality Monitoring Program	Both	Section 9.11
11	Air Quality – Incineration Management Plan	To mitigate impacts to air quality from incineration activities.	The Proponent shall develop and implement an Incineration Management Plan that takes into consideration the recommendations provided in Environment Canada's Technical Document for Batch Waste Incineration (2010).	2 - Air Quality	Waste Management Plan (carried over from Operations) will apply when incinerators in operation	Both	Section 5.3.7 Section 9.11
14	Noise and Vibration - Noise and Vibration Monitoring	To mitigate noise and vibration at Project sites, especially living areas.	The Proponent shall conduct noise and vibration monitoring at Project accommodations sites located at the Mary River mine site, Steensby Inlet Port site, and Milne Inlet Port site. Sampling shall be undertaken during the summer and winter months during all phases of Project development.	3 - Noise and Vibration	Considered, however no monitoring proposed during closure and negligible residual effects expected.	Both	N/A
15	Noise and Vibration	To enhance public safety when travelling around the Project area.	Noise and Vibration Monitoring - The Proponent shall collaborate to the extent possible with the Qikiqtani Inuit Association and local Hamlet organizations when undertaking consultation with all affected communities regarding railway, tote road and marine shipping operations. During these consultations, it is recommended that the Proponent provide information including video, audio, and photographic representation as well as any other aids (i.e. models) that may enhance the general public's understanding of railway, tote road and marine shipping operations, as well as all safety considerations for members of the public who may be travelling around the project area.	3 - Noise and Vibration	When undertaking consultation with all affected communities, collaboration with the Qikiqtani Inuit Association and local Hamlet organizations performed via Mine Closure Technical Advisory Group sessions.	Both	Section 2.7
17	Hydrology and Hydrogeology - Effluent Management	To prevent impacts to water bodies from effluent.	The Proponent shall develop and implement effectives measures to ensure that effluent from project-related facilities and/or activities, including sewage treatment plants, ore stockpiles, and mine pit, satisfies all discharge criteria requirement established by the relevant regulatory agencies prior to being discharged into the receiving environment.	8 - Water Quality	Aquatic Monitoring and Reporting Program Environmental Effects Monitoring Program	Both	Section 9.5 Section 9.5.1
18	Hydrology and Hydrogeology - Pit Lake Monitoring	To enhance predictions for mine site closure conditions.	The Proponent shall carry out continued analyses over time to confirm and update, accordingly, the approximate fill time for the mine pit lake identified in the FEIS.	8 - Water Quality 9 - Surface Water	None. ICRP will be reviewed annually and updated regularly throughout the life of the Project to confirm	IOL	Section 5.3.1.4

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Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post Closure Monitoring Program	IOL or Crown Land	ICRP Ref
				and Sediment Quality	and/or update, accordingly the approximate fill time for the mine pit lake identified in the FEIS.		Appendix D
19	Hydrology and Hydrogeology - Water Infrastructure Monitoring	To mitigate impacts to natural water flow.	The Proponent shall ensure that it develops and implements adequate monitoring and maintenance procedures to ensure that the culverts and other conduits that may be prone to blockage do not significantly hinder or alter the natural flow of water from areas associated with the proposed mine. In addition, the Proponent shall monitor, document and report the withdrawal rates for water removed and utilized for all domestic and industrial purposes.	8 - Water Quality 9 - Surface Water and Sediment Quality	Will be addressed in Annual Report.	Both	N/A
20	Groundwater/Surface Waters - Explosives	To ensure that the effects associated with the manufacturing, storage, transportation and use of explosives do not negatively impact the areas surrounding the Project.	The Proponent shall monitor the effects of explosives residue and related by-products from project-related blasting activities as well as develop and implement effective preventative and/or mitigation measures, including treatment, if necessary, to ensure that the effects associated with the manufacturing, storage, transportation and use of explosives do not negatively impact the Project and surrounding areas.	8 - Water Quality 9 - Surface Water and Sediment Quality	None. Negligible once closure activities have ceased.	N/A	N/A
24	Groundwater/Surface Waters - Effluent Management	To mitigate impacts to groundwater and surface waters from effluent.	The Proponent shall monitor as required the relevant parameters of the effluent generated from Project activities and facilities and shall carry out treatment if necessary to ensure that discharge conditions are met at all times.	8 - Water Quality	Aquatic Monitoring and Reporting Program	Both	Section 9.5
27	Landforms, Geology and Geomorphology - Natural Aesthetics	To mitigate impacts to natural aesthetics.	The Proponent shall include within its public consultation report information related to the sentiments expressed by affected communities about the impacts that changes to the topography and landscape have had on the aesthetic value of the Project area.	4 - Landforms, Soil and Permafrost	Geotechnical/Engineering Monitoring	Both	Section 9.4
28	Landforms, Geology and Geomorphology - Permafrost	To ensure that permafrost integrity is maintained.	The Proponent shall monitor the effects of the Project on the permafrost along the railway and all other Project affected areas and must implement effective preventative measures to ensure that the integrity of the permafrost is maintained.	4 - Landforms, Soil and Permafrost	Geotechnical/Engineering Monitoring	Both	Section 9.4
30	Landforms, Geology and Geomorphology - Quarries	To provide oversight on quarry design and management.	The Proponent shall develop site-specific quarry operation and management plans in advance of the development of any potential quarry site or borrow pit.	4 - Landforms, Soil and Permafrost	Geotechnical/Engineering Monitoring	Both	Section 9.4
32	Vegetation - Construction and Operations	To prevent introduction of invasive species.	The Proponent shall ensure that equipment and supplies brought to the Project sites are clean and free of soils that could contain plant seeds not naturally occurring in the area. Vehicle tires and treads in particular must be inspected prior to initial use in Project areas.	5 - Vegetation	Terrestrial Environment Monitoring and Reporting	Both	Section 9.7
33	Vegetation - Monitoring	To facilitate monitoring.	The Proponent shall include relevant Monitoring and Management Plans within its Environmental Management System, Terrestrial Environment Management and Monitoring Plan (TEMMP).	5 - Vegetation	Terrestrial Environment Monitoring and Reporting	Both	Section 9.7
37	Vegetation - Monitoring	To prevent establishment of invasive species.	The Proponent shall incorporate protocols for monitoring for the potential introduction of invasive vegetation species (e.g., surveys of plant populations in previously disturbed areas) into its Terrestrial Environment and Monitoring Plan. Any introductions of non-indigenous plant species must be promptly reported to the Government of Nunavut Department of Environment.	5 - Vegetation	Terrestrial Environment Monitoring and Reporting	Both	Section 9.7
38	Vegetation – Adaptive Management	To mitigate impacts to vegetation abundance, diversity and health.	The Proponent shall review, on an annual basis, all monitoring information and the vegetation mitigation and management plans developed under its Environmental Management System, Terrestrial Environment and Monitoring Plan (TEMMP) and adjust such plans as may be required to effectively prevent or reduce the potential for significant adverse project effects on vegetation abundance, diversity and health.	5 - Vegetation	Terrestrial Environment Monitoring and Reporting	Both	Section 9.7
39	Vegetation - Reclamation and Revegetation	To prevent erosion and promote progressive revegetation of disturbed areas.	The Proponent shall develop a progressive revegetation program for disturbed areas that are no longer required for operations, such program to incorporate measures for the use	5 - Vegetation	Terrestrial Environment Monitoring and Reporting	Both	Section 9.7

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Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post Closure Monitoring Program	IOL or Crown Land	ICRP Ref
			of test plots, reseeding and replanting of native plants as necessary. It is further recommended that this program be directly associated with the management plans for erosion control established for the Project.				
40	Vegetation - Reclamation and Revegetation	To prevent erosion and promote progressive revegetation of disturbed areas.	The Proponent shall include revegetation strategies in its Site Reclamation Plan that support progressive reclamation and that promote natural revegetation and recovery of disturbed areas compatible with the surrounding natural environment.	5 - Vegetation	Terrestrial Environment Monitoring and Reporting	Both	Section 9.7 Appendix D
41	Freshwater Aquatic Environment - Setbacks	To mitigate impacts of runoff into freshwater aquatic habitat.	Unless otherwise approved by regulatory authorities, the Proponent shall maintain a minimum 100-metre naturally-vegetated buffer between the high-water mark of any fish-bearing water bodies and any permanent quarries with potential for acid rock drainage or metal leaching.	4 - Landforms, Soil and Permafrost 5 - Vegetation	Geotechnical/Engineering Monitoring	Both	Section 9.4
42	Freshwater Aquatic Environment - Setbacks	To mitigate impacts of runoff into freshwater aquatic habitat.	The Proponent shall maintain minimum a 30-metre naturally-vegetated buffer between the mining operation and adjacent water bodies.	4 - Landforms, Soil and Permafrost 5 - Vegetation	Geotechnical/Engineering Monitoring	Both	Section 9.4
44	Freshwater Aquatic Environment - Explosives	To mitigate impacts of explosives on freshwater aquatic habitat.	The Proponent shall meet or exceed the guidelines set by Fisheries and Oceans Canada for blasting thresholds and implement practical and effective measures to ensure that residue and by-products of blasting do not negatively affect fish and fish habitat.	8 - Water Quality	Aquatic Monitoring and Reporting Program Environmental Effects Monitoring Program	Both	Section 9.5 Section 9.5.1
45	Freshwater Aquatic Environment - General	To mitigate impacts to freshwater aquatic habitat.	The Proponent shall adhere to the No-Net-Loss principle at all phases of the project to prevent or mitigate direct or indirect fish and fish habitat losses.	10 - Freshwater Fish, Fish Habitat, and Other Aquatic Organisms	Aquatic Monitoring and Reporting Program Environmental Effects Monitoring Program	Both	Section 9.5 Section 9.5.1
46	Freshwater Aquatic Environment - Drainage	To mitigate impacts to freshwater aquatic habitat.	The Proponent shall ensure that runoff from fuel storage and maintenance facility areas, sewage and wastewater other facilities responsible for generating liquid effluent and runoff meet discharge requirements.	8 - Water Quality	Aquatic Monitoring and Reporting Program Environmental Effects Monitoring Program	Both	Section 9.5 Section 9.5.1
49	Terrestrial Wildlife and Wildlife Habitat - Terrestrial Environment Working Group	The TEWG will provide direction and guidance to the Proponent regarding: adding to baseline information during construction and before project operations commence; monitoring and reporting regarding effects occurring during operations; and providing advice regarding changes that may be required to make sure the management of negative impacts is effective and that lasting damage is prevented.	The Proponent shall establish a Terrestrial Environment Working Group ("TEWG") which will act as an advisory group in connection with mitigation measures for the protection of the terrestrial environment and in connection with its Environmental Effects Monitoring Program, as it pertains to the terrestrial environment. Members may consider the draft terms of reference for the TEWG filed in the Final Hearing, but they are not bound by them. The role of the TEWG is not intended to either duplicate or to affect the exercise of regulatory authority by appropriate government agencies and departments.	7 - Terrestrial Wildlife and Habitat	Terrestrial Environment Monitoring and Reporting	Both	Section 9.7
50	Terrestrial Wildlife and Habitat - General	To ensure appropriate and responsive adaptive management.	The Proponent shall continue to develop and implement Project-specific monitoring for the terrestrial environment, and will demonstrate appropriate refinements to design, incorporation of analytical methods and elaboration of methodologies. The monitoring plan shall contain clear thresholds to allow for the assessment of long-term trends and cumulative effects where project interactions are identified. Coordination and cooperation will be required where data collection, analysis and interpretation, or responsibility for mitigation and management requires the efforts of multiple parties (e.g., government, Qikiqtani Inuit Association, communities).	7 - Terrestrial Wildlife and Habitat	Terrestrial Environment Monitoring and Reporting	Both	Section 9.7
51	Terrestrial Wildlife and Habitat - General	To promote coordination of monitoring efforts.	The Proponent, either directly or as part of the TEWG, shall consider and, where appropriate, cooperate with relevant regional and/or community-based monitoring initiatives that raise issues or produce information pertinent to mitigating project-induced	7 - Terrestrial Wildlife and Habitat	Terrestrial Environment Monitoring and Reporting	Both	Section 9.7

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Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post Closure Monitoring Program	IOL or Crown Land	ICRP Ref
			impacts. The Proponent shall give special consideration for supporting regional studies of population health and harvest programs for North Baffin caribou which help address areas of uncertainty for Project impact predictions.				
55	Terrestrial Wildlife and Habitat - Reporting	To mitigate potential impacts to wolves.	The Proponent shall develop an adaptive management plan applicable to wolves and wolf habitat in collaboration with the Government of Nunavut-Department of Environment (GN-DOE) to ensure compliance with the *Nunavut Wildlife Act.* Consideration must be given to the following: a. Monitoring for active wolf dens within a 10 km radius from the mine site, under the direction and prior approval of the GN DOE, and reporting the results through NIRB's Annual Reports on terrestrial wildlife in the Potential Development Area (PDA); b. Estimating the available (glacio-fluvial materials) esker habitat within the Regional Study Area/PDA and identifying such habitat as ecologically sensitive; c. Developing "wolf indices" for presence/abundance of wolves (by conducting studies) to set a baseline pre-construction baseline; and d. Ensuring that wolf monitoring is capable of determining the relative abundance and distribution of wolves in the Project Development.	7 - Terrestrial Wildlife and Habitat	Terrestrial Environment Monitoring and Reporting	Both	Section 9.7
56	Terrestrial Wildlife and Habitat - Reporting		The Proponent shall develop a strategy for the recovery of terrestrial wildlife habitat in a progressive manner that is consistent with the *Nunavut Wildlife Act.* Overall, this will require the integration of a decision-making process and the identification of mitigation responses to cumulative impacts on caribou survival, breeding propensity, and population dynamics.	7 - Terrestrial Wildlife and Habitat	Terrestrial Environment Monitoring and Reporting	Both	Section 9.7
57	Terrestrial Wildlife and Habitat - Aircraft Disturbances	To mitigate and monitor for impacts to wildlife.	The Proponent shall report annually regarding its terrestrial environment monitoring efforts, with inclusion of the following information: a. Description of all updates to terrestrial ecosystem baseline data; b. A description of the involvement of Inuit in the monitoring program; c. An explanation of the annual results relative to the scale of the natural variability of Valued Ecosystem Components in the region, as described in the baseline report; d. A detailed presentation and analysis of the distribution relative to mine structures and activities for caribou and other terrestrial mammals observed during the surveys and incidental sightings; e. Results of the annual monitoring program, including field methodologies and statistical approaches used to support conclusions drawn; f. A summary of the chronology and level of mine activities (such as vehicle frequency and type); g. An assessment and presentation of annual environmental conditions including timing of snowmelt, green-up, as well as standard weather summaries; and h. A discussion of any proposed changes to the monitoring survey methodologies, statistical approaches or proposed adaptive management stemming from the results of the monitoring program.	7 - Terrestrial Wildlife and Habitat	Terrestrial Environment Monitoring and Reporting requirements will be addressed in Annual Report.	Both	Section 9.7

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58	Terrestrial Wildlife and Habitat - Explosives	To mitigate and monitor for impacts to wildlife.	Within its annual report to the NIRB, the Proponent shall incorporate a review section which includes: a. An examination for trends in the measured natural variability of Valued Ecosystem Components in the region relative to the baseline reporting; b. A detailed analysis of wildlife responses to operations with emphasis on calving and post-calving caribou behavior and displacements (if any), and caribou responses to and crossing of the railway, the Milne Inlet Tote Road and associated access roads/trails; c. A description of the extent of dust fall based on measured levels of dust fall (fugitive and finer particles such as TSP) on lichens and blueberries, and ash content of caribou fecal pellets; d. A demonstration and description of how the monitoring results, including the railway, road traffic, air traffic and dust fall contribute to cumulative effects of the project; e. Any proposed changes to the monitoring survey methodologies, statistical approaches or proposed adaptive management stemming from the results of the monitoring program; f. Any updates to information regarding caribou migration trails. Maps of caribou migration trails, primarily obtained through any new collar and snow tracking data, shall be updated (at least annually) in consultation with the Qikiqtani Inuit Association and affected communities, and shall be circulated as new information becomes available.	7 - Terrestrial Wildlife and Habitat	Terrestrial Environment Monitoring and Reporting. Reporting requirements will be addressed in Annual Report.	Both	Section 9.7
59	Terrestrial Wildlife and Habitat - Operations (General)	To mitigate aircraft disturbance to wildlife and Inuit harvesting.	The Proponent shall ensure that aircraft maintain, whenever possible (except for specified operational purposes such as drill moves, take offs and landings), and subject to pilot discretion regarding aircraft and human safety, a cruising altitude of at least 610 metres during point to point travel when in areas likely to have migratory birds, and 1,000 metres vertical and 1,500 metres horizontal distance from observed concentrations of migratory birds (or as otherwise prescribed by the Terrestrial Environment Working Group) and use flight corridors to avoid areas of significant wildlife importance. The Proponent, in collaboration with the Terrestrial Environment Working Group shall develop a program or specific measures to ensure that employees and subcontractors providing aircraft services to the Project are respectful of wildlife and Inuit harvesting that may occur in and around project areas.	6 - Birds	Terrestrial Environment Monitoring and Reporting	Both	Section 9.7
61	Terrestrial Wildlife and Habitat - Public Engagement	To mitigate Project impacts to wildlife.	Whenever practical and not causing a human safety issue, a stop work policy shall be implemented when wildlife in the area may be endangered by the work being carried out. An operational definition of 'endangered' shall be provided by the Terrestrial Environment Working Group.	6 - Birds 7 - Terrestrial Wildlife and Habitat	Terrestrial Environment Monitoring and Reporting	Both	Section 9.7
62	Terrestrial Wildlife and Habitat - Waste Management	To prevent increased harvesting pressure on wildlife.	The Proponent shall prohibit project employees from transporting firearms to site and from operating firearms in project areas for the purpose of wildlife harvesting.	None.	None.	N/A	N/A
63	Birds - Awareness	To keep communities up to date with Project operations.	The Proponent shall liaise with local Hunters and Trappers Organizations in advance of carrying out terrestrial wildlife surveys. At a minimum, The Proponent shall also meet annually in person with Hunters and Trappers Organizations to discuss wildlife monitoring and mitigation plans and address community concerns regarding wildlife interactions. The Proponent may be required to facilitate these meetings through payment of honoraria and meeting costs.	6 - Birds 7 - Terrestrial Wildlife and Habitat	Terrestrial Environment Monitoring and Reporting	Both	Section 9.7
64	Birds - Species at Risk	To prevent human-carnivore interactions.	The Proponent shall ensure that its Environment Protection Plan incorporates waste management provisions to prevent carnivores from being attracted to the Project site(s). Consideration must be given to the following measures: a. Installation of an incinerator beside the kitchen that will help to keep the food waste management process simple and will minimize the opportunity for human error (i.e.	6 - Birds 7 - Terrestrial Wildlife and Habitat	Geotechnical/Engineering Monitoring	Both	Section 9.7

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			storage of garbage outside, hauling in a truck (odours remain in truck), hauling some distance to a landfill site, incomplete combustion at landfill, fencing of landfill, etc.); and b. Installation of solid carnivore-proof skirting on all kitchen and accommodation buildings (i.e., heavy-duty steel mesh that would drop down from the edge of the buildings/trailers and buried about a half meter into the ground to prevent animals from digging under the skirting).				
65	Birds - Species at Risk	To prevent disturbance to birds and bird habitat.	The Proponent shall ensure all employees working at project sites receive awareness training regarding the importance of avoiding known nests and nesting areas and large concentrations of foraging and moulting birds.	6 - Birds	Terrestrial Environment Monitoring and Reporting	Both	Section 9.7
66	Birds - Project Infrastructure	To prevent impacts to sensitive bird species.	If Species at Risk or their nests and eggs are encountered during Project activities or monitoring programs, the primary mitigation measure must be avoidance. The Proponent shall establish clear zones of avoidance on the basis of the species-specific nest setback distances outlined in the Terrestrial Environment Management and Monitoring Plan.	6 - Birds	Terrestrial Environment Monitoring and Reporting	Both	Section 9.7
67	Birds - Construction/Clearing Activities	To prevent impacts to sensitive bird species.	The Proponent shall ensure that the mitigation and monitoring strategies developed for Species at Risk are updated as necessary to maintain consistency with any applicable status reports, recovery strategies, action plans and management plans that may become available during the duration of the Project.	6 - Birds	Terrestrial Environment Monitoring and Reporting	Both	Section 9.7
68	Birds - Construction/Clearing Activities	To prevent potential injuries to birds.	The Proponent shall ensure flashing red, red strobe or white strobe lights and guy-wire deterrents are used on communications towers established for the Project. Consideration should also be given to reducing lighting when possible in areas where it may serve as an attractant to birds or other wildlife.	6 - Birds	Geotechnical/Engineering Monitoring Terrestrial Environment Monitoring and Reporting	Both	Section 9.4 Section 9.7
69	Birds - Flight Altitude Requirements	To prevent nesting by birds in active Project areas.	Prior to bird migrations and commencement of nesting, the Proponent shall identify and install nesting deterrents (e.g., flagging) to discourage birds from nesting in areas likely to be disturbed by construction/clearing activities taking place during the nesting season.	6 - Birds	Terrestrial Environment Monitoring and Reporting	Both	Section 9.7
70	Birds - Flight Altitude Requirements	To prevent impacts to birds and nesting areas.	The Proponent shall protect any nests found (or indicated nests) with a buffer zone determined by the setback distances outlined in its Terrestrial Environment Mitigation and Monitoring Plan, until the young have fledged. If it is determined that observance of these setbacks is not feasible, the Proponent will develop nest-specific guidelines and procedures to ensure bird's nests and their young are protected.	6 - Birds	Geotechnical/Engineering Monitoring Terrestrial Environment Monitoring and Reporting	Both	Section 9.4 Section 9.7
71	Birds - Monitoring	To mitigate aircraft disturbance to birds.	Subject to safety requirements, the Proponent shall require all project related aircraft to maintain a cruising altitude of at least: a. 650 m during point to point travel when in areas likely to have migratory birds b. 1100 m vertical and 1500 m horizontal distance from observed concentrations of migratory birds c. 1100 m over the area identified as a key site for moulting snow geese during the moulting period (July-August), and if maintaining this altitude is not possible, maintain a lateral distance of at least at least 1500 m from the boundary of this site.	6 - Birds	Terrestrial Environment Monitoring and Reporting	Both	Section 9.7
72	Birds - Monitoring	To mitigate aircraft disturbance to birds.	The Proponent shall ensure that pilots are informed of minimum cruising altitude guidelines and that a daily log or record of flight paths and cruising altitudes of aircraft within all Project Areas is maintained and made available for regulatory authorities such as Transport Canada to monitor adherence and to follow up on complaints.	None	None.	N/A	N/A
73	Birds - Monitoring	To develop appropriate mitigation and monitoring of impacts to birds.	The Proponent shall develop detailed and robust mitigation and monitoring plans for migratory birds, reflecting input from relevant agencies, the Qikiqtani Inuit Organization and communities as part of the Terrestrial Environment Working Group and to the extent applicable the Marine Environment Working Group.	6 - Birds	Terrestrial Environment Monitoring and Reporting Mine Closure Working Group	Both	Section 9.7

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74	Birds - Monitoring	To develop appropriate mitigation and monitoring of impacts to birds.	The Proponent shall continue to develop and update relevant monitoring and management plans for migratory birds under the Proponent's Environmental Management System, Terrestrial Environment Mitigation and Monitoring Plan prior to construction. The key indicators for follow up monitoring under this plan will include: peregrine falcon, gyrfalcon, common and king eider, red knot, seabird migration and wintering, and songbird and shorebird diversity.	6 - Birds	Terrestrial Environment Monitoring and Reporting	Both	Section 9.7
75	Birds - Monitoring	To assess the extent of terrestrial habitat loss.	The Proponent's monitoring program shall assess and report, on annual basis, the extent of terrestrial habitat loss due to the Project to verify impact predictions and provide updated estimates of the total project footprint.	6 - Birds	Terrestrial Environment Monitoring and Reporting	Both	Section 9.7
76	Marine Environment - Ice Breaking and Shipping	To mitigate potential impacts to the marine environment.	The Proponent shall develop a comprehensive Environmental Effects Monitoring Program to address concerns and identify potential impacts of the Project on the marine environment.	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A
77	Marine Environment - Ice Breaking and Shipping	The MEWG will consult with, and provide advice and recommendations to the Proponent in connection with mitigation measures for the protection of the marine environment, monitoring of effects on the marine environment and the consideration of adaptive management plans. The role of the MEWG is not intended to either duplicate or to affect the exercise of regulatory authority by appropriate government agencies and departments.	A Marine Environment Working Group ("MEWG") shall be established to serve as an advisory group in connection with mitigation measures for the protection of the marine environment, and in connection with the Project Environmental Effects Monitoring program, as it pertains to the marine environment. Membership on the MEWG will include the Proponent, Environment Canada, Fisheries and Oceans Canada, Parks Canada, the Government of Nunavut, the Qikiqtani Inuit Association, the Mittimatilik Hunters and Trappers Organization, and other agencies or interested parties as determined to be appropriate by these key members. Makivik Corporation shall also be entitled to membership on the MEWG at its election. The MEWG members may consider the draft terms of reference	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A
78	Marine Environment -Ice Breaking and Shipping	To obtain accurate and current ice information.	The Proponent shall update the baseline information for landfast ice using a long-term dataset (28 years), and with information on inter-annual variation. The analysis for pack and landfast ice shall be updated annually using annual sea ice data (floe size, cover, concentration) and synthesized and reported in the most appropriate management plan.	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A
79	Marine Environment -Shoreline Effects and Sediment Redistribution	To assist in the development of nautical charts for Canadian waters.	The Proponent shall provide the Canadian Hydrographic Services with bathymetric data and other relevant information collected in support of Project shipping where possible, to assist in the development of nautical charts for Canadian waters.	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A
87	Marine Environment -Ballast Water	To prevent invasive species introductions resulting from Project shipping.	The Proponent shall develop a detailed monitoring program at a number of sites over the long term to evaluate changes to marine habitat and organisms and to monitor for non-native introductions resulting from Project-related shipping. This program needs to be able to detect changes that may have biological consequences and should be initiated several years prior to any ballast water discharge into Steensby Inlet and Milne Inlet to collect sufficient baseline data and should continue over the life of the Project.	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A
89	Marine Environment - Ballast Water	To prevent impacts to marine water quality resulting from ballast water exchange.	The Proponent shall develop and implement an effective ballast water management program that may include the treatment and monitoring of ballast water discharges in a manner consistent with applicable regulations and/or exceed those regulations if they are determined to be ineffective for providing the desired and predicted results. The ballast water management program shall include, without limitation, a provision that requires ship owners to test their ballast water to confirm that it meets the salinity requirements of the applicable regulations prior to discharge at the Milne Port, and a requirement noting that the Proponent, in choosing shipping contractors will, whenever feasible, give	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A

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Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post Closure Monitoring Program	IOL or Crown Land	ICRP Ref
			preference to contractors that use ballast water treatment in addition to ballast water exchange.				
92	Marine Environment - Spill Prevention	To ensure adequate spill response capacity.	The Proponent shall ensure that it maintains the necessary equipment and trained personnel to respond to all sizes of potential spills associated with the Project in a self sufficient manner.	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A
103	Marine Environment - Traffic Log and Shipping Information	To monitor effectiveness of mitigation of shipping impacts to marine wildlife.	The Proponent shall report annually to the NIRB regarding project-related ship track and sea ice information, including: a. A record of all ship tracks taken along both shipping routes covering the entire shipping season; b. When employing ice-breaking, an overlay of ship tracks onto ice imagery to determine whether ships are effectively avoiding shore leads and polynyas; c. A comparison of recorded ship tracks to the expected nominal shipping route, and probable (if any) extent of year-round shipping during periods of ice cover and open-water; d. An assessment of the level of adherence to the nominal shipping route and the spatial extent of the shipping zone of influence; and e. When employing ice-breaking, marine bird and mammal species and number of individuals attracted to ship tracks in ice.	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A
106	Marine Environment - Shipboard Observers	To ensure that interactions with marine mammals and Project shipping activities are effectively monitored.	The Proponent shall ensure that shipboard observers are employed during seasons where shipping occurs and provided with the means to effectively carry out assigned duties. The role of shipboard observers in shipping operations should be taken into consideration during the design of any ore carriers purpose-built for the Project, with climate controlled stations and shipboard lighting incorporated to permit visual sightings by shipboard observers during all seasons and conditions. Any shipboard lighting incorporated should be in accordance with the *Canada Shipping Act, 2001's Collision Regulations*, and should not interfere with safe navigation of the vessel.	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A
113	Marine Environment - Arctic Char	To prevent impacts to marine fish in Steensby Inlet and Milne Inlet.	The Proponent shall conduct monitoring of marine fish and fish habitat, which includes but is not limited to, monitoring for Arctic Char stock size and health condition in Steensby Inlet and Milne Inlet, as recommended by the Marine Environment Working Group.	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A
114	Marine Environment - Arctic Char	To prevent impacts to marine fish in Steensby Inlet and Milne Inlet.	In the event of the development of a commercial fishery in the Steensby Inlet area or Milne Inlet-Eclipse Sound areas, the Proponent, in conjunction with the Marine Environment Working Group, shall update its monitoring program for marine fish and fish habitat to ensure that the ability to identify Arctic Char stock(s) potentially affected by Project activities and monitor for changes in stock size and structure of affected stocks and fish health (condition, taste) is maintained to address any additional monitoring issues identified by the MEWG relating to the commercial fishery.	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A
120	Marine Environment - Marine Mammal Interactions	To prevent impacts to marine mammals associated with Project shipping.	The Proponent shall ensure that, subject to vessel and human safety considerations, all project shipping adhere to the following mitigation procedures while in the vicinity of marine mammals: a. Wildlife will be given right of way; b. Ships will when possible, maintain a straight course and constant speed, avoiding erratic behavior; and c. When marine mammals appear to be trapped or disturbed by vessel movements, the vessel will implement appropriate measures to mitigate disturbance, including stoppage of movement until wildlife have moved away from the immediate area.	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A

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121	Marine Environment - Marine Mammal Interactions	To prevent impacts to marine mammals and seabird colonies associated with Project shipping.	The Proponent shall immediately report any accidental contact by project vessels with marine mammals or seabird colonies to Fisheries and Oceans Canada and Environment Canada respectively, by notifying the appropriate regional office of the: a. Date, time and location of the incident; b. Species of marine mammal or seabird involved; c. Circumstances of the incident; d. Weather and sea conditions at the time; e. Observed state of the marine mammal or sea bird colony after the incident; and, f. Direction of travel of the marine mammal after the incident, to the extent that it can be determined	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A
122	Marine Environment - Marine Mammal Interactions	To prevent impacts to marine mammals and seabird colonies associated with Project shipping.	The Proponent shall summarize and report annually to the NIRB regarding accidental contact by project vessels with marine mammals or seabird colonies through the applicable monitoring report.	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A
123	Marine Environment - Marine Mammal Interactions	To prevent impacts to marine mammals and seabird colonies associated with Project shipping.	The Proponent shall provide sufficient marine mammal observer coverage on project vessels to ensure that collisions with marine mammals and seabird colonies are observed and reported through the life of the Project. The marine wildlife observer protocol shall include, but not be limited to, protocols for marine mammals, seabirds, and environmental conditions and immediate reporting of significant observations to the ship masters of other vessels along the shipping route, as part of the adaptive management program to address any items that require immediate action.	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A
124	Marine Environment - Marine Mammal Interactions	To prevent impacts to marine mammals and marine fish populations from increased harvesting pressures in Project areas.	The Proponent shall prohibit project employees from recreational boating, fishing, and harvesting of marine wildlife in project areas, including Steensby Inlet and Milne Inlet. The Proponent is not directed to interfere with harvesting by the public in or near project areas, however, enforcement of a general prohibition on harvesting in project areas by project employees during periods of active employment (i.e. while on site and between work shifts) is required.	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A
125	Marine Environment - Public Engagement	To assess acceptability of acoustic deterrent devices for the general public.	Prior to use of acoustic deterrent devices, the Proponent shall carry out consultations with communities along the shipping routes and nearest to Steensby Inlet and Milne Inlet ports to assess the acceptability of these devices. Feedback received from community consultations shall be incorporated into the appropriate mitigation plan.	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A
125 a	Marine Environment - Public Engagement	To ensure public acceptability of project vessel anchor sites and reduce potential conflicts between project marine shipping and local harvesting.	The Proponent shall consult with potentially-affected communities and groups, particularly Hunters' and Trappers' Organizations regarding the identification of project vessel anchor sites and potential areas of temporary refuge for project vessels along the shipping routes within the Nunavut Settlement Area. Feedback received from community consultations shall be incorporated into the most appropriate mitigation or management plans.	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A
126	Marine Environment - Public Engagement	To incorporate local input into monitoring data collection.	The Proponent shall design monitoring programs to ensure that local users of the marine area in communities along the shipping route have opportunity to be engaged throughout the life of the Project in assisting with monitoring and evaluating potential project-induced impacts and changes in marine mammal distributions.	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A
127	Marine Environment - Public Engagement	To promote public awareness and engagement with Project shipping activities.	The Proponent shall ensure that communities and groups in Nunavik are kept informed of project shipping activities and are provided with opportunity to participate in the continued development and refinement of shipping related monitoring and mitigation plans.	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A
128	Marine Environment - Public Engagement	To ensure habitat compensation is acceptable to local communities.	The Proponent shall consult with local communities as fish habitat off-setting options are being considered and demonstrate its incorporation of input received into the design of	N/A - Related to Marine Monitoring	N/A	Crown (Marine)	N/A

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			the Fish Habitat Off-Setting Plan required to offset the Harmful Alteration, Disruption or Destruction of Fish and Fish Habitat (HADD).				
129	Population Demographics - Qikiqtaaluk Socio-Economic Monitoring Committee	Description of the general monitoring framework to be developed in consultation with the Qikiqtaaluk Socio-Economic Monitoring Committee.	The Proponent is strongly encouraged to engage in the work of the Qikiqtaaluk Socio-Economic Monitoring Committee along with other agencies and affected communities, and it should endeavor to identify areas of mutual interest and priorities for inclusion into a collaborative monitoring framework that includes socio-economic priorities related to the Project, communities, and the North Baffin region as a whole.	N/A - Related to Population Demographics	Will be addressed by the Socio-Economic Monitoring Committee	Both	Section 9.10
130	Population Demographics - Project-Specific Monitoring	Recognizing that some Project-specific socio-economic monitoring initiatives may be best addressed in smaller more focused working groups, this is encouraged where possible.	The Proponent should consider establishing and coordinating with smaller socio-economic working groups to meet Project specific monitoring requirements throughout the life of the Project.	N/A - Related to Population Demographics	Will be addressed by the Socio-Economic Monitoring Committee	Both	Section 9.10
131	Population Demographics - Monitoring Demographic Changes	To monitor demographic changes affecting the North Baffin communities and the territory as a whole in order to understand changes and to evaluate the Proponent's predictions as related to population demographics.	The Qikiqtaaluk Socio-Economic Monitoring Committee is encouraged to engage in the monitoring of demographic changes including the movement of people into and out of the North Baffin communities and the territory as a whole. This information may be used in conjunction with monitoring data obtained by the Proponent from recent hires and/or out-going employees in order to assess the potential effect the Project has on migration.	N/A - Related to Population Demographics	Will be addressed by the Socio-Economic Monitoring Committee	Both	Section 9.10
132	Population Demographics - Training Programs	To develop training programs in ways which contribute to limiting the potential for migration to occur as North Baffin residents seek training and employment opportunities in the larger centre of Iqaluit.	The Proponent is encouraged to partner with other agencies such as Hamlet organizations in the North Baffin region, the Municipal Training Organization, and the Government of Nunavut in order to adapt pre-existing, or to develop new programs which encourage Inuit to continue living in their home communities while seeking ongoing and progressive training and development. Programs may include driver training programs offered within Hamlets, providing upgraded equipment to communities for use in municipal works, providing incentives for small businesses to remain operating out of their community of origin, or supplementing existing recreational facilities and programming in North Baffin communities.	N/A - Related to Education and Training	Will be addressed by the Socio-Economic Monitoring Committee	Both	Section 9.10
133	Population Demographics - Monitoring Demographic Changes	Training programs may be developed with the goal of limiting the potential for migration to occur as North Baffin residents may choose to seek employment and therefore move from smaller North Baffin communities to the larger centre of Iqaluit.	The Proponent is encouraged to work with the Qikiqtaaluk Socio-Economic Monitoring Committee and in collaboration with the Government of Nunavut's Department of Health and Social Services, the Nunavut Housing Corporation and other relevant stakeholders, design and implement a voluntary survey to be completed by its employees on an annual basis in order to identify changes of address, housing status (i.e. public/social, privately owned/rented, government, etc.), and migration intentions while respecting confidentiality of all persons involved. The survey should be designed in collaboration with the Government of Nunavut's Department of Health and Social Services, the Nunavut Housing Corporation and other relevant stakeholders. Non-confidential results of the survey are to be reported to the Government of Nunavut and the NIRB.	N/A - Related to Population Demographics	Will be addressed by the Socio-Economic Monitoring Committee	Both	Section 9.10
134	Population Demographics - Employee Origin	Project-specific information regarding employee origin is important to comparing predictions of labour availability and employment opportunities with actual levels of employment from various demographic segments over different geographic areas.	The Proponent shall include with its annual reporting to the NIRB a summation of employee origin information as follows: a. The number of Inuit and non-Inuit employees hired from each of the North Baffin communities, specifying the number from each; b. The number of Inuit and non-Inuit employees hired from each of the Kitikmeot and Kivalliq regions, specifying the number from each; c. The number of Inuit and non-Inuit employees hired from a southern location or other province/territory outside of Nunavut, specifying the locations and the number from each; and	N/A - Related to Population Demographics	Included in Annual Report to NIRB and the Annual IIBA Implementation Report	Both	Section 9.10

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			d. The number of non-Canadian foreign employees hired, specifying the locations and number from each foreign point of hire.				
145	Livelihood and Employment - Barriers to Employment for Women	To monitor and understand the existence of barriers to employment for women specifically relating to childcare availability and costs.	The Proponent is encouraged to work with the Government of Nunavut and the Qikiqtaaluk Socio-Economic Monitoring Committee to monitor the barriers to employment for women, specifically with respect to childcare availability and costs.	N/A - Related to Livelihood and Employment	Will be addressed by the Socio-Economic Monitoring Committee and the Mine Closure Technical Advisory Group closer to closure	Both	Section 9.10
146	Livelihood and Employment - Availability of Childcare for Project Employees	To lessen the barriers to employment as relating to the availability of childcare.	The Government of Nunavut and the Qikiqtani Inuit Association are strongly encouraged to investigate the possibility for Project revenue streams to support initiatives or programs which offset or subsidize childcare for Project employees.	N/A - Related to Livelihood and Employment	Will be addressed by the Socio-Economic Monitoring Committee and the Mine Closure Technical Advisory Group closer to closure	Both	Section 9.10
147	Livelihood and Employment - Affordability of Housing	To lessen the barriers to maintaining employment as relating to the availability and costs of housing.	The Proponent is encouraged to work with the Government of Nunavut and the Nunavut Housing Corporation to investigate options and incentives which might enable and provide incentive for employees living in social housing to maintain employment as well as to negotiate for and obtain manageable rental rates.	N/A - Related to Livelihood and Employment	Will be addressed by the Socio-Economic Monitoring Committee and the Mine Closure Technical Advisory Group closer to closure	Crown	Section 9.10
152	Economic Development and Self-Reliance, and Contracting and Business Opportunities - IIBA contract requirements	To improve ability of small businesses to access Project contract and sub-contract opportunities.	The Qikiqtani Inuit Association is encouraged to provide the Board and the Qikiqtaaluk Socio-Economic Monitoring Committee with information regarding the effectiveness of any provisions within the Inuit Impact and Benefit Agreement which may require that larger contracts be broken down into smaller size in order that they are reasonably managed by smaller businesses in the North Baffin region, while respecting any confidential or privileged information.	N/A - Related to Economic Development and Self-Reliance	Included in Annual IIBA Implementation Report to QIA. Will be addressed by the Socio-Economic Monitoring Committee and the Mine Closure Technical Advisory Group closer to closure	Both	Section 9.10
153	Human Health and Well-Being - Employee and Family Health and Well-being	To provide adequate medical services on site, including those that contribute to the mental health and well-being of all employees.	The Proponent is encouraged to employ a mental health professional to provide counseling to Inuit and non-Inuit employees in order to positively contribute toward employee health and well-being.	N/A - Related to Human Health and Well-being	Included in Annual IIBA Implementation Report to QIA. Will be addressed by the Mine Closure Technical Advisory Group closer to closure	Crown	Section 9.10
154	Human Health and Well-being - Indirect Impacts to Health and Well-being	To understand the indirect impacts of the Project upon health and well-being.	The Proponent shall work with the Government of Nunavut and the Qikiqtaaluk Socio-Economic Monitoring Committee to monitor potential indirect effects of the Project, including indicators such as the prevalence of substance abuse, gambling issues, family violence, marital problems, rates of sexually transmitted infections and other communicable diseases, rates of teenage pregnancy, high school completion rates, and others as deemed appropriate.	N/A - Related to Human Health and Well-being	Will be addressed by the Socio-Economic Monitoring Committee and the Mine Closure Technical Advisory Group closer to closure	Both	Section 9.10
156	Human Health and Well-Being - Support Initiatives	To assist with fostering well-being within point-of-hire communities.	The Proponent is encouraged to assist with the provision and/or support of recreation programs and opportunities within the potentially affected communities in order to mitigate potential impacts of employees' absences from home and community life.	N/A - Related to Human Health and Well-being	Will be addressed by the Socio-Economic Monitoring Committee and the Mine Closure Technical Advisory Group closer to closure	Both	Section 9.10
157	Human Health and Well-Being - Counseling and Treatment Programs	To make available, necessary treatment and counseling services for employee and family well-being.	The Proponent should consider providing counseling and access to treatment programs for substance and gambling addictions as well as which address domestic, parenting, and marital issues that affect employees and/or their families.	N/A - Related to Human Health and Well-being	Included in Annual IIBA Implementation Report to QIA. Will be addressed by the Socio-Economic Monitoring Committee and the Mine Closure Technical Advisory Group closer to closure	Both	Section 9.10
158	Community Infrastructure and Public Services - Impacts to Health Services	To monitor indirect Project impacts to health and social services provided by the Government of Nunavut.	The Proponent is encouraged to work with the Government of Nunavut and other parties as deemed relevant in order to develop a Human Health Working Group which addresses and establishes monitoring functions relating to pressures upon existing services and costs to the health and social services provided by the Government of Nunavut as such may be impacted by Project-related in-migration of employees, to both the North Baffin region in general, and to the City of Iqaluit in particular.	N/A - Related to Community Infrastructure and Public Service	Will be addressed by the Socio-Economic Monitoring Committee and the Mine Closure Technical Advisory Group closer to closure	Crown	Section 9.10

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159	Community Infrastructure and Public Services - Impacts to Infrastructure	To monitor Project-related impacts to infrastructure within the Local Study Area communities.	The Proponent is encouraged to work with the Government of Nunavut to develop an effects monitoring program that captures increased Project-related pressures to community infrastructure in the Local Study Area communities, and to airport infrastructure in all point-of-hire communities and in Iqaluit.	N/A - Related to Community Infrastructure and Public Service	Will be addressed by the Socio-Economic Monitoring Committee and the Mine Closure Technical Advisory Group closer to closure	Crown	Section 9.10
160	Community Infrastructure and Public Services - Distribution of Benefits	To ensure the distribution of benefits is done in a way that off-sets Project-related impacts to infrastructure or services.	The Government of Nunavut and the Qikiqtani Inuit Association are encouraged to cooperate to ensure in a broad sense, that Project benefits	N/A - Related to Community Infrastructure and Public Service	Will be addressed by the Socio-Economic Monitoring Committee and the Mine Closure Technical Advisory Group closer to closure	Both	Section 9.10
161	Community Infrastructure and Public Services - Policing	To ensure the territorial government and its policing service are adequately prepared to handle any Project-related increases to the need for service and associated impacts.	The Government of Nunavut should be prepared for any potential increased need for policing, and ensure that the Royal Canadian Mounted Police is prepared to handle ongoing Project-related demographic changes and subsequent crime prevention that may be needed as a result of the development, operation, and closure of the Project.	N/A - Related to Community Infrastructure and Public Service	Will be addressed by the Socio-Economic Monitoring Committee and the Mine Closure Technical Advisory Group closer to closure	Crown	Section 9.10
162	Culture, Resources and Land Use - Public Consultation	To ensure the ongoing and consistent involvement of Elders and community members in developing and revising monitoring and mitigation plans.	The Proponent should make all reasonable efforts to engage Elders and community members of the North Baffin communities in order to have community level input into its monitoring programs and mitigative measures, to ensure that these programs and measures have been informed by traditional activities, cultural resources, and land use as such may be implicated or impacted by ongoing Project activities.	N/A - Related to Cultural Resources and Land Use	Will be addressed by the Community Working Group and the Mine Closure Technical Advisory Group closer to closure	Both	Section 9.10
163	Culture, Resources and Land Use - Public Consultation	To involve communities in the development and evolution of management and monitoring plans.	The Proponent shall continue to engage and consult with the communities of the North Baffin region in order to ensure that Nunavummiut are kept informed about the Project activities, and more importantly, in order that the Proponent's management and monitoring plans continue to evolve in an informed manner.	N/A - Related to Cultural Resources and Land Use	Will be addressed by the Community Working Group and the Socio-Economic Monitoring Committee and the Mine Closure Technical Advisory Group closer to closure	Both	Section 9.10
164	Socio-Economic Impacts - Shipping Notification	In order to inform members of North Baffin communities of planned Project shipping transits such that community members' planned travel routing may be adjusted to avoid interaction with Project ships and/or ship tracks.	The Proponent is required to provide notification to communities regarding scheduled ship transits throughout the regional study area including Eclipse Sound and Milne Inlet, real-time data regarding ships in transit and any changes to the proposed shipping schedule to the MEWG and agencies within Pond Inlet on a weekly basis during open water shipping, and to the RSA communities on a monthly basis.	N/A - Related to Cultural Resources and Land Use	Part of already established Marine safety protocols on site and though IIBA Implementation.	Both	Section 9.10
165	Socio-Economic Impacts - Emergency Shelters	In order to provide for human safety precautions in the event of adverse weather or other emergency situations along segments of linear transportation infrastructure.	The Proponent is strongly encouraged to provide buildings along the rail line and Milne Inlet Tote Road for emergency shelter purposes, and shall make these available for all employees and any land users travelling through the Project area. In the event that these buildings cannot, for safety or other reasons be open to the public, the Proponent is encouraged to set up another form of emergency shelters (e.g., seacans outfitted for survival purposes) every 1 kilometre along the rail line and Milne Inlet Tote Road. These shelters must be placed along Tote Road and rail routing prior to operation of either piece of infrastructure, and must be maintained for the duration of project activities, including the closure phase.	N/A	Part of already established Marine safety protocols on site. Will be addressed by the Community Working Group	Both	Section 9.10
166	Socio-Economic Impacts - Public Consultation	To ensure members of the public are able to access shipping information on an as-required basis in order to inform potential users of the scheduled Project activities which could require deviations to land users' schedules or routing.	The Proponent should ensure through its consultation efforts and public awareness campaigns that the public have access to shipping operations personnel for transits into and out of both Steensby Inlet port and Milne Inlet port either via telephone or internet contact, in order that any questions regarding ice conditions or ship movements that could assist ice users in preparing for travel may be answered by Project staff in a timely fashion.	N/A	Part of already established Marine safety protocols on site	Both	Section 9.10

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168	Governance and Leadership - Monitoring Program	Outline variables that are relevant to the Project and which should be adopted by the QSEMC's monitoring program.	The specific socioeconomic variables as set out in Section 8 of the Board's Report, including data regarding population movement into and out of the North Baffin Communities and Nunavut as a whole, barriers to employment for women, project harvesting interactions and food security, and indirect Project effects such as substance abuse, gambling, rates of domestic violence, and education rates that are relevant to the Project, be included in the monitoring program adopted by the Qikiqtani Socio-Economic Monitoring Committee.	N/A - Related to Governance and Leadership	Will be addressed by the Socio-Economic Monitoring Committee closer to closure	Both	Section 9.10
169	Governance and Leadership - Monitoring Economic Effects	To maintain transparency inform communities in relation to economic benefits associated with the Project.	The Proponent provide an annual monitoring summary to the NIRB on the monitoring data related to the regional and cumulative economic effects (positive and negative) associated with the Project and any proposed mitigation measures being considered necessary to mitigate the negative effects identified.	N/A - Related to Governance and Leadership	Will be addressed by the Socio-Economic Monitoring Committee closer to closure	Both	Section 9.10
173	Accidents and Malfunctions – Use of best practices	To provide additional spill contingency measures for spills in marine areas.	The Proponent shall employ best practices and meet all regulatory requirements during all ship-to-shore and other marine-based fuel transfer events.	N/A - Related to Marine Monitoring	Part of already established Marine safety protocols on site	Crown (Marine)	N/A
174	Accidents and Malfunctions – Community level spill response	To improve community ability to assist in spill response.	The Proponent and the Canadian Coast Guard are required to provide spill response equipment and annual training to Nunavut communities along the shipping route to potentially improve response times in the event of a spill.	N/A - Related to Marine Monitoring	Part of already established Marine safety protocols on site	Crown (Marine)	N/A
175	Accidents and Malfunctions - Ship Track Markers in Ice Cover	To ensure that measures taken to mark the shipping track(s) during periods of ice cover are effective in advising ice-based travelers, and that, where necessary, revisions to this practice can be made to ensure public safety.	The Proponent shall, in coordination and consultation with the Qikiqtani Inuit Association and the Hunters and Trappers Organizations of the North Baffin communities and Coral Harbour, provide updates to its Shipping and Marine Mammals Management Plan to include adaptive management measures it proposes to take should the placement of reflective markers along the ship track in winter months not prove to be a feasible method of marking the track to ensure the safety of ice-based travelers.	N/A - Related to Marine Monitoring	Part of already established Marine safety protocols on site	Crown (Marine)	N/A
176	Accidents and Malfunctions – Revised spill modeling	To improve community ability to assist in spill response.	The Proponent is required to revise its spill planning to include additional trajectory modeling for areas of Hudson Strait, such as Mill Island, where walrus concentrate, as well as for mid-Hudson Strait during winter conditions as well as for the northern shipping route, including Milne Inlet, Eclipse Sound and Pond Inlet.	N/A - Related to Marine Monitoring	Part of already established Marine safety protocols on site	Crown (Marine)	N/A
177	Accidents and Malfunctions - Foreign Flagged Vessels	To ensure foreign flagged ships operating in Canadian waters are held to the same standard as domestic ships with regard to emergency response planning.	The Proponent shall enroll any foreign flagged vessels commissioned for Project-related shipping within Canadian waters into the relevant foreign program equivalent to Transport Canada's Marine Safety Delegated Statutory Inspection Program.	N/A - Related to Marine Monitoring	Part of already established Marine safety protocols on site	Crown (Marine)	N/A
178	Alternatives analysis – Mill Island shipping route consideration	To prevent disturbance to walrus and walrus habitat on the northern shore of Mill Island.	Subject to safety considerations and the potential for conditions, as determined by the crew of transiting vessels, to result in route deviations, the Proponent shall require project vessels to maintain a route to the south of Mill Island to prevent disturbance to walrus and walrus habitat on the northern shore of Mill Island.	N/A - Related to Marine Monitoring	Part of already established Marine safety protocols on site	Crown (Marine)	N/A
180	Transboundary Effects - Makivik Corporation involvement in the Marine Environment Working Group	To enable Makivik Corporation and Nunavik communities near shipping lanes to remain informed and involved in those shipping activities which could affect the marine environment and marine mammals.	The Marine Environment Working Group established for this Project shall invite a representative from Makivik Corporation to be a member of the Group	N/A - Related to Marine Monitoring	Will be addressed in Annual Report and in Marine Environmental Working Group	Crown (Marine)	N/A
181	Transboundary Effects - Marine Environment Working Group Reporting	To enable Makivik Corporation and Nunavik communities near shipping lanes to remain informed and involved in those shipping	Regardless of whether Makivik Corporation participates as a member of the Marine Environment Working Group, the Marine Environment Working Group will provide	N/A - Related to Marine Monitoring	Will be addressed in Annual Report and in Marine Environmental Working Group	Crown (Marine)	N/A

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Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post Closure Monitoring Program	IOL or Crown Land	ICRP Ref
		activities which could affect the marine environment and marine mammals.	Makivik Corporation with regular updates regarding the activities of the Marine Environment Working Group throughout the Project life cycle.				
182	Transboundary Effects - Reporting to Marine Environment Working Group (MEWG)	To enable Makivik Corporation and Nunavik communities near shipping lanes to remain informed and involved in those shipping activities which could affect the marine environment and marine mammals.	Baffinland shall make available to Makivik Corporation any ship route deviation reports provided to the NIRB in accordance with the terms and conditions set out in Section 4.12.4 of the Final Hearing Report.	N/A - Related to Marine Monitoring	Will be addressed in Annual Report and in Marine Environmental Working Group	Crown (Marine)	N/A
183	Project monitoring of impacts to marine mammals	To address concerns associated with the potential for impacts to marine mammals, and compliance and enforcement of terms and conditions in Project Certificate No. 005 relating to ship-based observer programs, noise exposure assessments, and the identification of other mitigation measures that have the potential to further reduce potential impacts to marine mammals.	The Proponent shall collaborate with the Marine Environmental Working Group (MEWG) to develop impact avoidance or mitigation strategies for the protection of the marine environment and shall implement these strategies. The Proponent shall implement any direction from the Department of Fisheries and Oceans (DFO), issued in furtherance of their mandate, for any avoidance or mitigation measures, including cessation of any activity, for the protection of the marine environment. The Proponent shall, every six months, provide to DFO and the MEWG a tracking table and a plain language summary of (i) collective recommendation of the other members of the working group, and (ii) any directions from DFO. For each, the table must show the Proponent's means of implementation. Where any direction or recommendations are not fully implemented, the Proponent shall include the rationale.	N/A - Related to Marine Monitoring	Will be addressed in Annual Report and in Marine Environmental Working Group	Crown (Marine)	N/A
184	Project monitoring of impacts to marine mammals	To address concerns associated with the potential for impacts to marine mammals, and compliance and enforcement of terms and conditions in Project Certificate No. 005 relating to ship-based observer programs, noise exposure assessments, and the identification of other mitigation measures that have the potential to further reduce potential impacts to marine mammals.	The proponent shall collaborate with the Marine Environmental Working Group to review the status of compliance with, and implementation of, all of the Terms and Conditions in Project Certificate No. 005 related to marine environmental protection.	N/A - Related to Marine Monitoring	Will be addressed in Annual Report and in Marine Environmental Working Group	Crown (Marine)	N/A
185	General	To provide certainty and predictable timelines for shipping for the project, and to better define criteria for the commencement and closing of the shipping season. Certainty and predictability will increase safety for traditional use of sea ice, and mitigate impacts to marine wildlife.	All project related shipping associated with the Northern Shipping route shall observe the following conditions, subject to the variances and/or exceptions below: a) The Proponent must avoid breaking landfast ice at all times during the shipping season. b) The Proponent shall confirm a continuous path of 3/10th ice concentrations along the Northern Shipping route is available prior to commencement of the shipping season. c)The Proponent is required to plan for and cease all shipping from Milne Port by October 31. The Proponent may proceed with a variance to condition (b) above, or under exceptional circumstances that may occur from time to time seek an exception to condition (c). Variances and exceptional circumstances require the direct engagement of Qikiqtani Inuit Association (QIA), as well as the written confirmations obtained from the Hamlet of Pond Inlet, the Mittimatalik HTO (MHTO) and QIA as described below. Examples of a variance may include: sea ice coverage changing from 3/10th or less to greater than 3/10th due to	N/A - Related to Marine Monitoring	Will be addressed in Annual Report and in Marine Environmental Working Group	Crown (Marine)	N/A

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Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post Closure Monitoring Program	IOL or Crown Land	ICRP Ref
			changes in environmental conditions such as wind, or a generally later forecast for ice break up. Exceptional circumstances include events that are unforeseen and occur outside of Baffinland's control but will not include contingencies that the Proponent should reasonably have planned for. Examples of unforeseen events may include: a breakdown in loading equipment, weather disruptions to shipping schedules, or a later than expected ice break up past July 15. In the event a need for variance or an exceptional circumstance arises, the Proponent is required to provide a detailed written description to the NIRB, QIA, Hamlet of Pond Inlet and MHTO clearly demonstrating how it will meet each of the following criteria before continuing with operations: (i) a description of the rationale for variation or exceptional circumstances and anticipated duration of the extended shipping season; (ii) a description as to whether the anticipated ice conditions during the shipping period are consistent with Appendix B commitments and the Shipping and Marine Wildlife Management Plan; (iii) a description confirming that shipping will proceed in full compliance with all Project Certificate terms and conditions and Appendix B commitments (including but not limited to the 6 mtpa limits described in Terms and Conditions 179(a) and (b) and the requirement not to break landfast ice); (iv) a description of any additional mitigation or monitoring efforts being undertaken as a result of the variation or exceptional circumstance; (iv) a description of how the Proponent has made best efforts to meet with the Hamlet, MHTO and the QIA to discuss and consider the variation or exceptional circumstance; (v) copies of all public communications relating to the variation or exceptional circumstance; (vi) written confirmation (or evidence of verbal confirmation) from the Hamlet and the MHTO that sea ice overlapping the shipping route is not being used for travel or harvesting by harvesters or community members, and that the proposed shipping activity will not result in additional safety risks to hunters or the community that cannot be mitigated, for instance, by transiting through a path of less consolidated ice in Eclipse Sound and Milne Inlet or exceptional circumstance. All determinations related to variances and exceptional circumstances will be communicated to NIRB. For greater clarity, this condition applies to all ships supporting the Mary River Project including ore carriers and supply ships.				
186	Terrestrial Environment – Hunters' Access Route(s)	To establish a safe access route for hunters to travel within the project area thereby reducing the shared use of the Milne Inlet Tote Road.	The proponent is required to construct and maintain hunters access route(s) in and around the Milne Inlet Tote Road. The specific location of hunters' access route(s) shall be confirmed based upon input from the Mittimatalik Hunters and Trappers Organization and the Qikiqtani Inuit Association. The responsible parties shall also develop and jointly approve an Access Route Operations and Maintenance Procedure and/or Plan.	N/A - Related to Cultural Resources and Land Use	Will be addressed in Annual Report	Both	N/A
187	Terrestrial Environment – Dust Audit	To consistently assess and monitor impacts of dust from project activities for the purpose of assessing the efficacy of project mitigation measures and to examine alternative mitigation and management options.	The Proponent is required to resource an annual audit of dust impacts and mitigations associated with project activities to be completed by a third party acceptable to the responsible parties. The dust audit shall evaluate effectiveness of current measures and if necessary, contain recommendations and options to reduce the spread and impacts of dust from project activities.	7 - Terrestrial Wildlife and Habitat	Terrestrial Environment Monitoring and Reporting. Reporting requirements will be addressed in Annual Report.	Both	Section 9.7

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Ref #	Category	Objective	Project Condition/Type A Water Licence Condition	Related VEC	Associated Closure/Post Closure Monitoring Program	IOL or Crown Land	ICRP Ref
188	Terrestrial Environment – High Risk Conditions for Dust Dispersion	To establish a program to identify high risk conditions for dust dispersal, and a plan for additional measures to be taken at the times the conditions are present, which may include the use of additional dust suppression and operational staged decreases in dust generating site activities. Baffinland, working with the TEWG will establish site specific thresholds for conditions that may increase dust dispersion (i.e., wind speed), and corresponding mitigations to implement when thresholds are met.	The Proponent is required to resource an annual audit of dust impacts and mitigations associated with project activities to be completed by a third party acceptable to the responsible parties. The dust audit shall evaluate effectiveness of current measures and if necessary, contain recommendations and options to reduce the spread and impacts of dust from project activities.	7 - Terrestrial Wildlife and Habitat	Terrestrial Environment Working Group and Terrestrial Monitoring and Reporting. Reporting requirements will be addressed in Annual Report.	Both	Section 9.7
189	General	There is a need to ensure that Proponent commitments which are made on the public record but not recorded in Project Certificate Terms and Conditions are carried out as agreed to. An interim Project Monitor, appointed on agreement of the Responsible Parties, will review and report on a bi-annual (twice yearly) basis regarding the Proponent's performance of Project Certificate Terms and Conditions and the Proponent commitments listed in Appendix B to this Project Certificate 005.	The Proponent is to carry out all commitments listed in Appendix B to this Project Certificate 005. Performance of these commitments will be evaluated by an interim Project Monitor appointed on agreement of the Responsible Parties. Where the Proponent has not carried out a commitment the Proponent is required to provide a detailed written description to the NIRB, clearly explaining why they were unable to carry out the condition and how it will meet the condition going forward.	N/A	N/A	Both	N/A

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TABLE B.2 PART J OF TYPE "A" WATER LICENCE 2AM-MRY2540 (NWB, 2025)

Item	Requirements of Part J of the Licence *The Interim Closure and Reclamation Plan shall be updated as necessary from time to time and must address all mine related components including the following:*	ICRP Location
1a	Detailed description, including maps and other visual representations, of the preconstruction conditions for each site, accompanied by a detailed description of the proposed final landscape, with emphasis on the reclamation of surface drainage over the restored area	Sections 3, 4 and 5.2
1b	A description of how progressive reclamation will be employed and monitored throughout the life of the mine, plus reclamation scheduling and coordination of activities with the overall sequence of the project; details of reclamation scheduling and procedures for coordinating reclamation activities within the overall mining sequence and materials balance	Section 6
1c	Implications of any updated water balance and water quality model prediction results and any adaptive management measures that may be required	Section 5.3.1 and Appendix D1, D2 and D3
1d	An evaluation of closure and reclamation measures for each mine component, including the goals, objectives, closure criteria and the rationale for selection of the preferred measures	Section 5
1e	A comprehensive assessment of materials suitability, including geochemical and physical characterization and a schedule of availability for reclamation needs. Particular attention shall be given to cover materials, including maps showing sources and stockpile locations of all reclamation construction materials.	Sections 3.3.6, 5.3.2 and 5.3.3
1f	An assessment and description of any required post-closure treatment for pit water that is not acceptable for discharge, taking into consideration further studies completed and updated modeling information	Section 5.3.1.9 and Appendix D1
1g	Contingency measures for all reclamation components including action thresholds that are linked to the monitoring programs	Section 5.3.1.9
1h	Monitoring programs to assess reclamation performance and environmental conditions including monitoring locations for surface water and Ground Water, parameters	Section 9
1i	Monitoring schedules and overall timeframes	Section 9
1j	QA/QC procedures for managing the demolition landfill and other waste disposal areas	Section 5.3.7

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Item	Requirements of Part J of the Licence *The Interim Closure and Reclamation Plan shall be updated as necessary from time to time and must address all mine related components including the following:*	ICRP Location
1k	A list of non-salvageable materials and disposal locations	Sections 5.3.4, 5.3.5 and 5.3.7
1l	Rock storage facility closure design plans and sections including the types of material placed and volumes	Section 5.3.2
1m	Protocol for the disposal of any contaminated soil	Section 5.3.7 and 9.6
1n	An assessment of the long-term physical stability of all remaining project components	Section 9.4
1o	A revised closure and reclamation cost estimate	Section 10
1p	A detailed implementation schedule for completion of reclamation work	Section 8, Table 8.1
1q	Multiple climate change projections (SSP1, SSP2 and SSP 5) in the next update of the thermal model planned for 2026;	To be included in next revision
1r	An assessment of the potential impacts of pit development on local permafrost and hydrogeological regimes prior to pit development to define closure requirements	To be included in next revision
1s	Including soil or sediments containing site related contaminants that pose a risk to human health and/or the environment.	To be included in next revision

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TABLE B.3 TERRITORIAL LAND USE REGULATIONS, PURSUANT TO THE TERRITORIAL LANDS ACT

Regulation Requirement	TLUR Section	ICRP Location
All closure work shall be carried out in accordance with permit requirements as stated in the *Territorial Land Use Regulations.*	s. 8 through 10, 31	Section 2.5
"Subject to the terms and conditions of his permit or the express written authority of an inspector, every permittee shall replace all materials removed by him in the course of excavating, other than rock trenching, and shall level and compact the area of excavation."	s. 12	Table 5.1
"Restore the channel and bed of the stream to their original alignment and cross section."	s. 13.(1 b)	Table 5.1
"Subject to the terms and conditions of his permit, every permittee shall, after completion of a land use operation, restore the permit area as nearly as possible to the same condition as it was prior to commencement of the land use operation."	s. 18	Table 5.1
Remove all buildings, machinery, equipment, materials and fuel drums or other storage containers used in connection with the land use operation.	s. 19.(1)	Section 5.3
A final plan will be issued to the "engineer" within 60 days following completion of the land use operation or expiration of the permit.	s. 33	Section 1.3
All plan drawings submitted under the Regulations shall: • Be drawn to scale that clearly illustrates all mine features • Shows the scale on the drawing • Provide geographic co-ordinates	s.35	Section 4 and Appendix A
"In order to ensure that a permittee complies with the terms and conditions of his permit with these Regulations, the engineer may include in the permit a condition that the permittee deposit with the Minister a security deposit not exceeding $100,000."	s. 36	Section 10
"(1) Subject to subsection (2), where a permittee wishes to discontinue a land use operation at any time prior to the date of completion set out in the permit, he shall give notice of discontinuance in writing to the engineer indicating the date upon which he proposes to discontinue the land use operation. (2) A notice of discontinuance given pursuant to subsection (1) shall be given to the engineer at least 10 days prior to the proposed date of the discontinuance. (4) The discontinuance of a land use operation pursuant to this section does not relieve the permittee from any obligations arising under the terms and conditions of the permit or under these Regulations up to the time of discontinuance or from complying with any notice, direction or order given by an inspector or by the engineer.	s. 43	Section 2.3.1 and Section 7

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TABLE B.4 ABANDONMENT AND RECLAMATION POLICY FOR INUIT OWNED LANDS (QIA, 2024)

Item	Policy Requirement	Baffinland Response
1	Have **all** reports and plans including addendums and responses been submitted?	Yes
2	Are the submitted reports and plans executable standalone documents with adequate rational and detail?	Yes
3	Do all reports and plans contain appropriate referencing (document name, author, section, and page number) to **all** supporting information?	Yes
4	Do the reports and plans demonstrate a firm understanding, of QIA's *Guiding Principles on Reclamation* and provide rationale on how these principles have been satisfied?	Yes
5	Has IQ and consultation with Community Land and Resources Committee(s) been applied? Has the Tenant provided detailed community consultation records?	Closure and reclamation issues discussed at hearings related to the Project Certificate. Commitment to Inuit Engagement Strategy and MCTAG in the future to incorporate community input and IQ.
6	Are **all** the components that are considered in the abandonment and reclamation plan listed?	Yes
7	Does each component of the Project have an abandonment and reclamation objectives and criteria?	Yes
8	Has an A&R plan been provided with a financial security estimate?	Yes. Financial security estimate is conducted in accordance with Section 9.2 of Commercial Lease, No. Q13C301.
9	Have Table 1, 2, 3 and 4 of Appendix B been used in completing the financial security estimate?	Yes. Adapted to suit project specific requirements.
10	Has evidence been provided to support the Policy assumptions for **all** reports and plans?	Yes
11	Has the Tenant contacted QIA if uncertainty existed in how the Tenant was to determine an acceptable estimate?	Yes

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TABLE B.5 EIS GUIDELINES (NUNAVUT IMPACT REVIEW BOARD, 2015)

EIS Guidelines Requirement (Section 9.6 of the EIS Guidelines, NIRB, 2015)	ICRP Location
To ensure that issues associated with the effective closure and reclamation of all Project Components is considered at the earliest possible stage in the mine development process, thereby influencing mine design to take into account environmental issues related to mine closure and reclamation	All
To establish major targets for reclamation of lands potentially affected by the Project	Table 5.1
Description of reclamation methods, time frames and schedules, including proposed notice periods to employees and public	Section 5
Description of temporary closure measures and a discussion of at what point a temporary closure should be considered permanent for the purposes of requiring implementation of aspects of the Mine Closure and Reclamation Plan	Section 7
Discussion of research programs to address challenges to reclamation, given the local conditions	Appendix D
Considerations for the protection of public health and safety	Sections 7.1.1 to 7.1.5 and 7.3.1 to 7.3.6
Description of closure and post-closure monitoring of environmental components including, but not limited to, wildlife, vegetation, air quality, landform stability and water quality	Section 9
Discussion of the need for long-term monitoring and maintenance by establishing physical and chemical stability of reclaimed areas	Section 9
Discussion on reduction or elimination of environmental effects once the mine ceases operation	Section 5, Table 5.1 and Section 9
Discussion regarding re-establishment of conditions that permit the land to return to similar pre-mining land use	Table 5.1 & Section 5.3
Consideration for ARD and/or ML potential of rocks, in association with related waste rock management strategies	5.3.1.7, 5.3.1.9 & 5.3.2.7, 5.3.2.9 Appendix D
Any considerations for the restoration of the natural aesthetics of the Project	Table 5.1 Appendix D
The Plan is considered to be a “living” document; the level of detail should undergo further revision to reflect the progress of the Project as well as changes in technology and/or standards or legislation. Future revisions should also consider input from consultations with communities and other stakeholders on methods to be used, and potential uses for project infrastructure, etc.	Section 1.3 and Section 2.7

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TABLE B.6 GUIDELINES FOR THE CLOSURE AND RECLAMATION OF ADVANCED MINERAL EXPLORATION AND MINE SITES IN THE NORTHWEST TERRITORIES (MVLWB/AANDC 2013)

Guideline Requirement	ICRP Section
1.0 Plain Language Summary i. Plain language summary of CRP, with key aspects of current plan, major uncertainties and how they will be addressed, and differences from previous plans	Section 1.0
2.0 Introduction i. Purpose and scope of the closure and reclamation plan as it relates to Boards' requirements, previous versions of CRP, expectation of stakeholders. Approval dates of previous CRPs.	Section 2
ii. General project description, description of proponents, spatial and temporal extent of project	Section 2.1
iii. Status of plan (e.g., interim CRP, final CRP, etc.)	Section 2.4
iv. Goal of the closure and reclamation plan	Section 2.5
v. Identify closure and reclamation planning team. Describe, list or show important internal/external organizational relationships and specific responsibilities that facilitate/manage closure and reclamation.	Section 2.6
vi. Outline approach to engagement, how they have or will integrate local community values into the CRP, strategies for engaging communities in CRP development and implementation	Section 2.7
vii. Identify relevant regulatory authority and existing/required permits, authorizations, agreements related	Section 2.8
viii. Conformance table showing where CRP satisfies applicable licences/permits. List of additional standards/guidelines to be followed.	Section 2.8 and Appendix B (this appendix)
3.0 Project Environment i. Overview of pre-disturbance atmospheric environment (e.g., climate, temperature, precipitation, air quality), including maps, tables, figures	Section 3.1
ii. Overview of pre-disturbance physical (terrestrial) environment (e.g., physiography, geology, permafrost, geological hazards, hydrogeology), including maps, tables, figures	Section 3.2
iii. Overview of pre-disturbance chemical environment (e.g., soil/sediment chemistry, surface water/groundwater quality, ARD and metal leaching potential), including maps, tables, figures	Section 3.3
iv. Overview of pre-disturbance biological environment (e.g., vegetation, aquatic life, terrestrial wildlife, avifauna, overall ecosystem), including maps, tables, figures	Section 3.4
4.0 Project Information i. Site location, regional and local context of affected areas, access points and methods of access, including maps and photos	Section 4.1
ii. History of ore discovery, exploration, previous development and operations, ownership changes, summary of application, permitting, and licencing process to date	Section 4.2
iii. Description of site geology, mining resource, extraction methods and rational for footprint and specific target areas, including maps, figures, tables	Section 4.3
iv. Project summary, including life of mine plan through closure and reclamation and various options proposed from EA	Section 4.4

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Guideline Requirement	ICRP Section
v. List of all project components	Table 4.1
5.0 Permanent Closure and Reclamation i. Definition of permanent closure and reclamation	Section 5.1
ii. Indicate components that may require passive long-term care and expected timelines for relinquishment	Section 5.3
iii. Description of project components, including details (e.g., dimensions, footprint, relative locations on map), lifespan and current status, with supporting maps, figures, photos	Section 4.4, 5.3 and Appendix A
iv. Description of pre-development, existing, and projected final site conditions using maps, photos, figures as appropriate. Illustrate relevant water bodies, topographic modifications, and vegetation changes. Identify important/unique environmental conditions with bearing on closure.	Section 5.3 (Sections 5.3.X.2)
v. List of closure objectives and criteria for each component, with any uncertainties noted with reference to the associated reclamation research plan	Table 5.1
vi. Alternatives analysis of various closure options with clear demonstration of pros and cons, risk scenarios and unique/novel closure situations for the specific component	Section 5.3 (Sections 5.3.X.4)
vii. Selection of preferred closure activity with rationale for selection/rejection of others	Section 5.3 (Sections 5.3.X.4)
viii. Description of engineering work (e.g., demolition, construction) necessary for selected closure activity, with supporting information for proposed work to prove proposed technology or engineering will be successful	Section 5.3 (Sections 5.3.X.5)
ix. Assessment of potential negative residual effects remaining after completion of reclamation. Provide results of risk assessments and discuss how any predicted residual effects compare to stakeholders' preferences and or to company's commitments made during EA.	Section 5.3 (Section 5.3.X.6) Appendix G
x. Identify uncertainties associated with the risks of various closure options and how to select the best closure activity, how to best implement a selected closure activity, how to define closure criteria, how Traditional Knowledge will inform closure planning and more. Include how each uncertainty will be addressed (reclamation research, engineering study plan, etc.).	Section 5.3 (Sections 5.3.X.7) Appendix D
xi. Description of what post-closure monitoring will occur (e.g., fugitive dust, stream flow, wildlife and aquatic life movement etc.) and why, including sampling locations, frequencies, duration, maintenance activities, methods of reporting	Table 3.1, Section 5.3 (Sections 5.3.X.8) Section 9.0
xii. List of possible contingencies should closure activity not be successful in meeting closure criteria and objectives, with identification of preferred contingency with rationale	Section 5.3 (Sections 5.3.X.9)
6.0 Progressive Reclamation i. Definition of progressive reclamation	Section 6.1

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Guideline Requirement	ICRP Section
ii. Opportunities for progressive reclamation during life of the project, including location, aerial extent of work, description of planned reclamation activities and any planned/required monitoring	Section 6.2
iii. Summary and location of completed progressive reclamation activities, including a list of reports detailing any reclamation that has occurred, and any lessons learned that will inform closure planning	Section 6.3

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Guideline Requirement	ICRP Section
7.0 Temporary Closure i. Closure goal and closure objective of temporary closure	Sections 7.1 and 7.3
ii. Selected temporary closure activities for each project component (must include minimum activities identified by MVLWB guidelines)	Sections 7.1 and 7.3
iii. Monitoring activities during temporary closure	Sections 7.2 and 7.4
iv. Contingencies for unforeseen events/conditions during temporary closure if response different from normal operations, including effects on any monitoring activities and plans to address any effects	Section 5.3 (Sections 5.3.X.9)
v. Temporary closure schedule, including anticipated timing/sequence of events, description of temporary closure activities for each component, duration and approximate end date of closure period	Section 7.1 and 7.3
8.0 Integrated Schedule of Activities i. Component-specific schedule depicting operations, closure dates, and expected start and end times for selected closure activities, including progressive reclamation, initiation and completion of research, timeframes for meeting closure criteria and monitoring and reporting phases	Section 8.0
ii. Description of schedule uncertainties	Section 8.0
9.0 Post-Closure Site Assessment i. Description/study design of post-closure impact assessment	Section 9.0 and Appendix G
10.0 Financial Security i. Estimates of total liability of permanent closure (including post-closure monitoring programs and activities)	Section 10
ii. Cost breakdown for each project component	ASR documentation
iii. Match estimate with timing of closure and reclamation activities	ASR documentation
11.0 References i. List of documents/reports that support characterization of baseline environmental data, geochemical analyses and predicted ML/ARD potential, and relevant engineering work related to support the CRP	Section 12
Appendix A Glossary of Terms and Definitions i. Plain language explanation of discipline specific technical terms and key closure and reclamation planning terms	Section 11.1
Appendix B List of Acronyms, Abbreviations, Units, and Symbols	Section 11.2
Appendix C Record of Engagement i. Table outlining all completed engagement specific to closure, including issues identified by engaged parties and how company has addressed them	Appendix E

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Guideline Requirement	ICRP Section
Appendix D Lessons Learned from Other Projects i. Summary table of relevant on-site closure issues/concerns dealt with at other projects, the completed activity, lessons learned and application to managing project closure and reclamation	Appendix F
Appendix E Reclamation Research Plans i. Reclamation research plans required to address uncertainties. Plans should describe the uncertainty, research/study objective, overview of tasks, linkages to other research/studies, project research schedule, costs and references.	Appendix D

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TABLE B.7 MINE SITE RECLAMATION GUIDELINES FOR THE NORTHWEST TERRITORIES (AANDC, 2007)

Guideline Requirement	ICRP Location
Develop and implement preventive and control strategies to effectively minimize the potential for ARD and ML to occur	Sections 5.3.1.5, 5.3.2.5, 5.3.3.6
Where ARD and ML are occurring as a result of mine activities, mitigate and minimize impacts to the environment	Sections 5.3.1.9 and 5.3.2.9
Re-establish the pre-mining ground cover, which may involve encouraging self-sustainable indigenous vegetation growth	Table 5.1 and Appendix D
Remediate any sources of contamination that may have been created during the development and operation of the mine site in order to protect humans, wildlife, and environmental health	Table 5.1
Ensure physical stability of residual earth structures for environmental, human, and wildlife safety	Table 5.1
Open Pit: • Minimize access to protect human and wildlife safety • Implement water management strategies to minimize and control migration and discharge of contaminated drainage, and if required, collect and treat contaminated water • Stabilize slopes to minimize erosion and slumping	Section 5.3.1
Waste Rock: • Minimize erosion, thaw settlement, slope failure, collapse or the release of contaminants or sediments	Section 5.3.2
Buildings and infrastructure, equipment: • Return area to its original state or to a condition compatible with the end land-use targets	Section 5.3.4
Restore natural drainage patterns where surface infrastructure has been removed	Table 5.1
Landfills: • Control erosion and effects to the ground thermal regime	Section 5.3.7
Water Management Systems: • Dismantle and remove/dispose of as much of the system as possible and restore natural or established new drainage patterns • Stabilize and protect from erosion and failure for the long term	Tables 5.1 & 5.3.8

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TABLE B.8 MINE SITE RECLAMATION POLICY FOR NUNAVUT (AANDC, 2002)

Policy Requirement	ICRP Location
Areas should be returned to viable and self-sustaining areas where practical	Section 5.2
Use best management principles such as progressive reclamation and reduce the environmental risk	Section 2.2
Communication and consultation shall be undertaken with all applicable parties	Section 2.4
Closure impacts for all mine components	Table 5.1 Appendix G
Closure costs estimates should be undertaken by a third party using a recognized methodology such as RECLAIM. Closure cost estimates should include contingency factors.	Section 10
Inclusion of a progressive reclamation plan	Section 6.0
Removal/stabilization of all structures	Sections 5.3
Reclaim and stabilize waste rock stockpiles remaining on site	Section 5.3.2
Reclaim the disturbed surface areas to acceptable standards	Table 5.1
Water quality at closure shall meet or exceed the accepted standards	Table 5.1
Temporary Closure measures shall be included in the Preliminary Closure Plan and cost estimate	Section 7.0
Inclusion of a post-closure monitoring program	Section 9.0
Detailed closure and decommissioning of the following: • Buildings and other structures • Roads • Airstrips • Waste rock stockpiles • Ore stockpiles • Quarries • Open pit • Petroleum and chemical storage areas and facilities • Pipelines • Power corridors • Sewage and waste disposal areas and Mine drainage	Section 5.3
Re-vegetation of the site where practical	Section 5.2 and Table 5.1
Meet or exceed applicable water standards	Table 5.1
Recycle materials where practical	Section 5.3.7
Closure cost estimate to be calculated for the total financial security for final closure	Section 10
Utilization of a recognized methodology for calculating the closure costs (i.e. RECLAIM model)	Section 10
Establish financial security to be provided to the Minister of Aboriginal Affairs and Northern Development Canada (previously Indian Affairs and Northern Development)	Section 10

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TABLE B.9 MINE RECLAMATION IN THE NORTHWEST TERRITORIES AND YUKON (DIAND, 1992)

Guideline Requirement	ICRP Location
Preliminary Closure Plan objectives are to: • Protect the public health and safety • Prevent and/or reduce the environmental deterioration • Return all disturbed areas to the original state or an accepted level of reclamation	Table 5.1
Ensure post-closure physical and chemical stability	Section 5.2
Development of a monitoring program to assess the effectiveness of the restoration to be undertaken between the Proponent and Indian and Northern Affairs Canada	Section 9.0
Reclaimed areas should be returned to previous land use and aesthetics, to the extent possible	Table 5.1
Include temporary closure and indefinite (long-term) Preliminary Closure Plans	Section 5.0 Section 7.0
Mine features should be closed in accordance with the guidelines provided in Tables 5.2 through Table 5.8 (Robertson and Kirsten 1992)	Section 5.0
Inclusion of a fully developed closure cost estimate	Section 10
Re-vegetation where practical. Local arctic species and distributions should be considered	Section 5.2 Appendix D

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TABLE B.10 GUIDELINES FOR ABANDONMENT AND RESTORATION PLANNING FOR MINES IN THE NORTHWEST TERRITORIES (NWT WATER BOARD, 1990)

Guideline Requirement	ICRP Location
Evaluation of ML/ARD potential for open pit, waste rock stockpiles and disturbed areas	Sections 3.2, 3.3 and Appendix D
Cover design for waste rock stockpiles, if required. Stockpiles should be designed and contoured to ensure stability.	Section 5.3.2
Re-vegetation of disturbed areas, where practical	Section 5.1 and Table 5.1
Open pit closure preferably backfilling or flooding	Section 5.3.1
Stability of open pit should be investigated	Section 5.3.1
Quarries should be backfilled and contoured to match the surrounding topography	Section 5.3.3
Removal of fuel and chemical storage tanks and associated piping and plumbing if applicable	Section 5.3.4
Fuel contaminated soils should be remediated	Section 5.3.7
Chemical storage facilities should be removed from site	Section 5.3.7
Soils surrounding chemical facilities should be tested for contamination and where present be removed from site	Section 5.3.4
Culverts should be removed from site	Section 5.3.8
Airstrips should be left intact, unless deemed unsafe	Section 5.3.5
Natural drainage should be restored to the site. Roads that do not impede the natural drainage may remain intact	Table 5.1
Solid wastes should be dealt with in responsible manner	Section 5.3.7
Hazardous wastes are to be disposed at an approved facility	Section 5.3.7
Buildings and structures should be removed from the site	Section 5.3.4
Concrete foundations may be left in a safe condition	Section 5.3.4
The Preliminary Closure Plan should include a planned shutdown/temporary closure scenario	Section 7.1
The Preliminary Closure Plan should include a long-term shutdown/Long-term Closure scenario	Section 7.3
The Preliminary Closure Plan should include a final abandonment/final closure scenario	Section 5.0
It is encouraged that site closure include phased plan development (progressive closure)	Section 6.0
A monitoring program should be devised to measure the effectiveness of the site closure	Section 9.0
Financial security is required for the closure phase	Section 10

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BIM-5200-PLA-0026 APPENDIX C – SITE PHOTOS

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Mine Site

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Aerial View of Mine Site (September 2021)



Aerial View of Mine Site Bulk Fuel Storage Facility (MS-03) and Power Generation Facility (August 2025)

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Aerial view of Mine Site Crusher Facility (August 2025)



Aerial view of Mine Site Complex (MSC) (August 2025)

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Aerial view of Mine Site Mobile Maintenance Buildings (August 2025)



Aerial view of Emulsion Plant (August 2025)

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Aerial view of Sailivik Camp Complex (August 2025)



Aerial view of Deposit No. 1 (Nuluujaak Pit) (August 2025)

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Aerial View of Deposit No. 1 (Nuluujaak Pit) (June 2025)

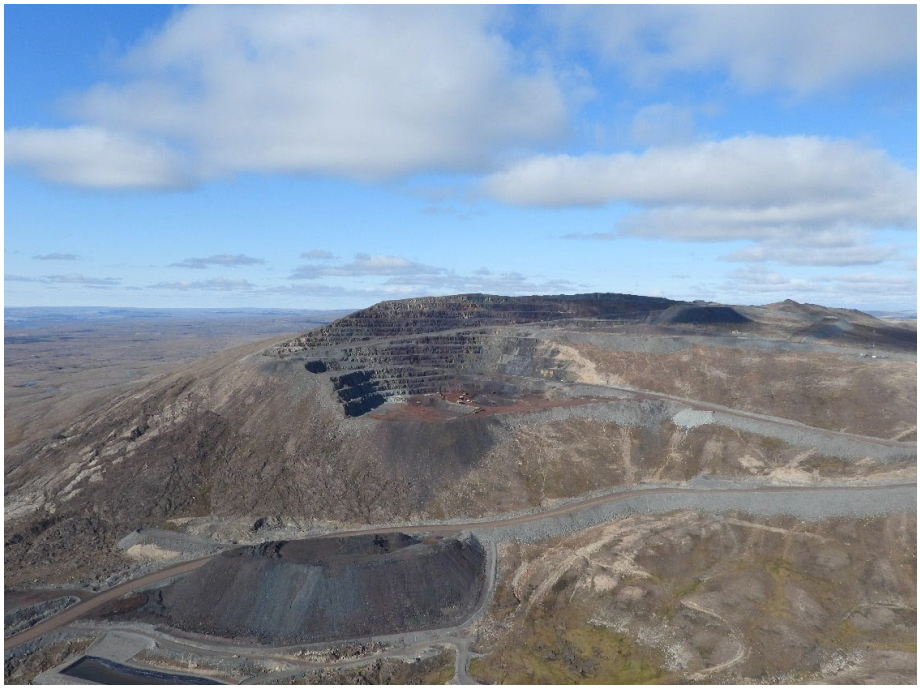


Aerial View of Deposit No. 1 (Nuluujaak Pit) and By-Pass Road (August 2025)

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Aerial View of Deposit No. 1 and the Mine Haul Road (August 2025)



Aerial View of Deposit No. 1 Nuluujaak Pit Wall and the Run of Mine Ore Stockpile Facility (August 2025)

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Aerial View of Deposit No. 1 Nuluujaak Pit Walls (August 2025)



470 Sump Surface Water Management Pond (August 2025)

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Aerial View of Cross-cut 570 Hill Side Road and 108 By-pass Road (August 2025)



Aerial View of Run of Mine Ore Stockpile Facility (August 2025)

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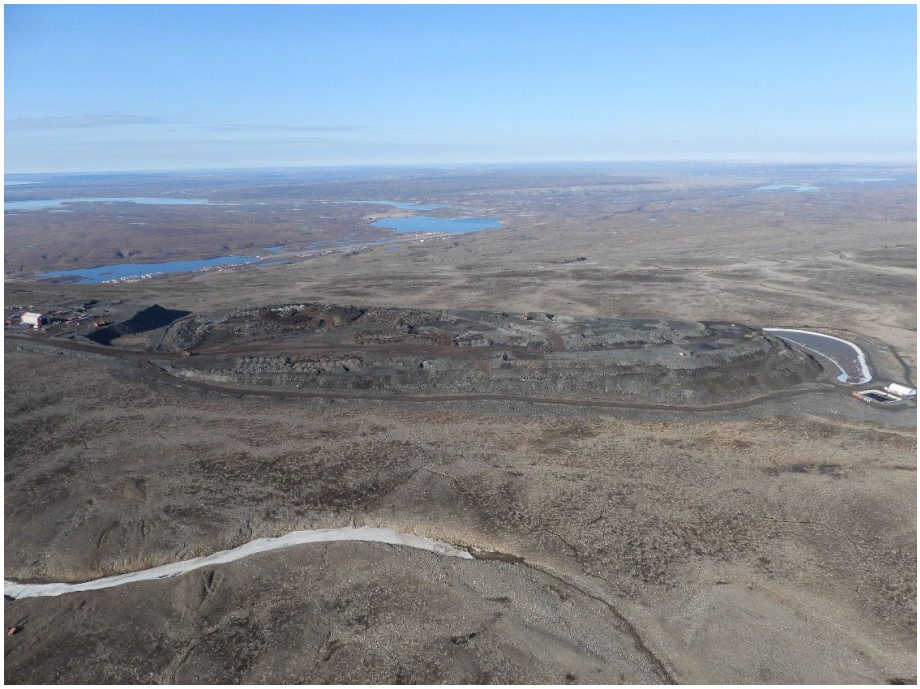


Aerial View of Run of Mine Ore Stockpile Facility (August 2025)



Aerial View of Waste Rock Facility (June 2025)

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Waste Rock Facility (August 2025)



Aerial View of Waste Rock Facility Surface Water Management Pond (MS-08) (September 2023)

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9

Waste Rock Facility Surface Water Management Pond (July 2025)



Mine Site KM105 Surface Water Management Pond (MS-11) (August 2025)

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Aerial View of Mine Site KM105 Surface Water Management Pond (MS-11) (June 2025)



Aggregate Filter Berm inside the KM 105 Surface Water Management Pond (MS-11) (August 2025)

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Aerial View of Magazine Access Road and Emulsion Storage (August 2025)



Aerial View of KM 104 Laydown (August 2025)

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Aerial View ofKM 105 Steensby Aggregate Pad Construction (April 2025)



Aerial View of Mine Site Crusher Facility (August 2025)

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Aerial view of Mine Site Non-Hazardous Waste Landfill and Landfarm Facility (August 2025)



Aerial View of Mine Site Quarry (QRM2) (August 2025)

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Aerial View of Mary River Airstrip (August 2025)

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MILNE PORT

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Aerial view of Milne Port (July 2025)



Aerial View of Ore Pad Facility (July 2025)

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Aerial view of West Ore Pad Surface Water Management Pond (MP-06) (July 2025)



Aerial View of East Ore Pad Surface Water Management Pond (MP-05) (July 2023)

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Aerial view of Freight Dock and B1 Pad (July 2025)



Aerial View of Bulk Fuel Storage Facility (MP-03) (August 2025)

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Polishing Waste Stabilization Pond (MP-01A) and Main Generators (July 2025)



Aerial View of Milne Port Accommodation, Port Site Complex (July 2025)

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Aerial View of Quarry (Q1) (June 2025)



Aerial View of the 380 Person Camp (July 2023)

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Aerial view of Landfarm (MP-04) and Contaminated Snow Berm (MP-04A) (July 2025)

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TOTE ROAD

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Aerial view of KM97 Bridge Crossing (July 2025)



Aerial View of KM80 Laydown and Bridge (July 2025)

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KM80 Bridge Crossing (July 2025)



Aerial View of KM 63 Bridge (June 2025)

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KM63 Bridge Crossing (July 2025)



Aerial View of KM17 Bridge with Flat Deck Truck Crossing (June 2025)

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STEENSBY CAMP

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Aerial view of Steensby Camp - unoccupied (July 2025)

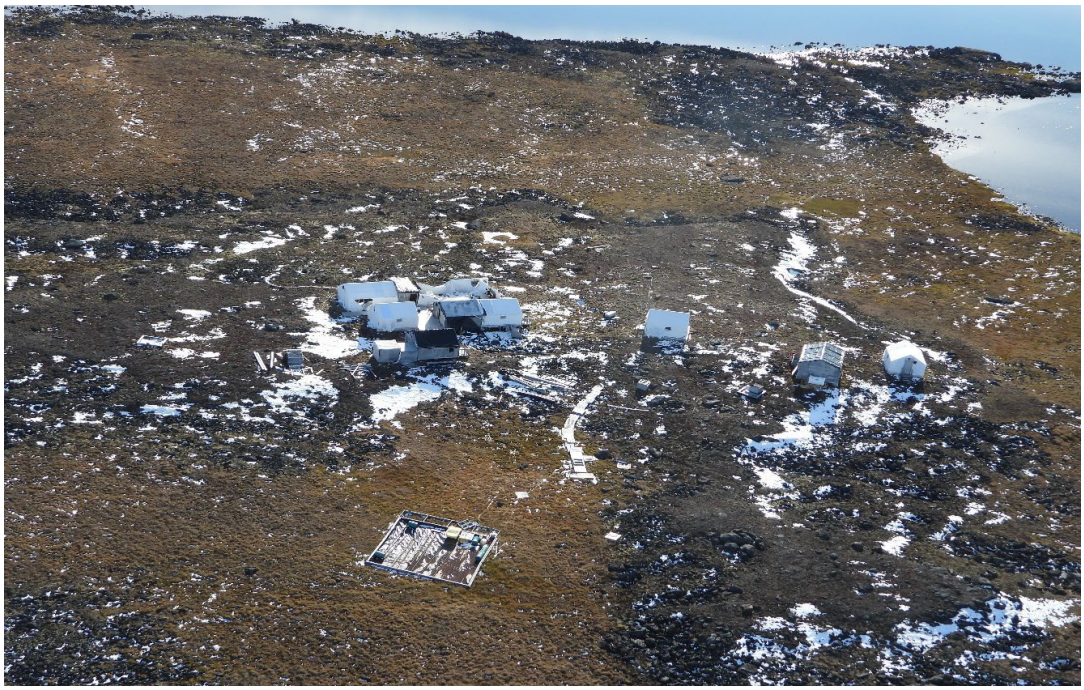


Aerial view of Steensby Camp – unoccupied (July 2025)

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MID-RAIL CAMP

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Aerial view of Mid-Rail Camp – unoccupied (September 2025)

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BIM-5200-PLA-0026 APPENDIX D1 - RECLAMATION RESEARCH PROGRAM - OPEN PIT RUNOFF WATER QUALITY

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TABLE OF CONTENTS

1. BACKGROUND 3

2. UNCERTAINTY 4

3. RESEARCH/STUDY OBJECTIVE 4

4. OVERVIEW OF TASKS AND PROJECT RESEARCH SCHEDULE 4

5. DETAILED DESCRIPTION OF TASKS AND FINDINGS OF RESEARCH COMPLETED 6

6. PROPOSED RESEARCH TASKS 1.2 TO 1.4 - OPEN PIT WATER QUALITY 9

7. LINKAGES TO OTHER RESEARCH/STUDIES 10

8. COSTS 10

9. REFERENCES 10

TABLE OF TABLES

Table 4.1: Overview of Tasks for Reclamation Research - Open Pit Runoff Water Quality 5

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1. BACKGROUND

This research plan outlines the schedule and pathway for assessing technical uncertainties and informing the ongoing development of the closure and reclamation plan specific to assumptions and planning regarding pit water runoff quality at closure. Items related to permafrost, hydrology and pit infilling are defined with Appendix D2 of this ICRP.

At the end of mining, the open pit will gradually fill with water from precipitation; the timeline for this to occur passively is estimated at 85 to 150 years, depending on annual precipitation, evaporation and other factors (Knight Piésold, 2008). Baffinland has since committed to reducing this time period using alternatives for enhanced flooding of the open pit (addressed under the “Open Pit Flooding Timeline” research program, Appendix D2).

AMEC (2012) developed water quality estimates for pit water for the final year of mining (Year 21), which were utilized as input in the water quality mass loading model under the assumption that, once the pit has filled, in each subsequent (post-closure) year all precipitation into the open pit will accumulate and that excess water will discharge via a spillway during the open water period according to the natural hydrograph.

The mass loading modelling indicated that Level I magnitude effects to water quality will occur under low flow conditions, with a calculated HQ between 1 and 10 for mercury, selenium and silver. It is noted that an HQ >10 was calculated for mercury within the F0 tributary, upstream of fish presence or habitat; however, since the assessment of water and sediment quality is based on fish as the receptor, the effects assessment considers the resultant water quality at fish habitat within the Mary River, where all parameters have an HQ value less than 10.

Based on pit water quality for Year 21 of mining, it is possible the water will have a pH of around 4.2, which is outside of the pH range of the MDMER (6.0 to 9.0) however the mass loading modelling carried out is based on conservative assumptions and Baffinland is continuing to study the geochemistry of waste rock and ore to further refine predictions and management plans, which this research plan outlines.

In addition, Baffinland has conducted further modelling to predict the pit water quality for early closure scenarios. The December 5, 2025 Water Balance and Water Quality Model (WBWQM) by Nunami Stantec Limited predicts that no pit lake will form during early closure scenarios. The mine will continue to function as a hillside excavation, and inflow to the Pit is expected to discharge through natural, gravity-driven drainage pathways rather than accumulate as a lake.

Recent modelling for the early closure scenario predicts that the pH of Pit drainage water will range between 6.79 and 7.60, which complies with the Water Licence range of 6.0 to 9.5. Furthermore, no metals concentrations are predicted to exceed the effluent discharge limits outlined in the Project's Type 'A' Water Licence (2AM-MRY2540) during any phase.

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2. UNCERTAINTY

Due to the early stage of project development and the fact only conceptual geochemical modelling (mass loadings assessment) has been completed to date, there is uncertainty with respect to the open pit water quality predictions.

Inflows to the open pit include: direct precipitation, runoff, groundwater inflow, and any enhanced flooding flows. Outflows include evaporation/sublimation, groundwater seepage discharge, and overflow discharge (once fully flooded). Chemistry of water in the open pit will be influenced by both the chemistry of the inflows, as well as the pit walls, residues from the mining process (blasting, etc.), and seasonal or temporary stratification of the water column into waters of differing chemistry and temperature (such as a chemocline or thermocline) that may be affected by bathymetry, climactic conditions, quality and temperature of inflows, wind, influence of permafrost, ice over (formation) and ice off (melting).

Note that water stratification is only a concern if a deep pit lake actually forms. Under the early closure scenario, water drains out immediately without pooling or mixing, meaning these chemical or thermal layers will not form.

3. RESEARCH/STUDY OBJECTIVE

This research plan aims to:

- improve predictions for water quality within the open pit during flooding operations and to inform decision making with respect to enhanced flooding alternatives, and
- to improve long-term water quality predictions for open pit (pit lake) effluent flows with respect to meeting applicable closure objectives and criteria in post-closure, and to assess the effectiveness of water treatment options in modifying open pit runoff water quality, if necessary.

4. OVERVIEW OF TASKS AND PROJECT RESEARCH SCHEDULE

Deep pit lakes are often subject to a stratification of the water column into waters of differing chemistry typically due to strong density gradients within the water due to salinity or temperature. While permanent stratification of the pit lake can result in the long-term storage of salts within the pit, a seasonal turnover of the lake could result in poor water quality conditions at certain times of the year.

Based on the predicted water quality within the lake and data collected from the site weather station, an assessment will be carried out to evaluate if the pit lake will likely be meromictic or if it will become seasonally stratified. In support to this evaluation, a focused review of scientific literature relating to meromictic pit lakes in cold regions was carried out. Further, analyses of the temperature gradients, wind conditions, precipitation, groundwater inflows, and other conditions will be carried out as site conditions allow (i.e. presence of an open pit) to evaluate the likelihood of the pit lake becoming stratified and subsequently becoming mixed.

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The following are an overview of the anticipated tasks required to obtain the study objectives; the objectives are general in nature and not explicitly linked to the tasks below. An indication on status of each task is provided and when warranted, anticipated commencement and/or conclusion dates. The anticipated timelines to complete Tasks D1.1 to D1.4 are presented in Table 4.1.

Table 4.1: Overview of Tasks for Reclamation Research - Open Pit Runoff Water Quality

Task #	Task	Reference Document	Status Anticipated Start and/or End Date
1.1	Establish initial water quality predictions and review relevant baseline conditions	FEIS Volume 7, Section 3.4 (Baffinland, 2012)	Completed
	Conduct literature review and analyze long-term predicted conditions to assess if permanent meromictic conditions are anticipated. - Should long-term meromictic conditions be anticipated, this characteristic should be incorporated into the open pit predictive water quality model. - Should it be possible to create long-term permanent meromictic conditions in the open pit, designs should be developed so that these measures could be incorporated into the ICRP if justified.	Golder, 2021	Completed
	Collect site weather data at the top of Deposit No. 1	Golder, 2021	Ongoing
1.2	Monitor water quality within the open pit, runoff to the open pit, groundwater surrounding the open pit, and other inflows to the open pit. Water quality data should be compared against the assumptions made in the initial water quality predictions. Follow up investigation of unknown sources of contaminants may be required. Results and collected data are to be presented in the research program progress reports within the annual report.	N/A	Onset of open pit dewatering activities to end of Project life
1.3	Update the pit water quality predictive model for early and final closure scenarios. 1. Early closure scenario: - Operational pit water quality predictions for the next 5 years (2025-2029) - Water quality predictions for an early closure scenario at the end of 2029, considering three	N/A	Early closure scenario: Completed on December 5, 2025. Final pit closure scenario

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Task #	Task	Reference Document	Status Anticipated Start and/or End Date
	different climate change scenarios for a 100-year period. - Comparison of water quality prediction for the early scenario against closure objectives and criteria (ICRP Rev 6 Table 5.1) - Evaluate water quality predictions against FEIS predictions and Type 'A' Waste Licence Discharge Criteria. 2. Final closure scenario - Development of a predictive water model for final pit closure - Modelling will include an assessment of the influence of filling time on open pit water chemistry (see *Appendix D2 - Open Pit Flooding Timeline*). - The development of source terms for the model (including pit wall geochemical parameters and inflow water quality) will be developed as part of this modelling exercise A risk assessment will be completed assessing the risks to wildlife from incidental contact with the pit water at predicted concentrations		developed within 5 years following start of operation of the Steensby Component.
1.4	If required, suitable contingencies should be identified and assessed for addressing long-term water quality.	N/A	Within 1 year of updating the water quality predictive model (only if required)

5. DETAILED DESCRIPTION OF TASKS AND FINDINGS OF RESEARCH COMPLETED

TASK 1.1 - PIT LAKE MEROMIXIS

Golder (2021) completed a literature review of pit lakes in northern climates. The scope of work included:

- Reviewing Baffinland's current ICRP and the planned closure scenario for the open pit
- Literature review for other examples of northern climate pit lakes and proposed pit lakes

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- Provide a high-level summary of factors to consider with respect to developing meromictic conditions within the pit lake in post-closure
- Recommend data collect and studies that could be completed during operations to further the understanding of pit lake conditions in post-closure at the Project

The literature review identified a previous study reviewing results from six pit lakes in northern Canada (Pieter and Lawrence, 2014), as well as pit lake predictive water quality modelling conducted by Golder for pits at the Ekati and Diavik mines (Northwest Territories) and the Meadowbank mine (Nunavut).

The Pieter and Lawrence (2014) study included three pit lakes at the Faro mine site (Yukon), two pit lakes at the Equity Silver Mine (Northern BC), and the Zone 2 pit lake at Colomac mine (Northwest Territories). The purpose of their review was to illustrate a variety of observed pit lake behaviour and factors that promote or inhibit meromictic conditions. Of the six pit lakes studied, two showed meromictic conditions of varying degree (Faro and Waterline) while the other four pit lakes were weakly stratified because of varying factors such as groundwater inflow (Zone 2), ongoing sludge and water management at site (Main Zone and Vangorda) and pit slope stability (Grum).

Golder's predictive modelling results for the three NWT/Nunavut pit lakes suggested that the pit lakes would fully mix at least once per year in the spring (some also in the fall) and to show weak meromictic conditions in the summer and winter months. This is a result of hydraulic connection between multiple pits, proximity to surface water bodies and consolidation of waste deposited at the bottom of the pits.

Pit lakes differ from natural lakes due to their small surface area, greater depth and typically brackish water which can result in the formation of permanent stratification known as meromixis (or meromictic conditions). Meromictic conditions form when the deeper water in the pit lake becomes sufficiently dense than surface waters to inhibit mixing of the water column, usually due to higher salinity water at depth. The separation between the upper less saline water (mixolimnion) and deeper more saline water (monimolimnion) is referred to as the chemocline. Even if meromictic conditions form, there is still the possibility of mixing or turnover within pit lakes. Factors that can enhance stability of meromictic conditions include:

- The relative depth of the pit lake (maximum depth divided by diameter of surface area)
- Pit lake salinity and ice cover
- Inflow salinity and volume

For most of the pit lakes presented in Pieters and Lawrence (2014), salinity stratification was predominantly driven by ice-melt and runoff. When surface water freezes, salt dissolved in the water is largely excluded from the ice. This can result in a density contrast between the ice-melt water in the spring and the underlying deep water which can promote and stabilize meromictic conditions within pit lakes.

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Salinity of runoff and groundwater inflow can also influence meromictic conditions and either increase or decrease stability of meromictic conditions depending on salinity of these inflows. This is shown in both the Pieters and Lawrence (2014) existing pit lake examples and in the modelled predictions presented in Golder (2018a, 2018b, 2019) where inflows, and even hydraulic connections between multiple pit lakes, can influence the development and strength of meromictic conditions.

Factors that can induce mixing within pit lakes, which weakens meromictic conditions, includes processes such as wind strength and direction, cooling of surface water and ice formation. During ice-free seasons, wind and surface cooling can drive upwelling or deeper mixing zones within pit lakes. Ice formation can weaken meromictic conditions if sufficient salt is excluded from the ice to raise salinity within the upper portion of a pit lake to similar concentrations as deeper parts resulting in mixing/turnover of the pit lake.

In summary, there are many factors to consider when assessing whether, and how strongly, meromictic conditions may develop within a pit lake. Information required to complete an assessment prior to closure can be collected from a site as the open pit is developed. Predictive modelling can then be completed using collected site data to help inform closure options.

The results of the literature review show that development of meromictic conditions can occur at northern Canadian sites depending on the site-specific conditions.

Recommended further studies:

- Further studies of site conditions should be completed to further assess the potential formation of meromictic conditions within the flooded pit post closure. Topography, pit bathymetry/dimensions, temperature, and wind direction/speed play a critical role in understanding potential for pit lake turnover and development of meromictic conditions.
- On-site data should be collected in the vicinity of the open pit and must include site weather, wind conditions, precipitation, and groundwater inflows and water quality to the open pit during operations. Ongoing geochemical characterization of waste rock can be used to understand the potential influence of the exposed pit walls on water quality at closure and during filling of the open pit at closure. This information will also support alternative pit filling strategies.
- Data collected from the on-site monitoring and geochemical characterization can be used to develop hydrodynamic and water quality models to predict pit lake stratification and water quality post-closure. These models would benefit from data and observations once the open pit has been developed and therefore, it is recommended that these tasks be initiated only after mining has progressed to a stage where the open pit has been at least partially developed.

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6. PROPOSED RESEARCH TASKS 1.2 TO 1.4 - OPEN PIT WATER QUALITY

No results have been provided yet as the mine has not advanced into the open pit stage. Ore has, to date, been extracted from the hillslope, rather than the future open pit. The following provides a detailed description of the work scheduled to be completed.

TASK 1.2 - WATER MONITORING AND COMPARISON AGAINST WATER QUALITY PREDICTIONS

The quality and flow of key inflows to the open pit should be monitored (or otherwise estimated) and compared against water quality predictions.

It is, however, not advised that runoff from the pit walls is used as an analogue for future water quality in the open pit. The chemistry of the pit wall runoff will differ from the longer-term pit wall runoff with respect to the proportions of various rock types that comprise the pit walls, the degree of weathering of those faces, and that samples will likely be impacted by other (potentially significantly larger) open pit inflows.

Current mining activities have not yet created a pit at Deposit No. 1, and the active mining area remains a hilltop outcrop. No additional information is available at this time to update the estimated fill time of the mine pit lake. A reclamation research program to evaluate the open pit flooding timeline is outlined in Appendix D2, however Tasks 1.1 and 1.2 under this program cannot be completed until an open pit has formed and active dewatering is occurring.

It is anticipated that the comparison of water quality monitoring results against water quality predictions will start five years following the operation of the full Project scope, which includes the Steensby Component. The comparison of water quality monitoring results is estimated to start in 20374, typically one year following the development of the predictive water quality model for the final pit closure scenario. It is planned that a detailed comparison will occur every 5 years, ideally in conjunction with the development of the ICRP and milestone security estimate. It is possible this timing may be adjusted as the model is developed (as described in the following task) depending on model results and feedback from regulators, landowners and stakeholders.

Should the measured chemistry or flow of any of the key pit inflows deviate significantly from predicted values over a 5-year basis, the water quality prediction model will be updated in light of the results of water quality modelling, and updates to the mine plan or geochemical analyses.

TASK 1.3 - UPDATE WATER QUALITY PREDICTIONS

Updating the water quality prediction requires the mine to be at a stage of development where representative field data can be collected to develop models and closure prediction scenarios. The following work is scheduled to be undertaken in conjunction with key mine development milestones

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(pit development initiation). The full schedule is available in Appendix D7, and consists of the following steps:

1. The early closure pit water quality model was completed on December 5, 2025. It evaluated operations, early closure, and post-closure under various climate and drought scenarios. The model confirmed that water quality will meet all Type 'A' Water Licence criteria.
2. Development of a predictive water model for final pit closure (model development to be initiated following completion of Steensby construction, with publication within five years following operation of the Steensby Component).
    a. Modelling will include an assessment of the influence of filling time on open pit water chemistry (see Appendix D2 - Open Pit Flooding Timeline).
    b. The development of source terms for the model (including pit wall geochemical parameters and inflow water quality) will be developed as part of this modelling exercise
    c. A risk assessment will be completed assessing the risks to wildlife from incidental contact with the pit water at predicted concentrations

These models will be used to inform security costing, pit development and water treatment (if required).

TASK 1.4 - WATER TREATMENT OPTIONS ANALYSIS

Water treatment alternatives will be considered if it is found that the predicted water quality in the Pit Lake (at initial discharge, or long term) is not anticipated to meet effluent water quality. Due to the 2025 early closure model predicting that water quality will naturally meet all Water Licence limits, active water treatment is not expected to be needed for early closure.

7. LINKAGES TO OTHER RESEARCH/STUDIES

This research will be linked to the research being completed regarding pit flooding timelines. Findings of waste rock stockpile runoff water quality reclamation research (Appendix D3) will be considered. Updates on prediction of open pit runoff water quality will be provided in future updates of the ICRP.

The full schedule for undertaking this work is contained with Appendix D7 of the ICRP.

8. COSTS

Cost are to be determined as scoping is still being undertaken.

9. REFERENCES

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BIM-5200-PLA-0026 APPENDIX D2 - RECLAMATION RESEARCH PROGRAM - OPEN PIT FLOODING TIMELINE

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TABLE OF CONTENTS

1. BACKGROUND 3

2. UNCERTAINTY 3

3. RESEARCH/STUDY OBJECTIVE 3

4. OVERVIEW OF TASKS AND PROJECT RESEARCH SCHEDULE 3

5. DETAILED DESCRIPTION OF TASKS AND FINDINGS OF RESEARCH COMPLETED 5

5.1 COMPLETED RESEARCH 5

5.2 PROPOSED RESEARCH TASKS 2.1 TO 2.4 – OPEN PIT FLOODING/FILLING RESEARCH RESULTS 5

6. LINKAGES TO OTHER RESEARCH/STUDIEs 7

7. COSTS 7

8. REFERENCES 7

TABLE OF TABLES

Table 4.1: Overview of Tasks for Reclamation Research – Open Pit Flooding Timeline 4

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1. BACKGROUND

Based on passive inflows alone (seepage into the pit, direct precipitation, and surface runoff), it is anticipated that the open pit will take an estimated 85 to 150 years to passively fill (Knight Piésold, 2008). The flooding of the open pit could be accelerated by pumping water from a nearby water source (i.e. accelerated flooding). At a conceptual level, four potential water sources have been identified: Sheardown Lake, Camp Lake, Mary Lake, and Mary River. It was estimated that withdrawal from these sources could reduce the flooding time to as little as 2 years (based on a total withdrawal of 10% of the annual volume, although this would require very specific and ideal conditions to achieve. Section 5.3.1.4 presents some preliminary assumptions and calculations regarding the enhanced pit infilling alternative. As active mining at Deposit 1 remains a hilltop outcrop, and development of an open pit is not anticipated until at least 2034 (based on current development), refinements of the feasibility of potential pit filling scenarios will be provided in future versions of the ICRP based on outcomes of reclamation research and studies prior to the development of the open pit.

2. UNCERTAINTY

With respect to natural, passive flooding, the rate of groundwater inflow is the primary source of uncertainty with respect to open pit flooding time prediction.

With respect to the enhanced flooding schemes, the primary source of uncertainties are:

- the chosen methods of pumping and water withdrawal;
- the maximum permissible rate of water taking from the water sources; and
- the practical limits of pumping water from those sources to the open pit (feasibility and financial viability).

The potential impacts of pit infilling on the permafrost regime in the local area is a source of uncertainty that is relevant to natural pit infilling as well as enhanced flooding scenarios.

3. RESEARCH/STUDY OBJECTIVE

The goal of this program is to better assess the timelines for open pit flooding for both natural flooding and the enhanced pit infilling alternative and develop a flooding program that will meet closure objectives and criteria in post-closure within an appropriate timeline relative to the proposed monitoring.

4. OVERVIEW OF TASKS AND PROJECT RESEARCH SCHEDULE

Pit infilling time is a key parameter that affects proposed closure scenarios and timeline. There have been two pit infilling scenarios, a passive groundwater filling scenario and an active pump based infilled scenario in which nearby water bodies would be used as a water source to accelerate pit infilling. To ascertain which of these methods is better suited to the proposed reclamation plan, a

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research program will be undertaken to understand the preferred infilling method. The key tasks of the program are as follows:

- Updating the accuracy of the open pit flooding timeline under passive conditions.
- Assessing the potential water sources for enhanced pit infilling in greater detail and increase the accuracy of the enhanced pit infilling timelines.
- Enhancing the understanding of the impacts of the pit flooding time on the overall closure plan and monitoring timeline.
- Understanding the potential impacts of pit flooding on the permafrost regime near the pit.

The following are an overview of the anticipated tasks required to obtain the study objectives; the objectives are general in nature and not explicitly linked to the tasks below. An indication on status of each task is provided and when warranted, anticipated commencement and/or conclusion dates. The anticipated timelines to complete anticipated tasks are presented in Table 4.1.

Table 4.1: Overview of Tasks for Reclamation Research – Open Pit Flooding Timeline

Task #	Task	Reference Document	Status Anticipated Start and/or End Date
2.1	Establish initial flooding time estimates.	KP, 2008	Completed
	Monitor mine dewatering flow rates.	N/A	(2034-Life of Project)
	Use mine dewatering flow rates to update mine flooding model to estimate passive (natural) flooding time.	N/A	Initial assessment in 2036, follow-up assessment in 2039 and every 5 years thereafter.
2.2	Assess regional hydrology flows and retention times in each potential water source.	N/A	Completion in 2034
	Evaluate maximum allowable water taking with respect to protection of aquatic life.		
	Feasibility assessment of practicality of pumping from each water source.		
	Estimated flooding times from each water source to be updated using mine flooding model.		
2.3	Review the impacts of natural and enhanced open pit flooding on the mine closure activities and monitoring with MCTAG.	N/A	Task to commence following completion of Tasks 2.1 and 2.2. Estimated length of 3 years
2.4	Assess the impacts of pit flooding on the permafrost regime surrounding the pit.	N/A	Task to commence following completion of Tasks 2.1 and 2.2.

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Task #	Task	Reference Document	Status Anticipated Start and/or End Date
			Estimated length of 3 years

5. DETAILED DESCRIPTION OF TASKS AND FINDINGS OF RESEARCH COMPLETED

5.1 COMPLETED RESEARCH

Initial predictions for filling times (natural and enhanced) have been previously estimated, as described in Section 5.3.1.4. As the pit will not be formed until 2034 and no significant dewatering has yet occurred, research has yet to be completed for this closure item. Additional research that is to be carried out will be reported in the QIA-NWB Annual Report for Operations and in future updates of the ICRP.

5.2 PROPOSED RESEARCH TASKS 2.1 TO 2.4 – OPEN PIT FLOODING/FILLING RESEARCH RESULTS

The following provides a detailed description of the work scheduled to be completed.

TASK 2.1 - PIT FLOODING TIMELINE PREDICTIONS (PASSIVE CONDITIONS)

To better understand the rate of natural flooding of the open pit, pit dewatering flows (monthly volumes) will be recorded throughout operations to provide an estimate of the overall net inflows to the open pit, including all inflows (groundwater inflow, direct precipitation, and runoff) and outflows (evaporation and seepage).

It was previously estimated that natural flooding would take between 85 and 150 years (Knight Piésold, 2008). Using the open pit dewatering flows as a basis of calibration, this estimate can be refined at a later time.

To complete this task, pumping records and data from the site weather station will be recorded during operations. The pit flooding model will then be updated with acquired site data.

TASK 2.2 - ASSESSMENT OF POTENTIAL WATER SOURCES / ENHANCED FLOODING

Assisted pit filling is governed by two parameters – technical limitations that drive pumping costs, and water source locations/drawdown limits. Costs are driven by materials and equipment required for the operation (e.g., heat traced piping, pumps, generators, and fuel requirements) as well as the construction and maintenance of the necessary roads and berms. Pumping water to the pit is uphill and therefore significant elevation head will provide technical challenges to any pumping design.

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Water source drawdown limits are designed to ensure that the volume of water extracted from a given source has minimal impact on the aquatic ecosystem. Key factors to consider when calculating maximum acceptable drawdown of a lake include issues such as the potential disturbance of spawning habitat, as well as the residency time of the water body.

To better understand alternatives for enhanced pit filling, the following steps are planned:

- A desktop review of regional hydrological and potential spawning habitat data will be conducted to support the development of waterbody-specific assessments for the maximum allowable water taking rate
- A feasibility level engineering assessment will be carried out for pumping water from each of the potential water sources to confirm the feasibility of each alternative
- The estimated flooding times will be updated for each enhanced flooding scenario

TASK 2.3 - ENHANCING THE UNDERSTANDING OF THE IMPACTS OF THE PIT FLOODING TIME ON THE OVERALL CLOSURE PLAN AND MONITORING TIMELINE

Following the completion of Tasks 2.1 & 2.2, the integrated schedule of closure activities would be reviewed considering the updated natural and enhanced flooding scenarios and summarized for discussion with the Mine Closure Technical Advisory Group (MCTAG). The flooding timeline would also impact post-closure monitoring durations at the open pit and down gradient areas.

TASK 2.4 - UNDERSTANDING THE POTENTIAL IMPACTS OF PIT FLOODING ON THE PERMAFROST REGIME NEAR THE PIT

The topic of the impacts of flooding on the pit (either passive or active) has been raised during discussions with regulators, landowners and stakeholders. It is possible that flooding could have impacts on permafrost, so to investigate these potential impacts Baffinland is proposing a multi-step research program to determine the factors in play and how each flooding scenario (including after the pit lake is stable) interacts with permafrost at the areas adjacent to the pit site. It is anticipated that this program will consist of the following steps:

- A literature review of applicable papers and site information to inform the assessment of flooding on permafrost within the pit area.
- A qualitative assessment of selected closure scenarios on permafrost regimes.
- If required, design and conduct a quantitative assessment of the potential impacts of permafrost regime. This could include the following:
    - Installation of additional thermistors
    - Development of a thermal model
    -

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6. LINKAGES TO OTHER RESEARCH/STUDIES

This research will be linked to the research being conducted on open pit water quality as described in Appendix D1.

7. COSTS

Costs are to be determined as scoping is still being undertaken.

8. REFERENCES

Knight Piésold Ltd., 2008. Technical Memorandum: Mary River Project – Estimated Time for Open Pit to Fill with Water (Deposit No. 1). Ref. No. NB08-00868, September 8.

Golder Associates Ltd. (Golder), 2021. Technical Memorandum: Baffinland Iron Mines Mary River Project: Pit Lake Literature Review. Ref. No. 20446413-10000-Rev0, March 15.

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BIM-5200-PLA-0026 APPENDIX D3 - RECLAMATION RESEARCH PROGRAM - WASTE ROCK FACILITY SEEPAGE/RUNOFF WATER QUALITY

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TABLE OF CONTENTS

1. BACKGROUND 3

2. UNCERTAINTY 3

3. RESEARCH/ STUDY OBJECTIVE 4

4. OVERVIEW OF TASKS AND PROJECT RESEARCH SCHEDULE 5

4.1 TASK 1 - MONITOR DRAINAGE FROM WRF 5

4.2 TASK 2 – MONITORING OF ROCK PLACEMENT UNDER AMBIENT FIELD CONDITIONS (REPLACES FIELD TEST PADS) 5

4.3 TASK 3 - GEOCHEMICAL / WATER QUALITY MODELLING 5

5. OVERVIEW OF TASKS AND SCHEDULE 6

6. FINDINGS OF RESEARCH COMPLETED 7

7. LINKAGES TO OTHER RESEARCH/STUDIES 12

8. COSTS 12

9. REFERENCES 12

TABLE OF FIGURES

Figure 6.1: Concentrations Over Time in WRF Runoff and Seepage for Selected Parameters . 8

Figure 6.2: WRF Pond – Time Series Model Results for Sulphate and Nickel 9

TABLE OF TABLES

Table 5.1: Overview of Tasks for Reclamation Research - WRF Water Quality 6

Table 6.1: Acid Generation Potential Criteria Field Classification – Baffinland Mary River Site 10

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1. BACKGROUND

The areas under consideration for the purposes of this research program include:

- Waste rock stockpile (referred to as the Waste Rock Facility, WRF)
- Perimeter ditch system around the WRF
- WRF Pond

Runoff from the WRF is collected by the perimeter ditches and directed towards the WRF Pond for management. An additional inflow from the Deposit 1 sump is pumped to the WRF Pond.

The Water Treatment Plant (WTP) is not included in the current evaluation, however the results of the research program will provide insight as to what if any water treatment may be required, and the duration of this treatment.

Geochemical characterization of the WRF was initially provided in the Final Environmental Impact Statement (FEIS) (AMEC Environment & Infrastructure, 2012) with subsequent evaluation completed as described in WSP, 2024. The results of the geochemical assessment indicate that, in the absence of appropriate mitigation, a small proportion of the rock has potential for generation of acidity through oxidation or release of acidity through dissolution of soluble sulphate minerals. For this reason, PAG waste rock, and non-PAG waste rock are handled as separate streams and are placed in zones within the Waste Rock Facility. PAG material will be effectively encapsulated in non-PAG material and frozen.

In order to mitigate oxidation and subsequent release of acidity and metals, the deposition strategy for the waste rock area is to promote permafrost aggradation. Studies of waste rock in permafrost demonstrate that permafrost forms an effective long-term barrier to water and oxygen, thereby preventing significant oxidation of sulphidic waste rock located below the surficial active zone which is subject to seasonal freeze-thaw. Further, based on the geochemical characterization the closure strategy has been refined to focus on thin-lift deposition in the WRF to promote rapid freezing (within two summer seasons). This is expected to limit migration of water and metals from the pile. Following closure, generation of ML/ARD is not anticipated. Some seepage and drainage is still anticipated to discharge from the active layer and from portions of the waste rock pile where permafrost aggradation may not have occurred.

2. UNCERTAINTY

The focus of this reclamation research program is on addressing the physical aspects of the WRF with respect to further understanding and refining water quality from the WRF at closure. Aspects of this program have been underway for several years. Water quality monitoring of seepage from the WRF has been ongoing since 2015. In lieu of developing a field test pad and additional humidity cell testing it was determined that detailed study of the existing WRF would provide substantial additional field-scale information better than what could be determined through field-scale test pads. As such, a

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detailed waste rock evaluation program is ongoing and includes thermal monitoring, water quality monitoring, geochemical testing and waste placement tracking as is summarized in WSP 2024. A water balance was prepared in 2019 (Golder 2019a) to estimate surface water flows generated over the WRF footprint for the period of January 2020 – September 2021 and provided inputs to the WRF water quality model (Golder 2019b). Baffinland has gained some experience at this point with operation of the facility and resultant water quality. An update to both the water balance and water quality model was completed in 2023 (WSP 2024).

There remains a level of uncertainty as to the final composition of waste rock within the WRF over the life of mine; the composition may vary with respect to the proportion of waste rock by lithology, geochemistry, and the associated seepage/drainage conditions. Climactic conditions as well as thermal conditions within the pile can affect the rate of chemical release and reactions, permafrost development creating low permeability conditions in an otherwise free draining media. The wetting-up time may impact the time for precipitation to report as seepage.

To further refine the closure strategy and better understand implications with respect to water quality the following uncertainties are to be considered as part of this research plan:

- Implications of thin lift deposition on thickness of the active zone and timing of freezing of materials
- Influence of oxidation on upper active zone on downstream water quality under the updated mitigation conditions
- Influence of open pit pumping and runoff on pond water quality
- Influence of climatic conditions and flows on water quality
- Influence of updated geochemical source terms on water quality

There is uncertainty with respect to the results from the modeling, and further uncertainty with respect to downstream and receiver implications should the model results return values that are unexpected or that are above current EIS predictions. Should this be the case then additional downstream data collection and modeling would be required in order to understand the full implications of the project at closure. In addition, as more information becomes available, water quality modelling is expected to be updated periodically.

3. RESEARCH/ STUDY OBJECTIVE

This research plan is designed to improve understanding of the expected performance of the WRF closure concept to confidently characterize predicted waste rock effluent discharge quality and assess if WRF seepage water quality can be expected to meet closure objectives and criteria (MDMER, CCME PAL) in post-closure.

Specific objectives include:

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- Determination of quantity of WRF runoff and seepage that can be expected post-closure.
- Determination of quality of WRF runoff and seepage that can be expected post-closure.
- Greater understanding of the thermal evolution of the WRF and permafrost development to determine impact on geochemical reactions and, therefore, seepage water quality.

4. OVERVIEW OF TASKS AND PROJECT RESEARCH SCHEDULE

The following is an overview of the anticipated tasks required to obtain the study objectives; the objectives are general in nature and not explicitly linked to the tasks below. An indication on status of each task is provided and when warranted, anticipated commencement and/or conclusion dates.

4.1 TASK 1 - MONITOR DRAINAGE FROM WRF

Water quality should be monitored at selected locations around the WRF. Where seepage can be reliably associated with a particular area of the WRF, careful records should be kept of the schedule, volumes, and lithology of waste rock that is deposited in that area.

4.2 TASK 2 – MONITORING OF ROCK PLACEMENT UNDER AMBIENT FIELD CONDITIONS (REPLACES FIELD TEST PADS)

A previous iteration of this reclamation research program identified field test pad construction and monitoring, however this is no longer proposed since site-specific data is now available that is more representative of the actual materials mined on site and is not be subject to sampling uncertainties anticipated in developing the correct materials for a field cell test program.

A detailed geochemical review of conditions in the WRF was conducted in 2019 through 2024. The existing WRF was instrumented with thermistors, oxygen sensors, piezometers (vibrating wire plus standpipes). Seepage, runoff oxygen consumption, and thermal conditions were documented (WSP 2024). Locations were defined where exposure duration was known, logged and sampled in lifts to determine potential depth of oxidization over time. The program completed was more comprehensive in scope and provided substantial information better than would otherwise have been attainable from field test pads, as such the test pads were determined to be unnecessary, and it is instead proposed to continue with ongoing monitoring of the WRF (Task 1) and to re-evaluate the pile based on updated observed conditions and geochemical sources periodically.

4.3 TASK 3 - GEOCHEMICAL / WATER QUALITY MODELLING

With regards to modelling, the detailed test work completed, combined with supplemental and operational sampling provides suitable data with which to support geochemical and water quality modelling. Results from the current study areas can be extrapolated to the overall WRF. As a first step, the existing WRF pad was studied for basic hydrogeologic function through installation of vibrating wire and standpipe piezometers with an aim to resolve the effects of wetting-up time and advancement of permafrost (see also Research Program: Waste Rock Thermal Modelling Appendix

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D4). Subsequently, seepage was analysed and continues to be monitored with respect to chemistry, making allowances for composition of the waste rock pile, thermal conditions, and hydrogeologic function. Seepage over time was evaluated in conjunction with implementing thin lift deposition around the pile edges and on-top of the pile. This information now needs to be addressed in an updated geochemical and water quality model which projects to closure conditions which will be the subject of ongoing work.

The model will consider available climactic conditions (based on updated site weather data), mine production data, geochemical assays, and thermal conditions. The model will then be calibrated based on the detailed measurements of size, placement locations/patterns using the leachate from the WRF considering the monitored locations of the WRF. Water quality predictions will then be compared against the relevant criteria.

The model will be constructed with two separate time scales/domains to better inform potential closure scenarios. A Near Term (or unexpected) closure scenario will be developed first (slated for completion in 2032), which has been added to the research program to address review comments regarding water treatment in an unexpected closure scenario. A Life of Mine model will be developed (slated for completion in 2037) to address uncertainties and quantify the expected long term water quality from the WRF.

Should additional studies be required, recommendations for these studies would be included within the Reclamation Research Progress Reports. Depending on the results of the comparison this may include extending the water quality modeling.

5. OVERVIEW OF TASKS AND SCHEDULE

The anticipated timelines to complete Tasks 1 to 3 above are presented in Table 5.1.

Table 5.1: Overview of Tasks for Reclamation Research - WRF Water Quality

Task #	Task	Reference Document	Status or Anticipated Start and/or End Date
3.1	Monitor drainage water quality from WRF. Conduct periodic focused review of seepage quality monitoring results to predicted leachate values.	N/A	Ongoing for life of Project

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Task #	Task	Reference Document	Status or Anticipated Start and/or End Date
3.2	Monitoring of thermal conditions, geochemistry and rock placement under ambient conditions. This is coupled with the tasks for D3.1 and includes review of instrumentation in combination with seepage water quality results. This work will inform the project about projected drainage quality and water quality modelling assumptions under site-specific cold climate conditions. This information will be periodically reviewed for any significant divergence from expected conditions.	Phase 1 Waste Rock Management Plan (BAF-PH1-830-P16-0029)	Designed/constructed in 2019. Updated in 2023, and Monitored from 2019 through the Life of Project
3.3	Geochemical and Water Quality Modelling. Modelling, interpretation and documentation of monitoring results updated to include closure and post-closure conditions. Updated periodically to assess confidence if WRF runoff water quality is expected to meet closure objectives and criteria (MDMER, CCME PAL) in post-closure.	N/A	Model constructed for near-term closure scheduled for 2032 Model constructed for Life Of Mine scheduled for 2037, then updated every 10 years

6. FINDINGS OF RESEARCH COMPLETED

Water quality monitoring

Seepage from the WRF has been monitored as part of regular site operation. In the summer of 2017, seepage conditions from the WRF were found to be more acidic than was anticipated. A water treatment facility was installed to address short-term issues with respect to water quality. Following implementation of changes to operational practices (thin lift deposition and maintaining PAG deposition zones an appropriate distance from the pile edge) water quality improved in the seepage and runoff. When considering the dataset from 2018 onwards a trend of increasing pH values and associated decreasing concentrations of key parameters can be observed (Figure 1). The figure shows that pH values below 4.5 were not observed following 2019. Lower concentrations were observed in the last full year of data (2022) for the seepage and runoff from the WRF: the pH ranged from 6.3 to 8; zinc and nickel concentrations ranged from 0.00056 to 0.24 mg L-1 and from 0.003 to 0.048 mg L-1, respectively (both below MDMER limits); and the sulphate concentrations were between 15 to 2413 mg L-1. Details are provided in WSP 2024. The information provides a valuable understanding of conditions associated with operational decisions as well as influence of input chemistry/rock types on expected discharge chemistry.

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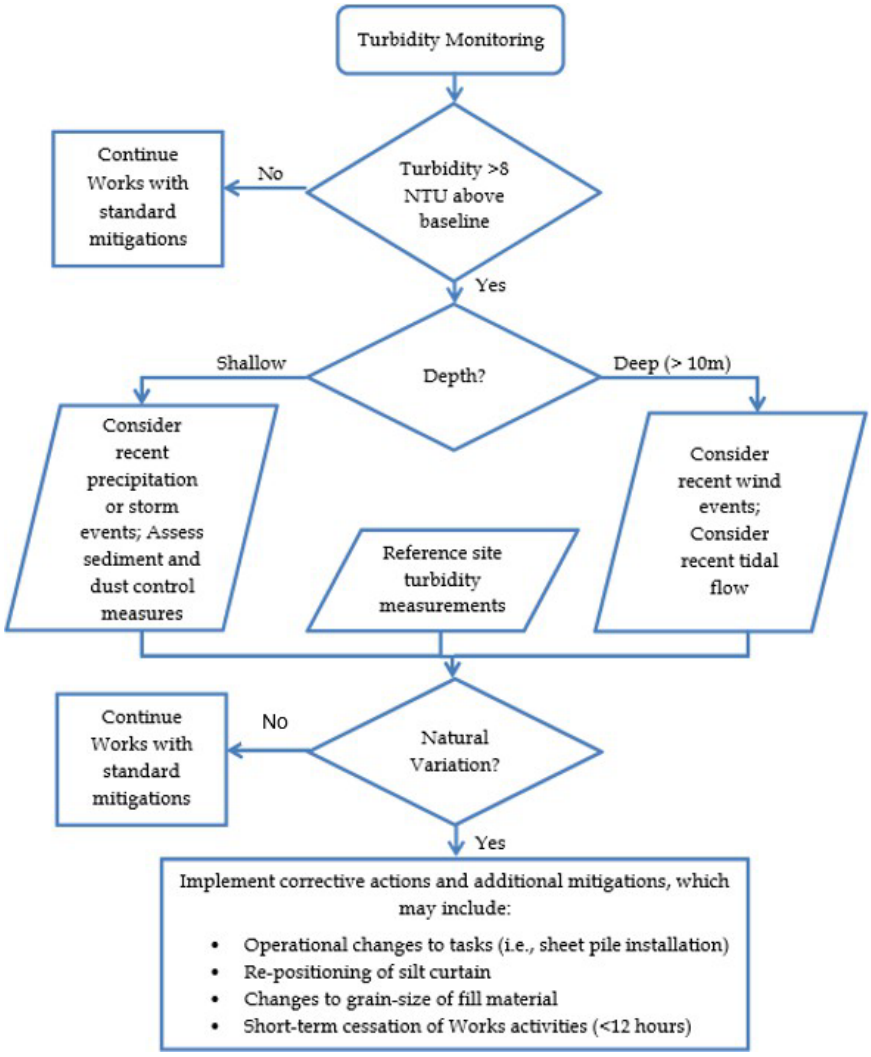


Figure 6.1: Concentrations Over Time in WRF Runoff and Seepage for Selected Parameters

Water Quality Modelling

An update to both the water balance and water quality model was completed in 2023 (WSP 2024). An updated water quality model for the period up to 2026 was prepared based on collection and analysis of the instrumentation data (thermistor, oxygen sensor, and geochemical samples) as available through 2022 (WSP, 2024). The water quality model was used to predict runoff concentrations through to 2026 based on the current mine plan and water balance. The model assumed that flow from the WRF only occurs via direct runoff or as shallow interflow within the waste rock active layer as was confirmed through thermal measurements which show aggradation of permafrost in the basal layer of the WRF. Water that infiltrates the WRF becomes frozen due to permafrost aggradation and seepage

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is limited to shallow interflow near the margins of the WRF which is captured, along with runoff, in collection ditches. The model was calibrated to the observed water quality trends within the WRF runoff with the primary focus on predicting average yearly nickel concentrations as nickel was identified as the primary parameter of concern.

Based on the updated input conditions as observed through 2022, the water quality model predicted neutral pH values (6.6 – 7.4) and concentrations of nickel (median value of 0.1 mg/L) below the MDMER criteria (0.5 mg/L) at the WRF pond. The change in model results and improvement in pH and nickel concentrations between 2019 and 2022 can be attributed to Baffinland's efforts to encapsulate exposed PAG waste rock with non-AG and minimize exposure times for PAG rock. Figure 2 provides the model results for key parameters sulphate and nickel. Building on the existing water quality model, an updated model is required to evaluate potential closure conditions.

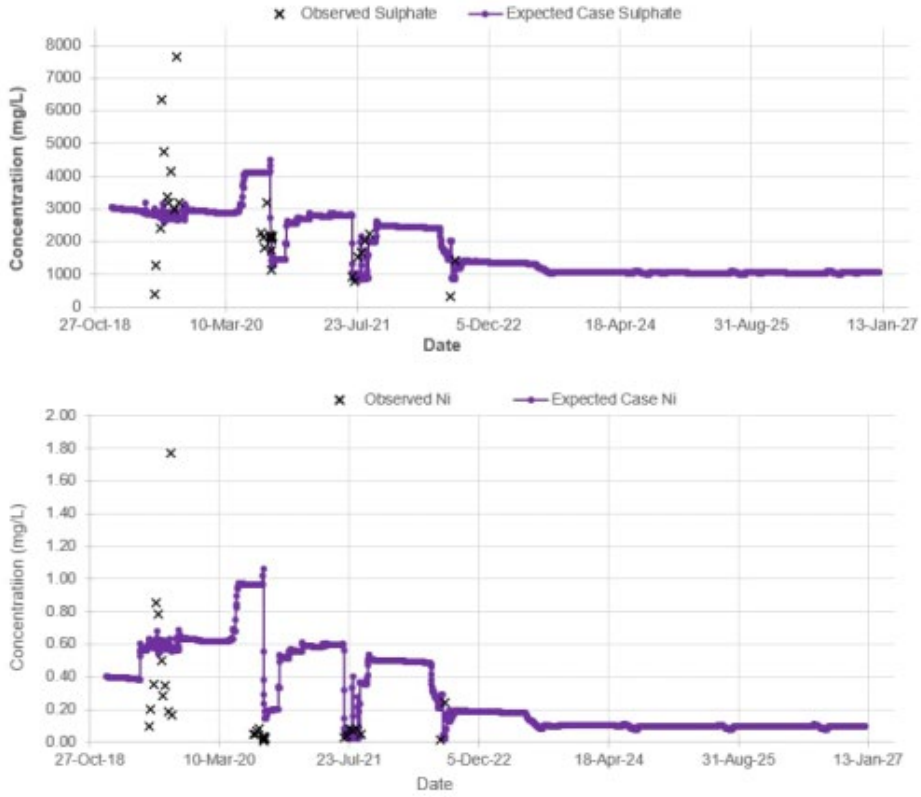


Figure 6.2: WRF Pond – Time Series Model Results for Sulphate and Nickel

Geochemistry monitoring program

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For Deposit No. 1, the current field methodology for geochemical characterization involves testing of drillhole cuttings from each blasthole and measuring the paste pH and total sulphur content. The field classification system was updated in 2019 to consider the possible presence of soluble sulphate minerals (e.g., melanterite) that were observed in portions of the deposit (Golder 2019b) by adding paste pH as an additional criterion. Material where total S is greater than or equal to 0.2 wt. % Total S or if paste pH is less than 6 the material is treated as PAG. Table 6.1 provides a summary of the current field classification criteria.

Table 6.1: Acid Generation Potential Criteria Field Classification – Baffinland Mary River Site

Acid Generation Potential	Criteria
Treat as Potentially Acid Generating (PAG)	Total sulphur >= 0.20 wt% as S
Treat as Potentially Acid Generating (PAG)	Total sulphur < 0.20 wt% as S and paste pH <=6
Treat as Non-Potentially Acid Generating (Non-PAG)	Total sulphur < 0.20 wt% as S and paste pH > 6

The 2023 geochemistry update report provides an evaluation of the results of the ongoing geochemistry monitoring program and is based on a review of results of geochemical sampling completed from 2020 through 2022 (WSP, 2024). The evaluation includes a review of 8,603 blasthole drill cutting samples with on-site measurements of total sulphur and paste pH and a review of results from a subset of 395 split samples that underwent both field testing (pH and total sulphur) and analytical laboratory testing which also included acid-base accounting (ABA) analysis. The use of total sulphur, as well as the combination of total sulphur plus sample pH (or paste pH) was evaluated for use in on-site classification as compared to the Neutralization Potential Ratio (NPR) developed through full ABA test work. Site water quality measurements were also reviewed for potential metal leaching and acidity trends.

Key conclusions from the completed review and analysis are as follows:

Field vs. Analytical results:

- A review of sample results from on-site analysis and analytical laboratory testing shows good agreement for total sulphur analysis and paste pH analysis between field analysis and off-site analytical analysis, indicating that the results of field analysis of total sulphur and paste pH are reasonable for decision making purposes. It is also considered that x-ray fluorescence (XRF) for analysis of total sulphur is a valid method for use in classifying the waste materials in the field.
- Total Sulphur and ABA results / review of sample representativeness / uncertainty:
- Considering the dataset of 8,603 on-site analysis of paste pH, of the 8,603 samples 0.4% of samples (33 samples) had some associated acidity (paste pH values of less than 6) and were

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distributed near the ore zones. Possible causes of low pH in the absence of elevated total sulphur include stored oxidation products, or soluble sulphate minerals.

- Baffinland currently segregates waste rock material as PAG and Non-AG using a total sulphur cut-off of 0.20 wt% as S and paste pH greater than 6. The uncertainty when using 0.2% S as an analogue for NPR of less than or equal to 2 is approximately 0.5%, with 0.51% of samples being incorrectly categorized as Non-PAG based on the recent ABA data collected. This recent ABA data continues to support the use of the 0.2 wt% Total Sulphur criteria (and the recently added paste pH criteria of 6) as being a suitable analogue for NPR of less than or equal to 2.
- When further considering potential soluble sulphate mineral misclassification, when considering that only about 0.38% of materials contain soluble sulphate based on overall paste pH measurements, and a misclassification rate of 0.51%, only 0.002% of rock placed in the WRF with soluble sulphate minerals has some potential of being incorrectly managed.
- A review of the available on-site water quality data indicates that misclassification and misplacement of materials with stored acidity in areas where this material should not be placed is not appreciable, as is exemplified by the improvement in WRF water quality observed on site.
- Leachate Chemistry from lab testing and on-site site runoff and seepage measurements:
- There has been an observed improvement in on site water quality with an observed increase in pH and decrease in metals concentrations from 2018 through 2022. All 2022 measurements of on-site runoff and seepage were of neutral pH with no exceedances of the MDMER guideline values with the exception of total suspended solids.
- It is considered that the proper use of the waste rock screening criteria coupled with updated rock management practices is resulting in the observed improvement in water quality on-site.
- The on site testing shows that a very small proportion (<0.4%) of waste materials have stored acidity or potential for acidification due to oxidation.
- Operational procedures currently appear to be effective in reducing and managing ARD/ML on site based on the 2022 observed on-site runoff and seepage chemistry.

The geochemical results from SFE testing and on site water quality analysis indicate that the overall waste rock pile design and placement, as presented in the previous WRMPs (including use of thin lifts to promote freezing and placement of Non-AG material around the edges of the pile), are reasonable and appropriate to reduce potential for acid generation and metal leaching. Regular operational monitoring and material segregation is still required to confirm the future geochemical performance of the WR, however based on low potential rock misclassification rates, coupled with on-site observations of seepage and runoff water quality from 2020 through 2022 that show improving water quality over time, the current waste rock segregation criteria is considered reasonable and appropriate.

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7. LINKAGES TO OTHER RESEARCH/STUDIES

Predicted leaching rates for various waste rock lithologies will be shared between this study and the Open Pit Runoff Water Quality research program (Appendix D1).

The thickness of the active layer from the waste rock thermal modelling will be considered in the development of the waste rock runoff water quality predictions.

Regular updates on waste rock characterization and prediction of runoff water quality will be provided in future updates of the Life-of-Mine Waste Rock Management Plan (BAF-PH1-830-P16-0031) and ICRP.

8. COSTS

Costs are to be determined as scoping is still being undertaken.

9. REFERENCES

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BIM-5200-PLA-0026 APPENDIX D4 - RECLAMATION RESEARCH PROGRAM - WASTE ROCK THERMAL MODELLING

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TABLE OF CONTENTS

1. BACKGROUND 3

2. UNCERTAINTY 3

3. RESEARCH/STUDY OBJECTIVE 3

4. OVERVIEW OF TASKS AND PROJECT RESEARCH SCHEDULE 3

5. DETAILED DESCRIPTION OF TASKS AND FINDINGS OF RESEARCH COMPLETEd 4

5.1 TASK 4.1 - THERMISTOR DATA COLLECTION 4

5.2 TASK 4.2 - THERMAL MODEL DEVELOPMENT - WRF 5

5.3 TASK 4.3 - THERMAL MODEL DEVELOPMENT - LANDFILL 5

5.4 FINDINGS OF RESEARCH COMPLETED 6

6. LINKAGES TO OTHER RESEARCH/STUDIES 10

7. COSTS 10

8. REFERENCES 10

TABLE OF FIGURES

Figure 5.1: WRF Thermistors 8

Figure 5.2: Landfill Thermistors and Sampling Stations 9

TABLE OF TABLES

Table 4.1: Baffinland's Regulatory Approvals 4

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1. BACKGROUND

Thermal analyses of the waste rock facility (WRF) to predict the long-term distribution of permafrost within the dump will be required, as this will have a bearing on post-closure water quality of seepage from the stockpile. The heat transfer processes can be simulated with available computer models; however, none of the models can confirm that permafrost will develop within the stockpile without more reliable input data regarding the method of placing the waste rock and the resulting properties of the waste rock in the stockpile. In addition, it will be important to compare the thermal analyses against existing case histories including the Nanisivik mine.

Currently there is a 2-D thermal model that is used by Baffinland to confirm thermal assumptions and place material within the WRF to best promote fast permafrost aggregation (WSP, 2024a), and a 1-D thermal model that is used to assess long term climate change implications on permafrost within the WRF (WSP, 2024b).

2. UNCERTAINTY

While work has been completed to define how the WRF will experience permafrost aggradation during operations and closure, uncertainties remain regarding what the eventual active layer thickness will be when considering climate change. Preliminary 1-D thermal modelling completed provides a first pass assessment of the required thickness of a thermal cap to be implemented on top of the WRF at closure, but there are still uncertainties related to thermal material properties, the integration of additional thermistor data, and the sensitivity of model inputs (WSP, 2024b).

3. RESEARCH/STUDY OBJECTIVE

Thermal monitoring and evaluation are required as part of the current Life of Mine Waste Rock Management Plan and to support current modelling of permafrost aggradation rates and thickness of the active layer when considering climate change.

The objective of the thermal modelling program is to monitor ground temperatures and confirm the aggradation of permafrost within the WRF and active layer thickness to update long-term ground temperature predictions.

4. OVERVIEW OF TASKS AND PROJECT RESEARCH SCHEDULE

The following is an overview of the anticipated tasks required to obtain the study objectives; the objectives are general in nature and not explicitly linked to the tasks below. An indication on status of each task is provided and when warranted, anticipated commencement and/or conclusion dates. These tasks are summarized in Table 4.1 below.

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Table 4.1: Baffinland's Regulatory Approvals

Task #	Task	Reference Document	Status Anticipated Start and/or End Date
4.1	Thermistor Data Collection	Phase 1 Waste Rock Management Plan (BAF-PH1-830-P16-0029)	2018 - Life of Project (as necessary)
4.2	Thermal Model Update - WRF	Phase 1 Waste Rock Management Plan (BAF-PH1-830-P16-0029)	1D thermal model informing the depth of the active layer considering climate change first constructed in 2024. 2D thermal model informing the depth of the active layer considering climate change is expected to be completed in early 2027 Thermal model to be updated on ~5-year intervals
4.3	Thermal Model - Landfill Cover	N/A	1-D Model - 2027 2-D Model 2030 – Life of Project (as necessary) Update on ~5 year intervals

5. DETAILED DESCRIPTION OF TASKS AND FINDINGS OF RESEARCH COMPLETED

5.1 TASK 4.1 - THERMISTOR DATA COLLECTION

Data from temperature sensors installed to monitor the ground temperatures will be collected on a regular basis and used to ensure that frozen conditions are maintained below the WRF. There are a total of 9 thermistor installation sites at the WRF where data is actively being collected and monitored (Figure 4.1). The requirement for additional instrumentation will be reviewed regularly based on the results of site observations and measurements, future expansions to the WRF footprint and requirements for future modelling.

Thermistor installation to help understand the thermal regime within the landfill occurred in 2025. Figure 4.2 show the location of the thermistors installed. The requirement for additional instrumentation will be reviewed regularly based on the results of site observations and measurements.

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5.2 TASK 4.2 - THERMAL MODEL DEVELOPMENT - WRF

Based on the results of geochemical sampling and thermal instrumentation, a thermal model for the waste rock stockpile will be developed. If substantial heat generation from oxidation is expected based on geochemical results, the thermal model may incorporate heat generation from sulphide oxidation in the pile to model the impact of heat generation on the pile freeze-back process. Climate change will be included to account for warming temperatures after closure, based on the latest climate change predictions.

The model will be developed in a staged process, with a 1-D model (WSP, 2024b) being developed using simplified boundary conditions, initial conditions and weather data. This model will be used to provide the basis to develop a more complex 2-D model that assesses the long-term implications of climate change which will be completed in early 2027. Parameters such as waste rock moisture content, material thermal conductivity and the effects of snow insulation will be defined as part of the 2-D model development. Background research will be conducted regarding other similar projects and research conducted in permafrost regimes (such as temperature parameters relation to potential ML/ARD production in permafrost). Model parameters such as non-linear ground flow temperature and rock heterogeneity will be assessed and integrated into the model if deemed technically required by monitoring data.

The model will consider three climate change scenarios as part of the analysis, specifically three scenarios as defined by the IPCC Sixth Assessment Report on Climate Change (IPCC, 2021). These scenarios are as follows, or equivalent scenarios based on the latest science:

1. SSP1-2.6 (Global CO2 emissions cut to net zero ~2075)
2. SSP2-4.5 (Global CO2 emissions around current levels until ~2050, then falling but not reaching net zero until 2100)
3. SSP5-8.5 (Global CO_2 emissions continue to rise throughout the 21st century, with no net zero achieved by 2100)

These scenarios form a range from least to highest projected climate change impacts, and as such will provide a comprehensive data set of the potential impacts of climate change on thermal development at the WRF.

5.3 TASK 4.3 - THERMAL MODEL DEVELOPMENT - LANDFILL

Thermal modelling of the final landfill cover will be completed using the lessons learned from the modelling of the WRF, including applicable boundary conditions, weather scenarios and other model and site parameters. The initial 1-D model is expected to be complete by November 1, 2027, and the 2-D model is scheduled to be completed in 2030.

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5.4 FINDINGS OF RESEARCH COMPLETED

WRF Instrumentation & Data Collection

A field program was undertaken in 2018 and 2019 to characterize the waste rock deposited at the WRF and to install instrumentation throughout the WRF to assess its thermal performance. A summary of instrumentation installed in 2018-2019 can be found in the Phase 1 Waste Rock Management Plan (Baffinland 2024). A more recent field program was completed in 2024 with the installation of thermistors at five new sites (BH3R, BH4, BH5R, BH6, T6). Figure 5.1 provides an overview of the thermistor installation sites in the WRF where data is actively being collected and monitored.

WRF Thermal Assessments

Thermal assessments of the WRF completed in 2019 and 2023 involved interpretation of instrumentation data and preparation of a 2D thermal model to provide guidance to operations on waste rock placement to promote fast permafrost aggradation (WSP 2024a).

Key findings from the WRF thermal assessments include:

- The portions of the pile monitored by temperature probes remained entirely frozen throughout the monitoring period, with exception of a 2 - 3 m thick active zone subject to seasonal freeze and thaw cycles.
- Placement of additional rockfill in the pile prevents previously deposited rock from thawing and allows for progressive cooling over time.
- The thermal regime of the pile is likely effected by a combination of seasonal variations in air temperature preferential air flow through the pile, and localized heat generation associated with sulphide oxidation and/or mineral dissolution, but the fact that the pile remained mostly frozen during all times with a progressive cooling trend continues to indicate that the site cold climatic conditions is the prevailing mechanism governing the thermal regime in the pile, as intended in the design.
- All conceptual deposition schedules modelled eventually achieved sustained sub-zero temperatures at the base of the waste rock lift.

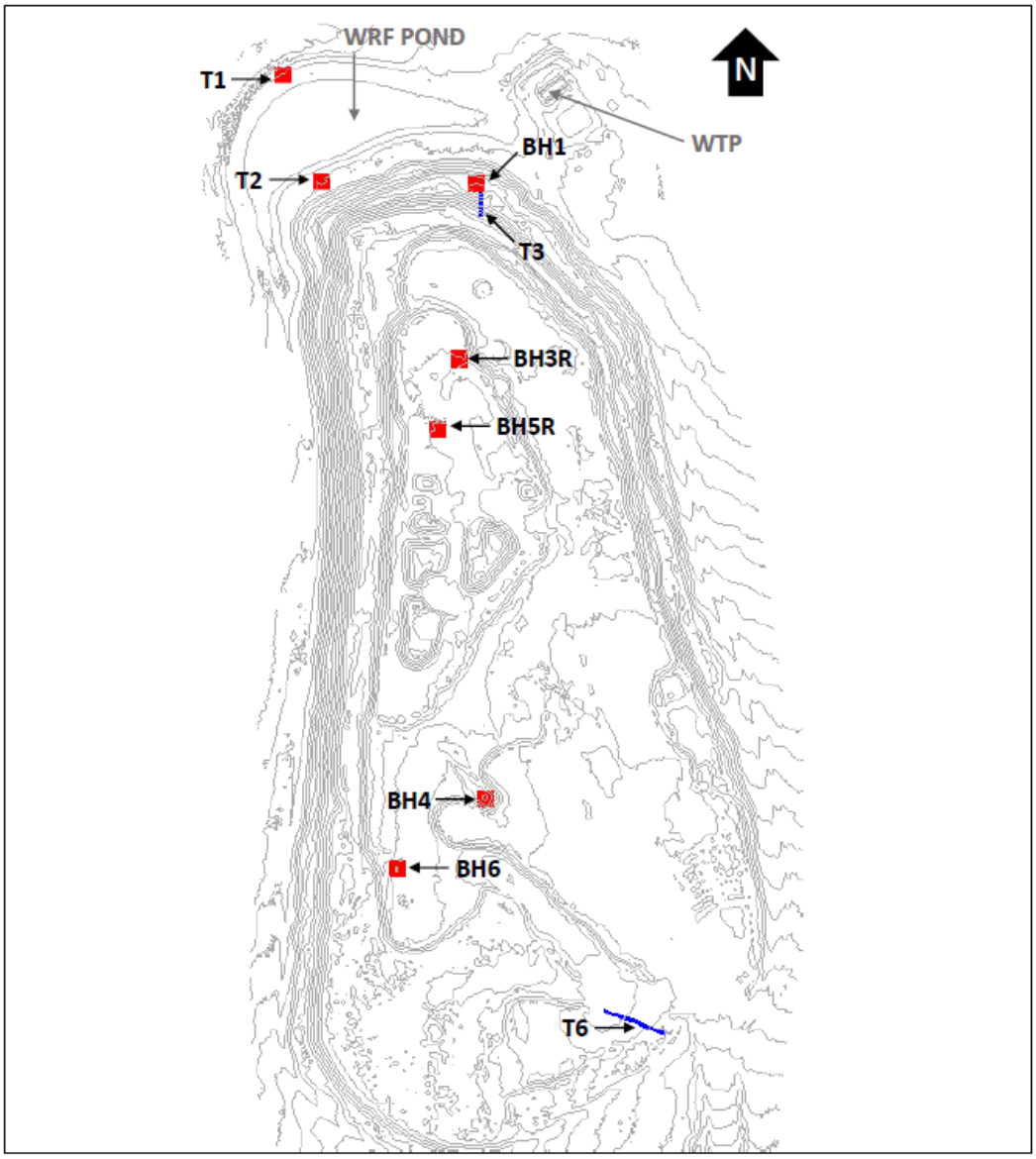
1-D Thermal Model Considering Climate Change

In 2024, Baffinland completed a conceptual 1-D thermal model of the WRF to predict the impact of climate change on the depth of ground subject to seasonal freezing and thawing, in support of preliminary assessment of the required thickness of a thermal cap to be implemented on top of waste rock pile at closure (WSP, 2024b). The 1-D transient thermal model was prepared using available thermistor data and the finite element software TEMP/W. The model, while conceptual, suggests that the thermal cap is required to be at least 3 m thick to maintain an appropriate thermal cover in the

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WRF when considering climate change projects. The 1-D modelling exercise identified limitations in the model and existing dataset that will be addressed in the next phase of 2-D modelling (schedule is available in Table 4.1 and within Appendix D7). Future updates to the thermal model will establish an appropriate final cover thickness, considering the latest climate change predictions.

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PROJECT:	Waste Rock Facility Thermistors
SURVEY DATE:	October 2024
PRINT DATE:	October 2024
LEGEND:	Vertical thermistor site — Horizontal thermistor site
SCALE:	Meters 0 100 200 400 600

FIGURE 5.1: WRF Thermistors

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FIGURE 5.2: Landfill Thermistors and Sampling Stations

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6. LINKAGES TO OTHER RESEARCH/STUDIES

The thickness of the active layer will be considered in the development of the waste rock runoff water quality predictions (Appendix D3).

7. COSTS

Costs are to be determined as scoping is still being undertaken.

8. REFERENCES

Baffinland. 2024. Phase 1 Waste Rock Management Plan. BAF-PH1-830-P16-0029 Rev 4.1.

International Panel on Climate Change. Climate Change 2021 – The Physical Science Basis. August 2021

WSP 2024a. Waste Rock Management Plan - June 2023 through September 2026. Reference No. 22572750-006-R-Rev1-5000. January 2024.

WSP 2024b. Assessment of Active Zone Depth Considering SSP1-2.6 Climate Change Projections at Mary River Mine. Reference No. CA0020274.4798-005-TM-Rev2. October 2024.

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BIM-5200-PLA-0026 APPENDIX D5 - RECLAMATION RESEARCH PROGRAM – NATURAL (UNASSISTED/PASSIVE) REVEGETATION

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TABLE OF CONTENTS

1. BACKGROUND 3

2. RESEARCH/STUDY OBJECTIVES 3

3. RESEARCH/STUDY OBJECTIVE 4

4. OVERVIEW OF TASKS AND PROJECT RESEARCH SCHEDULE 4

5. DETAILED DESCRIPTION OF TASKS AND FINDINGS OF RESEARCH COMPLETED 6

5.1 COMPLETED RESEARCH 6

6. PROPOSED RESEARCH 13

7. LINKAGES TO OTHER RESEARCH/STUDIES 16

8. COSTS 16

9. REFERENCES 16

TABLE OF TABLES

Table 4.1: Overview of Tasks for Reclamation Research - Natural Revegetation 4

Table 5.1: Existing mine operations considered in literature review of re-vegetation of disturbed areas in Northern climates 6

Table 5.2: Reclamation Pilot Study – Assessment and Monitoring Timeline 13

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1. BACKGROUND

Section 5.0 of the ICRP describes the Project's closure and reclamation principles and site-specific objectives. Consistent with international principles and standards for the recovery of mines sites (Young et al. 2022), the Project's unifying goals are to achieve a safe, stable, and non-polluting landscape that aligns with an agreed-upon end land-use and aesthetic. Specifically, per the ICRP (BIM 2018) *"[…] the [Mary River] site abandonment goal of the final closure activities is to return project sites and affected areas to viable and, wherever practicable, self-sustaining ecosystems that are compatible with a healthy environment and with human activities"*.

To achieve this goal, reclamation and revegetation approaches must be informed by the Project environmental setting (e.g. climate, soil substrate), conditions of the existing project (e.g., historic/legacy factors), and technical feasibility. As described in the FEIS Volume 6, Section 3.0, proposed reclamation activities will provide physical and chemical stability and will be designed to promote natural revegetation of disturbed areas. In practice, for the purposes of the Project, natural revegetation includes recontouring and regrading areas of the Project's disturbance footprint to tie-in to the predominant landscape, minimize instability and erosion potential and allowing the surrounding natural revegetation to encroach and re-establish.

Natural revegetation in the Arctic is characteristically slow and constrained by an inherently challenging environmental setting (Billings 1987, Chapin et al. 1995). The predominant vegetation assembly at the Project refers to Moist to Dry Non-Tussock Graminoid/Dwarf Shrub land cover type (Olthof et al. 2015), adapted to a biogeoclimatically harsh and occasionally sparsely vegetated terrain (depending on location). The growing substrate (if/where mineral soil should occur) refers to Regosolic and Brunisolic Turbic Cryosols characterized by permafrost, rocky/cobbly/sandy textures and aggregation, and low fertility. Given this environmental setting, the expectation and underlying rationale is that revegetation of the reclaimed Project will reflect early succession patterns and species biodiversity for these graminoid, sedge and dwarf shrub dominated plant communities. Therefore, consistent with this objective, this Reclamation Research Program (RRP) focuses on evaluating the suitability of surface and surface substrates (including overburden materials) to support vegetation development and determining surface preparation techniques that promote (and potentially enhance) natural revegetation processes. Here, emphasis is on re-establishment of native vegetation that is consistent with and on a trajectory toward the adjacent undisturbed landscape.

2. RESEARCH/STUDY OBJECTIVES

This RRP proposes to identify and refine best practices for promoting natural revegetation and early succession at the Project, accounting for the inherent constraints imposed by the Project's history and ecological setting. Key limitations at the Project include a restrictive growing substrate (low fertility, sandy/cobbly textures and aggregation), permafrost and absence of salvaged surface soil (i.e., conserved during construction) that could be used as a reclamation growing substrate. Where appropriate, this reclamation research will inform and occur alongside progressive reclamation

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programs for disturbed areas, no longer required for operations, with the aim of reducing the Project's active footprint. Primary objectives of this RRP center on evaluating the suitability of surface and surface substrates (including overburden materials) to support vegetation development and determining post-disturbance surface preparation techniques that promote (and potentially enhance) natural revegetation processes. Here, emphasis is currently on re-establishment of native vegetation that is consistent with and on a trajectory toward the adjacent undisturbed landscape. Given that the Project is in an early operations phase, specific objectives currently focus on (but are not limited to):

- Characterizing the suitability of available surface substrates conducive to natural revegetation
- Determining the timeframe for and composition of natural/unassisted early revegetation
- Identification of appropriate indicators for species establishment and trajectories for revegetation

3. RESEARCH/STUDY OBJECTIVE

Thermal monitoring and evaluation are required as part of the current Life of Mine Waste Rock Management Plan and to support current modelling of permafrost aggradation rates and thickness of the active layer when considering climate change.

The objective of the thermal modelling program is to monitor ground temperatures and confirm the aggradation of permafrost within the WRF and active layer thickness to update long-term ground temperature predictions.

4. OVERVIEW OF TASKS AND PROJECT RESEARCH SCHEDULE

Table D5.1 summarizes the status of tasks and initiatives under this RRP. Additional tasks and initiatives are expected to be advanced based on research outcomes and as such the schedule is an estimate only.

Table 4.1: Overview of Tasks for Reclamation Research - Natural Revegetation

Task #	Task	Reference Document	Status or Anticipated Start/End Date
5.1	Data/information review of Project-specific baseline data applicable to revegetation	EDI 2020 EDI 2022	Completed
5.2	Literature review of available reclamation/revegetation research for Northern/Arctic environments	EDI 2019	Completed
5.3	Reclamation Pilot Study (Phase I). Post-disturbance Natural Revegetation Survey and establishment of Reclamation Pilot Study	EDI 2020 EDI 2022	Initiated/Ongoing

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Task #	Task	Reference Document	Status or Anticipated Start/End Date
5.3.1	Characterization of terrain/soil and potential constraints to natural revegetation	EDI 2024	
5.3.2	Identification of future research initiatives/opportunities		
5.3.3	Monitoring Reclamation Pilot Study trial sites (as/when necessary)		
5.4	Interim Review/Revision of RRP Objectives	—	Initiated/Ongoing
5.4.1	Updated literature review of available reclamation research for Northern/Arctic environments		
5.4.2	Project Reclamation Feasibility Analysis (PRFA)		
5.5	Inuit Engagement - objectives, indicators, thresholds and responses	—	TBD[1]
5.6	Reclamation Trial (Phase II) - Opportunities for Progressive reclamation	—	Preliminary Scoping 2036-2037
5.6.1	Preliminary Design		
5.6.2	Revegetation Survey and Reclamation Trial Site Scouting		
5.6.3	Establishment of Reclamation Trials/Investigations		
5.7	Status of Soil Salvage (Feasibility) and Refinement of Scarification Techniques (Surface Configurations)	—	2036-ongoing

NOTE:

1. Requires discussion with the QIA; this input may be obtained from the QIA-led Culture, Resources and Land Use (CRLU) Monitoring Program and/or the future Mine Closure Technical Advisory Group.

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5. DETAILED DESCRIPTION OF TASKS AND FINDINGS OF RESEARCH COMPLETED

Summaries and key findings for completed tasks under this RRP are provided hereafter.

5.1 COMPLETED RESEARCH

TASK 5.1 Review Of Baseline Data Collection Results Applicable To Re-Vegetation During Reclamation

A preliminary review of baseline data applicable to re-vegetation was completed as part of FEIS development (Baffinland 2012, FEIS Appendix 6C - Vegetation Baseline Report. Refer to section 4.0 for a description of Project Setting as it related to vegetation; see section 4.4 for Observations Applicable to Reclamation). Approximately 20 plots were established on or adjacent to anthropogenically disturbed portions of the existing Access Road/Corridor (now generally coinciding with the Tote Road). Sites were surveyed to inform volunteer species composition and early succession patterns on disturbed landscapes. Key observations were that natural revegetation of disturbance environments occurs at the Project, although cover vegetation was generally low/scant and species appeared to be slow growing. Vegetation composition differed depending on surface substrate, ranging from predominantly sandy to gravelly/rocky substrates.

Note-1: A more targeted survey of natural revegetation patterns of disturbed environments at the Project is described under Task 5.3 (below).

Task 5.2 Literature Review Of Re-Vegetation At Disturbed Areas In Northern Climates

A literature review (desktop) of recent advances in Northern/Arctic mine reclamation in Canada and the USA was conducted to examine strategies (to the extent possible and practical) that may promote natural revegetation in the Arctic setting (EDI 2019). For example, surface soil preparation, decompaction, and the viability of seeding and planting. The literature review included a summary of the bioregional context and the closure and reclamation programs (e.g., approaches to reclamation and revegetation, and reported outcomes) of nine northern mines across Canada and the USA and lessons learnt. In addition, the review identified potential surface preparation techniques that could be considered at the Mary River Project. The mine projects (both closed and operating) included in the review are presented in Table 5.2.

Table 5.1: Existing mine operations considered in literature review of re-vegetation of disturbed areas in Northern climates

Status	Mine	Location
Closed	Polaris Mine	Little Cornwallis Island, Nunavut
	Nanisivik Mine	Baffin Island Nunavut

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Status	Mine	Location
Operating	Red Dog Mine	Northwest Alaska, USA
	Hope Bay Doris North Mine	Northwest, Nunavut
	Meadowbank Mine	Baker Lake Region, Nunavut
	Diavik Diamond Mine	North Slave Lake Regional, NWT
	Ekati Diamond Mine	North Slave Lake Regional, NWT
	Gahcho Kué Mine	Kennady Lake Regional, NWT
	Con Mine	Yellowknife, NWT

Lessons from other northern mines during this literature review have been incorporated into Appendix F Lessons Learnt from Other Projects. A key takeaway was that availability of salvaged soil as a reclamation growing substrate is a constraint on the types of reclamation strategies that can be implemented at a given site - notwithstanding the implications of biogeoclimatic setting and the range of ecosystems that can be established therein. If/where trials have been initiated, other northern mines have emphasized surface soil preparations conducive to natural revegetation in their reclamation design (EDI 2019).

For these reasons, reclamation research at the Project focuses on evaluating the suitability of surface and surface substrates to support vegetation and determining surface preparation techniques that promote natural revegetation processes. Given the lack of salvaged soil at the Project, this means facilitating surface conditions conducive to natural (i.e., unassisted or passive) colonization of native species from surrounding undisturbed vegetation. Three recommendations for a path forward to address preliminary uncertainties regarding revegetation were identified:

1. Identify Site Preparation Techniques Best Suited/Tailored for Natural Revegetation:
   a) Characterize control/undisturbed landscape conditions as a template for reclaimed environments.
   b) Examine landscape preparation approaches that will increase the availability of micro-habitats conducive to plant early-establishment.
   c) Determine timelines and measurables for reclamation success.
2. Identify Indicator Species Best Suited for Natural Revegetation:
   a) Characterize control/undisturbed vegetation conditions as a template for reclaimed environments.
   b) Examine landscape preparation approaches that will increase the suitability of micro-habitats for plant early-establishment and development of cover vegetation.
   c) Determine timelines and measurables for reclamation success.
3. Examine the Feasibility (i.e., Viability and Applicability) of Seeding/Planting and Soil Amendments

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Note-2: The natural vegetation cover and status of plant growth at the Project varies depending on surface substrate, elevation, proximity to water and availability of soil moisture. Notably, portions of the Project that occur at high elevation and/or are characterized by rocky terrain (typically lacking or having only thin, discontinuous mineral soil) are often naturally devoid of vegetation. Recommendation #3 is not applicable to these portions of the Project. Reclamation and closure activities will focus on grading and surface preparations; revegetation efforts are expected to promote natural (unassisted/passive) vegetation re-establishment commensurate to conditions of the adjacent natural environment.

Note-3: Per Task 5.4 (Table 5.1), BIM is committed to Interim Review/Revision of RRP Objectives, including considerations for recent reclamation research and feasibility analysis of Project-specific reclamation activities. Baffinland recently evaluated outcomes from vegetation propagation studies elsewhere in northern and Arctic climes (cf. Ficko et al. 2015; Hnatowich et al. 2023a, 2023b; Lamarre et al. 2023; Neby et al. 2022). If/where applicable, research outcomes and objectives (hereafter) have been updated in light of these additional literature sources. Upon review, studies on seed-dispersal (Ficko et al. 2015) and direct placement/transplantation of vegetation (Hnatowich et al. 2023a, 2023b; Lamarre et al. 2023) may not be compatible with the Project setting and existing conditions, although understanding of these processes will benefit future reclamation planning. Meanwhile, the study by Neby et al. (2022) highlights the inherent challenges of revegetation in the Arctic and slow revegetation timeline in the tundra biome. Consistent with this ICRP's objectives and approach to facilitate surface conditions conducive to natural (i.e., unassisted or passive) revegetation, it is emphasized that 'natural' revegetation does occur; however, this is contingent on minimizing incidental disturbances to the adjacent and nearby 'natural' (i.e., intact) environment. 'Active' revegetation approaches (relying on reclamation methods more commonly applied in relatively more temperate environments, e.g., seeding/planting, fertilization) have yet to be demonstrated as a viable strategy for the Project.

Task 5.2 Reclamation Pilot Study Summary

Building on the desktop review (Task 5.2) and to address the recommendations of the review in phases, Baffinland retained EDI in 2018-2019 to design and implement a field program to address recommendation #1 through design and implementation of a Reclamation Pilot Study (EDI 2020). The Reclamation Pilot Study included the following objectives:

1. Document the status of opportunistic and unassisted revegetation at the Project to understand post-disturbance revegetation and ecological successions patterns
2. Establish preliminary reclamation trials that examine methods and approaches that are considered appropriate and adaptable to the inherent challenges of the Arctic environment
3. Identify pathways and opportunities for future studies

The Reclamation Pilot Study comprised (1) a Post-disturbance Revegetation Survey and (2) and a Reclamation Trial. The Reclamation Trial was intended to be a starting point for research and

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development to examine revegetation strategies appropriate for and adaptable to the Project. Annual Project Update reports for this RRP including locations of trial sites have been provided to the Nunavut Impact Review Board (NIRB) as part of annual Project reporting. A summary of the two aspects of the Reclamation Pilot Study is provided below.

Post-disturbance Revegetation Survey

This survey focused on documenting the terrain, soil conditions, species composition, successional trajectories, and assumed revegetation rates within existing disturbed Project areas. Suitable study sites were selected and established at four (4) locations along the Tote Road; KM52, KM16, KM18 and within an abandoned airstrip near KM58. These sites were chosen as they represented different timeframes since disturbance (relative to the time of the field survey) within the Project footprint, ranging from one-year post-disturbance (KM52) up to >40 years post-disturbance (KM58). Study sites at KM52 and KM16 were established in 2019 and sites at KM18 and KM58 were established in 2021 (Table 5.2). Maps with locations of each are provided in the most recent 2023 Project Update (EDI 2024).

Experimental Design — The first field component of the Post-disturbance Revegetation Survey (summer 2019) focused on surveying natural/unassisted revegetation and establishing a preliminary trial design. The second field component (summer 2021) expanded the number of survey locations and established the Reclamation Trial sites. Each study site layout was comprised of three (3) paired vegetation plots (1x1 m vegetation quadrats) and soil plots (30x30x30 cm soil survey pits) distributed at the start, middle and end of a 100 m or 150 m vegetation cover transect. Applying the same experimental design, control areas (i.e., deemed representative of pre-development [undisturbed] site conditions) were sited on adjacent land approximately 30 m from the Project footprint. The experimental design is a standardized replicated control-comparison study based on accepted industry survey methods for reclamation and closure assessment. Locations were scouted and ground-truthed in collaboration with site environment personnel. Site selection accounted for Tote Road realignment activities (i.e., ground disturbance), access and safety, as well as areas where earthworks for trials could be completed within existing permit conditions. Study objectives were/are to document opportunistic revegetation within the immediate disturbed environment. All sites were paired with nearby/adjacent control (30m from PDA) in these areas, to reflect the same terrain, soil and vegetation conditions within the immediate disturbance footprint. These control sites represent the same soil moisture and nutrient characteristics at the trial sites; control sites are considered the nearest source for seeds and growth propagules for ingress of natural revegetation.
Vegetation survey procedures for characterizing surface cover and composition were based on methods used in Baffinland's existing vegetation monitoring program and described in the Canadian Tundra and Taiga Experiment (CANTTEX) — Field Manual (Bean and Henry 2003; Bean et al. 2003).

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Results & Discussion— Predictably, the highest levels of natural revegetation were observed among 'older' sites (KM16, KM58), coinciding with areas demonstrating more vigorous cover vegetation on adjacent undisturbed (control) land. These disturbed areas also occasionally demonstrated remnant intact fragments of the vegetation matte representing source material for revegetation. Consistent with findings by Hnatowich et al. (2023a, 2023b) and Lamarre et al. (2023), who investigated transplantation techniques for surface vegetation, the proximity and viability of intact vegetation should play a key role in 'natural' unassisted/passive site revegetation. Per Neby et al. (2022), this is contingent on minimizing incidental disturbances to the adjacent and nearby 'natural' (i.e., intact) environment.

A key observation of the reclamation pilot study was that all survey sites demonstrated varying levels of natural unassisted revegetation — even KM52, representing ~1-year post-disturbance. Bare ground generally decreased over time due to natural revegetation and surface litter accumulation. Although little-to-no vegetation was observed within 1-year post-disturbance, apparent early colonizers comprising predominately of graminoids, sedges and forbs, were observed at 1 to 3 years post-disturbance and became more prominent over time (5 years post-disturbance). Over a longer timeframe (>40 years post-disturbance) vegetation cover increased substantially (up to 60% to 70% of total cover) and was comprised of graminoids, sedges, forbs, and shrubs/Ericaceae. However, lichen (representing <2% of undisturbed cover vegetation) were not observed at any disturbed sites indicating conditions for their establishment were not satisfied and/or may indicate that lichen require a longer development timeline.

Preliminary findings from this study suggest that natural unassisted revegetation can occur at the Project site. Remarkably, species composition at all survey sites was comprised of only native species, no exotic or non-native vegetation were identified. Understanding revegetation patterns and processes will benefit future reclamation planning and management actions at the Project. As discussed in a companion paper (Audet and Setterington 2024, DRAFT/Under Review), this preliminary chronosequence will benefit from additional data capture and replication to bridge information gaps.

Reclamation Trial

The second aspect of the Reclamation Pilot Study focused on initiating preliminary reclamation trials at the Project to evaluate different surface configurations (referring to rough and loose and surface track-packing methods, described below) currently used as site preparations for revegetation across a wide range of environments and terrain (EDI 2024). The purpose was to determine logistical considerations and what can feasibly be applied at the Project to optimize natural revegetation outcomes based on landscape features and constraints of the Arctic environment. Site configurations (described below) were selected based on standard best practices identified during the literature review (Task 5.2) and previous reclamation experience.

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Experimental Design— The locations of the reclamation trials correspond with the KM52, KM16, and KM18 post-disturbance revegetation survey areas (as outlined above). At each trial location, a 100 m x 10 m (at KM52) or 150 m x 10 m trial strip (at KM16 and KM18) was delineated, all within the 25 m buffer from the centreline of the Right of Way (ROW) and corresponding with the permissible Project area for earthworks and maintenance along the Tote Road.

The two surface configurations evaluated, (1) 'rough and loose' and (2) 'track packing', are described below. Both are considered technically feasible for use at the Project.

Rough and loose refers to the use of a digging bucket to dig small depressions and generate low-profile mounds within a given landscape (Polster 2013). This method creates surface heterogeneity and microsite conditions favorable to seed establishment and germination (in the absence of direct/drill seeding) and facilitates soil preparation conducive to root proliferation and water infiltration.

Track-packing (i.e., surface imprinting) refers to using tracked earthwork equipment to create surface roughness (Neville 2003). This method is typically used to reduce the erosion potential of exposed soils by enhancing surface stability and generate micro-site conditions for seed establishment.

The 'rough and loose' surface configuration was applied to the entire reclamation test strip at KM52, KM16 and KM18 (i.e., to the extent possible due to the loose/unconsolidated substrate); 'track-packing' was then applied to half (1/2) of each test strip. More detailed description of earthwork logistical parameters and controls are provided in EDI (2024). Trial sites were established in 2019 and visually evaluated in summer 2020, 2021, 2022 and/or 2023 (depending on location) to document site conditions. A comprehensive survey of the trial sites applying methods used in the 2019 baseline survey (vegetation transect/quadrat, soil plot assessments and visual evaluation) was completed in Summer 2024.

Results & Discussion— Reclamation trials were established with the intention of (1) applying and evaluating the performance of different surface configurations commonly used in reclamation and (2) 'resetting' these environments to examine early colonization patterns. A key observation about the performance of surface preparations was that they were 'washed out' due to weathering (likely due to the sand-sandy loam surficial geology) and were no longer apparent at any of the trial sites within one year of their applications. Surface preparations were intended to create temporary surface heterogeneity and micro-site conditions favourable to seed establishment and germination while reducing erosion potential and enhancing surface stability. Although all sites were stable and demonstrated no major degradation, the surface texturing and micro-topographical earthworks created during the initial trial preparations no longer provided any functional value. Given that the Project setting is prone to prolonged periods of high wind, these surface preparations appear to provide only short-term mitigation. Future investigations could examine alternative options for minimizing erosion potential if/where required based on the surface geography and associated risk of erosion and potential effects on downgradient environments.

In terms of the status of revegetation, all sites predictably lacked a demonstrable/measurable vegetation cover. However, a few volunteer forbs, graminoids and occasionally juvenile shrubs (e.g. bladderpods, campions, sedges and dwarf willow) consistent with the adjacent native vegetation were

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found to have randomly colonized the trial sites after year 1 (i.e., representing <1% of the total study area). As potential early succession indicators in this environment, these types of volunteer vegetation increased modestly at all sites, representing approximately 1% to 3% of the total study areas from year 1 (2019) to year 5 (2023). Similar outcomes regarding the timelines for revegetation are reported by Neby et al. (2022). Anecdotally, the KM18 and KM16 sites (both characterized as subxeric) demonstrated the highest levels/rates of revegetation within the trial areas and the most vigorous cover vegetation on the adjacent undisturbed (control) area. It is suspected that the status and viability of intact and contiguous vegetation could play a key role in site recovery, as reported by Hnatowich et al. (2023a, 2023b) and Lamarre et al. (2023). However, lichen was not observed at any disturbed/revegetated trial sites. Understanding the environmental conditions and growth requirements of lichen will help to refine expectations for their natural reestablishment at the Project. Lastly, no non-native/exotic or invasive species were recorded at any of the sites during the follow-up evaluation years. By contrast, disturbed landscapes in relatively more temperate environments (particularly those near settlements and along travel corridors) are often prone to recalcitrant weeds and non-target species. Multi-pronged vegetation management strategies are then needed to prevent the establishment and spread of weeds. As no seeding, planting or vegetation management actions were applied at any trial sites and/or the Project at large, further investigation is required to understand the ‘forces at play’. It is suspected that the extreme Arctic setting and vigour/viability of the intact native vegetation may buffer small/discretely disturbed environments (such as these reclamation trial sites) and thereby limit the species capable of recolonizing therein including non-native/exotic or invasive species. The assessment and monitoring timeline for the Reclamation Pilot Study is provided in Table 5.3 below.

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Table 5.2: Reclamation Pilot Study – Assessment and Monitoring Timeline

Site	Assessment Time/Year July 2019	July 2020	July 2021	July 2022	July 2023	July 2024
KM52	Baseline Survey					
	Reclamation Trial		Visual/Walkover Monitoring		Comprehensive Survey	
KM16	Baseline Survey					
	Reclamation Trial		Visual/Walkover Monitoring		Comprehensive Survey	
KM18			Baseline Survey			
			Reclamation Trial	Visual/Walkover Monitoring		Comprehensive Survey
KM58			Baseline Survey			
			No Trial			

6. PROPOSED RESEARCH

The preliminary reclamation trials described in this RRP are intended as a starting point for research and development to examine revegetation strategies appropriate for and adaptable to the Project. EDI (2024) concluded that the study approach presented in Pilot Study provides an appropriate template and investigative strategy with which to identify other candidate trial sites, potentially initiate reclamation trials and apply consistent survey methods to document revegetation patterns and processes onsite. Building on outcomes of the Research Review (Desktop) and Reclamation Pilot Study (Field-Based) and accounting for the inherent constraints imposed by the Project's history and ecological setting, Baffinland aims to develop a subsequent phase of reclamation trial sites following a comprehensive evaluation of feasibility and scalability of reclamation options (i.e., per the Project setting and constraints) and assessment risks (i.e., associated with potential additional and increased adverse effects to the environment). Several additional tasks (described below) are identified to address the research objectives during this next phase (EDI 2024). Advancement of these investigative threads is active and ongoing. An estimated schedule for these tasks is presented in Table 5.1.

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Project Reclamation Feasibility Analysis

Baffinland is committed to ongoing evaluation (where appropriate) of available literature of revegetation in Northern/Arctic Environments to inform what reclamation methods are feasible at the Project given key project limitations related to the environmental setting and historic development. A Project Reclamation Feasibility Analysis (PRFA) will triage and provide supporting rationale for the ICRP's reclamation strategy and the direction for future research initiatives. Baffinland commits to engaging with QIA in the development of the design and Terms of Reference for the analysis as well as for subsequent review and consideration of the feedback process once the analysis is complete. Key tasks to be completed as part of the PRFA will include and take into consideration:

- Review of the range of different landscape features affected by the Project (i.e., based on topography, surface substrates, nutrient and moisture regimes)
- Determine to what extent/proportions of the project footprint are naturally vegetated (continuous cover) or not (unvegetated areas) — Refer to Note-2, section D5.4.1
- Review of existing reclamation trial outcomes
- Review and evaluate additional literature and case studies of northern mine revegetation programs and reclamation methods for applicability to the Mary River Project. This will include review and evaluation of active revegetation measures, including seeding, planting, transplants, and soil salvage methods.
- Determine the technical feasibility of different types of surface configurations to optimize natural revegetation outcomes at landscape features likely to support revegetation
- Completion of a risk assessment of feasible revegetation options
- Refine where 'natural' (unassisted/passive) vegetation establishment is most likely to occur and define appropriate expectations for recovery based on these conditions.

The outcomes of the PRFA will build on the existing technical knowledge and further refine the range of reclamation methods given Project constraints. These outcomes will be communicated as part of the Inuit Engagement Strategy. In addition, Baffinland commits to considering feedback from Inuit and IQ holders provided to Baffinland through the Inuit Engagement Strategy and from QIA during their review and revising the PRFA where appropriate.

Increase trial sites / increase range of reclamation endpoints

The Reclamation Pilot Study establishes a template for future trials. Baffinland will examine opportunities to focus on grading and surface preparations at the Project, emphasising an increase in trial sites and a wider range of reclamation endpoints. Revegetation efforts are expected to promote natural (unassisted/passive) vegetation re-establishment commensurate to conditions of the adjacent natural environment. Per recent findings, these future investigations should examine alternative options for minimizing erosion potential if/where required based on the surface geography and associated risk of erosion and potential effects on downgradient environments. Future studies will continue to inform identification of early indicators of revegetation success.

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Reclamation Trial – Phase II

Over the life of the mine, EDI (2024) highlighted the potential benefit of identifying decommissioned and/or progressively reclaimed Project features (e.g. discontinued laydown areas, access roads or other features associated with the Mine Site, the Milne Port and/or Tote Road) that could be potential candidate sites for reclamation studies. Where appropriate, these features could provide opportunities for planning, designing, and reclamation trials to examine the scalability of reclamation approaches and could be used to calibrate the time, effort and cost of reclamation activities onsite. During the next phase of this research program, Baffinland will incorporate outcomes from the Project Reclamation Feasibility Analysis into progressive reclamation occurring at the site.

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Status of Soil Salvage (Feasibility) and Refinement of Scarification Techniques (Surface Configurations)

To protect permafrost and existing landforms, all infrastructure is built on top of overburden. As such, overburden and soils are generally not able to be salvaged on site as a result of existing soil and permafrost conditions. An assessment will be completed of new developments within the project footprint to assess locations (area extents), options for, and feasibility of soil salvage. Post construction assessment will then inform refinement of 'scarification' techniques and options (i.e., surface configurations) to promote revegetation and stability. Findings will also inform expectations for early-stage revegetation and indicators of success.

Integration of Inuit Qaujimajatuqangit

Baffinland recognizes the value of integrating IQ in closure planning. Where appropriate, Inuit-defined objectives, criteria and actions as defined through implementation of the Inuit Engagement Strategy (see section 2.7), if provided to Baffinland, will be used in future research plans. The potential role of Inuit in monitoring and management in relation to implementation of the revegetation program will also be considered. Baffinland invites further discussion on these items through the Inuit Engagement Strategy (section 2.7). As this strategy has not been formalised, the schedule for research activities presented in Table 5.1 is presently an estimate only.

7. LINKAGES TO OTHER RESEARCH/STUDIES

Updates and advances to this Reclamation Research Plan will be provided in annual reports to the NIRB under Project Certificate No.005 and to QIA and NWB under Type "A" Water Licence 2AM MRY1325 and will be summarized in future versions of the ICRP.

8. COSTS

TBD

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BIM-5200-PLA-0026 APPENDIX D6 - RECLAMATION RESEARCH PROGRAM – ENVIRONMENTAL SITE ASSESSMENT AND LANDFARM RESEARCH

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TABLE OF CONTENTS

1. BACKGROUND 3

2. UNCERTAINTY 3

3. RESEARCH/STUDY OBJECTIVE 4

4. OVERVIEW OF TASKS AND PROJECT RESEARCH SCHEDULE 4

5. DETAILED DESCRIPTION OF TASKS AND FINDINGS OF RESEARCH COMPLETED 4

5.1 TASK 6.1 – LITERATURE REVIEW 5

5.2 TASK 6.2 - ASSESSMENT PRIORITIZATION 5

5.3 TASK 6.3 – ENVIRONMENTAL SITE ASSESSMENT 5

5.4 TASK 6.4 – REMEDIATION OF AREAS OF POTENTIAL CONCERN TASK 5

5.5 TASK 6.5 – LANDFARM TREATMENT RESEARCH 5

6. RESULTS TO DATE 5

7. LINKAGES TO OTHER RESEARCH/STUDIES 6

8. COSTS 6

9. REFERENCES 6

TABLE OF TABLES

Table 4.1: Overview Of Tasks For Reclamation Research – Environmental Assessment And Landfarm Research 4

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1. BACKGROUND

The entire site is considered as part of this research plan. Part of the objectives of the reclamation program is to quantify and remediate areas that may be contaminated because of site operations. While Baffinland has a strong environmental protection plan, walk away closure cannot be achieved until the site has been assessed and areas of potential environmental concern (APEC) have been quantified and reclaimed if required. To complete this objective, there needs to be an understanding of potential areas on site where contamination could have occurred because of mining operations, along with a technical understanding of the extent and type of contamination in relation to applicable regulations, Project Certificate conditions and reclamation guidelines from landowners and regulators.

A key component of the reclamation of APECs will be how the material will be treated. As per Baffinland's existing procedures, soil contaminated with petroleum hydrocarbons will be treated to the extent possible on site, within engineered landfarm facilities. Understanding the efficacy and timeline for treatment is a key component of site reclamation, and as such needs to be quantified for the unique climatic and operating conditions at site.

2. UNCERTAINTY

Understanding and quantifying environmental conditions on site related to soil and water are key component of the overall reclamation plan and objectives. While Baffinland has a robust Environmental Protection Plan and spill prevention and reporting system, unforeseen spills or contaminate migration can occur and as such there is uncertainty regarding areas and extents of potential contamination on site. To further refine the closure strategy and better understand implications with respect to potential site contamination and remediation the following uncertainties are to be considered as part of this research plan:

- Extent of high-risk areas that will require an environmental site assessment
- Identification of what process is appropriate to evaluate these areas
- Extent and type of contamination in assessed areas, and development of a reclamation process (if appropriate)
- Volume of soil/water required to be treated

Reclamation planning requires not just an understanding of extent, type and quantity of contamination, but an understanding of treatment options and timelines. Landfarming is a standard treatment within Nunavut and has been broadly applied successfully at mines and remedial sites across the territory. Weather, landfarm design and operational procedures can all have an impact on treatment time and effectiveness and must be understood to ensure mine reclamation schedules and treatment endpoints are achieved successfully. To refine the understanding of landfarm procedures, effectiveness and timelines the following uncertainties are to be considered as part of the research plan:

- Procedures for landfarm operations (aeration, soil movement and amendments).

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- Achievable treatment thresholds for hydrocarbons
- Required timelines for treatment

3. RESEARCH/STUDY OBJECTIVE

This research plan is designed to improve the understanding of areas of potential environmental contamination on site and understand what treatment is required to achieve land use objectives and how this treatment/reclamation will be completed.

Specific objectives include:

- The review of historical literature and reporting to prioritize areas of investigation.
- Assessment and Identification of Areas of Potential Concern (as required).
- Development of remediation and reclamation planning as required to support reclaiming of Areas of Potential Concern (as required).
- Assessment of the efficacy of landfarming at the Mary River site, and the development of procedures and schedules to treat soil.

4. OVERVIEW OF TASKS AND PROJECT RESEARCH SCHEDULE

The following is an overview of the anticipated tasks required to obtain the study objectives; the objectives are general in nature and not explicitly linked to the tasks below. An indication on status of each task is provided and when warranted, anticipated commencement and/or conclusion dates. These tasks are summarized in Table D6.1 below.

Table 4.1: Overview Of Tasks For Reclamation Research – Environmental Assessment And Landfarm Research

Task #	Task	Reference Document	Status Anticipated Start and/or End Date
6.1	Literature Review	N/A	2027
6.2	Assessment Prioritization	N/A	2027-2028
6.3	Environmental Site Assessment (as required)	N/A	2029 - Closure
6.4	Remediation of Areas of Potential Concern (as required)	N/A	2032 - Closure
6.5	Landfarm Treatment Research	N/A	2026-2032

5. DETAILED DESCRIPTION OF TASKS AND FINDINGS OF RESEARCH COMPLETED

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5.1 TASK 6.1 – LITERATURE REVIEW

Understanding the site history to date (land use, spill reporting, annual reporting and inspection reports) is needed to identify Areas of Potential Concern and develop a comprehensive understanding of contamination risks on site, to inform the prioritization and identification of areas for formal assessment. The results of this task will be included in future ICRP revisions and annual NIRB/QIA-NWB reporting.

5.2 TASK 6.2 - ASSESSMENT PRIORITIZATION

The results of the literature review will be used to develop a prioritization list for areas on site that will require further assessment and potential progressive reclamation. This list, along with a schedule for assessment, will be included in future revisions of the ICRP. Moving forward, this task will be completed annually as a part of routine site operations and the prioritization will be adjusted as required and appropriate

5.3 TASK 6.3 – ENVIRONMENTAL SITE ASSESSMENT

As identified in Task 2, specific areas and locations will have environmental site assessments performed as required. The goal of these studies is to assess areas deemed to be of priority for the presence, extent and type of contamination, to support the development of reclamation planning. It is anticipated that specific procedures for this research program task will be developed in conjunction with landowners, regulators and the Inuit Committees as deemed appropriate.

5.4 TASK 6.4 – REMEDIATION OF AREAS OF POTENTIAL CONCERN TASK

Where environmental site assessments identify the presence of contaminated materials in Task 3, they will be reclaimed using appropriate procedures and the results of the reclamation efforts will be verified and recorded to support closure planning. Hydrocarbon-impacted soils will be treated in on-site landfarms, as appropriate and informed by the research to be conducted in the following task (Task 6.5). Management methods for other materials such as metal-impacted soil will be determined based on the nature and extent of the impacts, and could include placement within the Waste Rock Facility, non-hazardous landfill facilities, or disposal offsite in a licensed facility.

5.5 TASK 6.5 – LANDFARM TREATMENT RESEARCH

There is currently hydrocarbon impacted soil contained within the Mine Site Landfarm facility. Starting in 2026, a research program will be designed that will assess the effectiveness of treatment within this facility and develop testing and management practices to ensure the landfarm is optimally operated to support closure and reclamation efforts. The results of this research will be communicated within updates to the ICRP.

6. RESULTS TO DATE

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TBD

7. LINKAGES TO OTHER RESEARCH/STUDIES

TBD

8. COSTS

TBD

9. REFERENCES

N/A

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BIM-5200-PLA-0026 APPENDIX D7 - RECLAMATION RESEARCH PROGRAM SCHEDULE

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APPENDIX D.7
INTERIM CLOSURE AND RECLAMATION PLAN REV NO. 6.1
RECLAMATION RESEARCH PROGRAMS OVERALL SCHEDULE

Task	Status		Hillside Cut																		Open Pit Development																		Closure
		Year of Mining	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
		Calendar Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051
Appendix D1 - OPEN PIT RUNOFF WATER QUALITY																																							
1.1 - Pit Lake Meromixis																																							
Establish initial water quality predictions and review relevant baseline conditions	Completed (Baffinland, 2012)																																						
Collect site weather at the top of Deposit No. 1	Ongoing																																						
Review meromictic lakes in cold regions	Completed (Golder, 2021)																																						
Evaluate likelihood of pit lake becoming stratified ≥ 5 years prior to planned mining cessation	Scheduled for 2046																																						
1.2 - Water Monitoring and Comparison against WQ Predictions																																							
Comparison of water monitoring results.	Scheduled for 2037 (one year after 1.3 WQ model update)																																						
1.3 - Update Water Quality Predictions																																							
Update pit water quality model for 5-year operational water quality predictions - early closure scenario	Completed (Baffinland, 2025)																																						
Complete predictive WQ model update - final pit closure scenario	Scheduled for five years following operation of the Steensby Component, estimated 2036																																						
1.4 - Water Treatment Options Analysis																																							
Complete options assessment if WQ modelling does not meet discharge limits	Contingency; not started																																						
Appendix D2 - OPEN PIT FLOODING TIMELINE																																							
2.1 - Pit Flooding Timeline Predictions (Passive Conditions)																																							
Monitor mine dewatering flow rates	Scheduled to start in 2034																																						
Use mine dewatering flow rates to update passive mine flooding model	Scheduled for 2036																																						
2.2 - Assessment of Potential Water Sources / Enhanced Flooding																																							
Assess flows and retention times of potential water sources	Scheduled for 2032-2034																																						
Evaluate maximum allowable water take from potential water sources	Scheduled for 2032-2034																																						
Prefeasibility assessment of pumping	Scheduled for 2032-2034																																						
Estimate mine flooding from each source using model	Scheduled for 2033-2034																																						
2.3 - Impacts of Pit Flooding Time on the Closure Plan and Monitoring Timeline																																							
Update impacts of passive vs. enhanced pit filling on closure schedule with the MCTAG	Not started																																						
Update plan based on selected pit filling scenario	Not started																																						
2.4 - Assessment of Pit Flooding on Permafrost Regime																																							
Assess the impacts of pit flooding on the permafrost regime surrounding the pit.	Scheduled for 2035, 3 year duration																																						
Appendix D3 - WASTE ROCK STOCKPILE SEEPAGE/RUNOFF WATER QUALITY																																							
3.1 - Monitor drainage WQ from waste rock stockpiles and complete humidity cell testing																																							
Monitor drainage water quality from waste rock stockpile	Ongoing																																						
3.2 - Monitoring of rock placement under ambient field conditions																																							
Study design for field test pads	Completed in 2019																																						
Geotechnical review of WRF conditions	Completed in 2024																																						
Monitoring of thermal conditions, geochemistry and rock placement	Monitoring from 2019 through life of Project																																						
3.3 - Geochemical/Water Modelling																																							
Water quality source terms Development and Refinement	Ongoing																																						
Modelling, interpretation and documentation of monitoring results (Near Term Closure)	Scheduled for completion 2032																																						
Modelling, interpretation and documentation of monitoring results (Life of Mine)	Scheduled for completion 2037																																						
Appendix D4 - WASTE ROCK THERMAL MODELLING																																							
4.1 - Thermistor Data Collection																																							
Installation and Monitoring of Thermistors in the WRF	Ongoing (Golder, 2019)																																						
Installation and Monitoring of Thermistors in the Landfill	Installation in 2025, ongoing monitoring																																						
4.2 - Thermal Model Update - WRF																																							
1-D Model Development, interpretation and Documentation	Completed; WSP (2024b)																																						
2-D Model Development, interpretation and Documentation	Scheduled for completion 2027																																						
4.3 - Thermal Model Update - Landfill																																							
1-D Model Development, interpretation and Documentation	Scheduled for completion 2027																																						
2-D Model Development, interpretation and Documentation	Scheduled for completion 2030																																						
Appendix D5 - NATURAL REVEGETATION																																							
5.1 - Review Baseline Data (FEIS)																																							
Data/information review of Project-specific baseline data applicable to revegetation	Completed; Baffinland (2012); EDI (2020,2022)																																						
5.2 - Literature review of available reclamation/revegetation research for Northern/Arctic environments																																							
Literature Review	Completed; EDI (2019)																																						
5.3 - Reclamation Pilot Study (Phase I) - Post-disurbance Natural Revegetation Survey and establishment of Reclamation Pilot Study																																							
Characterization of terrain/soil and potential constrainst to natural revegetation	Initiated/Ongoing; EDI (2020, 2022, 2024)																																						
Identification of future research initiatives/opportunities	Initiated/Ongoing; EDI (2020, 2022, 2024)																																						
Monitoring Pilot Study Reclamation trial sites (as/when necessary)	Initiated/Ongoing; EDI (2020, 2022, 2024)																																						
5.4 Interim Review/Revision of RRP Objectives																																							
Updated literature review of available reclamation research for Northern/Arctic environments	Initiated/Ongoing																																						
Project Reclamation Feasiblity Analysis (PRFA)	Initiated/Ongoing																																						
5.5 - Engage Inuit through Inuit Engagement Strategy																																							
Engagement activities through Inuit Engagement Strategy	TBD																																						
5.6 - Reclamation Trial (Phase II)																																							
Desktop Review/Planning	Scheduled for 2036																																						
Revegetation Survey and Reclamation Trial Site Scouting	Scheduled for 2036																																						
Establishment of Reclamation Trials/Investigations	Scheduled for 2036																																						
5.7 -Status of Soil Salvage (Feasibility) and Refinement of Scarification Techniques (surface configurations)																																							
	Scheduled for 2037-ongoing																																						
Appendix D6 - ENVIRONMENTAL SITE ASSESSMENT AND LANDFARM RESEARCH																																							
6.1 Literature review	Scheduled for 2032																																						
6.2 Assessment Prioritization	Scheduled for 2033-2034																																						
6.3 Environmental Site Assessment (as required)	Scheduled for 2035																																						
6.4 Remediation of Areas of Potential Concern (as required)	Scheduled for 2038																																						
6.5 Landfarm Treatment Research	Scheduled for 2032																																						

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BIM-5200-PLA-0026 APPENDIX E - RECORD OF ENGAGEMENT

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TABLE OF CONTENTS

1. RECORD OF ENGAGEMENT..... 3

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1. RECORD OF ENGAGEMENT

As the Project advances, Baffinland is committed to engagement with stakeholders regarding closure and reclamation issues as outlined in Section 2.4. Baffinland engages with communities that may be impacted by the Project, both directly and through the regulatory processes established by the Nunavut Agreement and through the structures established by its Inuit Impact Benefit Agreement (IIBA) with the Qikiqtani Inuit Association (QIA), signed in 2013 and amended in 2018. This approach has ensured that the communities have had many ongoing opportunities to provide feedback on valued components of importance to the community, the topics addressed in environmental assessment documentation, and proposed mitigations.

Community engagement is at the cornerstone of Baffinland's sustainability initiatives. It permeates every facet of operations, manifesting through several avenues, including our extensive community engagement tours such as the various annual Inuit Education and Training, Recruitment and Procurement tours, as well as workshops and meetings, which are intricately woven into the regulatory process. Baffinland maintains a robust presence within communities, conducting regular information sessions, enabling frequent community visits to the Project Site, and engaging with our Inuit employees. Additionally, Baffinland facilitates ad hoc visits on specialized topics. Through these interactions, Baffinland continually gathers invaluable feedback that informs and enriches operational practices. As Project engagement is an ongoing process for the life of mine, Baffinland will continue to engage with communities in a meaningful way to mitigate risks and gain mutual respect.

Since the Project was approved with the issuance of the Project Certificate No. 005 in 2012, there has been continuing engagement with the communities on the Project generally. These engagements did not restrict topics of discussion. It is important to highlight the breadth of public, community, government, and Inuit engagement that has occurred since mining production began in 2014. The following summarizes the key engagement activities that have been carried out by Baffinland since this time:

- more than 250 formal meetings have been held with Hamlet Councils and HTOs;
- approximately 100 Public Meetings, Towns Halls or Public Radio Shows;
- close to 75 Working Group Meetings (Marine, Terrestrial, and Socio-Economic);
- above 20 formal site visits;
- youth forums and community organization meetings such as sewing groups, foodbanks, schools and Search and Rescue committees;
- innumerable informal engagements through many interactions with local community members at the Mary River Project site; and
- continuous presence of Baffinland Community Liaison Officers in the North Baffin communities since 2007, and Inuit Knowledge Holders and Community Resource Guides since 2022.

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These approximately 450 formal engagements related to the project, in addition to the numerous and frequent other informal engagements, shows the deep commitment Baffinland has to working with communities and Inuit. This summary does not reflect:

- engagements with Inuit related to ongoing implementation of the IIBA, including engagements with Inuit contractors, job fairs and workshops and training of potential Inuit employees;
- engagements with Governments (Federal/ Territorial);
- the volume of written materials exchanged with key parties such as the Hamlets and the HTOs via email and via the NIRB review and reconsideration process.

Table 1 provides a summary of comments received during engagement activities that are specific to closure, together with associated Baffinland responses that were given at the time when the comment was received (where applicable). While mine closure has not been a primary topic of the feedback received during most engagement activities, many indirect discussions on closure have occurred focusing on related issues such as considering land-use in mine design (e.g. Tote Road), proposed environmental mitigation, management and monitoring techniques during mining, and residual effect predictions.

Note that Baffinland also consults with landowners and other key stakeholders as part of the Annual Security Review (ASR) process conducted in accordance with Part C and Schedule C of Type A Water Licence 2AM-MRY2540 and Section 9.2 of the Commercial Lease No. Q13C301 (see Section 1.3). Though not presented here, details of these consultations are available at the NWB public registry.

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Table 1 Record of Engagement – Comments from Localities and Intervenors

Date	Preliminary Interest	Stakeholder Group/Attendees	Location/ Engagement Name	Stakeholder Comment(s)/Summary of Issue(s) raised	Baffinland Response/s (if applicable)
2015-11-20	General	Members of the public – Pond Inlet	Pond Inlet Workshop No. 4	Community participant comment: This is not really concerning Baffinland but refers to caribou. The infrastructure from the Nanisivik Mine was left behind. We tried to get the mine to clean it up, but they didn't. There were fuel and diesel spills left behind. No one has cleaned it up. Seals have bad livers now because of what they were eating. Pond Inlet will need to worry about fuel and fuel clean up. The marine mammals can be affected because of this; we've seen the impacts in Arctic Bay from this. Just beware of all these promises the company makes.	Baffinland is required to post securities for reclamation and closure through the water licensing process. Ongoing monitoring programs, environmental effects assessment, and the development of this Interim Closure and Reclamation Plan will all safeguard against future environmental effects.
2016-05-08	General	Members of the public – Pond Inlet	Pond Inlet In-person meeting	Community participant comment: There's too much dust at the mine site. I'm worried about the stockpile being out in the open. I would like to see it covered with a shed. I'm worried about iron ore dust being left behind on the land.	Comment noted.
2016-11-25	General	Hall Beach	Hall Beach Public Forum/ Meeting	Community participant comment: When they dig down the whole mountain what are we going to call it?	Comment noted.
2017-05-30	General	Members of the public - Pond Inlet	Pond Inlet Community Meeting	Community participant comment: You mention that the mine is going to operate for 100 years, can things start being cleaned up at the mine right now?	While the life of the mine could last 100 years, Baffinland is committed to progressive reclamation measures where appropriate.
2017-05-31	General	Hamlet of Arctic Bay	Hamlet of Arctic Bay In person meeting	Community participant comment: The infrastructure you no longer need, is it possible for those to be made available to the communities.	Project team comment: Yes, QIA and communities have first rights. We will talk to them first before getting rid of anything.

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Date	Preliminary Interest	Stakeholder Group/Attendees	Location/ Engagement Name	Stakeholder Comment(s)/Summary of Issue(s) raised	Baffinland Response/s (if applicable)
2018-01-08	General	Igloolik	Igloolik In-person meeting	Community participant comment: Good evening, regarding Baffinland Phase 2 proposal, we were involved in Phase 1, in phase 2 there are many things that you are proposing, some of them having been completed, if you increase your trucks to haul, what traffic is going to increase, regarding dust, if you expand your operations how are you going to manage the dust, secondly, our land is our livelihood, this is our land that you are exploiting, people get away with a lot these days, if this is not your land you are visitors, you did not have a personal claim to it like us, how are you going to care for the land, reclaim it, how will you be the steward of the environment. That is very important. There are 5 communities affected, they need to have better information, exactly what changes you are proposing, it is confusing when changes happen and we aren't told, also while you're working on this we who live in our communities we live in this land, you will be working with the world, prices will rise and fall, we know that. Many people are unable to work due to low levels of education, I don't see how you plan to increase your Inuit employment, for instance if you have a train its called the Baffinland via rail, you have I think it would be good if you could say Baffinland which includes Igloolik, Pond Inlet, Arctic Bay, all the communities, not just Baffinland.	In regard to reclamation, the Project team confirmed that Baffinland works with QIA to develop closure and reclamation plans which dictate how the Project area will be reclaimed at closure, including revegetation studies and how infrastructure will be removed.
2018-04-05	General	Hall Beach Hamlet and HTA representatives	Hall Beach In-person meeting	Community participant comment: Drums were used in the early stage of exploration. Later on, they were using containers. The drums of fuel that were used are stockpiled at the dump now, corroding away. When I was a young man, these were used as fuel drums. It that going to be the same practice for you guys? Are you going to leave the drums there when you switch to containers?	Project team comment: No, we will send the empty drums south afterward. Things are different now; we need to put up reclamation funds ahead of time. Also, our practice now is to remove the drums by backhauling empty drums as well as any other waste we can't incinerate.
2018-04-06	General	Hamlet of Igloolik	Igloolik In-person meeting	Community participant comment: Environmental protection, jobs, and restoring the land at closure are all important. What will be done with surplus equipment when exploration is finished? How will drillholes be reclaimed?	Comment noted. This is considered as part of the closure planning.
2018-04-06	General	Igloolik Municipal Council, Igloolik HTA and QIA	Igloolik In-person meeting	Community participant comment: Three topics. I myself want the environment protected. Although the job opportunities are important, I also want the environment protected. While they are exploring, once they have done their exploration, we know they won't be making any money and they have to clean up the area. They have to close it and try to put it back the way it was before. Will they go back to Baffinland, or will they be surplus and given to QIA? If that were to happen, if they make money they would probably stay there. If they are going to drill deep down, what will they use to close them up (the drillholes)?	Project team comment: Baffinland is required to post securities for reclamation efforts, as a condition of operating the Mary River Project through the water licensing process. Baffinland will decide if camp and equipment will be sold to the community or brought to another project.

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Date	Preliminary Interest	Stakeholder Group/Attendees	Location/ Engagement Name	Stakeholder Comment(s)/Summary of Issue(s) raised	Baffinland Response/s (if applicable)
2018-06-15	General	Hall Beach	Hall Beach In-person meeting	Community participant comment: We were asking about tents and upgrading accommodations. Maybe you can give the tents to the communities.	Project team comment: There is a policy that the QIA has priority if they want to take decommissioned equipment. We have to consult with them first.

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2019-02-12 to 2019-02-14	General	Risk Assessment Workshop Participants, Various Community Members	Trois Riviere Community Risk Assessment Workshop	During the discussion of preliminary closure planning, participants provided the following comments: - It is too early to provide comments on closure. When the time comes, it will be different, and we may get the wrong idea now. Need to obtain community input when the plans are developed. - Consider potential for other mine projects to be developed and use the rail and other infrastructure. - If the rail line is developed from the south to the north port, consider giving it to an Inuit organization to operate. This could be used to transport commercial goods, or potentially used for tourism. This is a decision that should be made by Inuit at that time. - Is there the potential to extend the road to Pond Inlet? - There have been issues in the past with projects leaving equipment behind on the land. All equipment should be removed (do not treat the land as a dumpsite). - Rename the area of Mary River to the Inuktitut name (Old Mary River). A number of questions were raised from participants regarding the planned approach to closure, including: the disposal and burial of equipment, procedures that will be followed before equipment is buried, the locations of equipment burial and landfill sites, and the creation of a pit lake. Specific comments made by participants included the following: - The indigenous plants we had here should all come back. Perhaps once the dust is gone, they will be able to grow back. Vegetation comes back naturally over the years. - We do not have much vegetation in the Inuit diet. - Contaminants need to be assessed. If there are any contaminants in the dust, there may be chemicals that will inhibit growth of vegetation. Lichen takes a long time to grow. - It is difficult to grow vegetation when white rock and gravel is used as a cover. Soil is needed for revegetation. If black rock is used and soil placed on top, vegetation may be able to grow. - Would like Baffinland to try to keep things looking as natural as possible. - Regarding equipment, anything that can be used should be given to Inuit. All contaminants should go down south. The heavy equipment should go to communities. - The five affected communities should cooperate and should be involved in the closing of the mine. What is useful, including the railway, should go to the communities. - You ask what color you would like – we need to see it first. You have a picture of Mary River, but it is not a picture of the natural state. You should use pictures of the natural land before the project to assist with reclamation.	Comments noted.

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Date	Preliminary Interest	Stakeholder Group/Attendees	Location/ Engagement Name	Stakeholder Comment(s)/Summary of Issue(s) raised	Baffinland Response/s (if applicable)
2019-01-14/17	General	Risk Assessment Workshop Participants, Various Community Members	Mary River Mine Site Community Risk Assessment Workshop #1	Participants expressed the following point: After the mining is completed, there may be consequences that people find out about after the fact.	Baffinland adheres to an Interim Closure and Reclamation Plan (BAF-PH1-830-P16-0012) which details a Final Closure and Reclamation Plan. Post closure monitoring will continue until closure principles of long-term safety of the site, no long term active care requirements, physical stability and chemical stability have been shown to be met by monitoring results. These activities may be periodic. It is currently estimated post closure monitoring and follow-up inspections will be conducted for a period of fifteen (15) years based on impacts assessment determinations described in the FEIS.
2019-07-03	General	Members of the Public – Arctic Bay	Arctic Bay In-person meeting	Community participants: Arctic Bay concerned about narwhal and seal populations, dust and project closing date.	Comments noted.
2019-07-03	General	Hall Beach	Hall Beach In-person meeting	Community participant: Hall Beach HTO Chairperson concerned that they have only been shown "certain things" and defines reclamation.	Comment noted.
2019-07-03	General	Members of the Public – Clyde River	Clyde River In-person meeting	Community participant comment: Clyde River EDO would like to see fencing around contaminated areas.	Comment noted.
2021-10-05	General	North Baffin Community Economic Development Officers	Tele-conference	Call with Clyde River, Arctic Bay, and Pond Inlet to discuss updated closure plans for the Mary River Project.	Comment noted.
2021-10-05	General	North Baffin Community Economic Development Officers	Tele-conference	Follow-up call with Arctic Bay and Baffinland on closure plans for the Mary River Project.	Comment noted.
2021-10-13	General	Mary River Socio-Economic Monitoring Working Group Meeting (MRSEMWG)	Tele-conference	Updated Closure Planning.	Comment noted.

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Date	Preliminary Interest	Stakeholder Group/Attendees	Location/ Engagement Name	Stakeholder Comment(s)/Summary of Issue(s) raised	Baffinland Response/s (if applicable)
2023-12-01	Steensby Community Engagement	Qikiqtani Inuit Association, HTO members	Pond Inlet In-person meeting	Community participant comment: You said you are going to close Milne Inlet and open Steensby. Are you going to put it back to its original form? When are you going to start cleaning up? Are you going to be having meetings about what you are going to do with Milne Inlet?	Project team comment: Baffinland is in the process of determining what, if any, closure requirements there are for the northern infrastructure and will continue to work with QIA on this. Baffinland will share updates with the communities.
2024-04-22, 2024-05-02, 2024-06-26, 2024-07-11, 2024-10-09, 2024-10-15, 2024-11-15, 2024-11-22	Closure Plan	Qikiqtani Inuit Association	Tele-conference	Meetings with QIA regarding the Interim Closure and Reclamation Plan Updates.	Comments noted.

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BIM-5200-PLA-0026 APPENDIX F - LESSONS LEARNED FROM OTHER PROJECTS

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TABLE OF CONTENTS

1. LESSONS LEARNED FROM OTHER PROJECTS..... 3

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1. LESSONS LEARNED FROM OTHER PROJECTS

Mine and port decommissioning, closure, and rehabilitation have been conducted at sites in the Canadian North for several decades. This time period has allowed the planning, permitting, closure, and post-closure performance to be evaluated. These include: Colomac Mine, Giant Mine, Diavik Mine, Ekati Mine, Faro Mine, Nanisivik Mine/Port. As part of its reclamation research initiatives, Baffinland is committed to establishing the primary lessons learned from these examples and others, to help evaluate options related to, but not limited to: revegetation strategies; post closure property control and land use; stakeholder relationships and commitments; residual waste material management; post-closure maintenance (if required); water management (before, during, and after closure), and managing socio-economic impacts. Understanding the relevant lessons learned at comparable sites will be an ongoing process as part of the closure planning process, future updates will be added as applicable. An initial summary of lessons learned from some of these projects is compiled in Table 1.

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Table 1 Lessons Learned from other Projects

Development/Location	Activity Leading to Lesson	Lesson Learned	Management Result
Ekati and Diavik Mines - NWT	Placement and covering of mine rock piles and waste	Permafrost develops rapidly within mine rock piles with an active freeze/thaw layer, additional run-off and infiltration of water without proper cover.	The use of mine rock piles will limit the quantity of impacted seepage due to exposure to freezing surface temperatures and permafrost aggradation. Placement of an engineered cover over storage areas will promote surface runoff and further limit infiltration and water contact. Waste rock deposition sequencing in winter (max lift thickness).
Ekati and Diavik Mines - NWT	Revegetation research studies	Revegetation and planting in northern regions has generally been across long time lines, or often with uncertain success. Site re-contouring has improved natural recovery at the Ekati and Diavik Mines.	Identification of appropriate site preparation techniques to promote natural revegetation is a component of the current Reclamation Research Program (Appendix D).
Ekati, Diavik and Snap Lake Mines - NWT Jericho Mine - Nunavut	Caribou concerns and mine site infrastructure	Caribou are known to use artificial habitats created by mine structures (e.g., roads, mine waste piles). Caribou travel through and around the mine site during migration. There is a potential for caribou passage to be impeded or for caribou to be hurt or	Road and rail crossings designed for the northern transportation corridor at expected caribou travel routes.

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Development/Location	Activity Leading to Lesson	Lesson Learned	Management Result
		killed by mining operations. Structures and rock piles may also provide a means of shelter avoiding insects. Fencing can lead to caribou mortality from entanglement. Fences can be used by predators to limit escape options of their prey.	
Con Mine - NWT	Site surface and infrastructure	Certain infrastructure discussed in ongoing engagement may provide value to the local community, or third parties.	Opportunities for beneficial ongoing use of primary infrastructure including airstrip, road, rail embankments, and docks have been considered in engagement discussions to date.
Ekati Mine - NWT	Operational monitoring programs	Monitoring programs in place at site are effective in detecting changes.	The operational monitoring programs can be used to design effective post-closure monitoring programs.
Ekati Mine - NWT	Progressive reclamation of older infrastructure	The importance of treating closure and reclamation activities as projects is integrated into mining operations.	This learning is incorporated into approach taken for planning, resourcing, and execution of future progressive reclamation, and final reclamation efforts.
Minto Mine - Yukon	Progressive reclamation measures linked to operational development plans for waste rock storage, overburden	Reduced financial liability for closure costing and bonding.	Review operational plans and procedures to incorporate rigorous assessment and implementation of progressive closure measures. Baffinland's progressive

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Development/Location	Activity Leading to Lesson	Lesson Learned	Management Result
	dumps and tailings management areas		rehabilitation measures proposed as part of the ICRP are expected to be technically and economically feasible and reflect Project closure principles.
Giant Mine - NWT	Baker Creek Reach 4 Re-alignment	Frozen material exposed during excavation melted and caused settlement of excavated areas.	Characterization of frozen materials is needed for sensitive excavations. This includes road and rail construction areas.
Ekati, Diavik and Snap Lake Mines - NWT	Underestimated groundwater inflows in initial site water quantity and quality predictions	All three mines were developed where zones of enhanced permeability persisted, which led to underestimation of groundwater inflows, and in some cases the volume of high TDS water requiring management at surface.	Assessing the water-balance for the proposed Open Pit and timelines for its enhanced flooding is a priority of closure planning (see Appendix D5).
Faro Mine - Yukon Colomac, Gahcho Kue, Diavik, Ekati Mines - NWT Equity Silver Mine - BC	Flooding of open pits, and establishment of meromictic conditions	Poor water quality (e.g. acidic water, high TDS water) can be isolated at the bottom of the pit when meromictic conditions are present in a flooded pit lake. Information required to complete an assessment prior to closure can be collected from a site as the open pit is developed. Predictive modelling can then be completed using collected site data to help inform closure options.	Considerations for poor quality water, density differences, high TDS mine water at the bottom of the pit and low TDS overlying freshwater cap, as well as the pit geometry may affect homogenization of pit water following closure. This information is guiding development of an ongoing Reclamation Research Program

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Development/Location	Activity Leading to Lesson	Lesson Learned	Management Result
		Development of meromictic conditions can occur at northern Canadian sites depending on the site-specific conditions. Topography, pit bathymetry/dimensions, temperature, and wind direction/speed play a critical role in understanding potential for pit lake turnover and development of meromictic conditions.	focused on open pit runoff water quality (Appendix D1)
Cartier Mining, ArcelorMittal, Alaskan Railway, Churchill-Manitoba, Scandinavia and Tibet Railway Systems	Railway operations in northern regions that are affected by permafrost conditions	Cold climate conditions and extremities vary across different regions when considering design and implementation of rail systems.	Baffinland will draw from experience of previous railway operators in northern conditions. Baffin Island extreme cold lasts 5 to 6 months. One consideration is strategic management of operation and maintenance crews including rapid rotations at project site during extreme cold conditions.
Nanisivik Mine, Nunavut	Community in Nanisivik closed with the mine	Closure impacted the socio-economic conditions for Inuit in the area of the mine. This is a result of the precipited closure of the community supporting the mine, which had impacts on Inuit.	Engagement with Inuit is being proactively planned to occur throughout the closure planning process and well in advance of mine closure.
Ekati, Diavik, Gahcho Kue Mines - NWT	Remediation of hydrocarbon -contaminated	Hydrocarbon-contaminated soil material is expected during operations.	The Milne Port landfarm package includes the landfarm containment

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Development/Location	Activity Leading to Lesson	Lesson Learned	Management Result
	material during operations and immediately after contamination occurs	Establishing a land treatment area for hydrocarbon contaminated soils during operations ensures prompt cleanup, remediation of material, and reduced closure liability.	area and the contaminated snow containment area constructed south of the accommodation camp, near the Milne Inlet Quarry (Q1). The landfarm containment area was constructed to store/remediate the petroleum hydrocarbon (PHC) contaminated sand/gravel materials. A landfarm has also been constructed at the Mine Site. Remedial efforts for these impacted materials will be a priority for Baffinland.
Diavik Diamond Mine - NWT	Transition from operations to post-closure decommissioning and community handover (operations ceased March 2026).	The successful execution of a formal Closure Agreement with the Government in February 2026 highlighted the necessity of formal, long-term partnerships. Furthermore, practical salvaging of infrastructure, such as redistributing solar panel farms to local communities, creates a tangible, positive post closure legacy.	Establish proactive socio-economic monitoring agreements and formal closure partnerships with Inuit organizations well before the end of mine life.

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BIM-5200-PLA-0026 APPENDIX G - PREDICTED RESIDUAL EFFECTS

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TABLE OF CONTENTS

1. INTRODUCTION 3
2. FEIS RESIDUAL EFFECTS ASSESSMENT METHODOLOGY 3
2.1 DETERMINING SIGNIFICANCE OF RESIDUAL EFFECTS 3
3. RESIDUAL EFFECT PREDICTED AT PLANNED CLOSURE 12
4. CURRENT PREDICTED RESIDUAL EFFECTS 25
5. ONGOING RESIDUAL EFFECT EVALUATION 26
6. REFERENCES 39

TABLE OF TABLES

Table 2.1 Attributes used to Evaluate Significance or Residual Effects 4
Table 2.2 Ratings for Evaluating Residual Biophysical Effects 8
Table 2.3 Rating Criteria for Evaluating Residual Socio-Economic Impacts 9
Table 3.1 FEIS Predicted Residual Impacts and Closure/Post-Closure Monitoring 14
Table 5.1: Summary of Residual Effects of the Approved Project 28

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1. INTRODUCTION

Residual effects refer to the remaining environmental effects identified for the Project, post-mitigation, at the expected closure period of the Project. Based on the information presented in the Mary River Project FEIS, the Mary River Project as approved will have no significant adverse residual effects for the VECs identified within the biophysical environment. The Project is not expected to compromise the ecosystematic integrity of the Nunavut Settlement Area. In addition, no significant adverse residual effects are predicated to occur to VSECs identified within the socio-economic environment, and the Project is expected to have significant positive effects for most of the VSECs. This position is supported by comprehensive site-specific studies (baseline and modeling studies), IQ, extensive public consultation, and expert opinions.

An overview of the assessment methodology used to develop this residual effect position, as detailed in Volume 2 of the Mary River Project FEIS, is provided in Section 2. A summary of the residual effects identified for each VEC and VSEC as part of the Mary River Project FEIS is provided in Section 3. Section 4 provides current predicted residual effects and Section 5 provides an overview for Baffinland's approach to ongoing assessment of the predicted residual effects.

Further detail of the Project residual effects is presented in Volume 4 through 8 of the Mary River Project.

2. FEIS RESIDUAL EFFECTS ASSESSMENT METHODOLOGY

2.1 DETERMINING SIGNIFICANCE OF RESIDUAL EFFECTS

One of the underlying purposes of the EIS is the assessment and determination of significance of the residual effects and their acceptability to Inuit communities and the Project stakeholders. As directed by the NIRB Guidelines (NIRB 2015), determination of significance considers the following criteria.

- Direction or nature of an effect (i.e., positive/beneficial versus negative/adverse);
- Magnitude and complexity of an effect;
- Extent of the effect, including the geographical area that will be affected, the size of the affected human populations, and/ or the size of the affected wildlife populations and habitat;
- Frequency and/or duration of an effect;
- Reversibility or irreversibility of an effect;
- Probability or likelihood of occurrence of the effect; and
- The level of confidence in the effects prediction.

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These criteria were adopted for this assessment, as specified in the Guidelines and because the criteria have precedence of use for other environmental assessments in the Canadian Arctic (NIRB 2007, 2009; Lawrence Environmental 2000, 2004; Wolfden Resources Inc. 2006; De Beers Canada Inc. 2004). In addition to the above attributes, NIRB (2009) directed Baffinland to consider additional qualifiers in its significance evaluation. Additional attributes are considered, if and as applicable, in the assessment of the VECs/VSECs. Section 90 of the *Nunavut Planning and Project Assessment Act* (NuPPA) lists factors to be considered in determining the significance of impacts. Certain factors, listed below, are the same for all VECs:

- The ecosystem sensitivity of the area;
- The historical, cultural, and archaeological significance of the area; and
- The size of the human and the animal populations likely to be affected by the effects.

Definitions and assessment criteria for each are identified in Table 2.1, which lists the complete set of attributes (criteria and qualifiers), provides a definition and rationale as well as a summary of their relevance or context to the Mary River Project, and describes how the attribute was incorporated into the assessment.

TABLE 2.1 ATTRIBUTES USED TO EVALUATE SIGNIFICANCE OR RESIDUAL EFFECTS

Attribute	Definition and Rationale	Role in Significance Determination[2]
Direction and Nature[1]	The ultimate long-term trend of an environmental effect - positive, neutral, or negative.	**Qualifier** Only negative effects are assessed for significance
Magnitude [1]	The amount or degree of change in a measurable parameter or variable relative to existing conditions (the exposed population)[3]. This attribute can also consider complexity - the number of interactions (Project phases and activities) contributing to a specific effect.	**Primary Criterion** High magnitude = high significance **Secondary Criterion** If magnitude and geographic extent are related, the higher the potential significance
Extent[1]	The geographic area over which the interaction will occur.	**Secondary Criterion** The larger the zone of influence, the higher the potential significance
Frequency[1]	The number of times during a project or a project phase that an interaction or environmental effect can be expected to occur.	**Secondary Criterion** Greater the frequency of occurrence, the higher the potential significance

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Attribute	Definition and Rationale	Role in Significance Determination[2]
Timing	The Project Phase within which the environmental effect will occur.	**Qualifier** Provides context
Duration[1]	The period over which the environmental effect will occur.	**Secondary Criterion** The longer the duration of an interaction the higher the potential significance
Reversibility[1]	The likelihood that a VEC/VSEC or Indicator will recover from an environmental effect, including consideration of active management techniques. Reversibility is considered for biological VECs at the population level. Therefore, although an effect like mortality is irreversible, the effect at the population level might be reversible.	**Primary Criterion** The greater the potential to reverse an effect, the lower its potential significance
Probability[1]	The likelihood that an interaction and a consequent effect will, in fact occur.	**Qualifier** (considered only for potentially significant effects) The higher the probability of occurrence, the greater the significance
Certainty[1]	The level of confidence in the knowledge or analysis that supports the prediction, in particular with respect to limitations in overall understanding of the ecosystem, and limitations in the ability to foresee future events or conditions.	**Qualifier** (considered only for potentially significant effects) The lower the certainty of occurrence, the more conservative the approach to prediction of significance
Ecological/Socio-economic Context/Value[1]	The general characteristics of the area in which the Project is located, as indicated by existing levels of human activity and associated types of disturbance. Interpreted to mean the basis for	**Qualifier** VECs/ VSECs and Indicators have been identified as “valued”

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Attribute	Definition and Rationale	Role in Significance Determination[2]
	assigning “value” to the particular VEC.	
Environmental Sensitivity[1]	Environmental sensitivity of the area likely to be potentially affected. Refers to areas of heightened sensitivity that will be identified where applicable in relation to the Project (i.e., areas sensitive to spills; caribou calving areas).	**Qualifier** The Magnitude of an effect within an area of environmental sensitivity will be greater; therefore environmental sensitivity is considered in the discussion and rating of the Magnitude attribute
Historical, Cultural, Archaeological Significance[1]	To be considered within the geographic area to be potentially affected.	**Qualifier** (Extent - above) Historic, cultural and archaeological significance is evaluated within the archaeology effects assessment (Volume 4)
Human and wildlife populations, and the size of the affected wildlife populations and related habitat[1]	The size of the potentially affected human populations; and the size of the potentially affected wildlife populations and related habitat.	**Qualifier** (Extent - above)
The extent of the effects of the project on other regional human populations and wildlife populations, including the extent of the effects on Inuit harvesting activities[1]	The Project might have the potential to affect other human and wildlife population, if there are residual effects to marine wildlife or socio-economic benefits that extend outside Nunavut.	**Qualifier** Consider within the Transboundary Effects Assessment (FEIS Volume 9, Section 4; Phase 2 Proposal, TSD-27)
The potential for cumulative adverse effects given past,	The Project might have the potential for cumulative effects where residual effects from the Project are expected to occur.	**Qualifier** Consider in the Cumulative Effects Assessment (FEIS Volume 9,

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Attribute	Definition and Rationale	Role in Significance Determination[2]
present and future relevant events[1]		Section 1; Phase 2 Proposal, TSD-27
Ecosystem function and Integrity[1]	Ecosystem function and integrity is important to identified VECs and humans.	**Qualifier** Outcome of the significance determination
The effect on the capacity of resources to meet present and future needs (sustainability)[1]	The sustainability of this Project, and any major industrial project, is an important element to assess.	**Qualifier** Outcome of the significance determination
Value[1]	The value attached to the affected VEC or VSEC by those who identified them. An environmental or socio-economic component was identified as "valued" and was addressed in the EIS if it was found to have a high value to communities.	**Qualifier** Addressed as part of Issues Scoping where the "value" of each component is considered. The value attached to a VEC or VSEC is more or less equivalent to "Sensitivity" described above.

NOTES:

1. Specifically required by NIRB guidelines.
2. Criterion - directly contributes to the determination of significance. Primary criteria are given greater weight than secondary criteria. Qualifier - acts as a modifier to be considered when assigning values/rankings to assessment criteria.
3. In the majority of cases there is either a poor or no estimate available of the total population. However, for the purpose of undertaking an environmental assessment, an effects prediction can be made by making reasonable assumptions. The most common approach is to take an area that is less than the full range of a population and, often on the basis of density estimates (or by using habitat as an indicator), a conservative prediction is possible, i.e. If the effect is calculated for a portion of the population and it results in a magnitude of effect that is beneath a defined threshold, then it is reasonable to predict the effect on the entire population, even in the absence of a total population estimate. This approach is not greatly different from that used by resource managers that have the mandate to manage wildlife populations, who are challenged to develop harvest quotas, even where they do not have an accurate or complete population estimate available to support these decisions.

Volumes 4 through 8 of the Mary River Project FEIS present the effects predictions for individual resource specific component themes presented in each volume. Volume 9 of the Mary River Project FEIS presents the cumulative environmental effects assessment. Additional residual effects predictions for past assessments for the Approved Project include the ERP FEIS Addendum (Baffinland 2013) and subsequent addenda for the PIP (Baffinland 2018), PIPE (Baffinland 2020), PIP Renewal (Baffinland 2022) and SOP (Baffinland 2023) applications. More detail on these assessments is provided in Section G4.

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2.1.1 RATING CRITERIA OF RESIDUAL BIOPHYSICAL IMPACTS

For the categories for criteria and qualifiers applied directly to the determination of significance for residual biophysical effects, with due consideration to the NIRB requirements cited above, see Table 2.2.

TABLE 2.2 RATINGS FOR EVALUATING RESIDUAL BIOPHYSICAL EFFECTS

Criteria	Classification	
Magnitude (Specific to the VEC and the impact)	Level I	An effect on the exposed indicator/VEC that results in a change that is not distinguishable from natural variation and is within regulated values
	Level II	An effect that results in some exceedance of regulated values and/or results in a change that is measurable but allows recovery within one to two generations
	Level III	An effect predicted to exceed regulated values and/or results in a reduced population size or other long-lasting effect on the subject of assessment
Extent The physical extent of the effect, relative to study area boundaries	Level I	Confined to the LSA
	Level II	Beyond the LSA and within the RSA
	Level III	Beyond the RSA
Frequency How often the effect occurs	Level I	Infrequent
	Level II	Intermittent
	Level III	Frequent or continuous
Duration The length of time over which a Project effect will occur	Level I	Short-term (effect lasts up to four years)
	Level II	Medium-term (up to 25 years, for the life of the Project)
	Level III	Long-term (beyond the life of the Project) or permanent
Reversibility The likelihood of the VEC to recover from the effect	Level I	Fully reversible
	Level II	Reversible with cost/effort
	Level III	Irreversible
Qualifiers		
Certainty Limitations in the overall understanding of the ecosystem and ability to predict future conditions	High	Baseline data are comprehensive; predictions are based on quantitative data; effect relationship is well understood
	Medium	Intermediate degree of confidence between high and low
	Low	Baseline data are limited; predictions are based on qualitative data; effect relationship is not well understood
Probability	Unlikely	Less than 20% likelihood of occurrence

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Criteria	Classification	
The likelihood that the predicted impact/residual effect will occur	Moderate	Between 20 and 60% likelihood of occurrence
	Likely	Over 60% likelihood of occurrence

Each of the five criteria contributes to the determination of significance. Criteria are categorized in three levels (Levels I, II, and III), where Level I is indicative of a negligible or limited potential to contribute to an overall significant environmental effect, and Level III is indicative of a high potential. Level II represents the intermediate condition.

2.1.1 RATING CRITERIA FOR RESIDUAL SOCIO-ECONOMICS IMPACTS

Similar criteria were applied to the socio-economic effects assessment with some modification and additional criteria in consideration of the nature, complexity, and multiple perspectives associated with socio-economic issues. For the attributes (criteria and qualifiers) identified as the determinants of significance of socio-economic effects, see Table 2.3.

TABLE 2.3 RATING CRITERIA FOR EVALUATING RESIDUAL SOCIO-ECONOMIC IMPACTS

Criteria	Classification
Direction	Positive
	Variable
	Negative
Geographic Extent	Description of the area and communities most affected
Social Extent	Demographic groups or social units identified as most affected
Magnitude Intensity of the effect	Low
	Moderate
	High
Frequency How often the effect occurs	Infrequent
	Intermittent
	Continuous
Duration Length of time over which a Project effect will occur	Short-term (less than four years)
	Medium-term (up to 25 years, life of the Project)
	Long-term (beyond the life of the Project)
Reversibility Likelihood of recovery from effect	Reversible
	Partly reversible with cost/effort
	Irreversible

2.1.1 OVERALL EVALUATION OF SIGNIFICANCE

NIRB (2009) stated that impact significance is based on comparing the predicted state of the environment with and without the Project, and expressing a judgment as to the importance of the changes identified. NIRB directed that the EIS shall present the residual effects assessment of the Project so that the reader can clearly understand the real consequences of the Project, the degree of

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mitigation of effects, and which effects cannot be mitigated. NIRB also directed Baffinland to consider the dynamic change of ecosystems and their components in determining significance.

The overall significance of an effect is derived from the experience and professional judgment of the environmental practitioners who prepared the assessment, considering the rankings of the contributing attributes of significance:

- While substantially based on professional judgment, the following are general rules of thumb applied in determining significance:
- If the magnitude of the effect is low, then the predicted effect is "not significant," recognizing that magnitude includes consideration of sensitive species, habitats or populations. If effects on measurable components such as air or water quality meet applicable performance criteria, standards or guidelines, then the magnitude of the effect is negligible to moderate, and therefore the prediction will be for an effect that is "not significant."
- If the geographic extent of the effect is confined to the PDA or LSA, then the predicted effect is likely to be "not significant."
- If the extent of a negative socio-economic effect is limited to individuals who also receive a corresponding positive benefit, then the predicted effect is likely to be "not significant."
- If the effect has a moderate to high reversibility, the predicted effect is likely to be "not significant."
- If the duration of the effect is short term (e.g., construction period only) then the effect prediction is also likely to be "not significant."
- NIRB (2009) also directed Baffinland to communicate with potentially affected communities and organizations to solicit input on the values placed on VECs and VSECs as well as significance of impacts:
    - The Proponent shall describe how it will ascertain that significance that different parties assigned to each impact, and how it will proceed if different parties ascribe varying significance to VECs, VSECs or the associated impacts. If it is impossible to attain a consensus on the significance of certain impacts, the Proponent shall present the range of viewpoints expressed and shall present and justify its preference, if any. Finally, the Proponent shall describe the significance it ascribes to each effect, and justify how the significance of the effect was determined, taking into consideration and avoiding duplication of, the information provided above (NIRB 2009)
- Finally, in its Pre-Hearing Conference Report, NIRB (2011) directed Baffinland to reconsider the significance of potential Project impacts where parties raised concerns with the significance determinations presented within the Draft Environmental Impact Statement (DEIS).
- To this end, Baffinland attempted to assemble, synthesize and present feedback from the following sources:
    - Records of public meetings from 2006 through the first part of 2011.
    - Records from Inuit knowledge studies held to date (individual interviews and workshops).
    - Kajjuqtikkut - A five-day workshop held in Arctic Bay March 10-14, 2008, attended by members of the five Inuit Knowledge Study working groups. The key themes of transportation (marine and rail), caribou, marine mammals, and socio-economic issues were discussed and minutes recorded.

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- A five-day workshop jointly held by Baffinland and the QIA at Mary River the week of September 1218, 2010, with community representatives selected by the QIA. The workshop focused on community perspectives on the significance of predicted impacts on caribou, marine mammals and land use.
- Feedback of concerns raised with the significance determinations presented in the DEIS.

- Baffinland integrated a summary of the significance determination within each of the individual effects assessments in Mary River Project FEIS Volume 4 through Volume 8 while Volume 9 presents the cumulative environmental effects assessment. The approach in this EIS was to present the evidence clearly and in the manner requested in the Guidelines (NIRB 2009).

Consideration of Inuit Views on Significance

Baffinland recognizes the term “significance” is used differently in different contexts. Inuit have shared different views with Baffinland on what the word “significance” means to them. Some Inuit have told Baffinland that any change to the environment in which they live and carry out harvesting and other cultural practices is significant. Some Inuit have told us that they have observed significant changes to the environment that they do not attribute to the Project. Nonetheless, the assessment must recognize such changes whether the project is causing them or not.

Importantly, significance determinations are made following consideration of important mitigations and management measures applied to each VC. The mitigations applied reflect those that have been developed as a direct result of local Inuit feedback and participation in the Project. For example, many of the shipping mitigations that exist in the current Project have been developed as a direct result of what Baffinland has heard has been of importance to and would help minimize impacts from the Project.

Many Inuit have been clear that they expect Baffinland to make efforts to prevent negative impacts, regardless of how big or small those impacts may be. Baffinland also respects there are some aspects of Inuit views on significance that may be challenging to put into words (written and oral), and that non-Inuit may never fully understand. Based on this more holistic understanding of “significance”, Baffinland has worked with Inuit and regulatory authorities to develop mitigation measures and monitoring programs to address Inuit concerns. Where individuals and/or groups have indicated that they are concerned that an effect has occurred or may occur because of the Project, Baffinland has honored that advice and taken action as demonstrated throughout this assessment– meaning if Inuit have identified a concern, it has been treated as “significant” in terms of developing and implementing robust mitigation measures to minimize that effect. In the context of environmental assessment, the ultimate significance rating may result in a ‘non-significant’ effect as per the methodology applied, but that in no way implies that Baffinland does not treat the concerns and views shared with Baffinland as ‘non-significant’. A determination of non-significance will still result in monitoring programs to be applied and additional mitigation measures to be considered where relevant.

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The term “significance” in the context of standard environmental assessment methodology/practice for project regulatory applications has a specific meaning and project proponents are expected to apply specific methodology when determining ‘significance’. The terms “significant” and “not significant” within the environmental assessment context refer specifically to whether a project activity or component, when interacting with a VC, will produce residual effects that by various possible reasons are unacceptable by causing too great an adverse effect (such as exceedance of a defined threshold, if available). The Adaptive Management measures that have been developed for the Project will ensure that this continuous feedback loop will continue throughout the life of the Project, and that mitigations may continue to be developed as a result of feedback on topics of importance to local Inuit.

3. RESIDUAL EFFECT PREDICTED AT PLANNED CLOSURE

Using the methodology presented in Section 2, the predicted residual impacts were assessed and the associated consequences were evaluated for each impact to a VEC or VSEC. FIGURE G-1 provides a representation of this process ensure residual effect predictions are meeting expectations. TABLE G-1 provides a summary of the potential residual effects, by VEC and VSEC, identified for the Project during the FEIS and their associated closure and post closure monitoring programs.

Complete details including the environment consequence calculations, residual impact criteria classification, probability of occurrence and level of confidence all VECs and VSECs are presented in Volume 4 through 8 of the Mary River Project FEIS. The EIS was updated to account for the Early Revenue Phase.

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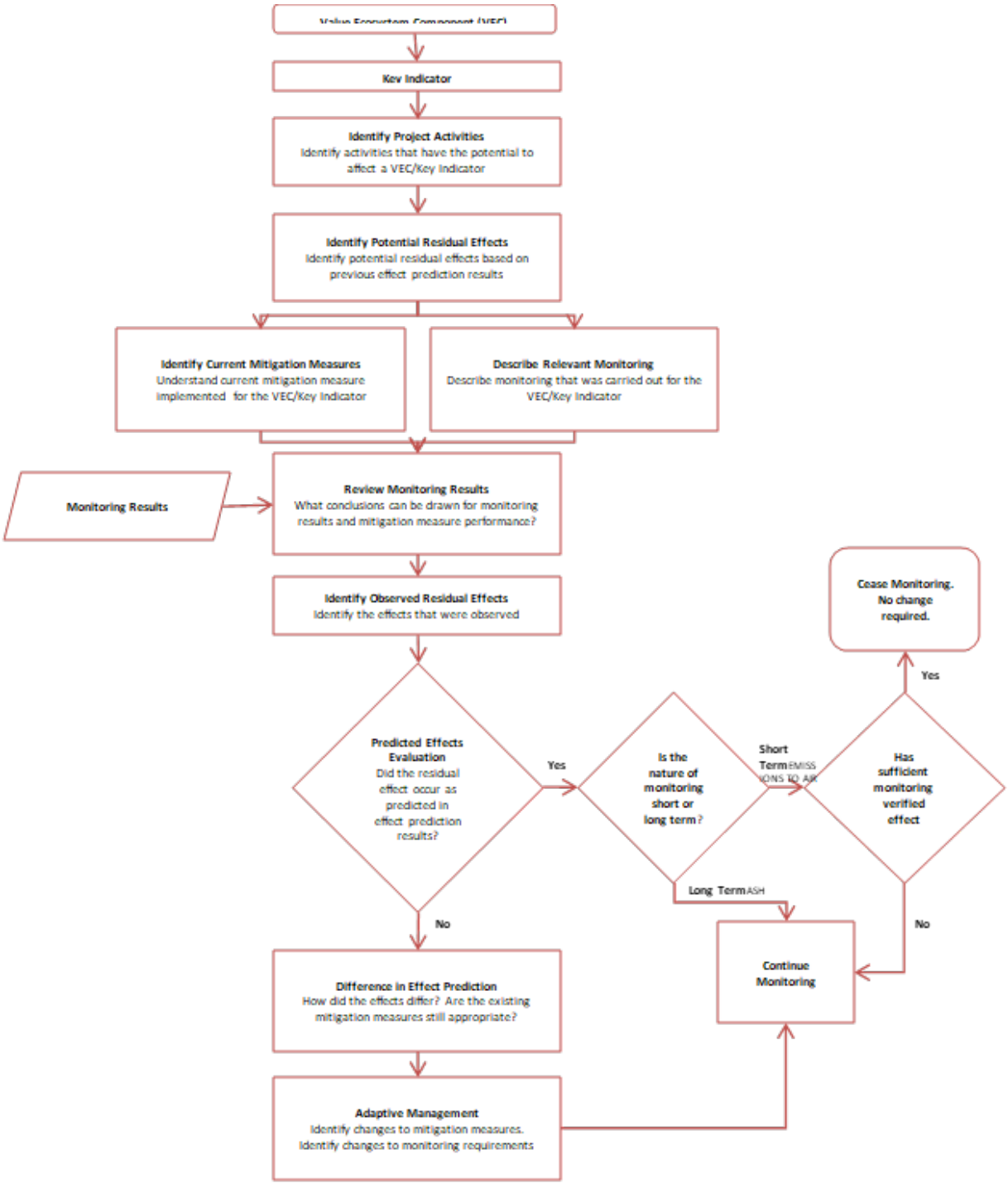


Figure G1: Approach to Evaluating Effect

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Table 3.1 FEIS Predicted Residual Impacts and Closure/Post-Closure Monitoring

VEC	Key Indicator	Potential Effect(s)	Mitigation Measures	Residual Effect (s) Predicted to Occur During Active Closure	Monitoring During Active Closure	Residual Effect(s) Remaining Post-Closure	Post-Closure Monitoring	ICRP Section Reference
ATMOSPHERIC ENVIRONMENT								
Climate change	Greenhouse Gases (GHG)	• Increased GHG emissions • Climate change	• Arctic grade diesel fuel • Rail transportation of ore	• Increased GHG emissions	• PC-mandated annual calculation of Project GHG emissions (NIRB Annual Report)	• Minimal GHG emissions generated post-closure (limited to site visits)	• None	• Not applicable; monitoring prescribed by PC and not required to confirm closure objectives met
Air quality	Air quality	• Increased concentrations of total suspended particulate (TSP), sulphur dioxide (SO_2), nitrogen dioxide (NO_2), and carbon monoxide (CO) • Increased deposition of dust, potential acid input (PAI)	• Apply best management practices for limiting air emissions • Use of low sulphur Arctic grade diesel fuel • Limit speed on roads • Ore crushing facilities are enclosed, vented and equipment with dust collection equipment • Apply dust suppressant as required in high traffic areas and stockpiles • Procurement policy on emissions from equipment (incinerator, generators, vehicles) • Waste segregation (incineration) • Where possible, use of granular material for road construction • Regular maintenance of equipment and vehicles	• Increased concentrations of TSP, SO_2, NO_2, CO • Increased deposition of dust and PAI	• TSP monitoring in Year 2 of active closure	• Negligible residual effects expected post-closure	• None	• Air Quality Monitoring and Reporting described in Section 9.11
Noise and vibration	Noise and vibration levels	• Sensory impact on wildlife	• Procurement policy for noise for equipment and vehicles • Use of mufflers – regular maintenance of engines and equipment	• Sensory impact on wildlife (effect expected to be comparable to the construction phase)	• No monitoring proposed	• Negligible residual effects expected post-closure	• None	• Not applicable
TERRESTRIAL ENVIRONMENT								
Landforms, soil and permafrost	Sensitive landforms	• Soil contamination • Soil structure alteration • Soil destabilization and erosion • Thaw weakening and settlement • Creep settlement	• Sitting of facilities and alignment of roads and railway • Design foundations suitable for site conditions • Design stream crossing structures for extreme flood event • Ensure adequate drainage and prevent pooling of water	• No residual effect (disturbance of sensitive landforms) after mitigation	• Regular visual inspections • Geotechnical Inspection • Environmental site assessment and remediation of hydrocarbon contaminated soils	• Residual effects not expected to occur post-closure; if reclamation objectives have been met	• Post-closure geotechnical inspections at start and end of post-closure monitoring	• Active closure phase monitoring described in Section 9.2 • Post-closure monitoring described in Section 9.2 • Appendix D
Vegetation	Vegetation	• Loss of vegetation abundance and diversity	• Limit physical footprint of facilities • Limit areas of access for vehicles • Progressive reclamation / closure • Promotion of natural revegetation	• Loss of vegetation limited to Project Development Areas (PDA)	• Invasive species monitoring (PC Condition 37) • Annual review of the TEMMP (PC Condition 38)	• Negligible adverse residual effects post-closure.	• None • Post-closure Terrestrial Environment Monitoring and Reporting program in Years 5 and 7 (the second and fourth years of post-closure)	• Terrestrial Environment Monitoring and Reporting described in Section 9.7 • Closure and reclamation research projects, Appendix D

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VEC	Key Indicator	Potential Effect(s)	Mitigation Measures	Residual Effect(s) Predicted to Occur During Active Closure	Monitoring During Active Closure	Residual Effect(s) Remaining Post-Closure	Post-Closure Monitoring	ICRP Section Reference
TERRESTRIAL ENVIRONMENT (CONT`D)								
Birds	Bird key indicators identified in the FEIS, including species at risk	• Destruction of nests • Habitat loss • Mortality • Influences on health • Sensory disturbance	• Mitigation measures identified in the Terrestrial Environment Management and Monitoring Plan (TEMMP), including: • Employee awareness / environmental induction program • Minimize footprint of facilities • Conduct nest search prior to start of activities • No hunting policy • Avoidance of areas of large concentrations of foraging or moulting birds • Avoidance of known nests or nesting areas • To the extent possible, enforce closure of a 500 m radius of the nest until fledging occurs • Nest-specific management plans • To the extent possible, develop appropriate aircraft approach and departure flight paths	• Habitat loss • Mortality • Influences on health	• No monitoring proposed during active closure • Baffinland will seek input from a Closure Working Group on actions that may enhance wildlife use of the area post-closure.	• Residual effects on bird species will gradually lessen with time as the project areas are naturally revegetated.	• Post-closure flora and fauna occupancy and use surveys in Years 5 and 7 (the second and fourth years of post-closure)	• Terrestrial Environment Monitoring and Reporting described in Section 9.7
Terrestrial wildlife and habitat	Caribou	• Habitat loss • Restriction of movement • Mortality	• Use of dust suppressant on Tote Road during growing season • Speed limits for trucks and trains which will provide more time for caribou to get off the road or rail, and will increase the chance of a truck being able to stop before a collision with a caribou. • The train is expected to operate 300 days per year, so seasonal stoppages are possible if large groups of migratory caribou return to the area. • Baffinland has a no hunting policy for all personnel while working on site. • Snow management that will grade snow banks along railway and roadway so that caribou are able to easily cross the transportation corridor without being blocked by steep snow banks. • The railway embankment will be constructed of finer fill material at the five identified trails for easier caribou movement across the railway embankment. The finer fill will replicate natural trail conditions. • Physical barriers from trains will be reduced by limiting train traffic to four passes per day.	• Habitat loss • Restriction of movement • Mortality	• Same as above	• Same as above	• Same as above	• Same as above

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	Key Indicator	Potential Effect(s)	Mitigation Measures	Residual Effect(s) Predicted to Occur During Active Closure	Monitoring During Active Closure	Residual Effect(s) Remaining Post-Closure	Post-Closure Monitoring	ICRP Section Reference
FRESHWATER AQUATIC ENVIRONMENT								
Water quantity	Water quantity	• Reductions in water quantity due to water withdrawals • Increases in water quantity due to effluent discharges • Redistribution of water flows in the natural environment due to diversions	• Permit required for water withdrawal • Measurement of withdrawal quantities as per Water License • Implement measures to reduce water consumption	• Residual effects predicted to occur during the operation phase will either remain or will be reduced through the removal of diversions and watercourse crossings	• Implementation of Closure and Post Closure Aquatic Monitoring • Stream gauging as identified in the Aquatic Effects Monitoring Plan (AEMP) • The Stream Diversion Monitoring Program, a targeted study of the AEMP, will likely have concluded	• Residual effects predicted to occur during the operation and into the active closure phase will remain static or will be reduced	• Implementation of Closure and Post Closure Aquatic Monitoring	• Closure and Post-closure Aquatic Monitoring and Reporting described in Section 9.5
Surface water and sediment quality	Water and sediment quality	• Changes in water quality due to point-source, non point-source and airborne emissions • Changes in sediment quality due to point-source, non point-source and airborne emissions	• Siting of facilities/quarries at least 30 m from stream or water body • Install range of sediment and erosion control structures • Install diversion/collection channel or containment berms where appropriate • Routine inspection and maintenance • Ice and freshet management • Implementation of BMPs for surface water management • Sewage treatment • Wastewater treatment plant (oily water, truck wash, maintenance facilities, explosives equipment wash water) • Management of potentially acid generating rocks from waste rock pile, ore stockpiles, quarries and mine • Minimize footprint of stream crossing • Compensation plan for HADD • Appropriate design of stream/river crossing structures • Limit barrier to movement with site specific design of rocky ramps at culvert crossing (where required) • Channel enhancement where required • Maintain minimum flow in impacted streams where possible • Monitor low flow stream, fish salvage if necessary • Fish barrier for extremely low flow streams • Application of DFO guideline when using explosives near fish-bearing waterbodies • Prevent discharge of contaminants	• Changes in water quality due to point-source, non point-source and airborne emissions • Changes in sediment quality due to point-source, non point-source and airborne emissions	• Implementation of Closure and Post Closure Aquatic Monitoring • Implementation of any remaining monitoring requirements of the closure phase AEMP	• Residual effects predicted to occur during the operation and into the active closure phase will remain static or will be reduced	• Aquatic and AEMP monitoring until mine achieves “recognized closed mine” status from the Nunavut Water Board • Implementation of Closure and Post Closure Aquatic Monitoring • As a component study of the AEMP, a final Environmental Effects Monitoring (EEM) study will be conducted as prescribed in the Metal and Diamond Mining Effluent Regulations (MDMER), to seek “recognized closed mine” status from Environment Canada under the MDMER, anticipate sampling in year	• As above

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			• Storage of fuel and other hazardous materials in secondary containment • Refuelling on impermeable surfaces and runoff contained • Emergency and Spill Response Plan				4 and 6 post closure.	
VEC	**Key Indicator**	**Potential Effect(s)**	**Mitigation Measures**	**Residual Effect(s) Predicted to Occur During Active Closure**	**Monitoring During Active Closure**	**Residual Effect(s) Remaining Post-Closure**	**Post-Closure Monitoring**	**ICRP Section Reference**
FRESHWATER AQUATIC ENVIRONMENT (CONT'D)								
Freshwater fish, fish habitat, and other aquatic organisms	Arctic char	• Effects on Arctic char health • Effects on Arctic char movement • Effects on Arctic char habitat quality • Arctic char mortality	• Siting of facilities/quarries at least 30 m from stream or water body • Install range of sediment and erosion control structures • Install diversion/collection channel or containment berms where appropriate • Routine inspection and maintenance • Ice and freshet management • Implementation of BMPs for surface water management • Sewage treatment • Wastewater treatment plant (oily water, truck wash, maintenance facilities, explosives equipment wash water) • Management of potentially acid generating rocks from waste rock pile, ore stockpiles, quarries and mine • Minimize footprint of stream crossing • Compensation plan for HADD • Appropriate design of stream/river crossing structures (culvert, bridges, etc.) • Limit barrier to movement with site specific design of rocky ramps at culvert crossing (where required) • Channel enhancement where required • Maintain minimum flow in impacted streams where possible • Monitor low flow stream, fish salvage if necessary • Fish barrier for extremely low flow streams • Use of explosives in or near streams/water bodies as per DFO Guidelines • Prevent discharge of contaminants • All hazardous materials stored on impermeable surface/secondary containment • Tank farm and large storage tanks placed in secondary containment structures (lined and impermeable) • Smaller tank – double wall ISO-containers • Refuelling on impermeable surfaces and runoff contained • Emergency and Spill Response Plan	• Effects on Arctic char health • Effects on Arctic char movement • Effects on Arctic char habitat quality	• Fisheries monitoring of in-water works during the removal of bridges, culverts and outfalls, as per DFO Fisheries Authorization and Water Licence • Implementation of any remaining monitoring requirements of the closure phase AEMP • Implementation of Closure and Post Closure Aquatic Monitoring	• Residual effects predicted to occur during the operation and into the active closure phase will remain static or will be reduced	• Fish and fish habitat monitoring as outlined in the AEMP until the mine achieves "recognized closed mine" status from the Nunavut Water Board • As a component study of the AEMP, a final Environmental Effects Monitoring (EEM) study will be conducted as prescribed in the Metal and Diamond Mining Effluent Regulations (MDMER), to seek "recognized closed mine" status from Environment Canada under the MDMER.. • Implementation of Closure and Post Closure Aquatic Monitoring	• Closure and Post-closure Aquatic Monitoring and Reporting described in Section 9.5

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VEC	Key Indicator	Potential Effect(s)	Mitigation Measures	Residual Effect(s) Predicted to Occur During Active Closure	Monitoring During Active Closure	Residual Effect(s) Remaining Post-Closure	Post-Closure Monitoring	ICRP Section Reference
MARINE ENVIRONMENT								
Marine water and sediment quality	Marine water and sediment quality	• Changes in water and sediment quality in Steensby and Milne Inlets • Accident and malfunction (e.g. oil spill)	• Site runoff water management as per management plan • Hazardous substances contained within impermeable areas as per Waste Management Plan • Sewage treatment and wastewater treatment plant (oily water, truck wash, maintenance facilities, explosives equipment wash water) • Emergency and Spill Response Plan, Milne Port OPEP and Steensby Port OPEP; SOPEP for all ships • Ship on-board waste management - no discharge at sea	• Changes in water and sediment quality in Steensby and Milne Inlets • Accident and Malfunction	• Implementation of Closure and Post Closure Aquatic Monitoring	• Residual effects predicted to occur during the operation and into the active closure phase will remain static or will be reduced	• Implementation of Closure and Post Closure Aquatic Monitoring	• Closure and Post-closure Marine Environment Monitoring and Reporting described in Section 9.8
Marine mammals	Ringed Saels Bearded Seals Walruses Beluga whales Narwahls Bowhead whales	• Disturbance caused by airborne and/or underwater noise from construction, shipping, and aircraft • Hearing impairment and/or damage caused by noise from construction activities • Masking of environmental sounds caused by vessel and construction noise	• Dock structures were designed to minimize the footprints in the marine environment • Schedule dock construction activity during period of low mammal occurrence – April to June (blasting, pile driving, dredging) • Use proven mitigation measures to reduce noise and noise propagation during construction (DFO's guideline overpressure limit, bubble curtain system for blasting) • Discourage marine mammals from the blast area with potential use of acoustic deterrent device • Vessels will maintain a constant course and speed whenever possible - reduce vessel speed in Milne Inlet • Vessels will minimize idling of engines when docked at Milne and Steensby ports • Aircraft will be operated at a minimum altitude of 450 m over marine areas, when weather conditions allow • Aircraft will be prohibited from flying low over marine mammals for sightseeing or photography	• Disturbance caused by noise from construction, shipping, and aircraft overflights • Masking caused by shipping noise	• Implementation of Closure and Post Closure Aquatic Monitoring	• Residual effects predicted to occur during the operation and into the active closure phase will remain static or will be reduced	• Implementation of Closure and Post Closure Aquatic Monitoring	• As above
	Polar bears	• Habitat change resulting from icebreaking and/or ice management • Disturbance caused by noise from construction, shipping, and aircraft • Mortality from human-bear interactions	• Primary use of Mary River airstrip during the Operation Phase • Educate workers about bear safety • Work areas kept clean of food scraps, garbage, and toxic materials • Use of bear monitor at camp sites • Use of bear deterrent devices	• Habitat change from icebreaking and/or ice management • Disturbance caused by noise from construction, shipping, and aircraft overflights • Mortality if a bear is killed in defense of human life	• Implementation of Closure and Post Closure Aquatic Monitoring • Baffinland will seek input from a Closure Working Group on actions that may enhance wildlife use of the area post-closure.	• None	• Implementation of Closure and Post Closure Aquatic Monitoring • Post-closure flora and fauna occupancy and use surveys in Years 5 and 7 (the second and fourth years of post-closure)	• As above • Terrestrial Environment Monitoring and Reporting described in Section 9.7.

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VEC	Key Indicator	Potential Effect(s)	Mitigation Measures	Residual Effect(s) Predicted to Occur During Active Closure	Monitoring During Active Closure	Residual Effect(s) Remaining Post-Closure	Post-Closure Monitoring	ICRP Section Reference
HUMAN ENVIRONMENT								
Population demographics	Demographic stability	• In-migration of a small number of workers from south will have effect on the demographic make-up of communities • Migration of non-Inuit Project employees into the North Baffin LSA • Migration of non-Inuit into North Baffin for indirect jobs • Inter-community Inuit migration • Out-migration from the North Baffin	• Designation of North Baffin communities as “Point of Hire” (Arctic Bay, Clyde River, Hall Beach, Igloolik, and Pond Inlet) • Iqaluit and a southern hub are also designated “Point of Hire” • Free transportation from “Point of Hire” to Mine Site	• In-migration of a small number of workers from south or other Nunavut communities will have effect on the demographic make-up of communities • Inter-community Inuit migration seeking alternate employment	• Baffinland will seek input from the Socio-Economic Working Group on actions that may support monitoring movement • Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Inter-community Inuit migration seeking alternate employment	• None	• Socio-economic Monitoring and Reporting described in Section 9.10
	Education and Skills	• Incentives related to school attendance and success • Opportunities to gain skills	• Minimum age of 18 yrs for Project employment • Career planning • Priority hiring for Inuit • Upgrading opportunities • Summer experience • Career counselling • Training	• Transferable skills for LSA employees • Incentives related to school attendance and success	• Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Transfer of skills to alternate employment	• None	• Socio-economic Monitoring and Reporting described in Section 9.10
Livelihood and Employment	Wage Employment	• Creation of jobs in the LSA • Employment of LSA residents	• LSA points of hire • Recruitment strategy • Inuit hiring policy • Management commitment	• Ongoing employment of LSA residents for closure roles • Development of banking and money management skills	• Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Development of money management skills	• None	• Socio-economic Monitoring and Reporting described in Section 9.10
VEC	**Key Indicator**	**Potential Effect(s)**	**Mitigation Measures**	**Residual Effect(s) Predicted to Occur During Active Closure**	**Monitoring During Active Closure**	**Residual Effect(s) Remaining Post-Closure**	**Post-Closure Monitoring**	**ICRP Section Reference**

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	Job Progression and Career Advancement	• New career paths	• Individual career support • Inuit hiring / promotions policy • Management commitment	• Expanded employment options based on acquired skills and experience • Resume and other employment documents to support future employment	• Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Expanded employment options based on acquired skills and experience	• None	• Socio-economic Monitoring and Reporting described in Section 9.10
Economic Development and Self-reliance	Land	• Increased pressure on the land • Changes to human engagement in land-based economy	• Lease agreement • VEC-related measures • Resources and Land Use measures (VSEC)	• Increased employment capacity and general well-being	• Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Transferable employment and life skills • Improved education and training • Increased wealth • Increased capacity to engage in procurement processes/provide services on alternate projects, industries and government contracts	• None	• Socio-economic Monitoring and Reporting described in Section 9.10

	People	• Increased opportunities for youth
		• Improved education and training
		  • Increased wealth and well-being
			• Inuit recruitment strategy
			• Education and training program
			• Community support fund
			  • Employee and family assistance program
				• Improved ability to achieve strategic community development objectives	• Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Increased local businesses
						  • Increased capacity to engage in procurement processes/provide services on alternate projects and industries and government contracts
							• None	• Socio-economic Monitoring and Reporting described in Section 9.10

VEC	Key Indicator	Potential Effect(s)	Mitigation Measures	Residual Effect(s) Predicted to Occur During Active Closure	Monitoring During Active Closure	Residual Effect(s) Remaining Post-Closure	Post-Closure Monitoring	ICRP Section Reference
	Community Economy	• Increased wealth in community	• Money management orientation • Community Fund • Monitoring to support decision-making	• Growth in the economy and related job creation and business expansion	• Baffinland will seek input from the Socio-Economic Working Group on actions that	• Increased local businesses	• None	• Socio-economic Monitoring and Reporting

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		• Rotational absence of residents • Increased local business opportunities			may support monitoring movement • Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Increased capacity to engage in procurement processes/provide services on alternate projects and industries and government contracts		described in Section 9.10

	Territorial Economy	• Expanded economic activity (GDP)
		  • Increased diversity of territorial economy
			• Direct and indirect investment in the economy
			• Payment of taxes
			  • Payment of resource royalties
				• Positive – increase awareness for LSA employees, focus on health and safety, employee assistance and counselling
				  • Negative - increased ability to afford substances will have effects on substance abuse
					• "No drug and alcohol" policy remains in place consistent during active closure in addition to medical checks in relation to new employees on site	• Positive – increase awareness for LSA employees, focus on health and safety
						  • Negative - increased ability to afford substances will have effects on substance abuse
							• None	• Socio-economic Monitoring and Reporting described in Section 9.10

Human health and well-being	Substance abuse	• Transport of substances through Project sites • Affordability of substances • Attitudes towards substances and addictions	• "No drug – no alcohol" policy • Measures to prevent transportation through sites • Employee and Family Assistance Program	• Improved well-being of children • Access to Employee and Family Assistance Program	• Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments •	• Increased life skills for parents and young adults of LSA employees	• None	• Socio-economic Monitoring and Reporting described in Section 9.10
	Well-being of children	• Changes in parenting • Increased household income and food security • Overall effects on children	• Orientation and training related to fly-in/fly-out adaptation, health, well-being • Employee and Family Assistance Program • Money management training • Community support fund	• Absence of residents while they are working at Project • Moving off of rotation, families will have to readjust to potential full time living/working arrangements	• Ongoing monitoring of exit interviews and grievance procedure to understand impact of rotation on employees • Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Moving off of rotation, families will have to readjust to potential full time living/working arrangements	• None	• Socio-economic Monitoring and Reporting described in Section 9.10

VEC	Key Indicator	Potential Effect(s)	Mitigation Measures	Residual Effect(s) Predicted to Occur During Active Closure	Monitoring During Active Closure	Residual Effect(s) Remaining Post-Closure	Post-Closure Monitoring	ICRP Section Reference
	Community social stability	• Absence from community during work rotation	• Orientation and training related to fly-in/fly-out adaptation • Short rotation (two week in / two week out)	• Competition for skilled workers may lead to temporary effects on municipal services.	• Baffinland will engage with the GN to establish a Labour	• Competition for skilled workers	• None	• Socio-economic Monitoring and Reporting

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				• Long term improvement in labour force capacity	Market Partnership to develop and implement strategies for dealing with labour force adjustments •			described in Section 9.10
Community infrastructure and public service	Recruitment and Retention of Hamlet	• Competition for skilled workers • Labour force capacity	• Early start for skills training • Ongoing training • Employment experience	• Expanded market —business services to Project • Expanded market —consumer goods and services • Increased entrepreneurial capacity	• Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Increased entrepreneurial capacity • Increased ability to participate in procurement processes	• None	• Socio-economic Monitoring and Reporting described in Section 9.10
Contracting and business opportunities	Opportunities For Business	• Expanded market - business services to Project • Expanded market - consumer goods and services • Increased entrepreneurial capacity	• Inuit contracting strategy • Cooperation with QIA to build Inuit capacity • Establish a fund to support and build capacity • Management assistance to Inuit designated firms • Opportunities for local entrepreneurs to work with Project	• Chance of unmitigated archaeological sites subject to accidental or deliberate partial or complete destruction is minimal • Potential for chance finds • Increased traffic at Steensby Inlet could affect archaeological resources	• Ongoing procedures for archeological finds on site	• Potential for chance finds	• None	• Socio-economic Monitoring and Reporting described in Section 9.10
Cultural resources	Archaeological Sites	• Disturbance or removal of archaeological sites • Unauthorized removal of artefacts • Potential loss of regionally significant sites through approved mitigation	• Pre-development archaeological surveys to support avoidance and protections of sites, mitigation by SDR prior to construction, implementation of a chance finds procedure • Training, flagging and exclusion zones, implementation of government-approved mitigation plans, involvement of local people, management plans, implementation of chance finds procedure	• Changes in caribou harvesting • Changes in marine mammal harvesting • Changes in fish harvesting	• Ongoing implementation of Article 13.4 NLCA Inuit Rights of Travel and Access • Ongoing implementation of Hunting and Weapons Policy on site	•	• None	• Socio-economic Monitoring and Reporting described in Section 9.10
Resources and land use	Inuit harvesting of wildlife	• Changes in caribou harvesting • Changes in marine mammal harvesting • Changes in fish harvesting	• Prohibition of harvesting by employees • Measures to mitigate VEC effects (VEC assessments)	• Safe travel around Eclipse Sound and Pond Inlet • Safe travel through Milne Port • Emissions and noise disruption • Sensory disturbance and safety along Milne Inlet Tote Road • Detour around Mine Site • HTO cabin closure • Difficulty and safety relating to railway crossings • Detour around Steensby Port • Restrictions on camping locations around Steensby Port	• Ongoing implementation of Article 13.4 NLCA Inuit Rights of Travel and Access • Ongoing implementation of Hunting and Weapons Policy on site during active closure	• Safety protocols developed as necessary for post closure including detours as necessary	• None	• Socio-economic Monitoring and Reporting described in Section 9.10
VEC	**Key Indicator**	**Potential Effect(s)**	**Mitigation Measures**	**Residual Effect(s) Predicted to Occur During Active Closure**	**Monitoring During Active Closure**	**Residual Effect(s) Remaining Post-Closure**	**Post-Closure Monitoring**	**ICRP Section Reference**

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Resources and land use	Travel and camps	• Safe travel around Eclipse Sound and Pond Inlet • Safe travel through Milne Port • Emissions and noise disruption • Sensory disturbance and safety along Milne Inlet Tote Road • Detour around Mine Site • HTO cabin closure • Difficulty and safety relating to railway crossings • Detour around Steensby Port • Restrictions on camping locations around Steensby Port	• Road Management Plan • Mine Closure Plan • Safety Plan • IIBA Agreement with QIA • Designated railway crossing locations	• Ongoing cultural awareness training for all staff and visitors on site • Increased awareness from cross-cultural training	• Ongoing monitoring of exit interviews and grievance procedure	• Increased awareness from cross-cultural training	• None	• Socio-economic Monitoring and Reporting described in Section 9.10
Cultural Well-Being	Cultural Well-Being	• Pijitsirnjiq – serving and providing for… • Pilnimmaksarniq – passing on of knowledge and skills • Avatittinnik Kamattiarniq – environmental stewardship	• Measures to support Inuit culture on site, including Inuktitut language plan • Inuit priority for employment • Inuit involvement in environmental monitoring	• Payments of payroll and corporate taxes to territorial government	• None	• None	• None	• Socio-economic Monitoring and Reporting described in Section 9.10
Benefits, taxes and royalties	Territorial own-source revenues	• Increased taxes and revenues from indirect and induced growth • Payments of payroll and corporate taxes to territorial government	• None	• IIBA agreement with QIA • Development of leadership skills	• Ongoing documentation of any supervisory skills training in place	• Increased leadership and team working skills	• None	• Socio-economic Monitoring and Reporting described in Section 9.10
VEC	**Key Indicator**	**Potential Effect(s)**	**Mitigation Measures**	**Residual Effect(s) Predicted to Occur During Active Closure**	**Monitoring During Active Closure**	**Residual Effect(s) Remaining Post-Closure**	**Post-Closure Monitoring**	**ICRP Section Reference**

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Governance and leadership	Governance and leadership	• IIBA Agreement with QIA • Development of leadership skills	• Participation in initiatives to identify indicators of relevance to regional monitoring programs, share data generated by activities related to the Project, and discuss the interpretation of this data with others involved in these initiatives • Fit well with the strategic priorities identified for both the RSA	• In-migration of a small number of workers from south or other Nunavut communities will have effect on the demographic make-up of communities • Inter-community Inuit migration seeking alternate employment	• Baffinland will seek input from the Socio-Economic Working Group on actions that may support monitoring movement • Baffinland will engage with the GN to establish a Labour Market Partnership to develop and implement strategies for dealing with labour force adjustments	• Inter-community Inuit migration seeking alternate employment	• None	• Socio-economic Monitoring and Reporting described in Section 9.10

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4. CURRENT PREDICTED RESIDUAL EFFECTS

At this time, the residual effect and impact assessment results from the Mary River EIS remain relevant as the Project is in the relatively early stages of operation and development has proceeded largely as proposed. Collection of information and data occurs on an annual basis under Baffinland's environmental and socio-economic monitoring programs and is used to assess current site conditions for comparison to initial predictions and assumptions from the Mary River EIS. Results are reported annually to the NIRB and other relevant stakeholders (Section 2.7). Overall, based on environmental monitoring program results to date, Baffinland suggests the Project has provided net positive effects to the region. No significant adverse effects have been identified. It is noted however, monitoring programs will provide more information during the life of the project.

Project residual effects have also been assessed as part of the ERP FEIS Addendum (Baffinland 2013) and subsequent addenda for the PIP (2018), PIPE (2020), PIP Renewal (2022), SOP (2023), and SOP2 (2024) applications. These assessments have predicted little to no changes in residual effects from the original FEIS assessment. In addition, monitoring results have generally confirmed that project effects from six years of operating at 6 Mtpa (2018 – 2023) across all VECs are within the predictions contained with the FEIS and addendums for the Approved Project. A summary of the current predicted residual effects of the Approved Project on all VECs is provided in TABLE G-8. However, it is acknowledged that community members have communicated concerns related to adverse effects and community experiences and observations may not always align with monitoring results (Baffinland 2024).

Revisions to existing predictions of residual impact assessments will be completed where significant variances are identified. Identification of significant variances includes the QA/QC; comparisons to the respective benchmark and to reference and/or baseline; and review of the data using various tools such as Exploratory Data Analysis (EDA) and Statistical Data Analysis (SDA), to determine if change is occurring. A change may be detected statistically or qualitatively, relative to benchmarks, baseline values and/or spatial or temporal trends. A change may be statistically significant, but professional judgement will also be applied using the various evaluation tools to detect a change qualitatively. If this analysis does not detect change, then no action is required. If a change is observed, then further evaluation of the data for that/those indicator(s) will be carried out to determine whether the observed change is Project-related. If the evaluation has indicated with some certainty that the measured change is Project-related, a determination of the action level associated with the observed monitoring results through comparisons to indicators or benchmarks will be conducted. As appropriate to the VEC in question, a determination of the action level associated with the observed monitoring results, and the appropriate response will align with:

- Section 5 of the Aquatic Effects Monitoring Plan (BAF-PH1-830-P16-0039)
- Section 5 of the Shipping and Marine Wildlife Management Plan (BAF-PH1-830-P16-0024)
- Appendix B of Terrestrial Environment Mitigation and Monitoring (BAF-PH1-830-P16-0027)

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5. ONGOING RESIDUAL EFFECT EVALUATION

To evaluate whether or not residual effect predictions are meeting expectations, Closure and Post Closure monitoring and reporting will occur. Similar to Operations monitoring, Closure and Post Closure monitoring will focus on the Project's potential effects on VECs and key indicators, and to apply the monitoring results to assess the Project`s environmental performance relative to the effects predictions.

The evaluation process involves several key steps, as follows:

- Identify the project activities that have the potential to affect a VEC/Key Indicator
- Identify the potential effects as identified in the FEIS or in subsequent environmental effects assessment processes
- Review monitoring results and conclusions to determine which predicted residual effects occurred (and other effects not predicted, if this occurred)
- Determine if the measured residual effect exceeded or differed from the predicted effect
- If the measured residual effect is different than predicted, identify adaptive management measures that can be implemented to eliminate or reduce the severity of the residual effect
- Determining whether or not ongoing monitoring is required, depending on:
    - The intended nature of the monitoring program - short- or long-term
    - Whether or not monitoring objectives have been required
    - Or if unexpected effects have required adaptive management - modifications to mitigation measures and/or monitoring programs

A review and re-evaluation of residual effect predictions, which help drive closure approach and criteria is conducted on an annual basis based on the most recent monitoring results and research available. The results of this process are communicated to key stakeholders in the NIRB Annual Report and QIA/NWB Annual Report for Operations and applicable results are incorporated into future revisions of the ICRP. Post Closure Monitoring Programs expected to be executed in Post Closure are detailed in Section 9.

- Geotechnical/Engineering Monitoring (Section 9.4)
- Closure and Post Closure Aquatic Monitoring and Reporting (Section 9.5)
- Environmental Effects Monitoring (Section 9.5.1)
- Environmental Site Assessment (Section 9.6)
- Post Closure Terrestrial Environment Monitoring and Reporting (Section 9.7)
- Marine Environmental Monitoring (Section 9.8)
- Safety Compliance Inspections (Section 9.9)
- Socio-economic Reporting (Section 9.10)
- Air Quality Monitoring (Section 9.11)

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The Post Closure Monitoring Programs referenced above are expected to be required based on current residual effect predictions. It is noted that additional detail regarding the study design for evaluating the residual impacts (e.g., scope and duration of performance monitoring programs, inspections, assessments, etc.) will be required in the future to support final approval of closure criteria.

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Table 5.1: Summary of Residual Effects of the Approved Project

VEC[1]	FEIS Residual Effects (Baffinland 2012)	ERP FEIS Addendum Residual Effects (Baffinland 2013)	SOP (Baffinland 2023)
ATMOSPHERIC ENVIRONMENT			
Climate Change	• Increased GHG emissions	• Negligible increase in GHG emissions	• Negligible changes in residual effects from the ERP
Air Quality	Increased concentrations of: • Total Suspended Particulate (TSP), sulphur dioxide (SO_2), nitrogen dioxide (NO_2), and carbon monoxide (CO). • Increased deposition of: • Dust, potential acid input (PAI).	• Minor increased effects on air quality at Milne Port, along the Tote Road and at the Mine Site	• Negligible changes in residual effects from the ERP particularly with implementation of dust control measures
Noise and Vibration	• Sensory impact on wildlife	• Minor increased effects on noise and vibration at Milne Port, along the Tote Road and at the Mine Site	• Negligible changes in residual effects from the ERP
TERRESTRIAL ENVIRONMENT			
Ground/Permafrost Stability	• No change from the ERP FEIS Addendum (no residual effect)	• No change from the ERP FEIS Addendum (no residual effect)	• No change from the ERP FEIS Addendum (no residual effect)
Vegetation	• Loss of vegetation limited to PDAs	• Loss of vegetation limited to the PDA	• Loss of vegetation abundance and diversity • Reduced vegetation health • Effects on culturally valued vegetation
Birds and Bird Habitat	• Habitat loss • Mortality risk • Influences on health	• Habitat loss, increased mortality risk, and decreased health due to the increase in PDA associated with the Tote Road	• Influences on health • Sensory disturbance

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VEC[1]	FEIS Residual Effects (Baffinland 2012)	ERP FEIS Addendum Residual Effects (Baffinland 2013)	SOP (Baffinland 2023)
Terrestrial Wildlife and Wildlife Habitat	• Habitat loss • Restriction of movement • Mortality risk	• Habitat loss, negative effects on movement, increased mortality risk, and decreased health and energetics associated with increased traffic along the Tote Road and activity at Milne Port	• Habitat loss • Restriction of movement • Mortality risk
Caribou	• Habitat loss • Restriction of movement • Mortality risk	• Habitat loss, negative effects on movement, increased mortality risk, and decreased health and energetics associated with increased traffic along the Tote Road and activity at Milne Port	• Habitat loss • Restriction of movement • Mortality risk
FRESHWATER ENVIRONMENT			
Freshwater Quantity and Quality	• Surface water quantity reductions from withdrawals and diversions • Changes in water quality due to point-source, non point-source, and airborne emissions	• Surface water quantity reductions from withdrawals and diversions • Changes in water quality due to point-source, non point-source, and airborne emissions	• Changes in water quality due to point source, non-point source, and airborne emissions.
Freshwater Biota and Habitat[2]	• Effects on freshwater biota health and condition • Alteration and/or destruction of freshwater habitat • Effects on productive capacity of freshwater habitat	• Effects on freshwater biota health and condition • Alteration and/or destruction of freshwater habitat • Effects on productive capacity of freshwater habitat	• Effects on freshwater habitat quality (i.e., changes in sediment quality due to point source, non-point source airborne emissions) • Effects on freshwater biota health and condition (i.e., Arctic char as Key Indicator)
MARINE ENVIRONMENT			
Sea Ice	• Disruption of landfast ice along shipping route in Steensby Inlet	• No change	• No change

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VEC[1]	FEIS Residual Effects (Baffinland 2012)	ERP FEIS Addendum Residual Effects (Baffinland 2013)	SOP (Baffinland 2023)
Marine Water and Sediment Quality	Steensby Inlet: • Change in water and sediment quality due to port construction activities including piling/blasting/dredging, propeller wash from barge/ship traffic, and discharges of wastewater / site run-off. • Change in water and sediment quality due to port operational activities, including propeller wash from ship traffic, ore dust dispersion/deposition, discharge of wastewater / site run-off, and discharges of ship ballast water. Milne Inlet: • Change in water and sediment quality due to port construction activities including propeller wash from barge/ship traffic, and discharges of wastewater / site run-off. • Change in water and sediment quality due to port operational activities, including propeller wash from ship traffic, discharge of wastewater / site run-off, and discharges of ship ballast water.	Milne Inlet: • Change in water and sediment quality due to port construction activities including piling/blasting/dredging, propeller wash from barge/ship traffic, and discharges of wastewater/site run-off. • Change in water and sediment quality due to port operational activities, including ore dust dispersion/deposition.	Milne Inlet: Increase in severity of the following residual effects: • Changes in marine water and sediment quality due to propeller wash, discharge of wastewater and site run-off, and ore dust dispersion/deposition.
Marine Habitat and Biota	Steensby Inlet: • Alteration of marine fish habitat via changes in marine water and sediment quality due to port construction activities including	Milne Inlet: • Alteration of marine fish habitat via changes in marine water and sediment quality due to port operational activities	Milne Inlet: Increase in severity of the following residual effects: • Effects on marine fish habitat and fish health via changes

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VEC[1]	FEIS Residual Effects (Baffinland 2012)	ERP FEIS Addendum Residual Effects (Baffinland 2013)	SOP (Baffinland 2023)
	dredging/blasting/infillin g, and wastewater/site run-off. • Alteration of marine fish habitat via changes in marine water and sediment quality due to port operational activities including propeller wash from vessel traffic, ore dust dispersion/deposition and discharge of ship ballast water. • Acoustic disturbance of fish caused by construction and operational (i.e., ship) noise Milne Inlet: • Acoustic disturbance of fish caused by construction and operational (i.e., ship) noise.	including propeller wash from vessel traffic and wastewater/site run-off. • Acoustic disturbance of fish caused by construction and operational (i.e., ship) noise.	in marine water and sediment quality due to increased in port operational activities at Milne Port including propeller wash from ship traffic, ore dust dispersion/depositio n, effluent discharge (stockpiles). • Change in benthic community structure due to NIS/AIS introductions from ballast water discharge or ship hull biofouling
Anadromous Arctic Char	Steensby Inlet: • Alteration of Arctic char marine habitat via changes in marine water and sediment quality due to port construction activities including dredging/blasting/infillin g, and wastewater/site run-off. • Alteration of Arctic char marine habitat via changes in marine water and sediment quality due to port operational activities including propeller wash from vessel traffic, ore dust	Milne Inlet: • Alteration of Arctic char marine habitat via changes in marine water and sediment quality due to port operational activities including propeller wash from vessel traffic and wastewater/site run-off. • Acoustic disturbance of fish caused by construction and operational (i.e., ship) noise.	Milne Inlet: Increase in severity of the following residual effects: • Effects on Arctic char marine habitat and Arctic char health via changes in marine water and sediment quality due to increased in port operational activities at Milne Port including propeller wash from ship traffic, ore dust dispersion/depositio n, effluent discharge (stockpiles).

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VEC[1]	FEIS Residual Effects (Baffinland 2012)	ERP FEIS Addendum Residual Effects (Baffinland 2013)	SOP (Baffinland 2023)
	dispersion/deposition and discharge of ship ballast water. • Acoustic disturbance of fish caused by construction and operational (i.e., ship) noise Milne Inlet: • Acoustic disturbance of fish caused by construction and operational (i.e., ship) noise.		
Marine Mammals	Milne Inlet and Steensby Inlet: • Alteration of habitat due to icebreaking (Steensby only). • Behavioural disturbance caused by noise from construction, shipping, and aircraft overflights. • Acoustic masking caused by construction and ship noise. • Hearing impairment and/or damage caused by construction and ship noise. • Mortality from collisions with vessels during construction and operational phase.	• Alteration of habitat due to installation of port infrastructure. • Disturbance caused by noise from construction, shipping, and aircraft overflights. • Acoustic masking caused by construction and ship noise. • Hearing impairment and/or damage caused by construction or ship noise. • Mortality from collisions with vessels during construction and operational phase. • Mortality if individual is killed in defense of human life (polar bear only).	Milne Inlet: Increase in severity of the following residual effects: • Alteration of habitat due to icebreaking. • Behavioural disturbance from ship noise. • Acoustic masking from ship noise. • Mortality if individual is killed in defense of human life (polar bear only).

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VEC[1]	FEIS Residual Effects (Baffinland 2012)	ERP FEIS Addendum Residual Effects (Baffinland 2013)	SOP (Baffinland 2023)
Narwhal	Milne Inlet and Steensby Inlet: • Alteration of habitat due to icebreaking (Steensby only). • Behavioural disturbance caused by noise from construction, shipping, and aircraft overflights. • Acoustic masking caused by construction and ship noise. • Hearing impairment and/or damage caused by construction and ship noise. • Mortality from collisions with vessels during construction and operational phase.	Milne Inlet: • Alteration of habitat due to installation of port infrastructure. • Disturbance caused by noise from construction, shipping, and aircraft overflights. • Acoustic masking caused by construction and ship noise. • Hearing impairment and/or damage caused by construction and ship noise. • Mortality from collisions with vessels during construction and operational phase.	Milne Inlet: Increase in severity of the following residual effects: • Alteration of habitat due to icebreaking. • Behavioural disturbance from ship noise. • Acoustic masking from ship noise. • Mortality from entrapment events during icebreaking.
Ringed Seal	Milne Inlet and Steensby Inlet: • Alteration of habitat due to icebreaking (Steensby only). • Behavioural disturbance caused by noise from construction, shipping, and aircraft overflights. • Acoustic masking caused by construction and ship noise. • Hearing impairment and/or damage caused by construction and ship noise. • Mortality from collisions with vessels or icebreakers (during construction and	Milne Inlet: • Alteration of habitat due to installation of port infrastructure. • Disturbance caused by noise from construction, shipping, and aircraft overflights. • Acoustic masking caused by construction and ship noise. • Hearing impairment and/or damage caused by construction or ship noise. • Mortality from collisions with vessels during construction	Milne Inlet: Increase in severity of the following residual effects: • Alteration of habitat due to icebreaking. • Behavioural disturbance from ship noise. • Acoustic masking from ship noise. • Mortality from icebreaking.

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VEC[1]	FEIS Residual Effects (Baffinland 2012)	ERP FEIS Addendum Residual Effects (Baffinland 2013)	SOP (Baffinland 2023)
	operational phase) or from exposure to blasting (during construction).	and operational phase.	
Walrus	Milne Inlet and Steensby Inlet: • Alteration of habitat due to icebreaking (Steensby only). • Behavioural disturbance caused by noise from construction, shipping, and aircraft overflights. • Acoustic masking caused by construction and ship noise. • Hearing impairment and/or damage caused by construction and ship noise. • Mortality from collisions with vessels and/or stampedeing at haul-out sites during construction and operational phase.	Milne Inlet: • Alteration of habitat due to installation of port infrastructure. • Disturbance caused by noise from construction, shipping, and aircraft overflights. • Acoustic masking caused by construction and ship noise. • Hearing impairment and/or damage caused by construction or ship noise. • Mortality from collisions with vessels during construction and operational phase.	Milne Inlet: Increase in severity of the following residual effects: • Alteration of habitat due to icebreaking. • Behavioural disturbance from ship noise. • Acoustic masking from ship noise.
HUMAN ENVIRONMENT			
Population Demographics	• In-migration of a small number of workers from south or other Nunavut communities will have effect on the demographic make-up of communities	• In-migration effects may be modestly increased with increased scale of operations employment. • Out-migration from the LSA is not expected to change since the level of local employment is unchanged.	• No change in residual effects beyond what was assessed for the ERP

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VEC[1]	FEIS Residual Effects (Baffinland 2012)	ERP FEIS Addendum Residual Effects (Baffinland 2013)	SOP (Baffinland 2023)
Education and Training	• Improved life skills amongst many LSA residents. • Incentives related to school attendance and success. • Opportunities to gain skills	• Negligible change to effects since the level of local employment (the source of interactions with life skills) is unchanged. • Effects on education will be the same. Training program will be similar, with likely addition of haul truck training.	• No change in residual effects beyond what was assessed for the ERP
Livelihood and Employment	• Creation of jobs in the LSA. • Employment of LSA residents. • Expanded employment and career development options.	• More jobs will be created and the level of job creation will still be of high magnitude relative to the LSA labour market baseline. • No change to local employment since available jobs are expected to exceed local supply capacity. • A slight increase in the diversity of career paths will occur with addition of road haul jobs. However, this is only a minor increase in what was already a major expansion in career paths introduced to the local labour market.	• Employment of LSA residents. • Continued positive effect
Contracting and Business Opportunities	• Expanded market — business services to Project. • Expanded market — consumer goods and services.	• There will be a modest increase in the diversity of business opportunities, however the magnitude of opportunities was	• No change in residual effects beyond what was assessed for the ERP

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VEC[1]	FEIS Residual Effects (Baffinland 2012)	ERP FEIS Addendum Residual Effects (Baffinland 2013)	SOP (Baffinland 2023)
	• Increased entrepreneurial capacity.	already high in the Approved Project FEIS. • Negligible change to effects to entrepreneurial capacity.	
Economic Development and Self-reliance	• Increased industrial utilization of land. • VC-related residual effects. • Harvesting and travel residual effects. • Increased human capacity and well-being. • Growth in the economy and related job creation and business expansion.	• Negligible change to effects since local employment (and associated income) is unchanged, and the level of business opportunities offered in the Approved Project were already diverse and substantial relative to local entrepreneurial capacity. • Job creation and taxes paid will be increased and remain high magnitude.	• Increased opportunities for youth • Increased education and training • Increased wealth • Economic activity • Continued positive effect
Benefits, Royalty, and Taxation	• Increased taxes and revenues. • Payments of payroll and corporate taxes to territorial government.	• Increase in taxes and royalties due to additional 3.0 Mt/a production. • No change in the components of taxes / royalties to be paid. Likely change in the timing of royalty and tax payments.	• No change in residual effects beyond what was assessed for the ERP
Community Infrastructure and Public Services	• Competition for skilled workers may lead to temporary effects on municipal services. • Long term improvement in labour force capacity.	• Negligible change to effects since level of LSA employment is not changed.	• No change in residual effects beyond what was assessed for the ERP
Human Health and Well-being	• Negative - increased ability to afford substances will have	• Negligible change to effects since level of	• Increased household food security due to increased income

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VEC[1]	FEIS Residual Effects (Baffinland 2012)	ERP FEIS Addendum Residual Effects (Baffinland 2013)	SOP (Baffinland 2023)
	effects on substance abuse • Positive – focus on health and safety, employee assistance and counselling will increase awareness of employees • Improved well-being of children • Absence of residents while they are working at Project will have effect on community social stability	LSA employment is not changed	
Inuit Culture, Resources, and Land Use	• Unmitigated archaeological sites subject to accidental or deliberate partial or complete destruction. • Potential for chance finds. • Increased traffic at Steensby Inlet could affect archaeological resources. • Changes in caribou harvesting. • Changes in marine mammal harvesting. • Changes in fish harvesting. • Emissions and noise disruption. • HTO cabin closure. • Detour around Steensby Port. • Restrictions on camping locations around Steensby Port	• No change to archaeological sites due to the same mitigation measures being implemented as in the Approved Project. • Potential for increased caribou – truck collisions but these will still be infrequent. • Potential for increased interactions with narwhal harvesting by Pond Inlet. • Increased frequency and duration of emissions and noise.	• No change to archaeological sites given that activities will occur in areas previously surveyed and mitigated • Adverse residual effects on caribou harvesting, marine mammal harvesting, fish harvesting, and land and water use due to dust on snow • No other change in residual effects beyond what was assessed for the ERP

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VEC[1]	FEIS Residual Effects (Baffinland 2012)	ERP FEIS Addendum Residual Effects (Baffinland 2013)	SOP (Baffinland 2023)
Inuit Travel Route Safety	• Safe travel around Eclipse Sound and Pond Inlet. • Safe travel through Milne Port. • Sensory disturbance and safety along Milne Inlet Tote Road. • Detour around Mine Site. • Difficulty and safety relating to railway crossings.	• Increased duration and probability but continued low magnitude of effects on safe travel around Eclipse Sound and Pond Inlet. • Increase in the frequency, duration and probability of travel interactions through Milne Port, but interactions readily managed to ensure safety. • Increased sensory disturbance and increased interactions with travellers along Milne Inlet Tote Road.	• No change in residual effects beyond what was assessed for the ERP
Cultural Well-being	• Support for values that are central to Inuit culture and cultural development.	• No change	• Potential change to: ○ Pijitsirnjiq – serving and providing for family and/or community… ○ Pilnimmaksarniq – passing on of knowledge and skills… • Avatittinnik Kamattiarniq – environmental stewardship

Notes:
1 VC names have evolved since the FEIS.
2 In effects assessments of the Approved Project, Arctic char has been used as the key indicator for effects to freshwater biota and habitat. As such, previously described residual effects on Arctic char and Arctic char habitat have been applied here as residual effects on both the freshwater biota and habitat and Arctic char VCs.

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BIM-5200-PLA-0026 APPENDIX H - DETAILED WATER AND SEDIMENT QUALITY ASSESSMENT

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TABLE OF CONTENTS

1. METHODOLOGY AND INPUTS 4

1.1 Assessment Methods and Criteria 4

1.2 MIXING ASSUMPTIONS 13

1.3 Source Terms - Waste Rock 14

1.4 Source Terms - Pit Water Quality 16

1.5 Source Terms – Ore runoff 16

2. RESIDUAL EFFECTS ASSESSMENT 18

2.1 AQUEOUS NON-POINT SOURCE EMISSIONS 19

2.2 Site Water Management - Impact Statement SWSQ-2 25

2.3 Laydown Areas - Impact Statement SWSQ-3 27

2.4 Explosives Manufacture, Explosives Magazine, and Explosives Use - Impact Statement SWSQ-4 29

2.5 Quarries and Borrow Sources - Impact Statement SWSQ-5 32

2.6 Camps, Fuel Storage and Waste Management - Impact Statement SWSQ-7 34

2.7 Water Use and Management - Impact Statement SWSQ-8 35

2.8 Airstrips and Airstrip Use - Impact Statement SWSQ-9 37

2.9 Aqueous Point Source Emissions 39

2.10 Milne Inlet Tote Road LSA 39

2.11 Mine Site LSA 42

2.12 Waste Rock Stormwater Discharge to Camp Lake and Tributaries - Impact Statement SWSQ-10 42

2.13 Waste Rock and Ore Stormwater Discharge to the Mary River - Impact Statement SWSQ-11 45

2.14 Pit Lake Water and Waste Rock Discharges to Mary River in Post-Closure - Impact Statement SWSQ-13 49

3. References 63

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TABLE OF TABLES

Table H.1 Key Indicators and Thresholds for Water and Sediment Quality 5

Table H.2 Key Issues for Water and Sediment Quality 9

Table H.3 Significance Rating for Evaluating Residual Water and Sediment Quality Effect 10

Table H.4 Predicted Pit Water Quality 17

Table H.5 Effects Assessment Summary - Aqueous Non-Point Source Emissions 22

Table H.6 Significance of Residual Effects from Non-Point Source Discharges 23

Table H.7 Effect Assessment Summary - Aqueous Point Source Discharges 40

Table H.8 Significance of Residual Effects from Point Source Discharges 41

Table H.9 Predicted Water Quality in Camp Lake Tributaries and Camp Lake under Mean Flow Conditions 46

Table H.10 Predicted Water Quality in Camp Lake Tributaries and Camp Lake in a Dry Year 47

Table H.11 Predicted Water Quality in the Mary River under Mean Flow Conditions (East Discharge) .. 51

Table H.12 Predicted Water Quality in the Mary River under 10-Year Dry Conditions (East Discharge) 52

Table H.13 Predicted Water Quality in the Mary River under Mean Flow Conditions (All Charges) 53

Table H.14 Predicted Water Quality in the Mary River under 10-Year Dry Conditions (All Discharges) . 56

Table H.15 Predicted Water Quality in the Mary River During Post-Closure Due to Discharges of Pit Water and Waste Rock 10-Year Low Flow Conditions 60

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1. METHODOLOGY AND INPUTS

Effects to freshwater and sediment quality have been identified as an area of interest by QIA during review of Baffinland's ICRP since 2015. This appendix presents a summary of findings specifically for this VEC. Effects on the surface water and sediment quality VEC were assessed in accordance with the methodology outlined in FEIS Volume 2, Section 3.0. VEC-specific modifications were made to the general methodology, which are highlighted below. As part of the effects assessment completed for the Phase 2 Proposal in 2018, a review of existing effluent quality predictions was completed. The conclusion of this review was that the previous modelling was substantially representative of the effluent quality monitoring conducted at site to date (TSD 13, Phase 2 Proposal). It is worth noting that modelling efforts to assess seepage and runoff quality at the Waste Rock Facility are ongoing as part of the Phase 1 Waste Rock Management Plan.

1.1 ASSESSMENT METHODS AND CRITERIA

The following basic EA steps were undertaken during the assessment:

- Regional and local study areas were determined.
- VECs, Key Indicators and Thresholds were identified.
- Project activities that could affect surface water and sediment quality were identified.
- Project interactions with, and effects on, the surface water and sediment quality VEC were identified.
- Linkage evaluations were performed outlining potential effects related to various phases of the Project (Construction, Operation, and Closure) and Project LSAs (Milne Port, Milne Inlet Tote Road, Mine Site, Railway Alignment, and Steensby Port).
- Mitigation measures were identified to avoid or reduce the potential effects during the various phases of the Project.
- Residual effects and their relative significance were identified for the surface water and sediment quality VECs.
- Long-term monitoring programs were identified to distinguish Project-related impacts from natural variability, in order to verify impact assessment predictions and to meet compliance/conformance criteria.

1.1.1 Key Indicators And Thresholds

For the assessment of potential effects on the surface water and sediment quality VEC a list of key indicators that were the most relevant and important elements of the VEC was assembled. The key indicators fall into four categories:

1. General Parameters
2. Metals
3. Nutrients

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4. Petroleum Hydrocarbons

Thresholds were identified representing a level of change where adverse effects may be expected to occur. In the case of water and sediment quality, it is important to note that the thresholds do not relate to water or sediment quality, but rather to known effects on aquatic receptors that rely on water and sediment to exist.

The thresholds used in this assessment were derived from the following sources, which are relevant in the context of this environmental effects assessment:

- Schedule 4 of the Metal and Diamond Mining Effluent Regulations under the Federal *Fisheries Act*.
- CCME Canadian Water Quality Guidelines for the Protection of Aquatic Life (PAL) (2003).
- Interim Sediment Quality Guidelines (ISQG) and Probable Effects Level (PEL) identified in the CCME Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (2003).

The CCME PAL thresholds are typically the most stringent; hence these values were generally selected for application.

Local waters around the Project sites have not historically been used for drinking, although the Project uses and will use local waters for potable water supply, and it is conceivable that Inuit travelling over the land could also drink any of the local water. Therefore, Health Canada's Canadian Drinking Water Guidelines (2004) have been used for comparison purposes.

To fill gaps for those key indicators that have no thresholds identified in the sources listed above, two secondary sources were adopted:

- BC Ministry of Environment (MOE) Approved and Working Water Quality Guidelines and Alert Levels.
- Criteria Continuous Concentration (Chronic) National Recommended Water Quality Criteria, USEPA (2006).

The relationships between potential surface water and sediment quality effects, key indicators and thresholds are summarized in Table H.1.

TABLE H.1 KEY INDICATORS AND THRESHOLDS FOR WATER AND SEDIMENT QUALITY

Potential Effect	Key Indicator	Thresholds (Magnitude and Extent)			
		MDMER[1]	CWQG (PAL)[2]	CDWQG[3]	NWB[4]
Water Quality from Mine Contact Water and Site Runoff	TSS (mg/L)	15	+5		35
	pH (pH unit)	6.0 - 9.5	6.5 - 9.0	6.5 - 8.5[11]	6.0 - 9.5
	Hardness $CaCO_3$ (mg/L)				
	Alkalinity $CaCO_3$ (mg/L)				
	Chloride (mg/L)		640 (Short-term) 120 (Long-term)	250[12]	

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Potential Effect	Key Indicator	Thresholds (Magnitude and Extent)			
		MDMER[1]	CWQG (PAL)[2]	CDWQG[3]	NWB[4]
	Sulphate SO_4 (mg/L)			500[12]	
	Ammonia N (total) (mg/L)		Varies[5]		
	Ammonia N (un-ionized) (mg/L)		0.019		
	Nitrate N (mg/L)		13	10	
	Nitrite N (mg/L)		0.06	3.2	
	Total P (mg/L)		see Table 7-3.4 (FEIS Volume 7)		
	Total Aluminum (mg/L)		0.005 - 0.1[6] (0.94)[7]	0.1	
	Total Antimony (mg/L)			0.006	
	Total Arsenic (mg/L)	0.3	0.005	0.01	
	Total Barium (mg/L)			1	
	Total Beryllium (mg/L)		0.0053[8]		
	Total Boron (mg/L)		29 (Short-term) 1.50 (Long-term)		
	Total Cadmium (mg/L)		0.000029[8]	0.005	
	Total Chromium (mg/L)		0.0047[7]	0.05	
	Trivalent Chromium (mg/L)		0.001		
	Hexavalent Chromium (mg/L)		0.0089		
	Total Cobalt (mg/L)				
	Total Copper (mg/L)	0.3	0.00467[7]	1.0[12]	
	Total Cyanide (mg/L)	0.5	0.005 (as free CN)	0.2	
	Total Iron (mg/L)		1.2[7]	0.3[12]	
	Total Lead (mg/L)	0.1	0.001[9]	0.01	
	Total Manganese (mg/L)			0.05[12]	
	Total Mercury (mg/L)		0.000026	0.001	

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Potential Effect	Key Indicator	Thresholds (Magnitude and Extent)			
		MDMER[1]	CWQG (PAL)[2]	CDWQG[3]	NWB[4]
	Total Molybdenum (mg/L)		0.073		
	Total Nickel (mg/L)	0.5	0.083[10]		
	Total Selenium (mg/L)		0.001	0.01	
	Total Silver (mg/L)		0.0001		
	Total Thallium (mg/L)		0.0008		
	Total Uranium (mg/L)		0.015	0.02	
	Total Vanadium (mg/L)		0.006[11]		
	Total Zinc (mg/L)	0.5	0.03	5.0	
	1-2 Propylene Glycol		500 (interim)		
Water Quality from Fuel Contact	Benzene (µg/L)		370		
	Toluene (µg/L)		2		
	Ethyl benzene (µg/L)		90		
	Lead (µg/L)		1		
	Oil and Grease (µg/L)		15,000		
Water Quality from Discharge of Sewage	BOD_5 (mg/L)				30
	Fecal Coliform (CFU/100mL)				1,000

Potential Effect	Key Indicator	Thresholds (Magnitude and Extent)			
		ISQG[14]	PEL[14]		
Sediment Quality	Arsenic (mg/kg)	5.9	17		
	Cadmium (mg/kg)	0.6	3.5		
	Chromium (mg/kg)	37.3	90		
	Copper (mg/kg)	35.7	197		
	Lead (mg/kg)	35.0	91.3		
	Mercury (mg/kg)	1.7	4.86		
	Zinc (mg/kg)	123	315		

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NOTES:

1. Mean monthly maximum averages in Table 2 of Schedule 4 of the Metal and Diamond Mining Effluent Regulations under the federal F*isheries Act*.
2. Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines for the Protection of Aquatic Life (pal) (2011).
3. Health Canada Guidelines for Canadian Drinking Water Quality Summary Table (2010).
4. Nunavut Water Board Effluent Quality Discharge Limits for Sewage Treatment Facilities to Freshwater Receiving Environment from in Table 4 of Type A Water Licence 2AM-MRY1325
5. Varies with temperature and pH.
6. Varies with pH; at pH <6.5 criterion is 0.005 mg/l; at pH >6.5 criterion is 0.1 mg/l.
7. Site specific criterion developed for the Mary River mine site area (Knight Piésold, 2011).
8. Varies with hardness [CD] = $10^{0.86[LOG10(HARDNESS)]-3.2}$ *mg/L*. based on mean hardness in Mary River of 84 mg/L, the cadmium criterion would be 0.000029 mg/L.
9. Varies with hardness. [PB] = $E^{1.273[LN(HARDNESS)]-4.705}$ *µG/L*. based on mean hardness in Mary River of 84 mg/L, the lead criterion would be 0.00255 mg/L.
10. Varies with hardness. [NI] = $E^{1.273[LN(HARDNESS)]-4.705}$ *µG/L*. based on mean hardness in Mary River of 84 MG/L, the nickel criterion would be 0.083 mg/L.
11. BC MOE approved and working Water Quality Guidelines.
12. Aesthetic Objective.
13. Proposed Guideline.
14. Interim Sediment Quality Guidelines (ISQG) and Probable Effects Level (PEL) identified in the CCME Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (2003).

The thresholds identified in Table H.1 were applied in the effects assessment in the following manner:

- MDMER Schedule 4 thresholds were applied as ‘end of pipe’ criteria for mine contact water discharge.
- CCME PAL (or site-specific water quality objectives) were applied as receiving environment criteria for all sources.
- NWB were applied as ‘end of pipe’ criteria for wastewater (sewage effluent) discharge.

Several key parameters are naturally elevated in surface waters around the Mine Site, and as such, site specific water quality objectives (SSWQOs) were developed for the following parameters using CCME (1993) background concentration procedure (Knight Piésold, 2011):

- Aluminum
- Chromium
- Copper
- Iron

The developed SSWQOs are summarized in Table H.1. It was not appropriate to develop site specific criteria for Uranium or Selenium as explained in FEIS Appendix 7B-2.

1.1.2 Key Issues And Pathways

Key issues which were assessed for the surface water and sediment quality VEC included:

- Pit water quality from the Mine Site LSA
- Surface runoff from Project roads in the five freshwater LSAs
- Discharges from Project WWTFs from the five freshwater LSAs

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- Acid Rock Drainage (ARD) and Metal Leaching (ML) resulting from waste rock piles, ore stockpiles, open pit dewatering, construction fills, embankment of roads and railway, and open quarries in the five freshwater LSAs
- Nutrient input from blasting activities and chemical leaching from rail sleeper coatings in the five freshwater LSAs
- Suspended sediment due to construction of mine facilities, Milne Inlet Tote Road, the railway and associated water crossings
- Runoff at fuel storage facilities, including fuel spills and malfunctions from the five freshwater LSAs
- Effects from waste management activities including storage, handling and landfilling of waste, landfarming of contaminated ice/snow/soil, the management of historically contaminated material, and sewage effluent discharges in the five freshwater LSAs
- Effects from construction and operation of camps in the five freshwater LSAs
- Effects from erosion and sediment transport due to vegetation removal, cuts/fills and other disturbances in the five freshwater LSAs
- Effects from dust deposition in the five freshwater LSAs
- Effects from drilling water withdrawals and returns in the Mine Site LSA

An account of key issues, indicators, and Project locations and phases that were incorporated in the effects assessment is provided in Table H.2.

TABLE H.2 KEY ISSUES FOR WATER AND SEDIMENT QUALITY

Key Issue	Indicators	Project Location (LSA)	Project Phase
Ground Preparation, Earthworks, Road and Railway Construction	pH, TSS, Metals and Nutrients	All	Construction and Closure
Site Water Management	pH, TSS, Metals, Nutrients and Petroleum Hydrocarbons	Milne Inlet LSA Northern Transportation Corridor LSA Mine Site LSA Rail Alignment LSA	Construction, Operation and Closure
Laydown Areas	pH, TSS, and Metals	All	Construction and Closure
Airstrips and Airstrip Use	TSS and Petroleum Hydrocarbons	All	Construction, Operation, Closure

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Key Issue	Indicators	Project Location (LSA)	Project Phase
Mine Contact Water - Waste Rock Stockpile	pH, TSS, Metals and Nutrients	Mine Site LSA	Operation, Closure and Post Closure
Mine Contact Water - Open Pit and Run of Mine Stockpile	pH, TSS, Metals and Nutrients	Mine Site LSA	Operation, Closure and Post Closure

1.1.3 Residual Effects Rating Criteria

Residual effects are those effects that persist after mitigation has been applied to potential effects. Each Project related residual effect was rated using the standard criteria described in FEIS Volume 2.0 and the VEC specific criteria identified in Table H.3.

TABLE H.3 SIGNIFICANCE RATING FOR EVALUATING RESIDUAL WATER AND SEDIMENT QUALITY EFFECT

Criteria	Classification	
Magnitude	Negligible	Concentrations of indicator(s) predicted to be less than threshold value(s)
	Level I	Concentrations of indicator(s) predicted to be above but within an order of magnitude of threshold value(s) (1 to 10x the threshold)
	Level II	Concentrations of Indicators predicted to exceed threshold value(s) by an order of magnitude or greater (10 to 100x the threshold)
	Level III	Concentrations of Indicators predicted to exceed threshold value(s) by more than two orders of magnitude (greater than 100x the threshold)
Extent The physical extent of the effect, relative to study area boundaries	Level I	Confined to the LSA
	Level II	Beyond the LSA and within the RSA
	Level III	Beyond the RSA

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Criteria	Classification	
Duration The length of time over which a Project effect will occur	Level I	Short-term (effect lasts for up to 4 years)
	Level II	Medium-term (up to 25 years, for the life of the Project)
	Level III	Long-term (beyond the life of the Project) or permanent
Frequency How often the effect occurs	Level I	Infrequent - rarely occurring
	Level II	Intermittent – occasionally occurring
	Level III	Continuous
Reversibility The likelihood of the VEC to recover from the effect	Level I	Fully reversible after activity is complete
	Level II	Partially reversible after activity is complete
	Level III	Non-reversible after activity is complete

Of the five rating criteria used in rating residual effects, magnitude is heavily weighted when determining the significance of the residual effect and is also the criterion that requires the most interpretation. Since the main receptor affected by changes in water quality is aquatic life, magnitude ratings were established based on aquatics -related thresholds, as summarized in Table H.1.

Receiving water quality objectives (WQOs) have been established for the Protection of Freshwater Aquatic Life (CCME PAL). If receiving waters meet the selected Water Quality Objectives (CCME PAL or SSWQOs) with a discharge, this is deemed a Negligible effect to freshwater biota and hence to water and sediment quality. Level I, II and III magnitude effects are related to the relative level of exceedance of any WQOs.

The potential effects associated with discharge of mine contact water into the natural environment are well understood and have led to the enactment of the MDMER under the *Fisheries Act*. The following parameters, identified in Schedule 4 of the MDMER, are regulated by point-of-discharge concentrations:

- Arsenic
- Copper
- Cyanide
- Lead
- Nickel

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- Zinc
- TSS
- Radium

These parameters have been regulated due to potential deleterious effects on fish and other biota in the receiving environment. Mine contact waters may be authorized for discharge under the MDMER of the *Fisheries Act*, provided the effluents at the point of discharge meet the MDMER Schedule 4 criteria and pass regular testing for acute lethality and chronic toxicity.

1.1.4 Baseline Characterization

Using the baseline data as a frame of reference, the following methods were applied to aqueous non-point source emissions, aqueous point source emissions and airborne emissions.

1.1.5 Aqueous Non-Point Source Emissions

Infrastructure and activities that were widespread or had non-point source emissions, were assessed in a qualitative manner on a Project-wide basis rather than assessing residual effects for each individual water body. To identify potential sensitivity to the particular indicators and to add context to the rating, general water quality parameters determined for the Sample Group and/or the LSA were considered. The description of the general water quality characteristics for Sample Groups (rivers/streams and lakes) is provided in FEIS, Volume 7, Tables 7-3.5 and 7-3.7.

Given the uncertainty regarding the potential contaminant source, distribution, and location that would be required to complete a quantitative assessment, a qualitative assessment was undertaken applying conservative assumptions. Examples of residual effects associated with aqueous non-point source emissions included increased TSS due to erosion and sediment transport, ML/ARD from various earth materials, nutrient additions from blasting, and petroleum hydrocarbon constituents from accidental spills.

The majority of meltwater and precipitation in the Project area occurs between June and September, the open -water period for streams and rivers. Consequently, erosion and sediment transport, nutrient and metals transport, and petroleum hydrocarbon mobilization are likely to occur in this period, when receiving waterbodies are at their maximum flows and have increased capacity to buffer these inputs.

Where residual effects were considered likely and there was a lack of reliable data available to quantify the contaminant source, a conservative approach was employed by assuming that the concentration of the key indicator(s) for that particular effect would exceed the respective threshold(s) (Table 7-3.8, FEIS, Volume 7), resulting in a Level II magnitude effect. For these cases, it was further assumed that the magnitude could be maintained below a Level III effect (i.e., less than an order of magnitude greater than the threshold) by identifying the occurrence of the effect through environmental monitoring and responding appropriately under an adaptive management framework.

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A conservative approach was also applied to assumptions regarding the effectiveness of mitigation measures, in recognition that there may be limitations associated with implementation and effectiveness, given the extreme climatic conditions in the Project area. Following that logic, where qualitative assessment was employed, a magnitude of Level I was only attributed to a residual effect when there was a high Level of Certainty that mitigation would be fully implemented and effective. All instances where the effectiveness of the mitigation was in question resulted in a magnitude rating of Level II.

1.1.6 Aqueous Point Source Emissions

For Project infrastructure and activities that generate point-source emissions with the potential to affect a specific receiving waterbody, the residual effects assessment focused on those particular locations, where adequate baseline data were available.

For point source mine contact water discharges, source terms of runoff water quality were obtained from geochemical testing (AMEC, 2012b) to compare effluent water quality to MDMER criteria, and to evaluate the resultant water quality in receiving waters compared to CCME PAL Guidelines. As a mitigation measure to maximize mixing, and to minimize changes in the natural flow regimes, discharges of mine contact waters will be carried out following the natural hydrograph. The Camp Lake tributary at MR-12 and the Mary River are gauged during the open water season, which will allow for real-time monitoring of flows and regulation of releases.

A mass balance approach was used, mixing annualized discharge flows with the annualized receiving flow at the nearest downstream location inhabited by fish. The mass balance model is shown below:

$$C_{Res} = \frac{(C_D \times Q_D) + (C_R \times Q_R)}{Q_{Res}}$$

Where:

C_D = indicator concentration in discharge (mg/L)
Q_D = volume of effluent discharged annually (m^3/year)
C_R = indicator concentration in receiving waterbody (mg/L)
Q_R = volume of water in the receiving waterbody annually (m^3/year)
C_{Res} = resulting (mixed) indicator concentration (mg/L)
Q_{Res} = volume of resulting (mixed) waterbody annually (m^3/year)

The model assumes near-instantaneous mixing in riverine environments due to the discharge to receiving flow ratio, and no modification of indicators due to precipitation, speciation, attenuation or degradation.

Modelling was carried out using both mean and 90th percentile baseline concentrations, and under both mean and low flow (7Q10) conditions.

1.2 MIXING ASSUMPTIONS

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While the water quality model used above assumes instantaneous mixing, in reality Initial Dilution Zones (IDZs) will exist at each discharge. The specifics for each discharge location are discussed below.

- West Waste Rock Stormwater Pond - Stormwater will be discharged to a natural drainage (L1) that is fishless until about 100 m before the drainage discharges into a main tributary of Camp Lake (tributary L0). The receiving water is the lower reach of L0 below the falls that provide the fish barrier. Stormwater will be mixed with the natural waters in the drainage L1, and although discharge flows are greater than natural flows, it is expected that this mixing will effectively occur over the approximate 1.5 km length to where the water flows over the falls and subsequently into tributary L0, receiving further dilution.
- East Waste Rock Stormwater Pond - Stormwater will be discharged to a natural drainage (F0) that is fishless until the F0 drainage discharges into the Mary River. Stormwater will be mixed with the natural waters in the drainage F0, and although discharge flows are similar to the natural flows, it is expected that this mixing will effectively occur over the approximate 2,500 m section to where the water flows over the falls. F0 then discharges into the Mary River at a point where the flows are highly turbulent, and therefore further mixing is expected to be nearly instantaneous.
- ROM Stockpile Stormwater Pond and Ore Stockpile Stormwater Pond - These discharges will be directly to the Mary River, but at distinct locations separated by approximately 1,500 m of river. IDZs will exist downstream of each discharge. Because of the volume and turbulent nature of flows in the Mary River, the IDZs will be confined to 20 to 30 m in length.

1.3 SOURCE TERMS - WASTE ROCK

Mine contact water from the Waste Rock Stockpiles at the Mine Site will be collected in stormwater ponds prior to discharge. Stormwater runoff water quality (source terms) from Waste Rock Stockpiles were derived by preparing a mass loading model using laboratory derived reaction data and the anticipated site conditions. The ponds will be designed with holding capacities that act to moderate water quality. During mining, when the waste rock pile is under development, stormwater will require retention to settle out solids. The water quality modelling by AMEC (2012a) suggests that if suspended solids are properly managed, the quality of discharge will meet MDMER requirements. While water treatment is not expected to be required, treatment options will be available as a contingency measure. As a conservative measure, maximum waste rock runoff quality estimates were used in the assessment.

For a number of parameters sampled in the humidity cell tests, metals were measured at or below the analytical method detection limit (MDL) for a large proportion of samples. Generally, the MDLs are high relative to the selected water quality objectives (CCME PAL or SSWQOs). For these parameters, the values assigned were set at one-half the MDL (AMEC, 2012a). The 90th percentile calculated source term was influenced by predicted water quality results based largely on the non-detect results in the humidity cells for the following metals: mercury (Hg), selenium (Se), copper (Cu), arsenic (As), cadmium (Cd), chromium (Cr), silver (Ag) and thallium (Tl). Consequently, the modelled water quality for these parameters is highly conservative.

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A similar issue with detection limits was identified in the baseline water quality dataset. The majority of sample results for several metals were reported as non-detect (measured below the MDL). In the baseline dataset, non-detect samples were conservatively set at the MDL. This contributed to overly conservative modelling results, i.e., when the majority of results were reported at the detection limit, the calculated values were close to or even exceeded the Water Quality Objective (WQO).

Two notable parameters, mercury and selenium, were calculated to exceed the respective WQO because of the high proportion of non-detects in both the baseline receiving waters and in the humidity cell testing.

	Mercury	Selenium
WQO (CCME PAL) (mg/L)	0.000026	0.001
90th Percentile Baseline Concentration (mg/L)	0.0001	0.0001
% of Detects in Baseline (Measured above MDL)	2 %	2 %
Calculated Source Term (mg/L) (west discharge / east discharge)	0.004 / 0.003	0.047 / 0.038
Humidity cell testing MDL (mgl/L)	0.001	0.001

As a consequence, mercury and selenium are predicted to reach Level II magnitude in the assessments.

During the technical review of the DEIS, the Qikiqtani Inuit Association expressed concern over the potential for nitrates to be elevated in the waste rock stormwater runoff, due to the quantities of ammonium nitrate fuel oil (ANFO) explosives that will be used in mining.

Ammonia releases have been associated with the use of certain explosives at mining and quarrying operations. The use of ammonium nitrate and fuel oil (ANFO) explosive could cause elevated nitrates in waste rock and mine run-off. Ammonia can occur as un-ionized (NH_3) or ionized (NH^{4+}) ammonium ion species. Total ammonia is a measure of both un-ionized and ammonium ion species. The un-ionized is more toxic to aquatic life than the ionized species. Consequently, mining companies have taken a number of initiatives to address this issue. For example, Diavik Diamond Mines Inc has investigated the use, loss and mitigation measures to address nitrate losses, and as a result, has developed and implemented at its site several iterations of an Ammonia Management Plan (Diavik Diamond Mines: Ammonia Management Plan).

Annual explosive use for blasting waste rock and ore is estimated to range from 15,700 tonnes to 18,200 tonnes per annum depending on the year. FEIS Volume 3, Appendix 3B, Attachment 8, Section

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2.6 states that the emulsion: AN ratio used for the Project is 70:30. The use of emulsion improves the bulk strength of the explosive and allows efficient rock breakage. The emulsion product also reduces ANFO solubility. Modeling by other companies concludes that ammonia releases can be reduced if proper controls are not implemented. The Explosives Management Plan (FEIS Volume 3, Appendix 3B, attachment 8) and FEIS Volume 10 Section 4.3.3 outline the mitigation measures that will be taken to control the nitrate concentrations entering the receiving environment.

Commercial ammonia reduction technologies, if required, include biological treatment, air stripping, ion exchange, reverse osmosis and breakpoint chlorination. Non-commercial technologies that may have future applications include aerated lagoons, constructed wetlands, land treatment and natural treatment in ponds. (Table 5, Annex C of the Diavik Diamond Mines Ammonia Management Plans), describes for each technology an ammonia reduction estimate, the environmental effect, an evaluation of technology feasibility, capital cost and operating time frames.

1.4 SOURCE TERMS - PIT WATER QUALITY

Preliminary estimates of pit water quality were made using a similar mass loading approach to that for the waste rock drainage quality (AMEC 2012b). Equilibrated estimates of pit water quality are presented in Table H.4. It is expected that the effluent quality during mine operations will meet MDMER requirements for metals. It is possible that, during the latter portion of the mine, pH may decrease below the lower limit of the MDMER (pH 6.0). The estimated water quality derived for the pit drainage includes allowance for acidic drainage from exposed potentially acid generating (PAG) rock toward the end of mine life. The quantity of this exposed rock and the data used in deriving this drainage quality is the subject of additional study.

It has therefore been assumed that pH adjustment of the pit water will be required in the second half of mine life and into post-Closure. During Operations, pH adjustment will most likely be carried out inside the pit before the water is pumped to the East Waste Rock Pond. Again, humidity cell testing is expected to over-estimate the runoff quality. These modelling results are very conservative and will be reviewed once data are available from recently initiated neutralizing potential-depleted humidity cell testing. This will improve confidence in drainage water quality and pH.

Although the pit water quality source term for the latter part of mine life is beyond the MDMER range for pH and may require minor pH adjustment, the source terms (assuming no treatment) have been applied in the water quality modelling as a conservative measure.

The EEM program under MDMER is specifically designed for this type of situation and is a well-designed monitoring tool. It is a tiered program, meaning that the results of monitoring are used in the design of subsequent monitoring, and results also serve to identify the need for corrective action (Dumaresq *et al*. 2002).

1.5 SOURCE TERMS – ORE RUNOFF

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Mine contact water from the ROM stockpile and the main ore stockpile at the Mine Site will be collected in stormwater ponds prior to discharge to the Mary River. Source terms were derived by calculating the 90th percentile concentrations from sampling carried out by Baffinland in 2010 from lysimeters installed in an ore stockpile generated at the site during the bulk sampling program in 2008. No runoff has been collected since then due to especially dry conditions during the 2011 field season. The runoff data, while limited, are considered conservative in that they represent runoff collected after the stockpile had been sitting dormant for two years; in reality the turnover in the ore stockpiles will be rapid and therefore the contact time between water and the ore will be limited. It has also been identified that non-representative manganese-rich ore may be a component of the lysimeter samples, since this ore was used in construction of the crusher pads where the lysimeters were located. Therefore, lysimeter results may be influenced by drainage from atypical ore.

Runoff from the ore stockpiles is not expected to require treatment beyond settlement of suspended solids in the stormwater pond. Nevertheless, treatment has been identified as a potential contingency measure that can be implemented if monitoring program results indicate that the water quality does not meet discharge criteria. More detail on contingency treatment options for mine contact water is provided in Life-of-Mine Waste Rock Management Plan (BAF-PH1-830-P16-0031).

TABLE H.4 PREDICTED PIT WATER QUALITY

Parameters	MDMER Limits	Year 6	Year 10	Year 15	Year 21
pH	6 - 9.5	6.5	6.5	5.1	4.2
Sulphate (mg/L)		77	80	88	158
Arsenic (mg/L)	0.3	0.006	0.006	0.006	0.007
Copper (mg/L)	0.3	0.007	0.008	0.016	0.074
Lead (mg/L)	0.1	0.0005	0.0005	0.0007	0.0022
Nickel (mg/L)	0.5	0.004	0.005	0.018	0.11
Zinc (mg/L)	0.5	0.030	0.031	0.035	0.062
Aluminum (mg/L)		0.24	0.24	0.77	4.2
Antimony (mg/L)		0.007	0.007	0.007	0.008
Boron (mg/L)		0.060	0.062	0.067	0.11
Cadmium (mg/L)		0.00005	0.00005	0.00006	0.00016
Chromium (mg/L)		0.007	0.007	0.008	0.019

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Parameters	MDMER Limits	Year 6	Year 10	Year 15	Year 21
Cobalt (mg/L)		0.002	0.002	0.008	0.053
Iron (mg/L)		<0.002	<0.002	0.031	0.22
Manganese (mg/L)		0.0001	0.0001	0.10	0.57
Mercury (mg/L)		0.0013	0.0014	0.0014	0.0016
Molybdenum (mg/L)		0.023	0.024	0.024	0.027
Selenium (mg/L)		0.015	0.016	0.016	0.022
Silver (mg/L)		0.0002	0.0002	0.0002	0.0008
Thallium (mg/L)		0.0007	0.0007	0.0007	0.0009
Vanadium (mg/L)		0.0024	0.0025	0.0025	0.0029
Barium (mg/L)		0.022	0.023	0.024	0.034
Sodium (mg/L)		1.0	1.0	1.1	1.8
Potassium (mg/L)		29.2	30.1	30.2	34.9
Calcium (mg/L)		36.0	37.2	37.4	43.4
Magnesium (mg/L)		20.2	20.8	22.9	40.0

NOTES:

1. Equilibrated concentrations, which assume equilibrium with amorphous $Al(OH)_3$, ferrihydrite and manganite where estimated concentrations exceed saturation indices for those phases.

1.5.1 Significance Determination

The potential to result in significant adverse environmental effects was determined for each residual effect, based on professional judgment of the combination of residual effect ratings for each potential effect and taking into account the environmental context and the Level of Confidence associated with each rating.

2. RESIDUAL EFFECTS ASSESSMENT

This Section presents potential effects, mitigation measures and the residual effects assessment for two categories:

- Aqueous Non-Point Source Emissions

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- Aqueous Point Source Emissions

2.1 AQUEOUS NON-POINT SOURCE EMISSIONS

Potential effects on surface water and sediment quality associated with aqueous non-point source emissions (key issues) and the significance of residual effects are identified in Table H.5. These emissions are common where activities take place near water bodies and may affect watercourses throughout the Project area. Locations of infrastructure and activities are described for each LSA.

2.1.1 PREDICTION CONFIDENCE

The significance rating and confidence level assigned to the predictions of significance for aqueous non-point source discharge effects to water and sediment quality are summarized in Table H.6.

2.1.2 Ground Preparation And Earthworks - Impact Statement Swsq-1

Impact Statement SWSQ-1: Project-related ground preparation and earthworks may result in changes to surface water and sediment quality in the five freshwater aquatic LSAs.

Ground preparation and earthworks are essential prerequisites during the Construction and Closure phase in all five freshwater LSAs. The areas requiring earthworks notably include the following:

- Developing each of the key areas (Milne Port, Mine Site and Steensby Port) including the construction and reclamation of buildings, laydown areas, access roads and other site infrastructure;
- Minor improvements to the roadbed of the Milne Inlet Tote Road; and
- Railway construction, including the construction access road.

Typical ground preparation activities include vegetation removal and stripping, resulting in ground surface conditions that are prone to potential erosion and liberation of potential contaminants of concern; this may have an effect on surface water quality through changes in pH or the introduction of TSS, petroleum hydrocarbons and/or nutrients. Left unmitigated, direct effects may be observed in surface water quality. By implementing standard best management practices (BMPs) during ground preparation activities, water quality effects can be avoided or reduced to the point where only incidental, minor to moderate adverse short-term effects are anticipated. As required, the following mitigation measures will be applied:

- Minimize the footprint of disturbance;
- Schedule ground preparation to maintain adequate ground cover during periods of expected rainfall;
- Install and maintain water management features, designed to segregate and prevent co-mingling of offsite water and onsite water;

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- Install and maintain adequately designed erosion control features;
- Install and maintain adequately designed sediment transport control features;
- Capture and treat potentially contaminated site run-off to applicable water quality standards prior to discharging to the receiving environment; and
- Erosion control measures.

Following the ground preparation activities, earthworks (earth moving, excavation, grading, cut/fill and backfilling) are required for development of components during Construction and reclamation of components during Closure.

The disturbance, exposure, transportation and relocation of earth materials can potentially affect surface water quality in receiving bodies adjacent to these work areas. Left unmitigated, direct effects may be observed in surface water quality including changes in pH, introduction of TSS, petroleum hydrocarbons, and/or nutrients. By implementing standard BMPs described above, water quality impacts can be avoided or reduced to the point where only minor to moderate short-term adverse effects are anticipated.

In the event that existing contamination is suspected or encountered during earthwork activities, the Hazardous Materials and Hazardous Waste Management Plan (BAF-PH1-830-P16-0011) will be used as a guideline for containment, testing, removal, treatment and disposal of contaminated media.

Soil spoils will be re-used nearby as general fill (if suitable), stored for reclamation purposes and/or disposed of in roadside borrows. Borrows will be contoured to provide stable side slopes and restore natural drainage.

Temporary roads will be decommissioned and restored through scarification as soon as practical to reduce the risk of potential effects of erosion and sediment transport. Culverts and bridges will be removed to restore pre-disturbance drainage patterns.

The Southern railway alignment and train-related infrastructure are described and illustrated in FEIS Volume 3. Completion of the rail line will incorporate ground preparation and earthworks, a temporary access road, rail bed construction and rail sleeper installation. The entire rail line consists of new construction through previously unaltered landscape; therefore, potential effects on water and sediment quality are anticipated.

Rail line construction activities with the potential to affect surface water and sediment quality include culvert installation, bridge construction, infilling of right-of-way through watercourses (encroachment), rail bed construction, grading, and water management.

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Standard BMPs will be employed to address potential effects during Construction and Closure. The rail bed, rail line and associated features will be designed and installed so as to avoid contamination of surface waters. Specifically, all structures will be designed, constructed and operated in compliance with Fisheries Act authorizations designed to protect water quality as an integral component of fish habitat. Adherence to the conditions of the Fisheries Act Authorizations and standard BMPs are anticipated to result in minor adverse residual effects.

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TABLE H.5 EFFECTS ASSESSMENT SUMMARY - AQUEOUS NON-POINT SOURCE EMISSIONS

Effect		Residual Effect Evaluation Criteria					Significance
Effect	**Direction & Nature of Effect**	**Magnitude / Complexity**	**Geographical Extent**	**Frequency**	**Duration**	**Reversibility**	**Rated Significance of Residual Effect**
SWSQ-1 **Ground preparation & earthworks**	**Negative** Water quality (pH, TSS, metals, nutrients and hydrocarbons)	**Level II:** Effect is expected to result in a change greater than threshold value(s)	**Level I:** confined to the LSA	**Level I:** infrequent	**Level II:** will occur for the operation phase (life of the Project)	**Level I:** effect is reversible after activity is complete	Not Significant
SWSQ-2 **Site Water Management**	**Negative** Water quality (pH, TSS, metals, nutrients and hydrocarbons)	**Level II:** Effect is expected to result in a change greater than threshold value(s)	**Level I:** confined to the LSA	**Level I:** infrequent	**Level I:** will occur mainly during the construction phase	**Level II:** effect is partially reversible with cost/effort	Not Significant
SWSQ-3 **Laydown Areas**	**Negative** Water quality (pH, TSS, metals, nutrients and hydrocarbons)	**Level II:** Effect is expected to result in a change greater than threshold value(s)	**Level I:** confined to the LSA	**Level I:** infrequent	**Level I:** will occur mainly during the construction phase	**Level I:** effect is reversible after activity is complete	Not Significant
SWSQ-4 **Explosives**	**Negative** Water quality (pH, TSS, metals, nutrients and hydrocarbons)	**Level II:** Effect is expected to result in a change greater than threshold value(s)	**Level I:** confined to the LSA	**Level I:** infrequent	**Level II:** will occur for the operation phase (life of the Project)	**Level I:** effect is reversible after activity is complete	Not Significant
SWSQ-5 **Quarries and Borrow Areas**	Negative Water quality (pH, TSS, metals, nutrients and hydrocarbons)	**Level II:** Effect is expected to result in a change greater than threshold value(s)	**Level I:** confined to the LSA	**Level I:** infrequent	**Level I:** will occur mainly during the construction phase	**Level I:** effect is reversible after activity is complete	Not Significant
SWSQ-7 **Camps and Fuel Management**	**Negative** Water quality (pH, TSS, metals, nutrients and hydrocarbons)	**Level I:** Effect is expected to be less than threshold values	**Level I:** confined to the LSA	**Level II:** will occur intermittently	**Level II:** will occur for the operation phase (life of the Project)	**Level II:** effect is partially reversible with cost/effort	Not Significant
SWSQ-8 **Water Use and Management**	**Negative** Water quality (pH, TSS, metals, nutrients and hydrocarbons)	**Level I:** Effect is expected to be less than threshold values	**Level I:** confined to the LSA	**Level III:** continuous	**Level II:** will occur for the operation phase (life of the Project)	**Level I:** effect is reversible after activity is complete	Not Significant
SWSQ-9 **Airstrips and Airstrip Use**	**Negative** TSS and Petroleum Hydrocarbons	**Level II:** Effect is expected to result in a change greater than threshold value(s)	**Level I:** confined to the LSA	**Level I:** infrequent	**Level III:** will occur beyond the life of the Project	**Level I:** effect is reversible after activity is complete	Not Significant

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TABLE H.6 SIGNIFICANCE OF RESIDUAL EFFECTS FROM NON-POINT SOURCE DISCHARGES

Key Issue	Significance of Predicted Residual Environmental Effect		Likelihood [1]	
	Significance Rating	Level of Confidence	Probability	Certainty
SWSQ-1: Project-related ground preparation and earthworks, including road and railway construction/closure	N	2	N/A	N/A
SWSQ-2: Project-related site water management	N	2	N/A	N/A
SWSQ-3: Project-related laydown areas	N	1	N/A	N/A
SWSQ-4: Project-related explosives manufacture, storage, and use	N	2	N/A	N/A
SWSQ-5: Quarries and borrow sources	N	2	N/A	N/A
SWSQ-7: Camps, fuel storage and waste management	N	2	N/A	N/A
SWSQ-8: Water use and management	N	2	N/A	N/A
SWSQ-9: Airstrips and airstrip use	N	2	N/A	N/A

KEY:

2. Significance Rating: S= Significant, N = Not Significant, P = Positive
   Level of Confidence: 1= Low; 2= Medium; 3=High
   a. Likelihood - only applicable to significant effects
   b. Probability: 1= Unlikely; 2= Moderate; 3=Likely
   c. Certainty: 1= Low; 2= Medium; 3=High

Materials from borrow sources have undergone representative geochemical testing, which has indicated that non reactive material is available throughout the alignment for rail bed construction. The use of non reactive rock avoids the potential for acid generation and metals leaching that could affect surface water and sediment quality. Imported materials used in rail bed construction will be screened

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for other obvious contaminants that could affect nearby watercourses. In the event that existing contamination is suspected or encountered during earthwork activities, the Project's Hazardous Materials and Hazardous Waste Management Plan (BAF-PH1-830-P16-0011) will be used as a guideline for containment, testing, removal, treatment and disposal of contaminated media.

The rail sleepers will be hewn from raw wood and will not have any preservatives such as creosote or zinc chloride. One of the factors in the selection of raw wood for rail sleepers was to remove the potential for adverse water quality effects. No negative adverse effects are expected from materials leaching from the raw wood rail sleepers.

2.1.3 Residual Effects Rating

2.1.3.1 MAGNITUDE

Based on a qualitative assessment, there is a potential for minor to moderate water quality effects associated with ground preparation and earthworks activities, including road and railway construction and reclamation. Generally, the mitigation measures described above are expected to prevent contact of sediment-laden water with natural surface waterbodies in the LSA. Mitigation measures may, however, have limitations, especially considering the extreme climatic conditions: the effectiveness of the installation and performance of sediment transport mitigation (e.g. silt fences) in frozen ground conditions, challenges in providing adequate ground cover, and challenges in completing earthworks in areas of permafrost.

Given the potential limitations of mitigation measures, it is anticipated that TSS loading could occasionally exceed the CCME threshold of +5 mg/L relative to baseline conditions. These effects are most likely to coincide with freshet conditions, which in themselves result in elevated TSS and have the potential to mitigate the magnitude of the potential effect through added capacity to buffer these inputs. Environmental construction monitoring is expected to be successful in identifying potential effects as they arise, and adaptive management will improve the performance of mitigation measures and thereby avoid exceedance of the CCME PAL guidelines.

In the event that existing (pre-Project) contaminated media are identified on any of the Project sites, appropriate measures will be taken to collect, treat and dispose of the material without increasing the footprint of the contamination and/or creating new pathways for contaminant transport. Currently, there are no known instances of existing contamination located in the Project area. Negligible to minor effects may be anticipated with any existing contaminated media identified during ground preparation and earthworks activities.

Based on the potential for water quality to occasionally exceed the identified thresholds, the effect was rated at Level II.

Environmental monitoring, ongoing water quality monitoring and adaptive management are expected to limit the magnitude of potential TSS related effects.

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2.1.3.1 Extent

The extent of residual water and sediment quality effects associated with ground preparation and earthworks will be limited to the LSA where the infrastructure is located. Environmental construction monitoring will identify effects and where necessary, mitigation will limit the extent of the effect. The extent is rated as Level I.

2.1.3.1 Frequency

Considering the temporal relation between freshet and/or extreme weather conditions and residual water and sediment quality effects, it is anticipated that these effects will be limited to summer months when construction activities are scheduled and when freshet and the majority of rain events occur. Frequency is rated as Level I.

2.1.3.1 Duration

While ground disturbance and road and railway construction will be concentrated in the Construction phase, these facilities will require ongoing maintenance throughout the duration of the Project. The duration has been rated as Level II.

2.1.3.1 Reversibility

The potential effects are anticipated to be fully reversible, once the roads have been decommissioned and rehabilitated and natural drainage has been restored. The effect is rated as Level I.

2.1.3.1 Significance - SWSQ-1 - Project-Related Ground Preparation And Earthworks, Including Road And Railway Construction/Reclamation

Based on the ratings described above, ground disturbance and earthworks activities are not expected to result in significant adverse environmental effects on the water and sediment quality VEC. The residual effect is ranked as Not Significant (Table H.5). The Level of Confidence associated with the significance ranking is Medium due to the combined qualitative and semi-quantitative nature of the assessment (Table H.6).

2.2 Site Water Management - Impact Statement SWSQ-2

Impact Statement SWSQ-2: Project-related site water management may result in changes to surface water and sediment quality in the five freshwater aquatic LSAs.

Management of storm water, process water and site runoff from engineered surfaces will be required throughout the five freshwater LSAs during all Project phases. The areas requiring site water management are identified in FEIS Table 3.2.1, Major Project Components, Volume 3. The approach to site water management is provided in the Surface Water and Aquatic Ecosystem Management Plan (BAF-PH1-830-P16-0026).

All stormwater sources have the potential to affect surface water quality through the alteration of Ph and/or introduction of TSS, petroleum hydrocarbons, metals and nutrients. By implementing

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standard BMPs such as the Land Development Guidelines for the Protection of Aquatic Habitat (DFO, 1993), adverse effects can be avoided or reduced. The following mitigation measures will be used to manage the effects of water management on surface water quality:

- Minimize the footprint of disturbance;
- Install and maintain water management features, designed to segregate and prevent co-mingling of offsite water and onsite water;
- Install and maintain adequately designed erosion control features;
- Install and maintain adequately designed sediment transport control features;
- Where required, locate infrastructure on competent bedrock or provide ground conditions that limit permeability and transport into the active layer; and
- Capture and treat contaminated site run-off prior to discharging to the receiving environment.

2.2.1 Residual Effects Rating

2.2.1.1 Magnitude

Preliminary site observations coupled with experience gained from existing operations in the Project area indicate that untreated site water can typically be managed in a way that prevents contact with natural surface waterbodies and water contained in the active layer. The underlying bedrock and permafrost conditions will act as a relatively impermeable barrier to migration of potential contaminants into groundwater.

All potentially affected stormwater sources will be collected, contained and treated to applicable water quality criteria prior to discharge. Environmental construction monitoring will focus on receiving waterbodies that have relatively soft water, i.e., sensitive to increased metal toxicity (upstream of the deposits, Mary Lake and tributaries, Camp Lake, Sheardown Lake, Ravn River and Cockburn Lake) and watercourses that are sensitive to nutrient inputs.

Based on the anticipated success of controlling stormwater and treating it to applicable discharge standards, only minor to moderate water effects are anticipated. The magnitude is rated as Level II.

2.2.1.2 Exent

Based on the scale of the surface areas where site water is being collected, the extent of residual water and sediment quality effects associated with Project-related site water management may extend beyond the LSA where the source is located, but is not anticipated to extend to the RSA scale. Environmental construction monitoring will identify residual water and sediment quality effects and where necessary, mitigation efforts will limit the extent of the effect. A Level I extent rating was assigned.

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2.2.1.3 FREQUENCY

Considering the temporal relation between freshet and/or extreme weather conditions and residual water and sediment quality effects, it is anticipated that these effects occur during summer months when construction activities are scheduled. A Level I frequency rating was assigned.

2.2.1.4 DURATION

Residual water and sediment quality effects associated with site water management are expected during the Construction and Operation phases of the Project and are anticipated to coincide with the timing of freshet, when any potential effect would be expected to be diluted by high flow conditions resulting in key indicator concentrations indistinguishable from baseline. A Level I duration rating was assigned.

2.2.1.5 REVERSIBILITY

Residual surface water and sediment quality effects associated with site water management are anticipated to be partially reversible. The majority of Project areas where site water management is required will be returned to the pre-disturbed state during Closure phase. Following rehabilitation, key indicators are generally expected to return to baseline conditions through removal of the contaminant source. A Level II reversibility rating was assigned.

2.2.1.6 SIGNIFICANCE - SWSQ-2 - PROJECT-RELATED SITE WATER MANAGEMENT

Based on these ratings, site water management infrastructure and site water discharge are not expected to result in significant adverse environmental effects on the water and sediment quality VEC in the five freshwater LSAs. The residual effect is ranked as *Not Significant* (Table H.5). The Level of Confidence associated with the significance ranking is Medium (Table H.6). While the assessment is qualitative, there is a high Level of Confidence in the effectiveness of mitigation measures.

2.3 LAYDOWN AREAS - IMPACT STATEMENT SWSQ-3

Impact Statement SWSQ-3: Project-related laydown areas may result in changes to surface water and sediment quality in the five freshwater aquatic LSAs.

Laydown areas are temporary sites used for the storage of equipment and construction materials during the Construction and Closure phase. Requirements are dictated by equipment needs, the sequence of construction/closure activities, and the timing of material shipments. These factors will be optimized to reduce the number of anticipated laydown areas, and to minimize their anticipated footprints. The two main considerations are sediment and erosion control, and introduction of hazardous substances, leading to discharge of sediment-laden or contaminated water into the receiving environment.

Left unmitigated, direct effects may be observed through the introduction of TSS and metals. By implementing standard BMPs during development and use, water quality effects can be avoided or minimized to the point where only minor to moderate adverse effects are anticipated. In addition to

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the mitigation measures described in the ground preparation section, the following mitigation measures will be employed in laydown areas, as required:

- Siting of laydown areas over competent bedrock or impermeable ground layers;
- Placement and grading of clean, free draining material to promote a workable lay down area environment;
- Installation of adequate storm water management infrastructure to restrict runoff from overland flow or seepage through the active layer into receiving waterbodies; and
- Appropriate handling and storage of hazardous materials.

2.3.1 Residual Effects Rating

2.3.1.1 Magnitude

Based on a qualitative assessment, that minor to moderate water quality effects may be associated with Project-related laydown areas and activities. The mitigation measures described above, while they are expected to prevent contact of sediment-laden or contaminated water with natural surface waterbodies may have limitations associated with their implementation and effectiveness.

Given these limitations, TSS loading could occasionally exceed the CCME threshold of +5 mg/L relative to baseline conditions. These effects are most likely to coincide with freshet conditions, which have the potential to mitigate the magnitude of the potential effect through added capacity to buffer these inputs. Environmental construction monitoring will identify potential effects as they arise and adaptive management will reduce the risk of exceeding the CCME PAL guidelines.

Potentially hazardous materials will be stored in appropriate containment in designated locations away from water bodies, to reduce the potential for loss of hazardous materials to the aquatic environment.

Based on the potential for changes in water quality occasionally to exceed the identified thresholds, a Level II magnitude rating was assigned.

2.3.1.2 Extent

The extent of residual water and sediment quality effects associated with Project-related laydown areas will be limited to the LSA in which they are located. Environmental construction monitoring will identify effects and, where necessary, mitigation efforts preclude or limit the extent of the effect. A Level I extent rating was assigned.

2.3.1.3 Frequency

Considering the temporal relation between freshet and/or extreme weather conditions and residual water and sediment quality effects that these effects would be limited to summer months when construction activities are scheduled and when freshet and the majority of rain events in the Project area occur. A Level I frequency rating was assigned.

2.3.1.4 Duration

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Residual water and sediment quality effects associated with laydown areas are only expected to occur during Construction and Closure. Potential effects are anticipated to coincide with the timing of freshet, when any potential effect would be expected to be diluted by high flow conditions resulting in key indicator concentrations indistinguishable from baseline. A Level I duration rating was assigned.

2.3.1.5 REVERSIBILITY

Residual surface water and sediment quality effects associated with Project-related laydown areas are anticipated to be fully reversible. Following the closure and rehabilitation, key indicators are generally expected to return to baseline conditions through removal of the contaminant source. A Level I reversibility rating was assigned.

2.3.1.6 SIGNIFICANCE - SWSQ-3 - PROJECT-RELATED LAYDOWN AREAS

Based on these ratings, laydown areas are not expected to result in significant adverse environmental effects on the water and sediment quality VEC in the five freshwater LSAs. The residual effect is ranked as *Not Significant* (Table H.5). The Level of Confidence is Low due to the qualitative nature of the assessment and potential limitations related to mitigation measures (Table H.6).

2.4 EXPLOSIVES MANUFACTURE, EXPLOSIVES MAGAZINE, AND EXPLOSIVES USE - IMPACT STATEMENT SWSQ-4

Impact Statement SWSQ-4: Project-related explosives manufacture, magazine, and use may result in changes to surface water and sediment quality in the five freshwater aquatic LSAs. Explosives transportation, storage and handling have the potential to affect surface water quality in receiving environments during the Construction, Operation and Closure phases.

Explosives will be used throughout the Project footprint area during Closure to operate quarries, make rock cuts and access aggregate. During early construction and late closure, packaged explosives and ANFO will be delivered to specific areas of use. Packaged explosives will be stored in magazine areas, which will comply with the set-back requirements of NRCan.

Permanent bulk explosives factories will be established at the Mine Site and Steensby Port as early as possible to manufacture explosives from ammonium nitrate. These will be used if possible during early closure.

Explosives (primarily ANFO) manufacture, transportation, storage and handling may result in the introduction of nitrogenous and petroleum hydrocarbon based components into surface water. Certain nitrogenous compounds can be toxic to aquatic life, depending on the form (e.g. nitrate, nitrite, or ammonia) and relative concentration. Elevated nitrogen concentrations can also result in the eutrophication of receiving waters where phosphorus is not limiting.

The following mitigation will be used to manage potential effects on surface water and sediment quality:

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- Explosives will be stored in explosives magazines positioned in accordance with the Nunavut Mine Health and Safety Act and Regulations. Detonators and explosives will be stored in separate magazines, and inventory will be strictly controlled by designated supervisors.
- Prefabricated magazines will be positioned and appropriately bermed to store explosives between unloading and distribution.
- If bulk mixing plants are available, ammonia nitrate (AN) will be delivered in bulk and transported by truck to the permanent storage facilities.

By implementing standard BMPs identified for explosives transportation, storage, and handling, water quality effects can be avoided or reduced to the point where only minor adverse effects are anticipated.

The mining pit will be mostly dry throughout the year; consequently ammonia or residual nitrogen is not expected to escape to the aquatic environment. During the freshet and summer months, any residual explosives washed away by precipitation will report to the waste rock pile; runoff will be channelled to a sedimentation pond, and discharge will be monitored for compliance with MDMER water quality limits.

The interaction between explosives use and water quality can be a challenge. The primary forms of mitigation to avoid contamination by nitrogen and petroleum hydrocarbons include use of appropriate weights of explosives to achieve desired blasting results, use of blast guards to prevent 'fly-away', and adequate water management features that will prevent co-mingling of contact and noncontact water. The primary area of use of explosives during Construction and Closure are quarries and borrow sources for aggregate production and are generally sited in competent ground conditions, away from sensitive receiving waterbodies, to minimize the potential for adverse effects. As an additional measure, collection sumps can be constructed to capture and treat potentially contaminated contact water prior to discharge.

2.4.1 Residual Effects Rating

2.4.1.1 MAGNITUDE

Based on a qualitative assessment, minor to moderate water quality effects may be associated with explosives manufacture, transportation, magazine and use. Due to the potentially serious nature of health and safety effects, mitigation will be tightly controlled and intently managed. The permanent bulk explosives factories, ANFO mixing plants, ammonium nitrate storage facilities, and truck wash facilities will be constructed to contain any solid explosives and contact water for appropriate treatment. It is not anticipated that nitrogenous and petroleum hydrocarbon residues originating from these sources will exceed applicable CCME thresholds. Residual effects on water quality and sediment quality are expected to be negligible to minor.

The majority of blasting during the Operation phase will be confined to the open pit where water containing elevated levels of nitrogenous and petroleum hydrocarbon residues can be collected and treated prior to discharge (described in Section 3.4.1.6).

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During Construction and Closure, nitrogenous and petroleum hydrocarbon residues are likely to be released due to blasting and wastage (minimal with pre-packaged ANFO) at quarry locations and other required sites. For these other scenarios, restricting blasting during freshet, volatilization by sunlight and attenuation by vegetation and soil and containment of contact water (where possible) are expected to limit potential effects. Even with the implementation of mitigation measures, it is possible that ammonia, nitrates, nitrites and petroleum hydrocarbon residues originating from blasting activities in less confined locations may occasionally exceed their respective CCME thresholds. These effects would likely coincide with the snow melt when accumulated nitrogen and petroleum hydrocarbon residues are released during the thaw and freshet conditions. High flow conditions will moderate the magnitude of the potential effect.

Nutrient characteristics of the receiving streams and lakes are summarized in FEIS Tables 7-3.5 and 7-3.7. The findings indicate that all of the freshwater receiving environments are relatively sensitive to nutrient inputs; therefore, environmental monitoring coupled with adaptive management will limit the magnitude of residual effects.

A Level II magnitude rating was assigned.

2.4.1.2 EXTENT

The extent of residual water and sediment quality effects associated with Project-related explosives manufacture, transportation, magazine and use will be limited to the LSA in which it is located. Environmental monitoring will identify residual water and sediment quality effects and where necessary, mitigation efforts will limit the extent of the effect. A Level I extent rating was assigned.

2.4.1.3 FREQUENCY

Considering the temporal relation between freshet and/or extreme weather conditions and residual water and sediment quality effects, it is anticipated that these effects would occur during summer months when construction activities are scheduled and when freshet and the majority of rain events occur. A Level I frequency rating was assigned.

2.4.1.4 DURATION

Explosives manufacture, transportation, storage and use will be required during the Construction, Operation and Closure phases. Considering that the most likely uncontrolled contribution of nitrogen to the aquatic environment would come from blasting in unconfined areas along the Milne Inlet Tote Road or Railway Alignment, it is likely the source would not persist beyond the Construction phase. Nitrogen introduced in the form of ammonium would likely be assimilated into biomass rapidly, resulting in a relatively short duration of effect. Since the nitrogen source will be removed after Construction, and given the anticipated rapid assimilation of ammonium, a Level II duration rating was assigned.

2.4.1.5 REVERSIBILITY

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The potential effects are anticipated to be fully reversible once blasting activities have ceased. This assumes that residual nutrient levels will be attenuated through nitrification/denitrification and that the conclusion of blasting activities will terminate the nitrogen source. A Level I reversibility rating was assigned.

2.4.1.6 Significance - SWSQ-4 - Explosives Manufacture, Storage and Use

Based on the ratings described above, explosives manufacture, storage and use are not expected to result in significant adverse environmental effects on the water and sediment quality VEC. The residual effect is ranked as *Not Significant* (Table H.5). The Level of Confidence is Medium (Table H.6). Despite the qualitative nature of the assessment, there is a High Level of Confidence in the effectiveness of the identified mitigation measures.

2.5 QUARRIES AND BORROW SOURCES - IMPACT STATEMENT SWSQ-5

Impact Statement SWSQ-5: Project-related quarries and borrow sources may result in changes to surface water and sediment quality in the five freshwater aquatic LSAs.

Quarries and borrow sources required for rock, fill and aggregate during construction and closure are identified on FEIS Figures 3.2.1 through 3.2.9 in Volume 3. The primary concern is the potential for ML/ARD and sediment generated at these locations to affect water quality when released into the natural environment.

As a mitigation measure, materials from identified quarries and borrow sources have undergone representative geochemical testing, which has indicated that the material is non-reactive (FEIS Volume 6). Additional testing will be completed to ensure that sources used during Construction and Closure consist of non-reactive material.

Quarries and borrow sources are generally sited in competent ground conditions away from sensitive receiving waterbodies to avoid the potential for adverse effects. As an additional measure, collection sumps will capture and treat affected contact water to applicable water quality standards prior to discharge. As stated in the Borrow Pit and Quarry Management Plan (BAF-PH1-830-P16-0004) Baffinland will strive to avoid quarry site that have the potential for ML/ARD. A detailed ML/ARD testing protocol for potential quarry sites is presented in the Borrow Pit and Quarry Management Plan. Based on the results of the representative geochemical testing, it is not anticipated that treatment will be required to address ML/ARD issues.

2.5.1 Residual Effects Rating

2.5.1.1 Magnitude

A semi-quantitative assessment of magnitude was based on representative geochemical testing of materials from quarries and borrows sources, which indicated that the sampled materials are non-reactive (FEIS, Volume 6). The use of non-reactive materials makes it likely that run-off from quarries

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and borrow sources will meet the CCME thresholds for pH and metals (ML/ARD). FEIS Tables 7-3.5 and 7-3.7, which summarize acid sensitivity of the receiving streams and lakes, indicate that none of the streams or lakes is particularly sensitive to acidic inputs.

Nitrogenous and petroleum hydrocarbon residues originating from blasting activities, as well as sediment-laden water, will be confined to the water management infrastructure within each quarry and borrow site. While mitigation measures will prevent contact of storm water with natural surface waterbodies, they may have limitations associated with their implementation and effectiveness. Given these limitations, it is anticipated that uncontrolled discharges of water from quarries and borrow sources may occasionally exceed applicable CCME thresholds. These exceedances would likely coincide with freshet conditions during snow melt; this will mitigate the potential effect through dilution.

Environmental construction monitoring will be comprehensive, with an emphasis on those receiving bodies that have relatively soft water quality, a condition that can result in increased susceptibility to metals uptake.

A Level II magnitude rating was assigned.

2.5.1.2 EXTENT

The extent of residual water and sediment quality effects associated with quarry or borrow sources will be limited to the LSA in which they are located. The relative insensitivity of watercourses to acidic inputs suggests a relatively high potential to buffer through elevated levels of calcium carbonates that are present. Environmental monitoring will identify effects and, where necessary, mitigation efforts will limit their extent. A Level I extent rating was assigned.

2.5.1.3 FREQUENCY

Considering the temporal relation between freshet and/or extreme weather conditions and residual water and sediment quality effects, these effects will be limited to summer months when construction/closure activities are scheduled and when freshet and the majority of rain events occur. A Level I frequency rating was assigned.

2.5.1.4 DURATION

Quarries and borrow sources will be required during the Construction and Closure phase. Potential effects are anticipated to coincide with the timing of freshet, when any potential effect will be diluted by high flow conditions, resulting in key indicator concentrations indistinguishable from baseline. A Level I duration rating was assigned.

2.5.1.5 REVERSIBILITY

The potential effects associated with quarry or borrow sources are anticipated to be fully reversible once blasting is completed and these locations have been closed and rehabilitated. A Level I reversibility rating was assigned.

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2.5.1.6 SIGNIFICANCE - SWSQ-5 - QUARRIES AND BORROW SOURCES

Based on the ratings described above, the residual effect is ranked as *Not Significant* (Table H.5). The Level of Confidence associated with the significance ranking is Medium due to the semi-quantitative nature of the assessment (Table H.6).

2.6 CAMPS, FUEL STORAGE AND WASTE MANAGEMENT - IMPACT STATEMENT SWSQ-7

Impact Statement SWSQ-7: Project-related camps, fuel storage and waste management may result in changes to surface water and sediment quality in the five freshwater aquatic LSAs.

Temporary and permanent camps will be located throughout the Project area as described and illustrated in FEIS Volume 3. The potential effects include changes in water and sediment quality due to withdrawal, waste management, fuel storage, and discharge of sewage.

In order to protect water quality, the following management actions have been adopted at waste management facilities:

- Incineration of non-hazardous combustible wastes;
- Landfilling of inert non-combustible wastes;
- Temporary storage and off-site shipping of hazardous and recyclable waste materials; and
- On-site treatment for hydrocarbon-impacted materials (soil, water, ice, and snow).

Diesel, gasoline and aviation fuel will be delivered to temporary camp locations via tanker trucks and will be stored in double-walled fuel tanks located on foundations equipped with impermeable bermed liners and bedding materials. The storage site will be far enough removed from receiving watercourses to reduce the potential for water quality effects.

Fuel will be delivered to the camps at Milne Port, the Mine Site and Steensby Port via marine vessels and tanker trucks and will be stored in large volume double-walled tanks located on foundations equipped with impermeable bermed liners and bedding materials. Within the bermed fuel storage areas, any fuel-contact water will be collected in engineered drainage and sumps, treated to applicable water quality standards, and then discharged if it does not exceed the CCME thresholds for TSS, oil and grease, or petroleum hydrocarbons.

2.6.1 Residual Effects Rating

2.6.1.1 MAGNITUDE

Effects associated with fuel storage and use and waste management were all assessed qualitatively. Mitigation measures described above will prevent the discharge of fuel contact water that exceeds CCME thresholds for TSS, oil and grease, or petroleum hydrocarbons.

Waste management mitigation as described above will limit any potentially adverse effects to a negligible to minor magnitude.

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A Level I magnitude rating was assigned.

2.6.1.2 EXTENT

The extent of the potential effect is likely to be limited to watercourses located in the LSA in which a camp is situated. A Level I extent rating was assigned.

2.6.1.3 FREQUENCY

The frequency of potential effects will be periodic and limited to summer months when the majority of precipitation falls in the Project Area. A Level II frequency rating was assigned.

2.6.1.4 DURATION

Camps, fuel storage and waste management will be required during Construction and Operation; therefore, a Level II duration rating was assigned.

2.6.1.5 REVERSIBILITY

The potential effects are anticipated to be partially reversible once this infrastructure is decommissioned and rehabilitated. A Level II reversibility rating was assigned.

2.6.1.6 SIGNIFICANCE - SWSQ-7 - CAMPS, FUEL STORAGE AND WASTE MANAGEMENT

Based on these ratings, construction and operation of camps, fuel storage and waste management are not expected to result in significant adverse environmental effects on the water and sediment quality VEC. The residual effect is ranked as *Not Significant* (Table H.5). The Level of Confidence is Medium (Table H.6). While the assessment is qualitative in nature, there is a High Level of Confidence in the effectiveness of mitigation measures.

2.7 WATER USE AND MANAGEMENT - IMPACT STATEMENT SWSQ-8

Impact Statement SWSQ-8: Project-related water use and management may result in changes to surface water and sediment quality in the five freshwater aquatic LSAs.

Water withdrawal will support a number of Project-related activities (FEIS Tables 7-2.5, 7-2.6, 7-2.9 and 7-2.10). Withdrawal from these sources has the potential for indirect effects on surface water quality by reducing the total volume of water in the system at that location.

Various Project-related water uses have the potential to affect water and sediment quality when process water is released back into the freshwater environment, including:

- Aggregate washing;
- Concrete manufacture;
- Concrete curing;
- Truck wash; and
- Equipment/floor wash-down.

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Water for aggregate washing will be pumped from the potable water source and stored in a designated washing area. The main consideration with aggregate wash water is the potential for it to contain a high TSS concentration. Wash water will be reused and recycled to the extent possible, and solids will be settled out prior to discharge.

Water used for concrete manufacture and curing will be pumped from the potable water source and stored at the batch plant. Volumetric trucks will be used for remote concrete pours, and standard BMPs will be put in place to ensure that untreated contact water is not discharged. The main consideration with concrete contact water is the potential to contain elevated TSS and pH, which may affect water quality in the environment. Concrete contact water will be treated through settlement and with pH adjustment (e.g. carbon dioxide sparging) prior to discharge.

Truck wash facilities will be constructed with water management features designed to segregate and prevent co-mingling of offsite and onsite water. A drain system and sump will capture and treat potentially contaminated water to applicable quality standards prior to discharge.

Snow, ice, soil or water that has been contaminated by petroleum hydrocarbons has the potential to impair water quality. Any such materials will be transported to lined, bermed treatment landfarm facilities, and materials that have been in contact with oil will be transported to the same locations for treatment in oil/water treatment facilities in the maintenance shops. Contaminated snow will be placed into cells in the landfarms; after thawing it will be treated and discharged. Discharges will not be directed into the freshwater environment; therefore, only minor adverse effects are anticipated from incidental occurrences.

2.7.1 Residual Effects Rating

2.7.1.1 Magnitude

Negligible to minor magnitude residual water quality effects may be associated with water abstraction (FEIS Tables 7-2.5, 7-2.6, 7-2.9 and 7-2.10). Water used for other activities (e.g., aggregate washing, concrete manufacture, concrete curing, and dust suppression for the quarry crusher) will be managed to ensure the discharges meet applicable CCME water quality guidelines. Negligible to minor water and sediment quality effects are anticipated.

Potential effects of contaminated by petroleum hydrocarbons were assessed qualitatively. Based on the mitigation described above, it is anticipated that treated contact water discharges will meet applicable CCME water quality guidelines and only negligible to minor adverse effects are expected.

A Level I magnitude rating was assigned.

2.7.1.2 Extent

The extent of the potential effect is likely to be limited to watercourses from which the abstraction or water use is occurring. A Level I extent rating was assigned.

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2.7.1.3 FREQUENCY

The frequency of the potential effect will be year round, while seasonal discharge of treated contact water will occur during freshet. A Level III frequency rating was assigned.

2.7.1.4 DURATION

Effects are anticipated to last through the Construction, Operation and Closure phases; therefore, a Level II duration rating was assigned.

2.7.1.5 REVERSIBILITY

The potential effects are anticipated to be fully reversible, once water withdrawal and treated contact water discharge are discontinued. A Level I reversibility rating was assigned.

2.7.1.6 SIGNIFICANCE - SWSQ-8 - WATER USE AND MANAGEMENT

Based on these ratings, water use and management are not expected to result in significant adverse environmental effects on the water and sediment quality VEC. The residual effect is ranked as *Not Significant* (Table H.5). The Level of Confidence is Medium (Table H.6). While aspects of the assessment are qualitative, there is a High Level of Confidence in the effectiveness of mitigation measures.

2.8 AIRSTRIPS AND AIRSTRIP USE - IMPACT STATEMENT SWSQ-9

Impact Statement SWSQ-9: Project-related airstrips and airstrip use may result in changes to surface water and sediment quality in the five freshwater aquatic LSAs.

The airstrip and related infrastructure are described in FEIS Volume 3. Its construction, operation and closure have the potential to affect surface water quality in adjacent water bodies. The primary concern during Closure stems from erosion and sediment transport during ground preparation and earthworks. Mitigation measures are summarized in the sections above.

The primary concern stems from the possibility of contaminating nearby water bodies with runoff from the surface of the airstrip, including de-icing agents such as propylene glycol. De-icing by a portable discharge unit will be carried out in a defined area to the side of the runway using propylene glycol. A synthetic organic polymer (EK 35) will be used as a dust suppressant on the airstrips as needed.

Water management features will be installed and maintained to prevent co-mingling of offsite water with potentially affected onsite water. Any potentially contaminated water will be treated to applicable quality standards prior their discharge.

2.8.1 Residual Effects Rating

2.8.1.1 MAGNITUDE

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As a result of the crowned configuration of the airstrip, surface run-off will be directed to drainage collection structures around the perimeter. Mitigation measures will prevent contact of sediment-laden water with natural surface waterbodies; however, mitigation measures may have limitations associated with their implementation and effectiveness. Given these limitations, it is anticipated that TSS loading could occasionally exceed the CCME threshold of +5 mg/L relative to baseline conditions. These exceedances would likely coincide with freshet conditions during snow melt, which is likely to dilute and mitigate any potential effects.

Use of propylene glycol is anticipated to result in negligible to minor water quality effects as collection and treatment will to ensure that the CCME interim guideline is not exceeded.

The synthetic organic polymer EK 35 is not an identified substance under CCME PAL; therefore, it is recommended that potential effects be assessed through routine water quality monitoring.

Based on the potential for infrequent exceedances of applicable CCME thresholds, a Level II magnitude rating was assigned.

2.8.1.2 Extent

The extent of the potential effect is likely to be limited to waterbodies adjacent to the airstrips. A Level I extent rating was assigned.

2.8.1.3 Frequency

The frequency of potential effects will be limited to summer months, when the majority of precipitation falls in the Project Area. A Level I frequency rating was assigned.

2.8.1.4 Duration

Airstrips and airstrip use will be required during Construction, Operations and Closure. Potential effects are anticipated to coincide with the timing of freshet, when high flows will act to reduce concentrations and render them indistinguishable from baseline. A Level III duration rating was assigned.

2.8.1.5 Reversibility

The potential effects are anticipated to be fully reversible once the infrastructure is decommissioned and rehabilitated and de-icing and dust suppression ceases. A Level I reversibility rating was assigned.

2.8.1.6 Significance - SWSQ-9 - Airstrips and Airstrip Use

Based on these ratings, airstrips and airstrip use are not expected to result in significant adverse environmental effects on the water and sediment quality VEC. The residual effect is ranked as *Not Significant* (Table H.5). The Level of Confidence is Medium (Table H.6). While the assessment is

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qualitative, there is a high Level of Confidence in the effectiveness of the identified mitigation measures.

2.9 AQUEOUS POINT SOURCE EMISSIONS

Potential effects on surface water and sediment quality associated with aqueous point source emissions (key issues) identified in Table H.2 are described below. These emissions are from a single, identifiable, localized source and affect a specific receiving waterbody. Locations of infrastructure and activities involving each aqueous point source emission are presented by LSA.

Table H.7 summarizes the ratings assigned to the significance criteria of residual effects associated with each effect discussed below.

2.9.1 Prediction Confidence

The confidence level assigned to the predictions of significance for aqueous non-point source discharge effects to water and sediment quality are summarized in Table H.8.

2.9.1.1 Milne Port LSA

All aqueous point source emissions from the Milne Port LSA are directed into Milne Inlet (marine environment) via surface release through a combination of constructed/natural drainage to areas that have no identified sensitive receptors (i.e., fish and/or fish habitat). Due to the absence of sensitive secondary receptors, an assessment of freshwater effects was not completed. The assessment of residual effects associated with emissions into the marine environment, where secondary receptors are located, is addressed in FEIS Volume 8.

2.10 MILNE INLET TOTE ROAD LSA

No aqueous point source emissions into the freshwater receiving environment are located in the Milne Inlet Tote Road LSA.

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TABLE H.7 EFFECT ASSESSMENT SUMMARY - AQUEOUS POINT SOURCE DISCHARGES

Effect		Residual Effect Evaluation Criteria					Significance
Effect	**Direction & Nature of Effect**	**Magnitude / Complexity**	**Geographical Extent**	**Frequency**	**Duration**	**Reversibility**	**Rated Significance of Residual Effect**
SWSQ-10 West Waste Rock Stormwater Discharge to Camp Lake and Tributaries	**Negative** Water quality (pH, TSS, metals, ammonia, nitrite)	**Level II:** concentrations of indicator(s) predicted to exceed threshold value(s) by an order of magnitude or greater	**Level I:** confined to the LSA	**Level II:** will occur frequently	**Level III:** long-term/permanent	**Level II:** effect is partially reversible (water treatment, if required)	Not Significant
SWSQ-11 Waste Rock and Ore Stormwater Discharge to Mary River	**Negative** Water quality (pH, TSS, metals, ammonia, nitrite)	**Level I:** concentrations of indicator(s) predicted to be above but within an order of magnitude of threshold value(s)	**Level I:** confined to the LSA	**Level II:** will occur frequently	**Level II:** will occur for the Operation phase (life of the Project)	**Level II:** effect is partially reversible (water treatment, if required)	Not Significant
SWSQ-12 Exploration Drilling Runoff to Mary River	**Negative** Water quality (pH, TSS, chlorides)	**Level I:** concentrations of indicator(s) predicted to be above but within an order of magnitude of threshold value(s)	**Level I:** confined to the LSA	**Level II:** will occur frequently	**Level II:** will occur for the Operation phase (life of the Project)	**Level I:** effect is reversible after activity is complete	Not Significant
SWSQ-13 Pit Lake and Waste Rock Discharges to Mary River in Post-closure	**Negative** Water quality (pH, TSS, metals)	**Level I:** concentrations of indicator(s) predicted to be above but within an order of magnitude of threshold value(s)	**Level I:** confined to the LSA	**Level II:** will occur frequently	**Level III:** long-term/permanent	**Level II:** effect is partially reversible (water treatment, if required)	Not Significant
SWSQ-14 Exploration Camp WWTF Effluent Discharge to Sheardown Lake	**Negative** Water quality (pH, TSS, BOD, nutrients, ammonia)	**Level I:** Effect is expected to be less than threshold values	**Level I:** confined to the LSA	**Level II:** will occur frequently	**Level II:** will occur for the Operation phase (life of the Project)	**Level I:** effect is reversible after activity is complete	Not Significant
SWSQ-15 Mine Site WWTF Effluent Discharge to Mary River	**Negative** Water quality (pH, TSS, BOD, nutrients, ammonia)	**Level I:** Effect is expected to be less than threshold values	**Level I:** confined to the LSA	**Level II:** will occur frequently	**Level II:** will occur for the Operation phase (life of the Project)	**Level I:** effect is reversible after activity is complete	Not Significant

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TABLE H.8 SIGNIFICANCE OF RESIDUAL EFFECTS FROM POINT SOURCE DISCHARGES

Key Issue	Significance of Predicted Residual Environmental Effect		Likelihood (1)	
			Probability	Certainty
	Significance Rating	Level of Confidence		
SWSQ-10 West Waste Rock Stormwater Discharge to Camp Lake and Tributaries	N	3	N/A	N/A
SWSQ-11 Waste Rock and Ore Stormwater Discharge to Mary River	N	3	N/A	N/A
SWSQ-12 Exploration Drilling Runoff to Mary River	N	2	N/A	N/A
SWSQ-13 Pit Lake and Waste Rock Discharges to Mary River in Post-closure	N	2	N/A	N/A
SWSQ-14 Exploration Camp WWTF Effluent Discharge to Sheardown Lake	N	2	N/A	N/A
SWSQ-15 Mine Site Camp WWTF Effluent Discharge to Mary River	N	2	N/A	N/A

KEY:

3. Significance Rating: S= Significant, N = Not Significant, P = Positive
4. Level of Confidence : 1= Low; 2= Medium; 3=High
   a. Likelihood - only applicable to significant effects
   b. Probability: 1= Unlikely; 2= Moderate; 3=Likely
   c. Certainty: : 1= Low; 2= Medium; 3=High

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2.11 MINE SITE LSA

Impact Statements SWSQ-10 to SWSQ-13: Project-related discharges of mine contact water may result in impaired surface water and sediment quality in the Mine Site LSA.

Management of storm water and process water that has been in contact with the iron ore (mine contact water) is required at the Mine Site. Plans and drawings illustrating proposed site water management infrastructure for mine contact water are provided in the Surface Water and Aquatic Ecosystem Management Plan (BAF-PH1-830-P16-0026). The following sources have been identified for inclusion in the aqueous point source emissions assessment because they involve mine contact water that will be discharged into the freshwater environment:

- Waste Rock Stockpile runoff to Camp Lake and Tributaries (SWSQ-10);
- Waste rock and ore stockpile runoff to Mary River (SWSQ-11);
- Exploration drilling runoff (SWSQ-12); and
- Pit lake water and waste rock discharges to Mary River in post-closure (SWSQ-13).

The development of source terms (runoff water quality estimates) for waste rock, ore and pit water is described above.

Given the variability in runoff flows, the ponds were sized to accommodate the two-year extreme event. Discharge is anticipated to be distributed evenly with the natural flows from approximately mid-June until September.

Details regarding theoretical treatment options are provided in the Life-of-Mine Waste Rock Management Plan (BAF-PH1-830-P16-0031). The main findings suggest that, with sufficient storage and upstream control, any water quality issues that arise can be managed. If the only challenge with the water quality is TSS concentration, this will often be solved using retention time alone. With a buffer pond that has a sufficiently large retention time it is possible to allow particles to settle while discharging - either by gravity or pumping - in a continuous system.

All mine contact water (including that from the ore stockpiles) in the Milne Port and Steensby Port LSAs is discharged to the ocean; their potential effects are assessed in FEIS Volume 8.

Residual effects ratings for the various mine contact water discharges are provided below.

2.12 WASTE ROCK STORMWATER DISCHARGE TO CAMP LAKE AND TRIBUTARIES - IMPACT STATEMENT SWSQ-10

Runoff discharged from the West Waste Rock Stockpile Pond (Pond 1) has the potential to adversely affect water quality in the tributary of Camp Lake to which stormwater will be discharged, and downstream into Camp Lake.

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Contact water (runoff) from the Waste Rock Stockpile will be settled in the west pond (Pond 1) prior to discharge to tributary L1, which in turn reports to tributary L0 and subsequently to Camp Lake. The arrangement of the stockpile, the sedimentation pond and the receiving environment are illustrated in Life-of-Mine Waste Rock Management Plan. It is predicted, based on waste rock seepage modelling, that runoff from the stockpile will meet MDMER requirements (Life-of-Mine Waste Rock Management Plan (BAF-PH1-830-P16-0031)).

Background water quality was measured in the open-water seasons (June to September) of 2006, 2007, 2008 and 2011. Open-water season means were calculated for key water quality parameters at sampling locations L0-01, L-02 and L1-08. Water quality sampling included analysis of routine water quality parameters identified in the Baseline Water and Sediment Quality Report in FEIS Appendix 7B-1. Background mean and 90th percentile baseline concentrations were applied to the modelling.

Mean and low flow rates (or annual volumes) were obtained from hydrological surveys conducted over five years (2006, 2007, 2008, 2010 and 2011).

A mass balance approach was applied using the methodology described above to estimate water quality in the receiving waters under mean flow conditions and by discharging runoff following the natural hydrograph. Resultant water quality in Camp Lake tributary L1 (at the location of falls which prevent the upstream passage of fish), downstream where L1 reports to tributary L0 and then at Camp Lake is presented in Table H.9. The same analysis during the 10-year dry year is presented in Table H.10.

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2.12.1 Residual Effects Rating

2.12.1.1 MAGNITUDE

The mass balance modelling indicates that several parameters will have Level II magnitude effects to water quality under both mean and low flow conditions at the nearest downstream location inhabited by fish at L0, and in Camp Lake (Hazard Quotient - HQ of >1 and <10). An HQ >10 and <100 was applied for mercury using 90th percentile baseline concentrations. All other parameters are at Level I or lower.

As mentioned above, each of the metals showing an HQ >1 (a Level I effect) or HQ >10 (a Level II effect) is identified in the humidity cell testing as having >50 % non-detects, and half the detection limits were assumed for non-detect results. Consequently, the derived source terms for these metals are substantially based on the MDLs. Most of these same parameters (including arsenic, cadmium, chromium, mercury, selenium and silver, as well as other metals that do not trigger a Level I effect) have measured baseline concentrations that are mostly non-detect, and therefore the calculated mean or 90th percentile concentrations are substantially based on MDLs. On this basis, the assignment of a Level II magnitude rating for water and sediment quality effects arising from discharge of stormwater from the west waste rock pond to the Camp Lake tributaries and Camp Lake is considered to be highly conservative. Baffinland is exploring options for re-testing or additional testing to obtain a dataset of more precise measurements for these parameters.

Aquatic Effects Monitoring, Environmental Effects Monitoring and routine water quality monitoring are expected to identify potential effects as they arise, and adaptive management will reduce the risk of exceeding the predicted effects level.

2.12.1.2 DURATION

Discharge of mine contact water from the West Waste Rock Pond into the lower reach of Camp Lake tributary L1 will be required during the Operation, Closure and post-closure phases of the Project; a Level III duration rating was assigned.

2.12.1.3 FREQUENCY

The frequency of the potential effect will be annual, limited to the period between June and September. A Level II frequency rating was assigned.

2.12.1.4 EXTENT

The extent of the potential effect is expected to be limited to the Mine Site freshwater LSA and to reach negligible levels where Camp Lake discharges into Mary Lake. A Level I extent rating was assigned.

2.12.1.5 REVERSIBILITY

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The potential effects are anticipated to be partially reversible. A Level II reversibility rating was assigned.

2.12.1.6 SIGNIFICANCE - SWSQ-10 - WEST WASTE ROCK STORMWATER DISCHARGE TO CAMP LAKE AND TRIBUTARIES

Based on these ratings, discharge of mine contact water from the West Waste Rock Sedimentation Pond into the tributary of Camp Lake is not expected to result in an adverse environmental effect on water and sediment quality in the Mine Site LSA. The residual effect is ranked as *Not Significant* (Table H.7). The Level of Confidence (Table H.8) is High due to the quantitative nature and conservative assumptions of the assessment. Additionally the EEM requirements of MDMER provide assurance that effects will be detected and necessary corrective actions implemented.

2.13 WASTE ROCK AND ORE STORMWATER DISCHARGE TO THE MARY RIVER - IMPACT STATEMENT SWSQ-11

Runoff discharged from the East Pond (Pond 2), containing both Waste Rock Stockpile runoff and pit water, has the potential to adversely affect water quality in the Mary River.

A mass balance approach similar to that used for the West Waste Rock Pond (SWSQ-10) was applied using the methodology described above to estimate water quality in the receiving waters under mean flow conditions and by discharging effluent following the natural hydrograph. Resultant water quality in the Mary River following discharge of the East Pond is presented in Table H.11, and the same analysis during the 10-year dry year is presented in Table H.12.

2.13.1 Residual Effects Rating

2.13.1.1 MAGNITUDE

The mass balance modelling indicates that Level I magnitude effects to water quality will occur under both mean and low flow conditions (all indicator parameters <10x the applicable WQO) in the Mary River at each of the locations modelled:

- In the Mary River at MR-12 where tributary F0 containing the east pond discharge reports to the Mary River, under mean flow conditions (Table H.11) and the 10-year dry condition (Table H.12); and
- At the point of mixing of the discharge of stormwater from the main ore stockpiles, including the ROM stormwater discharge, under mean flow conditions (Table H.13) and the 10-year dry condition (Table H.14).

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TABLE H.9 PREDICTED WATER QUALITY IN CAMP LAKE TRIBUTARIES AND CAMP LAKE UNDER MEAN FLOW CONDITIONS

								WATER QUALITY IN THE RECEIVING WATERS										
Parameter	Units	Baseline Water Quality (L0-01, L1-02, L1-08)			Baseline Water Quality Camp Lake	Receiving Water Quality Objectives (Note 5)	Discharge Scenario	CAMP LAKE TRIB L1 BEFORE DISCHARGE TO TRIB L0				MOUTH OF TRIB L0 AT OUTLET TO CAMP LAKE				CAMP LAKE		
							Flows Used	Discharge Equalized to Mean Summer Flow Discharge Volume = 843,000 m^3/yr Mean Baseline Flows in L1 = 790,807 m^3/yr				Discharge Equalized to Summer Flow - Additional Dilution in L0 Discharge Flows = 1,633,807 m^3/yr Mean Baseline Flows in L0 (MR-10) at outlet to lake = 976,453 m^3/yr				Assume Instantaneous Mixing within Lake = 27,511,100 m^3 Discharge Flows into Camp Lake (MR-10 Outlet Flows + Discharge Volume) = 2,610,260 m^3/yr		
		Mean Concentration	90th Percentile Concentration	% Detects	Mean Concentration		Baseline Concentrations		Mean	HQ	90th Percentile	HQ	Mean	HQ	90th Percentile	HQ	Mean (Lake) 90th Percentile (Streams)	HQ
							MDMER	West Waste Rock Pile Source Terms										
pH		7.84	8.38		7.61	6.5 - 9.0	-	6.9	7.35	-	7.62	-	7.54	-	7.90	-	7.64	-
Hardness	mg/L $CaCO_3$	74.11	121.00		57.69	-	-	-	-	-	-	-	-	-	-	-	-	-
Aluminum	mg/L	0.0190	0.0390	82%	0.0095	0.94	-	0.12	0.071	0.1	0.081	0.1	0.052	0.05	0.065	0.07	0.0143	0.02
Antimony	mg/L	-	0.0004	0%	0.00010	-	-	0.0031	-	-	0.0018	-	-	-	0.0013	-	0.00020	-
Arsenic	mg/L	-	0.0050	6%	0.00018	0.005	0.30	0.0025	-	-	0.0037	0.7	-	-	0.0042	0.8	0.00053	0.1
Barium	mg/L	0.0093	0.0119	59%	0.00565	-	-	0.064	0.038	-	0.039	-	0.027	-	0.029	-	0.0076	-
Beryllium	mg/L	-	0.0050	0%	0.00050	0.0053	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	0.0320	10%	0.01000	1.5	-	0.025	-	-	0.028	0.02	-	-	0.030	0.02	0.012	0.01
Cadmium	mg/L	-	0.00010	10%	0.000023	0.000029	-	0.000020	-	-	0.00006	2.0	-	-	0.00007	2.6	0.00003	0.9
Chromium	mg/L	-	0.0010	10%	0.00055	0.0047	-	0.0029	-	-	0.0020	0.4	-	-	0.0016	0.3	0.00064	0.1
Cobalt	mg/L	-	0.0003	4%	0.00011	-	-	0.00079	-	-	0.00055	-	-	-	0.00046	-	0.00014	-
Copper	mg/L	0.0015	0.0020	94%	0.00207	0.0047	0.30	0.0031	0.0023	0.5	0.0026	0.5	0.0020	0.4	0.0024	0.5	0.0021	0.4
Iron	mg/L	0.0471	0.0610	67%	0.03152	1.2	-	<0.002	0.023	0.02	0.030	0.03	0.032	0.03	0.042	0.03	0.032	0.03
Lead	mg/L	0.0002	0.0007	18%	0.000171	0.001	0.10	0.00020	0.0002	0.2	0.00044	0.4	0.0002	0.2	0.001	0.5	0.0002	0.2
Manganese	mg/L	0.0063	0.0100	51%	0.002289	-	-	0.00004	0.0031	-	0.0049	-	0.004	-	0.0068	-	0.002678	-
Mercury	mg/L	-	0.00010	2%	0.000040	0.000026	-	0.00057	-	-	0.00034	13	-	-	0.00025	9.7	0.000058	2.2
Molybdenum	mg/L	0.0027	0.0050	46%	0.000620	0.073	-	0.010	0.0065	0.1	0.0076	0.1	0.0051	0.07	0.0066	0.09	0.0011	0.02
Nickel	mg/L	0.0030	0.0050	32%	0.00109	0.083	0.50	0.0019	0.0024	0.03	0.0034	0.04	0.0026	0.03	0.0040	0.05	0.0013	0.02
Selenium	mg/L	-	0.0050	2%	0.00100	0.001	-	0.0077	-	-	0.0064	6	-	-	0.0059	5.87	0.0014	1.4
Silver	mg/L	-	0.0001	4%	0.000017	0.0001	-	0.000064	-	-	0.00008	0.8	-	-	0.00009	0.9	0.000023	0.2
Thallium	mg/L	-	0.0002	0%	0.00010	0.0008	-	0.00029	-	-	0.00025	0.3	-	-	0.00023	0.3	0.00011	0.1
Uranium	mg/L	0.0016	0.0027	100%	0.000402	0.015	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	0.0010	2%	0.00100	0.006	-	0.0010	-	-	0.0010	0.2	-	-	0.0010	0.2	0.0010	0.2
Zinc	mg/L	0.0020	0.0030	25%	0.00247	0.03	0.50	0.013	0.008	0.3	0.008	0.3	0.006	0.2	0.006	0.2	0.00280	0.1

NOTES:

5. Model assumes complete near instantaneous mixing of effluent and receiving water.
6. No mean concentration calculated where the majority of sampling results were below the method detection limit.
7. Effluent source terms provided by Amec (January, 2012).
8. Effluent source term of 0.001 used in calculations for iron.
9. Receiving water quality objectives obtained from Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines for the Protection of Aquatic Life (pal) (2003), continuous concentration (chronic) national recommended water quality criteria (United States Environmental Protection Agency (2006)), British Columbia Ministry of Environment approved and working water quality guidelines or other thresholds, as applicable.
10. In order to estimate effluent source terms, half the method detection limit of a parameter was adopted where more than half of the results for that parameter were non-detect (i.e. Less than the MDL). These effluent source terms are highlighted in blue.
11. Results with an HQ greater than 1 are highlighted in orange, to focus discussion in the effects assessment.

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TABLE H.10 PREDICTED WATER QUALITY IN CAMP LAKE TRIBUTARIES AND CAMP LAKE IN A DRY YEAR

									WATER QUALITY IN THE RECEIVING WATERS									
Parameter	Units	Baseline Water Quality (L0-01, L1-02, L1-08)			Baseline Water Quality Camp Lake	Receiving Water Quality Objectives (Note 5)	Discharge Scenario		CAMP LAKE TRIB L1 BEFORE DISCHARGE TO TRIB L0				MOUTH OF TRIB L0 AT OUTLET TO CAMP LAKE				CAMP LAKE	
							Flows Used		Discharge Equalized to 10-Year Low Flow Discharge Volume = 354,060 m^3/yr 10-Year Low Baseline Flows in L1 = 332,139 m^3/yr				Discharge Equalized to 10-Year Low Flow - Additional Dilution in L0 Discharge Flows = 686,199 m^3/yr 10-Year Low Baseline Flows in L0 (MR-10) at outlet to lake = 410,110 m^3/yr				Assume Instantaneous Mixing within Lake = 27,511,100 m^3 Discharge Flows into Camp Lake (MR-10 Outlet Flows + Discharge Volume) = 1,096,309 m^3/yr	
		Mean Concentration	90th Percentile Concentration	% Detects	Mean Concentration		Baseline Concentrations		Mean	HQ	90th Percentile	HQ	Mean	HQ	90th Percentile	HQ	Mean (Lake) 90th Percentile (Streams)	HQ
							MDMER	West Waste Rock Pile Source Terms										
pH		7.84	8.38		7.61	6.5 - 9.0	-	6.9	7.35	-	7.62	-	7.54	-	7.90	-	7.62	-
Hardness	mg/L $CaCO_3$	74.11	121.00		57.69	-	-	-	-	-	-	-	-	-	-	-	-	-
Aluminum	mg/L	0.0190	0.0390	82%	0.0095	0.94	-	0.286	0.157	0.2	0.166	0.2	0.105	0.11	0.119	0.13	0.0137	0.01
Antimony	mg/L	-	0.0004	0%	0.00010	-	-	0.007	-	-	0.004	-	-	-	0.003	-	0.0002	-
Arsenic	mg/L	-	0.0050	6%	0.00018	0.005	0.30	0.006	-	-	0.0055	1.1	-	-	0.0053	1.06	0.00038	0.08
Barium	mg/L	0.0093	0.0119	59%	0.00565	-	-	0.152	0.083	-	0.084	-	0.056	-	0.057	-	0.0076	-
Beryllium	mg/L	-	0.0050	0%	0.00050	0.0053	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	0.0320	10%	0.01000	1.5	-	0.060	-	-	0.046	0.03	-	-	0.041	0.03	0.0112	0.01
Cadmium	mg/L	-	0.00010	10%	0.000023	0.000029	-	0.00005	-	-	0.00007	2.5	-	-	0.00008	2.9	0.00003	0.87
Chromium	mg/L	-	0.0010	10%	0.00055	0.0047	-	0.007	-	-	0.0040	0.9	-	-	0.0029	0.62	0.00064	0.14
Cobalt	mg/L	-	0.0003	4%	0.00011	-	-	0.0019	-	-	0.0011	-	-	-	0.0008	-	0.00014	-
Copper	mg/L	0.0015	0.0020	94%	0.00207	0.0047	0.30	0.007	0.0045	1.0	0.0048	1.0	0.0034	0.7	0.0037	0.8	0.00213	0.5
Iron	mg/L	0.0471	0.0610	67%	0.03152	1.2	-	0.002	0.024	0.02	0.031	0.03	0.033	0.03	0.042	0.0351	0.032	0.03
Lead	mg/L	0.0002	0.0007	18%	0.000171	0.001	0.10	0.0005	0.0003	0.3	0.0006	0.6	0.0003	0.3	0.0006	0.6	0.00019	0.2
Manganese	mg/L	0.0063	0.0100	51%	0.002289	-	-	0.00010	0.0031	-	0.0049	-	0.0043	-	0.0068	-	0.0025	-
Mercury	mg/L	-	0.00010	2%	0.000040	0.000026	-	0.001	-	-	0.00075	29	-	-	0.00051	19.46	0.000058	2.23
Molybdenum	mg/L	0.0027	0.0050	46%	0.000620	0.073	-	0.024	0.014	0.2	0.015	0.2	0.010	0.13	0.011	0.15	0.0010	0.01
Nickel	mg/L	0.0030	0.0050	32%	0.00109	0.083	0.50	0.005	0.004	0.05	0.005	0.06	0.003	0.04	0.005	0.06	0.00123	0.01
Selenium	mg/L	-	0.0050	2%	0.00100	0.001	-	0.018	-	-	0.0119	12	-	-	0.0093	9.31	0.0013	1.32
Silver	mg/L	-	0.0001	4%	0.000017	0.0001	-	0.0002	-	-	0.00013	1.3	-	-	0.00012	1.2	0.00002	0.21
Thallium	mg/L	-	0.0002	0%	0.00010	0.0008	-	0.001	-	-	0.00045	0.6	-	-	0.00036	0.448	0.00011	0.14
Uranium	mg/L	0.0016	0.0027	100%	0.000402	0.015	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	0.0010	2%	0.00100	0.006	-	0.002	-	-	0.0017	0.3	-	-	0.0014	0.24	0.0010	0.17
Zinc	mg/L	0.0020	0.0030	25%	0.00247	0.03	0.50	0.031	0.017	0.6	0.017	0.6	0.011	0.4	0.012	0.4	0.0028	0.1

NOTES:

1. Model assumes complete near instantaneous mixing of effluent and receiving water.
2. No mean concentration calculated where the majority of sampling results were below the method detection limit.
3. Effluent source terms provided by Amec (January, 2012).
4. Effluent source term of 0.001 used in calculations for iron.
5. Receiving water quality objectives obtained from Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines for the Protection of Aquatic Life (pal) (2003), continuous concentration (chronic) national recommended water quality criteria (United States Environmental Protection Agency (2006)), British Columbia Ministry of Environment approved and working water quality guidelines or other thresholds, as applicable.
6. In order to estimate effluent source terms, half the method detection limit of a parameter was adopted where more than half of the results for that parameter were non-detect (i.e. Less than the MDL). These effluent source terms are highlighted in blue.
7. Results with an HQ greater than 1 are highlighted in orange, to focus discussion in the effects assessment.

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Fish habitat is present at the outlet of MR-12 (tributary F0), for which the resultant water quality in Mary River is shown on the far right of Tables H.11 and H.12. At this location, Level I water quality effects may be experienced based on an HQ >1 for mercury, selenium and silver (under mean flow conditions). Copper and chromium are added under the dry year condition. As discussed in the assessment of discharges from East Waste Rock Pond, the calculated baseline concentrations and source terms used in the modelling are from datasets where these parameters were predominantly non-detect. As such, a Level I magnitude rating is highly conservative.

Farther downstream, the ROM and main ore stockpiles will discharge into the Mary River. The resultant water quality in the Mary River considering these discharges as well as the east waste rock pond discharge discussed above is presented in Tables H.13 and H.14. Mercury, selenium and silver (under mean flow and low flow conditions), have a calculated HQ >1, suggesting a Level I magnitude effect with the same qualifiers as described above.

The resultant water quality downstream in Mary Lake was approximated considering discharges from the west stormwater pond via Camp Lake and the multiple discharges to Mary River, which also report to Mary Lake. Based on the average lake volume of 169,000,000 m3, HQs of 4, 1 and 1 were calculated for mercury, selenium and silver, respectively. Given that the modelling inputs (both baseline and source terms) for each of these parameters are based on MDLs, it is anticipated that the HQ values will be below 1, achieving a negligible effect on water quality in Mary Lake.

2.13.1.2 DURATION

While the temporary ore stockpiles will discharge stormwater during the Operations phase only, a Level II duration rating is assigned to this effect. The east waste rock pond and pit will continue to discharge runoff in the long term; however the post-closure effects of this is assessed separately in SWSQ-13.

2.13.1.3 FREQUENCY

The frequency of the potential effect will be annual, limited to the period between June and September when discharge is proposed. A Level II frequency rating was assigned.

2.13.1.4 EXTENT

The extent of the potential effect is expected to reach negligible levels where the Mary River discharges into Mary Lake, so, given that the effect is expected to be limited to the Mine Site freshwater LSA, a Level I extent rating was assigned.

2.13.1.5 REVERSIBILITY

The potential effects associated with the discharge of mine contact water from the Waste Rock Stockpile into the Mary River system are anticipated to be partially reversible. A Level II reversibility rating was assigned.

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2.13.1.6 SIGNIFICANCE - SWSQ - WASTE ROCK AND ORE STORMWATER DISCHARGE TO THE MARY RIVER

Based on these ratings, discharge of mine contact water from the Waste Rock Stockpile, ROM stockpile and Main Ore Stockpile into the Mary River is not expected to result in an adverse environmental effect on water and sediment quality in the Mine Site LSA. The residual effect is ranked as *Not Significant* (Table H.7). The Level of Confidence is High due to the quantitative and conservative nature of the assessment.

2.14 PIT LAKE WATER AND WASTE ROCK DISCHARGES TO MARY RIVER IN POST-CLOSURE - IMPACT STATEMENT SWSQ-13

At the end of mining, the open pit will gradually fill with water from precipitation; time is estimated at 85 to 147 years, depending on annual precipitation, evaporation and other factors (Knight Piésold, 2008).

During the years that the pit is filling, runoff will continue to discharge to tributary F0 and the Mary River from the East Waste Rock Pond.

AMEC (2012b) developed water quality estimates for pit water for the final year of mining (Year 21), which were applied in a water quality model under the assumption that, once the pit has filled, in each subsequent (post-Closure) year all precipitation into the open pit will accumulate and spill over the southern edge facing the Mary River, behaving like a spillway, and that water will be released during the open water period according to the natural hydrograph.

Based on pit water quality for Year 21 of mining, it is possible the water will have A pH of around 4.2, which is outside of the pH range of the MDMER (6.0 to 9.0). Adjustment of pH will be carried out periodically through post-closure using either batch lime treatment or in-line treatment, drawing down the pit lake periodically. As mentioned in above, the mass loading modelling carried out is based on conservative assumptions and Baffinland is continuing to study the geochemistry of waste rock and ore to further refine predictions, management plans, and post-closure strategies.

2.14.1 Residual Effects Rating

2.14.1.1 MAGNITUDE

The estimated water quality in the Mary River from pit water and waste rock stormwater discharges, assuming no treatment to adjust pH of pit water, is presented in Table H.15. The mass balance modelling indicates that Level I magnitude effects to water quality will occur under low flow conditions, with a calculated HQ between 1 and 10 for mercury, selenium and silver. It is noted that an HQ >10 was calculated for mercury within the F0 tributary, upstream of fish; however, since the assessment of water and sediment quality is based on fish as the receptor, the effects assessment considers the resultant water quality at fish habitat within the Mary River, where all parameters have an HQ value less than 10.

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2.14.1.2 DURATION

The effects associated with the discharge of pit water and waste rock runoff into the Mary River are permanent; Level III duration. The waste rock seepage will run off into the Mary River starting in the first year post-closure, whereas the pit water is not expected to discharge to the Mary River until the pit fills, after 80 years or more.

2.14.1.3 FREQUENCY

The frequency of the potential effect will be annual, limited to the period between June and September when discharge is proposed. A Level II frequency rating was assigned.

2.14.1.4 EXTENT

The extent of the potential effect is likely to be limited to the Mine Site freshwater LSA; a Level I extent rating was assigned.

2.14.1.5 REVERSIBILITY

The effects associated with the discharge of pit water and waste rock runoff into the Mary River is partially reversible. A Level II reversibility rating was assigned.

2.14.1.6 SIGNIFICANCE - SWSQ-13 - PIT LAKE WATER AND WASTE ROCK DISCHARGES TO MARY RIVER IN POST-CLOSURE

Based on these ratings, discharge of pit water and stormwater from the East Waste Rock Sedimentation Pond into the Mary River is not expected to result in an adverse environmental effect on water and sediment quality in the Mine Site LSA. The residual effect is ranked as Not Significant (Table H.7). The Level of Confidence (Table H.8) is Medium, due to the assumptions made in the mass loading models and the consequently highly conservative nature of the effect prediction.

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TABLE H.11 PREDICTED WATER QUALITY IN THE MARY RIVER UNDER MEAN FLOW CONDITIONS (EAST DISCHARGE)

Parameter	Units	Baseline Water Quality in Trib F0 (F0-01, F0-05)			Baseline Water Quality in Mary River (E0-01, E0-03, E0-10)			Receiving Water Quality Objectives (Note 5)	Discharge Scenario			COMBINED EFFLUENT DISCHARGE FROM THE EAST WASTE ROCK POND	WATER QUALITY IN THE RECEIVING WATERS							
									Flows Used			Mean Volume of Effluent from East Pond = 370,138 m^3/yr Mean Volume of Effluent from Open Pit = 224,978 m^3/yr	WATER QUALITY IN TRIB F0 - CATCHMENT MR-12 (U/S OF FISH HABITAT) Mean Volume of Effluent Discharged from East Pond and Open Pit = 595,116 m^3/yr Mean Volume to mix at MR-12 = 4,152,146 m^3/yr				WATER QUALITY IN MARY RIVER AT MR-12 OUTLET (FISH HABITAT) Mean Volume of Effluent Discharged from Tributary, East Pond and Open Pit = 4,747,262 m^3/yr Mean Volume to mix in Mary River = 78,185,678 m^3/yr			
		Mean Concentration	90th Percentile Concentration	% Detects	Mean Concentration	90th Percentile Concentration	% Detects		Baseline Concentrations			Mean	Mean	HQ	90th Percentile	HQ	Mean	HQ	90th Percentile	HQ
									MDMER	Pit Water Source Terms (Year 21)	East Waste Rock Source Terms									
pH		8.01	8.31		7.83	8.20		6.5 - 9.0	-	4.20	6.9	5.88	7.74	-	8.01	-	7.83	-	8.19	-
Hardness	mg/L $CaCO_3$	84	133		58	105		-	-	-	-	-	-	-	-	-	-	-	-	-
Aluminum	mg/L	0.020	0.042	81%	0.191	0.394	100%	0.94	-	4.2	0.095	1.65	0.22	0.2	0.24	0.3	0.19	0.2	0.39	0.4
Antimony	mg/L	-	0.0004	0%	-	0.0001	2%	-	-	0.008	0.0025	0.0046	-	-	0.001	-	-	-	0.00015	-
Arsenic	mg/L	-	0.0010	4%	-	0.0010	8%	0.005	0.30	0.007	0.0020	0.0039	-	-	0.001	0.3	-	-	0.00102	0.2
Barium	mg/L	0.00945	0.01068	47%	0.01011	0.01319	57%	-	-	0.0340	0.051	0.045	0.014	-	0.015	-	0.010	-	0.013	-
Beryllium	mg/L	-	0.0050	0%	-	0.0005	0%	0.0053	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	0.010	2%	-	0.010	6%	1.5	-	0.11	0.020	0.054	-	-	0.016	0.01	-	-	0.010	0.01
Cadmium	mg/L	-	0.0000200	0%	-	0.00002	8%	0.000029	-	0.00016	0.000016	0.00007	-	-	0.000026	0.9	-	-	0.000020	0.7
Chromium	mg/L	0.0010	0.0010	8%	0.0018	0.0020	27%	0.0047	-	0.019	0.0023	0.0086	0.0020	0.4	0.0020	0.4	0.0018	0.4	0.0020	0.4
Cobalt	mg/L	0.0002	0.0003	4%	0.0002	0.0002	20%	-	-	0.053	0.00063	0.020	0.0027	-	0.0028	-	0.00035	-	0.00035	-
Copper	mg/L	-	0.0009	38%	0.0012	0.0018	64%	0.0047	0.30	0.074	0.0025	0.030	-	-	0.0045	1.0	-	-	0.0020	0.4
Iron	mg/L	0.04	0.05	19%	0.18	0.36	86%	1.2	-	0.22	<0.002	0.084	0.045	0.04	0.054	0.05	0.17	0.1	0.34	0.3
Lead	mg/L	0.00016	0.00020	13%	0.00029	0.00087	35%	0.001	0.10	0.0022	0.00016	0.0009	0.00026	0.3	0.00029	0.3	0.00029	0.3	0.00084	0.8
Manganese	mg/L	0.00260	0.01000	32%	0.00386	0.01000	48%	-	-	0.57	0.00004	0.22	0.029	-	0.036	-	0.0053	-	0.011	-
Mercury	mg/L	-	0.00010	0%	-	0.00010	2%	0.000026	-	0.0016	0.00045	0.0009	-	-	0.00020	8	-	-	0.00011	4.1
Molybdenum	mg/L	0.00306	0.00500	38%	0.00288	0.00500	46%	0.073	-	0.027	0.0078	0.015	0.0046	0.06	0.0063	0.09	0.0030	0.04	0.0051	0.07
Nickel	mg/L	0.0032	0.0050	10%	0.0031	0.0050	92%	0.083	0.50	0.11	0.0015	0.043	0.0081	0.1	0.010	0.1	0.0034	0.04	0.0053	0.06
Selenium	mg/L	-	0.001	0%	-	0.001	0%	0.001	-	0.022	0.0051	0.011	-	-	0.0023	2.3	-	-	0.0011	1.1
Silver	mg/L	-	0.00010	4%	-	0.00010	10%	0.0001	-	0.0008	0.000051	0.00033	-	-	0.00013	1.3	-	-	0.00010	1.0
Thallium	mg/L	-	0.0001	0%	-	0.0001	0%	0.0008	-	0.0009	0.00023	0.00048	-	-	0.00015	0.185	-	-	0.00010	0.1
Uranium	mg/L	0.00213	0.00299	100%	0.00252	0.00468	98%	0.015	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	0.001	0%	0.001	0.001	11%	0.006	-	0.0029	0.00083	0.0016	-	-	0.0011	0.179	-	-	0.0010	0.2
Zinc	mg/L	-	0.009	8%	0.003	0.006	25%	0.03	0.50	0.062	0.010	0.030	-	-	0.012	0.386	-	-	0.0063	0.2

NOTES:

1. Model assumes complete near instantaneous mixing of effluent and receiving water.
2. No mean concentration calculated where the majority of sampling results were below the method detection limit.
3. Effluent source terms provided by Amec (January, 2012).
4. Effluent source term of 0.001 used in calculations for iron.
5. Receiving water quality objectives obtained from Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines for the Protection of Aquatic Life (pal) (2003), continuous concentration (chronic) national recommended water quality criteria (United States Environmental Protection Agency (2006)), British Columbia Ministry of Environment approved and working water quality guidelines or other thresholds, as applicable.

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6. In order to estimate effluent source terms, half the method detection limit of a parameter was adopted where more than half of the results for that parameter were non-detect (i.e. Less than the MDL). These effluent source terms are highlighted in blue.
7. Results with an HQ greater than 1 are highlighted in orange, to focus discussion in the effects assessment.

TABLE H.12 PREDICTED WATER QUALITY IN THE MARY RIVER UNDER 10-YEAR DRY CONDITIONS (EAST DISCHARGE)

Parameter	Units	Baseline Quality in Trib F0 (F0-01, F0-05)			Baseline Quality in Mary River (E0-01, E0-03, E0-10)			Receiving Water Quality Objectives (Note 5)	MDMER (Mean Monthly)	Discharge Scenario		COMBINED EFFLUENT DISCHARGE FROM THE EAST WASTE ROCK POND	WATER QUALITY IN RECEIVING WATERS							
										Flows Used		10-Year Low Flow Volume of Effluent from East Pond = 244,291 m^3/yr -10-Year Low Flow Volume of Effluent from Open Pit = 148,485 m^3/yr	WATER QUALITY IN TRIB F0 - CATCHMENT MR-12 (U/S OF FISH HABITAT)				WATER QUALITY IN MARY RIVER AT MR-12 OUTLET (FISH HABITAT)			
													10-Year Low Flow Volume of Effluent Discharged from East Pond and Open Pit = 392,777 m^3/yr 10-Year Low Flow Volume to mix at MR-12 = 2,740,417 m^3/yr				10-Year Low Flow Volume of Effluent Discharged from Tributary, East Pond and Open Pit = 3,133,194 m^3/yr 10-Year Low Flow Volume to mix in Mary River = 53,166,261 m^3/yr			
		Mean Concentration	90th Percentile Concentration	% Detects	Mean Concentration	90th Percentile Concentration	% Detects			Baseline Concentrations			Mean	HQ	90th Percentile	HQ	Mean	HQ	90th Percentile	HQ
										Pit Water Source Terms (Year 21)	East Waste Rock Source Terms									
pH	0	8.01	8.31		7.83	8.20		6.5 - 9.0	-	4.20	6.9	5.88	7.74	-	8.01	-	7.83	-	8.19	-
Hardness	mg/L $CaCO_3$	84	133		58	105		-	-	-	-	-	-	-	-	-	-	-	-	-
Aluminum	mg/L	0.020	0.042	81%	0.191	0.394	100%	0.94	-	6.4	0.144	2.50	0.33	0.4	0.35	0.4	0.20	0.2	0.39	0.4
Antimony	mg/L	-	0.0004	0%	-	0.0001	2%	-	-	0.012	0.004	0.01	-	-	0.0012	-	-	-	0.00016	-
Arsenic	mg/L	-	0.0010	4%	-	0.0010	8%	0.005	0.30	0.011	0.003	0.006	-	-	0.002	0.3	-	-	0.001	0.2
Barium	mg/L	0.00945	0.01068	47%	0.01011	0.01319	57%	-	-	0.0515	0.077	0.07	0.01673	-	0.018	-	0.010	-	0.013	-
Beryllium	mg/L	-	0.0050	0%	-	0.0005	0%	0.0053	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	0.010	2%	-	0.010	6%	1.5	-	0.17	0.030	0.082	-	-	0.019	0.01	-	-	0.011	0.01
Cadmium	mg/L	-	0.0000200	0%	-	0.00002	8%	0.000029	-	0.00024	0.00002	0.0001	-	-	0.00003	1.1	-	-	0.00002	0.7
Chromium	mg/L	0.0010	0.0010	8%	0.0018	0.0020	27%	0.0047	-	0.029	0.003	0.013	0.003	0.5	0.003	0.5	0.0018	0.4	0.0020	0.4
Cobalt	mg/L	0.0002	0.0003	4%	0.0002	0.0002	20%	-	-	0.080	0.0010	0.031	0.004	-	0.004	-	0.0004	-	0.0004	-
Copper	mg/L	-	0.0009	38%	0.0012	0.0018	64%	0.0047	0.30	0.112	0.004	0.045	-	-	0.006	1.4	-	-	0.0021	0.4
Iron	mg/L	0.04	0.05	19%	0.18	0.36	86%	1.2	-	0.33	0.002	0.13	0.051	0.04	0.060	0.05	0.17	0.1	0.34	0.3
Lead	mg/L	0.00016	0.00020	13%	0.00029	0.00087	35%	0.001	0.10	0.0033	0.0002	0.001	0.0003	0.3	0.0004	0.4	0.00029	0.3	0.00084	0.8
Manganese	mg/L	0.00260	0.01000	32%	0.00386	0.01000	48%	-	-	0.86	0.00006	0.33	0.043	-	0.050	-	0.006	-	0.01221	-
Mercury	mg/L	-	0.00010	0%	-	0.00010	2%	0.000026	-	0.0024	0.001	0.001	-	-	0.0003	9.8	-	-	0.00011	4.2
Molybdenum	mg/L	0.00306	0.00500	38%	0.00288	0.00500	46%	0.073	-	0.041	0.012	0.023	0.006	0.08	0.007	0.1	0.0030	0.04	0.0051	0.07
Nickel	mg/L	0.0032	0.0050	10%	0.0031	0.0050	92%	0.083	0.50	0.17	0.002	0.064	0.011	0.1	0.012	0.1	0.004	0.04	0.0054	0.07
Selenium	mg/L	-	0.001	0%	-	0.001	0%	0.001	-	0.033	0.008	0.02	-	-	0.003	3.1	-	-	0.0011	1.1
Silver	mg/L	-	0.00010	4%	-	0.00010	10%	0.0001	-	0.0012	0.0001	0.001	-	-	0.0002	1.5	-	-	0.00010	1.0
Thallium	mg/L	-	0.0001	0%	-	0.0001	0%	0.0008	-	0.0014	0.0003	0.001	-	-	0.0002	0.2	-	-	0.00010	0.1
Uranium	mg/L	0.00213	0.00299	100%	0.00252	0.00468	98%	0.015	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	0.001	0%	0.001	0.001	11%	0.006	-	0.0044	0.001	0.002	-	-	0.001	0.2	-	-	0.0010	0.2
Zinc	mg/L	-	0.009	8%	0.003	0.006	25%	0.03	0.50	0.094	0.015	0.045	-	-	0.014	0.5	-	-	0.0064	0.2

NOTES:

1. Model assumes complete near instantaneous mixing of effluent and receiving water.
2. No mean concentration calculated where the majority of sampling results were below the method detection limit.
3. Effluent source terms provided by Amec (January, 2012).
4. Effluent source term of 0.001 used in calculations for iron.

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5. Receiving water quality objectives obtained from Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines for the Protection of Aquatic Life (pal) (2003), continuous concentration (chronic) national recommended water quality criteria (United States Environmental Protection Agency (2006)), British Columbia Ministry of Environment approved and working water quality guidelines or other thresholds, as applicable.
6. In order to estimate effluent source terms, half the method detection limit of a parameter was adopted where more than half of the results for that parameter were non-detect (i.e. Less than the MDL). These effluent source terms are highlighted in blue.
7. Results with an HQ greater than 1 are highlighted in orange, to focus discussion in the effects assessment.

TABLE H.13 PREDICTED WATER QUALITY IN THE MARY RIVER UNDER MEAN FLOW CONDITIONS (ALL CHARGES)

Parameter	Units	Baseline Quality in Mary River (E0-01, E0-03, E0-10)			Receiving Water Quality Objectives (Note 5)	MDMER	Discharge Scenario						WATER QUALITY IN MARY RIVER AFTER EAST POND DISCHARGE (FROM TABLE 7-3.18)		WATER QUALITY IN MARY RIVER AFTER ROM AND MAIN STOCKPILE DISCHARGE			
							Flows Used						Mean Volume of Effluent Discharged from Tributary, East Pond and Open Pit = 4,747,262 m^3/yr Mean Volume to mix in Mary River = 78,185,678 m3/yr		Mean Volume after Discharge of Tributary, East Pond, Open Pit and Mary River Upstream of MR-12 = 82,932,940 m^3/yr Mean Volume of ROM Pond = 18,203 m^3/yr Mean Volume of Effluent from Main Ore Stockpiles = 143,489 m^3/yr Total Ore Effluent = 161,692 m^3/yr Additional Dilution in Mary River = 5,333,330 m^3/yr			
		Mean Concentration	90th Percentile Concentration	% Detects			Ore Runoff (Based on Lysimeter Monitoring Results of Bulk Sample Ore Stockpile)						Mean Baseline	90th Percentile Baseline	Mean Baseline	HQ	90th Percentile Baseline	HQ
							Lump Ore Total Metals (2010-09-07)	Lump Ore Total Metals (2010-09-19)	Fine Ore Total Metals (2010-09-07)	Fine Ore Total Metals (2010-09-19)	Mean Ore Stockpile Source Terms	95th Percentile Ore Stockpile Source Terms						
pH	0	7.83	8.20		6.– - 9.0	-	5.76	5.93	6.68	6.48	6.21	6.65	7.8	8.2	7.8	-	8.2	-
Hardness	mg/L $CaCO_3$	58	105		-	-												
Aluminum	mg/L	0.191	0.394	81%	0.94	-	0.127	<0.015	<0.02	<0.06	0.044	0.112	0.19	0.39	0.19	0.2	0.39	0.4
Antimony	mg/L	-	0.0001	0%	-	-	<0.0005	<0.0005	<0.002	<0.002	0.001	0.001	-	0.00015	-	-	0.00015	-
Arsenic	mg/L	-	0.0010	4%	0.005	0.50	<0.0005	<0.0005	<0.002	<0.002	0.001	0.001	-	0.0010	-	-	0.0010	0.2
Barium	mg/L	0.01011	0.01319	47%	-	-	0.0236	0.0251	0.0213	0.0115	0.020	0.025	0.010	0.013	0.010	-	0.013	-
Beryllium	mg/L	-	0.0005	0%	0.0053	-	<0.0025	<0.0025	<0.01	<0.01	0.003	0.005	-	-	-	-	-	-
Boron	mg/L	-	0.010	2%	1.5	-	0.16	0.16	0.21	0.31	0.210	0.295	-	0.010	-	-	0.011	0.007
Cadmium	mg/L	0.00003	0.00010	0%	0.000029	-	0.000203	0.000198	<0.0002	0.00057	0.00027	0.00051	-	0.00002	-	-	0.00003	0.9
Chromium	mg/L	0.0018	0.0020	8%	0.0047	-	<0.0025	<0.0025	<0.01	<0.01	0.003	0.0050	0.0018	0.0020	0.0018	0.4	0.0020	0.4
Cobalt	mg/L	0.0002	0.0002	4%	-	-	0.09740	0.1080	0.0462	0.1400	0.098	0.1352	0.0003	0.0004	0.00058	-	0.00059	-
Copper	mg/L	0.0012	0.0018	38%	0.0047	0.30	0.00183	<0.0025	<0.002	<0.01	0.002	0.0045	-	0.0020	-	-	0.0019	0.4
Iron	mg/L	0.18	0.36	19%	1.2	-	0.825	0.031	0.041	0.082	0.24	0.714	0.17	0.34	0.17	0.1	0.34	0.3
Lead	mg/L	0.00029	0.00087	13%	0.001	0.20	<0.0003	0.001	<0.001	<0.001	0.0005	0.0009	0.00029	0.00084	0.00029	0.3	0.00084	0.8
Manganese	mg/L	0.00386	0.01000	32%	-	-	18.4	21.5	65.5	112	54.4	105.0	0.005	0.01147	0.197	-	0.203	-
Mercury	mg/L	-	0.00010	0%	0.000026	-	<0.00001	0.00004	<0.00001	<0.00001	0.00001	0.00003	-	0.00011	-	-	0.00011	4.0
Molybdenum	mg/L	0.00288	0.00500	38%	0.073	-	<0.00025	<0.00025	<0.001	0.0012	0.0005	0.001	0.0030	0.0051	0.0030	0.04	0.0051	0.1
Nickel	mg/L	0.0031	0.0050	10%	0.083	0.50	0.0977	0.107	0.035	0.113	0.088	0.112	0.0034	0.0053	0.0036	0.04	0.005	0.1
Selenium	mg/L	-	**0.001**	0%	0.001	-	<0.005	0.0051	<0.02	<0.02	0.007	0.010	-	0.0011	-	-	0.0011	1.1
Silver	mg/L	-	0.00010	4%	0.0001	-	<0.00005	<0.00005	<0.0002	<0.0002	0.00006	0.00010	-	0.00010	-	-	0.00010	1.0
Thallium	mg/L	-	0.0001	0%	0.0008	-	<0.0005	<0.0005	<0.002	<0.002	0.001	0.001	-	0.00010	-	-	0.00010	0.1

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Parameter	Units	Baseline Quality in Mary River (E0-01, E0-03, E0-10)			Receiving Water Quality Objectives (Note 5)	MDMER	Discharge Scenario						WATER QUALITY IN MARY RIVER AFTER EAST POND DISCHARGE (FROM TABLE 7-3.18)		WATER QUALITY IN MARY RIVER AFTER ROM AND MAIN STOCKPILE DISCHARGE			
							Flows Used						Mean Volume of Effluent Discharged from Tributary, East Pond and Open Pit = 4,747,262 m^3/yr Mean Volume to mix in Mary River = 78,185,678 m3/yr		Mean Volume after Discharge of Tributary, East Pond, Open Pit and Mary River Upstream of MR-12 = 82,932,940 m^3/yr Mean Volume of ROM Pond = 18,203 m^3/yr Mean Volume of Effluent from Main Ore Stockpiles = 143,489 m^3/yr Total Ore Effluent = 161,692 m^3/yr Additional Dilution in Mary River = 5,333,330 m^3/yr			
		Mean Concentration	90th Percentile Concentration	% Detects			Ore Runoff (Based on Lysimeter Monitoring Results of Bulk Sample Ore Stockpile)						Mean Baseline	90th Percentile Baseline	Mean Baseline	HQ	90th Percentile Baseline	HQ
							Lump Ore Total Metals (2010-09-07)	Lump Ore Total Metals (2010-09-19)	Fine Ore Total Metals (2010-09-07)	Fine Ore Total Metals (2010-09-19)	Mean Ore Stockpile Source Terms	95th Percentile Ore Stockpile Source Terms						
Uranium	mg/L	0.00252	0.00468	100%	0.015	-	0.00010	<0.00005	<0.0002	<0.0002	0.00008	0.00010	-	-	-	-	-	-

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Parameter	Units	Baseline Quality in Mary River (E0-01, E0-03, E0-10)			Receiving Water Quality Objectives (Note 5)	MDMER	Discharge Scenario						WATER QUALITY IN MARY RIVER AFTER EAST POND DISCHARGE (FROM TABLE 7-3.18)		WATER QUALITY IN MARY RIVER AFTER ROM AND MAIN STOCKPILE DISCHARGE			
							Flows Used						Mean Volume of Effluent Discharged from Tributary, East Pond and Open Pit = 4,747,262 m^3/yr Mean Volume to mix in Mary River = 78,185,678 m3/yr		Mean Volume after Discharge of Tributary, East Pond, Open Pit and Mary River Upstream of MR-12 = 82,932,940 m^3/yr Mean Volume of ROM Pond = 18,203 m^3/yr Mean Volume of Effluent from Main Ore Stockpiles = 143,489 m^3/yr Total Ore Effluent = 161,692 m^3/yr Additional Dilution in Mary River = 5,333,330 m^3/yr			
		Mean Concentration	90th Percentile Concentration	% Detects			Ore Runoff (Based on Lysimeter Monitoring Results of Bulk Sample Ore Stockpile)						Mean Baseline	90th Percentile Baseline	Mean Baseline	HQ	90th Percentile Baseline	HQ
							Lump Ore Total Metals (2010-09-07)	Lump Ore Total Metals (2010-09-19)	Fine Ore Total Metals (2010-09-07)	Fine Ore Total Metals (2010-09-19)	Mean Ore Stockpile Source Terms	95th Percentile Ore Stockpile Source Terms						
Vanadium	mg/L	0.001	0.001	0%	0.006	-	<0.005	<0.005	<0.02	<0.02	0.006	0.010	-	0.0010	-	-	0.0010	0.2
Zinc	mg/L	0.003	0.006	8%	0.03	0.50	<0.005	<0.015	<0.02	<0.06	0.013	0.027	-	0.0063	-	-	0.0063	0.2

NOTES:

1. Model assumes complete near instantaneous mixing of effluent and receiving water.
2. No mean concentration calculated where the majority of sampling results were below the method detection limit.
3. Effluent source terms provided by Amec (January, 2012).
4. Effluent source term of 0.001 used in calculations for iron.
5. Receiving water quality objectives obtained from Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines for the Protection of Aquatic Life (pal) (2003), continuous concentration (chronic) national recommended water quality criteria (United States Environmental Protection Agency (2006)), British Columbia Ministry of Environment approved and working water quality guidelines or other thresholds, as applicable.
6. In order to estimate effluent source terms, half the method detection limit of a parameter was adopted where more than half of the results for that parameter were non-detect (i.e. Less than the MDL). These effluent source terms are highlighted in blue.
7. Results with an HQ greater than 1 are highlighted in orange, to focus discussion in the effects assessment.

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TABLE H.14 PREDICTED WATER QUALITY IN THE MARY RIVER UNDER 10-YEAR DRY CONDITIONS (ALL DISCHARGES)

Parameter	Units	Baseline Quality in Mary River (E0-01, E0-03, E0-10)			Receiving Water Quality Objectives (Note 5)	MDMER	Discharge Scenario						WATER QUALITY IN MARY RIVER AFTER EAST POND DISCHARGE (TABLE 7-3.19)		WATER QUALITY IN MARY RIVER AFTER ROM AND MAIN STOCKPILE DISCHARGE			
							Flows Used						10-Year Low Flow Volume of Effluent Discharged from Tributary, East Pond and Open Pit = 3,133,194 m3/yr 10-Year Low Flow Volume to mix in Mary River = 53,166,261 m3/yr		10-Year Low Flow Volume after Discharge of Tributary, East Pond, Open Pit and Mary River Upstream of MR-12 = 56,299,454 m^3/yr 10-Year Low Flow Volume of ROM Pond = 12,378 m^3/yr 10-Year Low Flow Volume of Effluent from Main Ore Stockpiles = 97,573 m^3/yr Total Ore Effluent = 109,951 m^3/yr Additional Dilution in Mary River = 3,626,664 m^3/yr			
		Mean Concentration	90th Percentile Concentration	% Detects			Ore Runoff (Based on Lysimeter Monitoring Results of Bulk Sample Ore Stockpile)						Mean Baseline	90th Percentile Baseline	Mean Baseline	HQ	90th Percentile Baseline	HQ
							Lump Ore Total Metals (2010-09-07)	Lump Ore Total Metals (2010-09-19)	Fine Ore Total Metals (2010-09-07)	Fine Ore Total Metals (2010-09-19)	95th Percentile Ore Stockpile For Mean Flows Source Terms	Ore Stockpile Source Terms (Dry Year)						
pH	0	7.83	8.20		6.– - 9.0	-	5.76	5.93	6.68	6.48	6.65	6.65	7.83	8.01	7.82	-	8.0	-
Hardness	mg/L $CaCO_3$	58	105		-	-												
Aluminum	mg/L	0.191	0.394	81%	0.94	-	0.127	<0.015	<0.02	<0.06	0.112	0.170	0.20	0.39	0.20	0.2	0.39	0.4
Antimony	mg/L	-	0.0001	0%	-	-	<0.0005	<0.0005	<0.002	<0.002	0.001	0.002	-	0.000162	-	-	0.00016	-
Arsenic	mg/L	-	0.0010	4%	0.005	0.50	<0.0005	<0.0005	<0.002	<0.002	0.001	0.002	-	0.00103	-	-	0.00103	0.2
Barium	mg/L	0.01011	0.01319	47%	-	-	0.0236	0.0251	0.0213	0.0115	0.025	0.038	0.010	0.013	0.011	-	0.013	-
Beryllium	mg/L	-	0.0005	0%	0.0053	-	<0.0025	<0.0025	<0.01	<0.01	0.005	0.008	-	-	-	-	-	-

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Parameter	Units	Baseline Quality in Mary River (E0-01, E0-03, E0-10)			Receiving Water Quality Objectives (Note 5)	MDMER	Discharge Scenario						WATER QUALITY IN MARY RIVER AFTER EAST POND DISCHARGE (TABLE 7-3.19)		WATER QUALITY IN MARY RIVER AFTER ROM AND MAIN STOCKPILE DISCHARGE			
							Flows Used						10-Year Low Flow Volume of Effluent Discharged from Tributary, East Pond and Open Pit = 3,133,194 m3/yr 10-Year Low Flow Volume to mix in Mary River = 53,166,261 m3/yr		10-Year Low Flow Volume after Discharge of Tributary, East Pond, Open Pit and Mary River Upstream of MR-12 = 56,299,454 m^3/yr 10-Year Low Flow Volume of ROM Pond = 12,378 m^3/yr 10-Year Low Flow Volume of Effluent from Main Ore Stockpiles = 97,573 m^3/yr Total Ore Effluent = 109,951 m^3/yr Additional Dilution in Mary River = 3,626,664 m^3/yr			
		Mean Concentration	90th Percentile Concentration	% Detects			Ore Runoff (Based on Lysimeter Monitoring Results of Bulk Sample Ore Stockpile)						Mean Baseline	90th Percentile Baseline	Mean Baseline	HQ	90th Percentile Baseline	HQ
							Lump Ore Total Metals (2010-09-07)	Lump Ore Total Metals (2010-09-19)	Fine Ore Total Metals (2010-09-07)	Fine Ore Total Metals (2010-09-19)	95th Percentile Ore Stockpile For Mean Flows Source Terms	Ore Stockpile Source Terms (Dry Year)						
Boron	mg/L	-	0.010	2%	1.5	-	0.16	0.16	0.21	0.31	0.295	0.447	-	0.011	-	-	0.011	0.008
Cadmium	mg/L	0.00003	0.00010	0%	0.000029	-	0.000203	0.000198	<0.0002	0.00057	0.00051	0.00078	-	0.000021	-	-	0.000027	0.9
Chromium	mg/L	0.0018	0.0020	8%	0.0047	-	<0.0025	<0.0025	<0.01	<0.01	0.0050	0.008	0.0018	0.0020	0.0018	0.4	0.0020	0.4
Cobalt	mg/L	0.0002	0.0002	4%	-	-	0.09740	0.1080	0.0462	0.1400	0.1352	0.205	0.0004	0.0004	0.0008	-	0.0008	-
Copper	mg/L	0.0012	0.0018	38%	0.0047	0.30	0.00183	<0.0025	<0.002	<0.01	0.0045	0.007	-	0.0021	-	-	0.0020	0.4
Iron	mg/L	0.18	0.36	19%	1.2	-	0.825	0.031	0.041	0.082	0.714	1.08	0.17	0.34	0.17	0.1	0.35	0.3
Lead	mg/L	0.00029	0.00087	13%	0.001	0.20	<0.0003	0.001	<0.001	<0.001	0.0009	0.001	0.00029	0.00084	0.0003	0.3	0.00084	0.8
Manganese	mg/L	0.00386	0.01000	32%	-	-	18.4	21.5	65.5	112	105.0	159.1	0.006	0.012	0.30	-	0.30	-
Mercury	mg/L	-	0.00010	0%	0.000026	-	<0.00001	0.00004	<0.00001	<0.00001	0.00003	0.00005	-	0.00011	-	-	0.00011	4.2

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Parameter	Units	Baseline Quality in Mary River (E0-01, E0-03, E0-10)			Receiving Water Quality Objectives (Note 5)	MDMER	Discharge Scenario						WATER QUALITY IN MARY RIVER AFTER EAST POND DISCHARGE (TABLE 7-3.19)		WATER QUALITY IN MARY RIVER AFTER ROM AND MAIN STOCKPILE DISCHARGE			
							Flows Used						10-Year Low Flow Volume of Effluent Discharged from Tributary, East Pond and Open Pit = 3,133,194 m3/yr 10-Year Low Flow Volume to mix in Mary River = 53,166,261 m3/yr		10-Year Low Flow Volume after Discharge of Tributary, East Pond, Open Pit and Mary River Upstream of MR-12 = 56,299,454 m^3/yr 10-Year Low Flow Volume of ROM Pond = 12,378 m^3/yr 10-Year Low Flow Volume of Effluent from Main Ore Stockpiles = 97,573 m^3/yr Total Ore Effluent = 109,951 m^3/yr Additional Dilution in Mary River = 3,626,664 m^3/yr			
		Mean Concentration	90th Percentile Concentration	% Detects			Ore Runoff (Based on Lysimeter Monitoring Results of Bulk Sample Ore Stockpile)						Mean Baseline	90th Percentile Baseline	Mean Baseline	HQ	90th Percentile Baseline	HQ
							Lump Ore Total Metals (2010-09-07)	Lump Ore Total Metals (2010-09-19)	Fine Ore Total Metals (2010-09-07)	Fine Ore Total Metals (2010-09-19)	95th Percentile Ore Stockpile For Mean Flows Source Terms	Ore Stockpile Source Terms (Dry Year)						
Molybdenum	mg/L	0.00288	0.00500	38%	0.073	-	<0.00025	<0.00025	<0.001	0.0012	0.001	0.0017	0.0030	0.0051	0.0030	0.04	0.0051	0.1
Nickel	mg/L	0.0031	0.0050	10%	0.083	0.50	0.0977	0.107	0.035	0.113	0.112	0.170	0.004	0.0054	0.0038	0.05	0.0057	0.1
Selenium	mg/L	-	**0.001**	0%	0.001	-	<0.005	0.0051	<0.02	<0.02	0.010	0.015	-	0.0011	-	-	0.0011	1.1
Silver	mg/L	-	0.00010	4%	0.0001	-	<0.00005	<0.00005	<0.0002	<0.0002	0.0001	0.0002	-	0.00010	-	-	0.00010	1.0
Thallium	mg/L	-	0.0001	0%	0.0008	-	<0.0005	<0.0005	<0.002	<0.002	0.001	0.002	-	0.00010	-	-	0.00011	0.1
Uranium	mg/L	0.00252	0.00468	100 %	0.015	-	0.00010	<0.00005	<0.0002	<0.0002	0.0001	0.0002	-	-	-	-	-	-

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Parameter	Units	Baseline Quality in Mary River (E0-01, E0-03, E0-10)			Receiving Water Quality Objectives (Note 5)	MDMER	Discharge Scenario						WATER QUALITY IN MARY RIVER AFTER EAST POND DISCHARGE (TABLE 7-3.19)		WATER QUALITY IN MARY RIVER AFTER ROM AND MAIN STOCKPILE DISCHARGE			
							Flows Used						10-Year Low Flow Volume of Effluent Discharged from Tributary, East Pond and Open Pit = 3,133,194 m3/yr 10-Year Low Flow Volume to mix in Mary River = 53,166,261 m3/yr		10-Year Low Flow Volume after Discharge of Tributary, East Pond, Open Pit and Mary River Upstream of MR-12 = 56,299,454 m^3/yr 10-Year Low Flow Volume of ROM Pond = 12,378 m^3/yr 10-Year Low Flow Volume of Effluent from Main Ore Stockpiles = 97,573 m^3/yr Total Ore Effluent = 109,951 m^3/yr Additional Dilution in Mary River = 3,626,664 m^3/yr			
		Mean Concentration	90th Percentile Concentration	% Detects			Ore Runoff (Based on Lysimeter Monitoring Results of Bulk Sample Ore Stockpile)						Mean Baseline	90th Percentile Baseline	Mean Baseline	HQ	90th Percentile Baseline	HQ
							Lump Ore Total Metals (2010-09-07)	Lump Ore Total Metals (2010-09-19)	Fine Ore Total Metals (2010-09-07)	Fine Ore Total Metals (2010-09-19)	95th Percentile Ore Stockpile For Mean Flows Source Terms	Ore Stockpile Source Terms (Dry Year)						
Vanadium	mg/L	0.001	0.001	0%	0.006	-	<0.005	<0.005	<0.02	<0.02	0.010	0.015	-	0.0010	-	-	0.0010	0.2
Zinc	mg/L	0.003	0.006	8%	0.03	0.50	<0.005	<0.015	<0.02	<0.06	0.027	0.041	-	0.0064	-	-	0.0065	0.2

NOTES:

8. Model assumes complete near instantaneous mixing of effluent and receiving water.
9. No mean concentration calculated where the majority of sampling results were below the method detection limit.
10. Effluent source terms provided by Amec (January, 2012).
11. Effluent source term of 0.001 used in calculations for iron.
12. Receiving water quality objectives obtained from Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines for the Protection of Aquatic Life (pal) (2003), continuous concentration (chronic) national recommended water quality criteria (United States Environmental Protection Agency (2006)), British Columbia Ministry of Environment approved and working water quality guidelines or other thresholds, as applicable.
13. In order to estimate effluent source terms, half the method detection limit of a parameter was adopted where more than half of the results for that parameter were non-detect (i.e. Less than the MDL). These effluent source terms are highlighted in blue.
14. Results with an HQ greater than 1 are highlighted in orange, to focus discussion in the effects assessment.

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TABLE H.15 PREDICTED WATER QUALITY IN THE MARY RIVER DURING POST-CLOSURE DUE TO DISCHARGES OF PIT WATER AND WASTE ROCK 10-YEAR LOW FLOW CONDITIONS

Parameter	Units	Baseline Quality in Trib F0 (F0-01, F0-05)			Baseline Quality in Mary River (E0-01, E0-03, E0-10)			Receiving Water Quality Objectives (Note 5)	MDMER (Mean Monthly)	Discharge Scenario			COMBINED EFFLUENT DISCHARGE FROM THE EAST WASTE ROCK POND	WATER QUALITY IN RECEIVING WATERS							
										Flows Used			10-Year Low Flow Volume of Effluent from East Pond = 244,291 m^3/yr 10-Year Low Flow Volume of Effluent from Open Pit = 296,971 m^3/yr	WATER QUALITY IN TRIB MR-12 (U/S OF FISH HABITAT) 10-Year Low Flow Volume of Effluent Discharged from East Pond and Open Pit = 541,262 m^3/yr 10-Year Low Flow Volume to mix at MR-12 = 2,740,417 m^3/yr				WATER QUALITY IN MARY RIVER AT MR-12 (FISH HABITAT) 10-Year Low Flow Volume of Effluent Discharged from Tributary, East Pond & Open Pit = 3,281,679 m^3/yr 10-Year Low Flow Volume to mix in Mary River = 53,166,261 m^3/yr			
		Mean Concentration	90th Percentile Concentration	% Detects	Mean Concentration	90th Percentile Concentration	% Detects			Baseline Concentrations			Mean	Mean	HQ	90th Percentile	HQ	Mean	HQ	90th Percentile	HQ
										Pit Water Source Terms (Year 21)	East Waste Rock Source Term (Mean Flows)	East Waste Rock Source Terms (Dry Year)									
pH	0	8.01	8.31		7.83	8.20		6.5 - 9.0	-	4.20	6.9	6.9	5.42	7.58	-	7.83	-	7.82	-	8.18	-
Hardness	mg/L $CaCO_3$	84	133		58	105		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	5.7	18.6		8.3	17.0		120	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Suspended Solids	mg/L	-	2		3	6		15	15.00	-	-	-	-	-	-	-	-	-	-	-	-
Total Alkalinity	mg/L $CaCO_3$	74	108		47	81		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ammonia	mg/L	0.06	0.11		0.05	0.07		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrate	mg/L	0.1	0.1		-	0.1		13	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrite	mg/L	0.011	0.017		0.010	0.014		0.06	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	2	4		3	5		-	-	239	26	39	149	26	-	28	-	4	-	6	-
Total Phosphorous	mg/L	0.013	0.030		0.013	0.026		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aluminum	mg/L	0.020	0.042	81%	0.191	0.394	100%	0.94	-	6.4	0.095	0.144	3.56	0.60	0.6	0.62	0.7	0.21	0.229	0.41	0.4

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Parameter	Units	Baseline Quality in Trib F0 (F0-01, F0-05)			Baseline Quality in Mary River (E0-01, E0-03, E0-10)			Receiving Water Quality Objectives (Note 5)	MDMER (Mean Monthly)	Discharge Scenario			COMBINED EFFLUENT DISCHARGE FROM THE EAST WASTE ROCK POND	WATER QUALITY IN RECEIVING WATERS							
										Flows Used			10-Year Low Flow Volume of Effluent from East Pond = 244,291 m^3/yr 10-Year Low Flow Volume of Effluent from Open Pit = 296,971 m^3/yr	WATER QUALITY IN TRIB MR-12 (U/S OF FISH HABITAT) 10-Year Low Flow Volume of Effluent Discharged from East Pond and Open Pit = 541,262 m^3/yr 10-Year Low Flow Volume to mix at MR-12 = 2,740,417 m^3/yr				WATER QUALITY IN MARY RIVER AT MR-12 (FISH HABITAT) 10-Year Low Flow Volume of Effluent Discharged from Tributary, East Pond & Open Pit = 3,281,679 m^3/yr 10-Year Low Flow Volume to mix in Mary River = 53,166,261 m^3/yr			
		Mean Concentration	90th Percentile Concentration	% Detects	Mean Concentration	90th Percentile Concentration	% Detects			Baseline Concentrations			Mean	Mean	HQ	90th Percentile	HQ	Mean	HQ	90th Percentile	HQ
										Pit Water Source Terms (Year 21)	East Waste Rock Source Term (Mean Flows)	East Waste Rock Source Terms (Dry Year)									
Antimony	mg/L	-	0.0004	0%	-	0.0001	2%	-	-	0.012	0.003	0.004	0.01	-	-	0.0017	-	-	-	0.00019	-
Arsenic	mg/L	-	0.0010	4%	-	0.0010	8%	0.005	0.30	0.011	0.002	0.003	0.007	-	-	0.0020	0.4	-	-	0.00106	0.2
Barium	mg/L	0.00945	0.01068	47%	0.01011	0.01319	57%	-	-	0.0515	0.051	0.077	0.06	0.01831	-	0.019	-	0.011	-	0.014	-
Beryllium	mg/L	-	0.0050	0%	-	0.0005	0%	0.0053	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/L	-	0.010	2%	-	0.010	6%	1.5	-	0.17	0.020	0.030	0.105	-	-	0.026	0.02	-	-	0.011	0.01
Cadmium	mg/L	-	0.0000200	0%	-	0.00002	8%	0.000029	-	0.00024	0.00002	0.00002	0.0001	-	-	0.000040	1.4	-	-	0.000021	0.7
Chromium	mg/L	0.0010	0.0010	8%	0.0018	0.0020	27%	0.0047	-	0.029	0.002	0.003	0.017	0.004	0.8	0.0037	0.8	0.0019	0.406	0.0021	0.4
Cobalt	mg/L	0.0002	0.0003	4%	0.0002	0.0002	20%	-	-	0.080	0.0006	0.0010	0.044	0.008	-	0.0076	-	0.0006	-	0.00063	-
Copper	mg/L	-	0.0009	38%	0.0012	0.0018	64%	0.0047	0.30	0.112	0.003	0.004	0.063	-	-	0.011	2.4	-	-	0.0023	0.5
Iron	mg/L	0.04	0.05	19%	0.18	0.36	86%	1.2	-	0.33	0.001	0.002	0.18	0.064	0.1	0.072	0.06	0.17	0.144	0.34	0.3
Lead	mg/L	0.00016	0.00020	13%	0.00029	0.00087	35%	0.001	0.10	0.0033	0.0002	0.0002	0.002	0.0005	0.5	0.00049	0.5	0.00030	0.299	0.00085	0.8
Manganese	mg/L	0.00260	0.01000	32%	0.00386	0.01000	48%	-	-	0.86	0.00004	0.00006	0.47	0.080	-	0.087	-	0.008	-	0.01445	-
Mercury	mg/L	-	0.00010	0%	-	0.00010	2%	0.000026	-	0.0024	0.00045	0.00068	0.002	-	-	0.00035	13.6	-	-	0.00011	4.4
Molybdenum	mg/L	0.00306	0.00500	38%	0.00288	0.00500	46%	0.073	-	0.041	0.008	0.012	0.028	0.007	0.1	0.0088	0.12	0.0031	0.043	0.0052	0.07
Nickel	mg/L	0.0032	0.0050	10%	0.0031	0.0050	92%	0.083	0.50	0.17	0.002	0.002	0.092	0.018	0.2	0.019	0.2	0.004	0.048	0.0058	0.07
Selenium	mg/L	-	0.001	0%	-	0.001	0%	0.001	-	0.033	0.005	0.008	0.02	-	-	0.0044	4.4	-	-	0.0012	1.2

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Parameter	Units	Baseline Quality in Trib F0 (F0-01, F0-05)			Baseline Quality in Mary River (E0-01, E0-03, E0-10)			Receiving Water Quality Objectives (Note 5)	MDMER (Mean Monthly)	Discharge Scenario			COMBINED EFFLUENT DISCHARGE FROM THE EAST WASTE ROCK POND	WATER QUALITY IN RECEIVING WATERS							
														WATER QUALITY IN TRIB MR-12 (U/S OF FISH HABITAT)				WATER QUALITY IN MARY RIVER AT MR-12 (FISH HABITAT)			
										Flows Used			10-Year Low Flow Volume of Effluent from East Pond = 244,291 m^3/yr 10-Year Low Flow Volume of Effluent from Open Pit = 296,971 m^3/yr	10-Year Low Flow Volume of Effluent Discharged from East Pond and Open Pit = 541,262 m^3/yr 10-Year Low Flow Volume to mix at MR-12 = 2,740,417 m^3/yr					10-Year Low Flow Volume of Effluent Discharged from Tributary, East Pond & Open Pit = 3,281,679 m^3/yr 10-Year Low Flow Volume to mix in Mary River = 53,166,261 m^3/yr			
		Mean Concentration	90th Percentile Concentration	% Detects	Mean Concentration	90th Percentile Concentration	% Detects			Baseline Concentrations			Mean	Mean	HQ	90th Percentile	HQ	Mean	HQ	90th Percentile	HQ
										Pit Water Source Terms (Year 21)	East Waste Rock Source Term (Mean Flows)	East Waste Rock Source Terms (Dry Year)									
Silver	mg/L	-	0.00010	4%	-	0.00010	10%	0.0001	-	0.0012	0.0001	0.0001	0.001	-	-	0.00020	2.0	-	-	0.00011	1.1
Thallium	mg/L	-	0.0001	0%	-	0.0001	0%	0.0008	-	0.0014	0.0002	0.0003	0.001	-	-	0.00023	0.3	-	-	0.00011	0.1
Uranium	mg/L	0.00213	0.00299	100%	0.00252	0.00468	98%	0.015	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	mg/L	-	0.001	0%	0.001	0.001	11%	0.006	-	0.0044	0.001	0.001	0.003	-	-	0.0013	0.2	-	-	0.0010	0.2
Zinc	mg/L	-	0.009	8%	0.003	0.006	25%	0.03	0.50	0.094	0.010	0.015	0.058	-	-	0.017	0.6	-	-	0.0066	0.2

NOTES:

1. Model assumes complete near instantaneous mixing of effluent and receiving water.
2. No mean concentration calculated where the majority of sampling results were below the method detection limit.
3. Effluent source terms provided by Amec (January, 2012).
4. Effluent source term of 0.001 used in calculations for iron.
5. Receiving water quality objectives obtained from Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines for the Protection of Aquatic Life (pal) (2003), continuous concentration (chronic) national recommended water quality criteria (United States Environmental Protection Agency (2006)), British Columbia Ministry of Environment approved and working water quality guidelines or other thresholds, as applicable.
6. In order to estimate effluent source terms, half the method detection limit of a parameter was adopted where more than half of the results for that parameter were non-detect (i.e. Less than the MDL). These effluent source terms are highlighted in blue.
7. Results with an HQ greater than 1 are highlighted in orange, to focus discussion in the effects assessment.

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3. REFERENCES

AMEC, 2012c. Interim Mine Rock ML/ARD Report, Mary River Project. January 2012.

AMEC, 2012a. Interim Waste Rock Stockpile Seepage Quality Model Report, Mary River Project. January 2012.

AMEC, 2012b. Interim Open Pit Water Quality Model Technical Memorandum, Mary River Project. January 2012.

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