

Site Conditions

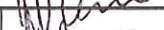
						
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DATE	REV.	STATUS	PREPARED BY	CHECKED BY	APPROVED BY	APPROVED BY
						CLIENT

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1. General

- 1.1 The information supplied herein establishes the general site conditions for equipment and materials. In the event of contradictions between statements contained herein and in the equipment specification of which this is a part, the equipment specification shall govern.
- 1.2 All site and climatic information shall be as specified in the latest edition and supplement of the National Building Code of Canada and as specified herein.

2. Site Location

- 2.1 The project is located at Mary River, Milne Inlet, and Steensby on Baffin Island in the Territory of Nunavut, Canada. It is located on the northern half of Baffin Island, approximately 160-km south of Mittimatalik (Pond Inlet) and 1000-km northwest of Iqaluit, the capital of Nunavut Territory.
- 2.2 The approximate coordinates of the sites are as follows:
- | | | |
|--------------|---------------------|-----------------------|
| Mary River: | Latitude: 71° 20' N | Longitude: 79° 14' W. |
| Milne Inlet: | Latitude: 71° 53' N | Longitude: 80° 57' W. |
| Steensby: | Latitude: 70° 18' N | Longitude: 78° 30' W. |

3. Environmental Design Conditions

3.1 Site Elevation

- 3.1.1 The approximate ground elevations above sea level are:
- | | |
|-----------------------------|----------|
| Milne Inlet: | 5 - 25m. |
| Mary River – top of mine: | 630m. |
| Mary River – ore stockpile: | 200m. |
| Steensby : | 0 - 60m. |

3.2 Temperature

3.2.1 Average

Table 3-1: Average Temperature 1971-2000
(Ref.: RWDI, 2011, Table 5-1.1)

Season (Months)	Mean Daily Temperature Maximum (°C)	Mean Daily Temperature Minimum (°C)
Winter (Dec – Feb)	-28.1	-35.3
Spring (Mar – May)	-16.6	-24.8
Summer (Jun – Aug)	9.6	3.1
Fall (Sep – Nov)	-8.4	-14.9
Annual	-11.5	-18.6

- 3.2.2 Table 3-2 presents a summary of the predicted future temperature from RWDI report for the Mary River and Steensby inlet sites for 2011 to 2100.

Table 3-2: Average Forecast Temperature for 2011-2100
(Ref.: RWDI, 2011, Table 5.1.5)

	Season (Months)	Mean Daily Temperature Maximum (°C)	Mean Daily Temperature Minimum (°C)
2011-2040	Winter (Dec – Feb)	-26.6 – -26.5	-33.9 – -33.6
	Spring (Mar – May)	-15.4 – -15.3	-23.5 – -23.1
	Summer (Jun – Aug)	10.2 – 10.2	3.7 – 3.7
	Fall (Sep – Nov)	-6.5 – -6.3	-12.9 – -12.6
	Annual	-10.1 – -10.1	-17.1 – -17.1
2041-2070	Winter (Dec – Feb)	-24.7 – -22.9	-32.0 – -30.1
	Spring (Mar – May)	-14.7 – -13.9	-22.6 – -21.3
	Summer (Jun – Aug)	10.3 – 11.2	3.9 – 4.7
	Fall (Sep – Nov)	-5.8 – -4.3	-12.1 – -10.1
	Annual	-9.3 – -8.0	-16.3 – -14.8
2071-2100	Winter (Dec – Feb)	-23.7 – -19.4	-30.9 – -26.6
	Spring (Mar – May)	-14.5 – -12.5	-22.2 – -19.5
	Summer (Jun – Aug)	10.8 – 12.1	4.4 – 5.6
	Fall (Sep – Nov)	-4.6 – -1.9	-10.5 – -7.4
	Annual	-8.6 – -6.0	-15.4 – -12.6

3.2.3 Design

Design outdoor temperature:

January, 2.5% Basis:	- 43°C
January, 1% Basis:	- 45°C
Winter, extreme minimum:	- 54°C
July, 2.5% Basis (dry bulb):	+ 14°C
July, 2.5% Basis (wet bulb):	+ 10°C
Summer, extreme Maximum:	+ 26°C
The Number of Degree-Days under 18°C (1971 - 2000):	11500 for Mary River Mine site 12000 for Milne Inlet

- 3.2.4 The extreme minimum temperature with wind chill in that region was recorded as -68.5°C between 1971 and 2000 in Pond Inlet weather station.

3.3 Earthquake Loads

- 3.3.1 Seismic conditions per Natural Resources Canada (www.nrcan.gc.ca):

Mary River:

$S_a(0.2) = 0.351$, $S_a(0.5) = 0.213$, $S_a(1.0) = 0.116$, $S_a(2.0) = 0.039$, $PGA = 0.170$.

Milne Inlet:

$S_a(0.2) = 0.342$, $S_a(0.5) = 0.173$, $S_a(1.0) = 0.101$, $S_a(2.0) = 0.035$, $PGA = 0.183$.

Steensby:

$S_a(0.2) = 0.254$, $S_a(0.5) = 0.172$, $S_a(1.0) = 0.100$, $S_a(2.0) = 0.035$, $PGA = 0.074$.

3.4 Precipitation

3.4.1 As per RWDI report average precipitation range from three Environment Canada metrological stations are shown in Table 3-3.

Table 3-3: Average Precipitation 1971 - 2000
(Ref.: RWDI, 2011, Table 5-1.1)

Season (Months)	Precipitation (mm/d)
Winter (Dec – Feb)	0.2 – 0.4
Spring (Mar – May)	0.3 – 0.6
Summer (Jun – Aug)	0.9 – 1.1
Fall (Sep – Nov)	0.7 – 1.0
Annual	0.8 – 0.8

3.4.2 Table 3-4 presents a summary of the predicted future precipitation from RWDI report for the Mary River and Steensby inlet sites for 2011 to 2100.

Table 3-4: Average Forecast Precipitation for 2011-2100
(Ref.: RWDI, 2011, Table 5.1.5)

	Season (Months)	Precipitation (mm/d)
2011-2040	Winter (Dec – Feb)	0.2 – 0.9
	Spring (Mar – May)	0.3 – 1.3
	Summer (Jun – Aug)	0.4 – 1.2
	Fall (Sep – Nov)	0.3 – 1.2
	Annual	0.8 – 0.9
2041-2070	Winter (Dec – Feb)	0.2 – 1.1
	Spring (Mar – May)	0.3 – 0.8
	Summer (Jun – Aug)	0.4 – 1.4
	Fall (Sep – Nov)	0.6 – 1.4
	Annual	0.8 – 1.0
2071-2100	Winter (Dec – Feb)	0.2 – 0.7
	Spring (Mar – May)	0.3 – 1.2
	Summer (Jun – Aug)	0.9 – 1.6
	Fall (Sep – Nov)	0.6 – 1.5
	Annual	0.9 – 1.2

3.4.3 Design

Maximum precipitation month	500 mm (2005; Nanisivik station, RWDI Report)
Total annual rainfall: - Mary River Mine - Milne Inlet - Steensby Inlet Port site	262 mm 217 mm 251 mm
One day rain (1/50 yr): - Mary River Mine - Milne Inlet - Steensby Inlet Port site	46 mm 35 mm 45 mm
15 min rainfall (1/10 yr) - Mary River Mine - Milne Inlet - Steensby Inlet Port site	4 mm 3 mm 4 mm

According to RWDI (2011), rainfall can occur from April to November, and August is the wettest month with 32.9 mm of rain. The historical data shows that the rainfall is increasing over the years at a rate of 0.24 mm/year (RWDI 2011 report).

3.5 Snow Loads

The month of October receives the most snow in the year, while snow can occur in any month of the year (RWDI, 2011). The mean annual snowfall is 144.5 cm and the deepest snow cover reported is 70 cm at the Pond Inlet weather station, which is the nearest from the Mary River mine site.

The design ground snow loads are as follows:

- Mary River Mine site:
1/50-year Ground snow load: $S_s = 2.9$ kPa and $S_r = 0.2$ kPa.
- Milne Inlet:
1/50-year Ground snow load: $S_s = 2.1$ kPa and $S_r = 0.2$ kPa.
- Steensby Inlet Port site:
1/50-year Ground snow load: $S_s = 2.1$ kPa and $S_r = 0.2$ kPa.

3.6 Wind Loads

- Mary River Mine site:
Hourly wind pressure: 1.17 kPa (for a wind velocity of 42m/sec) for 1/50-year return period.

- Milne Inlet:
Hourly wind pressure: 0.94 kPa (for a wind velocity of 38m/sec) for 1/50-year return period.
- Steensby Inlet Port site:
Hourly wind pressure: 0.66 kPa (for a wind velocity of 32m/sec) for 1/50-year return period.

3.7 Ice Accretion

- Ice thickness: 50 mm; and
- Ice density: 9.8 kN/m³.

END OF SECTION

Client: BIM	Data Sheet
Project: Baffinland Iron Ore	Title: Site Conditions
Doc No.: H337697-0000-10-107-0001	Date: Jan. 06, 2012

Site	Latitude	Longitude	Comment
Mary River Mine Site	71° 20' N	79° 14' W	160 km south of Pond Inlet
Milne Inlet	71° 53' N	80° 57' W	100 km north-west of Mary River Mine Site
Steensby Inlet Port Site	70° 18' N	78° 30' W	140 km south of Mary River Mine Site

Temperature		Winter	Summer	Notes
Average	°C	-	-	All Sites
Maximum	°C	-	+ 26	
Minimum	°C	-54	-	
Design Outdoor Temp. (2.5% basis)	°C	-43	+ 14	All Sites
Design Outdoor Temp. (1% basis)	°C	- 45	-	
Design (MDMT and LAST)	°C	-	-	

Wind Probability	Mary River Mine Site		Milne Inlet		Steensby Inlet Port Site		Notes
	Wind Pressure, q (KPa)	Wind Velocity (m/sec)	Wind Pressure, q (KPa)	Wind Velocity (m/sec)	Wind Pressure, q (KPa)	Wind Velocity (m/sec)	
1/10	-	-	-	-	-	-	
1/50	1.17	42	0.94	38	0.66	32	
1/100	-	-	-	-	-	-	

Earthquake		Mary River Mine Site	Milne Inlet	Steensby Inlet Port Site	Notes
Spectral Acceleration for 5% damping (based on 2% probability of exceedance in 50 yrs)	S _a (0.2)	0.351	0.342	0.254	
	S _a (0.5)	0.213	0.173	0.172	
	S _a (1.0)	0.116	0.101	0.100	
	S _a (2.0)	0.039	0.035	0.035	
	PGA	0.170	0.183	0.074	
Site Class		C	C	C	Note 1

Snow		Mary River	Milne Inlet	Steensby Inlet Port Site	Notes
Average Annual	mm	-	-	-	
Greatest in 24 hrs Annual	mm	-	-	-	
Ground Snow Load (S _g) (1/50 year)	KN/m ²	2.9	2.1	2.1	
Ground Snow Load (S _g) (1/50 year)	KN/m ²	0.2	0.2	0.2	
Unit weight of snow, γ	KN/m ³	3.0	3.0	3.0	

Frost		All Mines/ Sites	Addition Due to Global Warming	Notes
Perma Frost	Yes/ No	YES	0.5 m max. 1.0 m max.	Note 2
Perma Frost Depth		Down to Rock		
Depth of Active Layer:		0.6 – 3.0 m		
- Till		1.0 m		
- Sand and Gravel		1.5 – 2.5 m		

Rainfall		Mary River Mine	Milne Inlet	Steensby Inlet Port Site	Notes
Average Total Annual Rainfall	mm	262	217	251	
Greatest in 24 hrs Annual (1/ 50 yr)	mm	46	35	45	
Design Max. rate – 15 min. (1/ 10 yr)	mm	4	3	4	

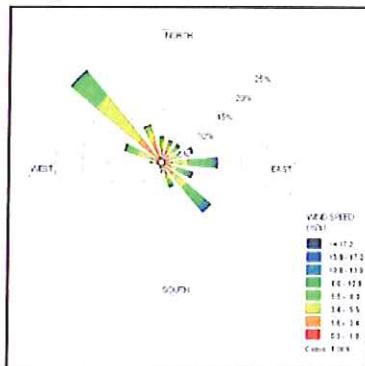
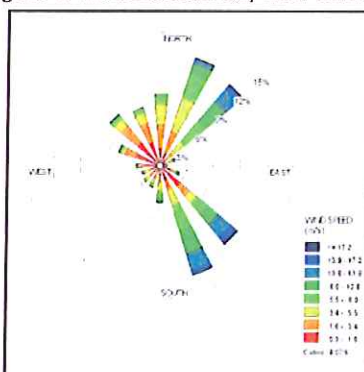
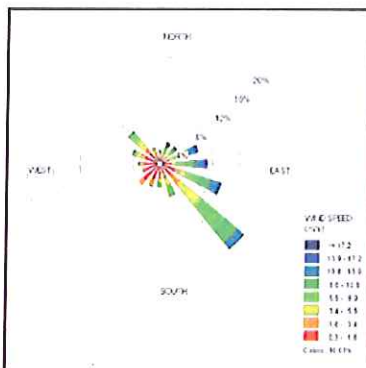
Degree - Days	Mary River Mine	Milne Inlet	Steensby Inlet Port Site	Notes
Heating – below 18.0°C (65°F)	11,500	12,000	-	
Freezing – below 0.0°C (32°F)	-	-	-	

Special Provisions & Others	Unit	Mary River Mine	Milne Inlet	Steensby Inlet Port Site	Notes
Lightning		-	-	-	
Dust Exposure	Yes/ No	Yes	Yes	Yes	
Site Elevation above Sea level	m	630 m at Deposit # 1	5-25 m	0-60 m	
		670 m at Deposit # 2			
		200 m at Stockpile Area			
Atmospheric Pressure - Design	kPa	-	-	-	

MDMT – Minimum Design Metal Temperature
LAST – Lowest Anticipated Service Temp.

Note 1: Site class should be verified by Geotechnical Report

Note 2: Global Warming allowance for 50 years can be included by adjusting values for active layer thickness



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