NI 43-101 Technical Report

Pre-feasibility Study for the Kamistiatusset (Kami) Iron Ore Property

Newfoundland and Labrador, Canada

Prepared for:

Champion Iron Limited

Effective Date: December 22, 2023

Signature Date: March 14, 2024

Prepared by the following Qualified Persons:

- André Allaire, P.Eng.__________________ BBA Engineering Ltd.
- Alexandre Dorval, P.Eng. ______________ G Mining Services Inc.
- Christian Beaulieu, P.Geo. _____________ Consultant for G Mining Services Inc.
- Mathieu Girard, P.Eng._________________ Consultant for Soutex Inc.
- Marie-Hélène Paquette, P.Eng._________ AtkinsRéalis
- Emmanuelle Millet, P.Geo. _____________ AtkinsRéalis
- Siavash Farhangi, P.Eng. ______________ WSP Canada Inc.
- Tarek Khoury, P.Eng. __________________ SYSTRA Canada Inc.

Date and Signature Page

This technical report is effective as of the 22nd day of December 2023.

Original signed and sealed on file	March 14, 2024
André Allaire, P.Eng., PhD. BBA Inc.	Date
Original signed and sealed on file	March 14, 2024
Alexandre Dorval, P.Eng. G Mining Services Inc.	Date
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Christian Beaulieu, P.Geo. Consultant for G Mining Services Inc.	Date
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Mathieu Girard, P.Eng. Consultant for Soutex Inc.	Date
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Marie-Hélène Paquette, P.Eng. AtkinsRéalis	Date

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Emmanuelle Millet, P.Geo. AtkinsRéalis	Date

Original signed and sealed on file	March 14, 2024
Siavash Farhangi, P.Eng. WSP Canada Inc.	Date

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CERTIFICATE OF QUALIFIED PERSON

André Allaire, P.Eng., PhD.

This certificate applies to the NI 43-101 Technical Report titled "Pre-feasibility Study of the Kamistiatusset (Kami) Iron Ore Property, Newfoundland and Labrador, Canada" (the "Technical Report"), prepared for Champion Iron Limited, dated March 14, 2024, with an effective date of December 22, 2023.

I, André Allaire, P.Eng., PhD., as a co-author of the Technical Report, do hereby certify that:

1. I am currently employed as a Senior Process Engineer in the consulting firm BBA Inc. located at 2020 Robert-Bourassa Blvd., Suite 300, Montréal, Québec, Canada, H3A 2A5.
2. I graduated from McGill University of Montreal with a B.Eng. in Metallurgy in 1982, an M. Eng. In 1986 and a Ph.D. in 1991. I have practiced my profession continuously since my graduation.
3. I am a member in good standing of the Professional Engineers of Newfoundland and Labrador (PEGNL#11438), Order of Engineers of Québec (OIQ #38480), and of the Canadian Institute of Mining Metallurgy and Petroleum.
4. I have practiced my profession continuously since my graduation in 1982. My relevant experience includes mineral processing, study management, and many NI 43-101 studies.
5. I have read the definition of "qualified person" set out in the NI 43-101 – Standards of Disclosure for Mineral Projects ("NI 43-101") and certify that, by reason of my education, affiliation with a professional association, and past relevant work experience, I fulfill the requirements to be a qualified person for the purposes of NI 43-101.
6. I am independent of the issuer applying all the tests in Section 1.5 of NI 43-101.
7. I am author and responsible for the preparation of Chapters 1, 2, 3, Sections 17.4 and 17.5, Chapter 18 (except Sections 18.3, 18.4.3 and 18.7), 19, 20 (except Sections 20.5.2, 20.7, 20.8, 20.9.2 and 20.10), 21 (except 21.1.10 and 21.3.3), 22, 23, 24, 25, 26 and 27 of the Technical Report.
8. I did not visit the Kami Property that is the subject of the Technical Report.
9. I have no prior involvement with the Property that is the subject of the Technical Report.
10. I have read NI 43-101 and the sections of the Technical Report for which I am responsible have been prepared following NI 43-101 rules and guidelines.
11. As at the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the portions of the Technical Report for which I am responsible not misleading.

Signed and sealed this 14th day of March 2024.

Original signed and sealed on file

André Allaire, P.Eng., PhD.
BBA Inc.

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CERTIFICATE OF QUALIFIED PERSON

Alexandre Dorval, P.Eng.

This certificate applies to the NI 43 101 Technical Report titled, “Pre-feasibility Study of the Kamistiatusset (Kami) Iron Ore Property, Newfoundland and Labrador, Canada” (the “Technical Report”) prepared for Champion Iron Limited dated March 14, 2024, with an effective date of December 22, 2023.

I, Alexandre Dorval, P.Eng., do hereby certify that:

1. I am currently employed as Open Pit Mining Engineering Coordinator with G Mining Services Inc., with an office located at 5025 Boul. Lapinière, Suite 1010, Brossard, Québec, J4Z 0N5.
2. I graduated from Laval University, Canada with a B.Sc. in Mining Engineering in 2012.
3. I am a professional engineer in good standing with the Ordre des Ingénieurs du Québec (#5027189), Professional Engineers of Ontario (#100214598), and Professional Engineers and Geoscientists of Newfoundland & Labrador (#11042) in Canada.
4. I have practiced my profession in the mining industry since graduation. I have over 8 years of experience as an open pit mining engineer in diverse roles and 3 years in underground mining engineering in planning. I have relevant experience having worked on projects ranging from pre-economic assessments and a feasibility study update to project implementation related to mining engineering.
5. I have read the definition of “qualified person” set out in the National Instrument 43-101 (“NI 43-101”) and certify that by reason of my education, affiliation with a professional association and past relevant work experience, I fulfil the requirements to be a qualified person for the purposes of NI 43-101.
6. I am independent of the issuer applying all the tests in Section 1.5 of NI 43-101.
7. I am author and responsible for Chapters 15 and 16 (except Section 16.7.5), and Sections 21.1.10, 21.3.3. I am also co-author and responsible for the relevant portions of Chapters 1, 2, 25, 26 and 27 of the Technical Report.
8. I have not visited the Kami Property.
9. I have no prior involvement with the Property that is the subject of the Technical Report.
10. I have read NI 43 101 and believe that the sections and sub-sections of the Technical Report listed in item 6 above have been prepared following NI 43-101 rules and guidelines.
11. As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make these portions of the Technical Report for which I am responsible not misleading.

Signed and sealed this 14th day of March 2024.

Original signed and sealed on file

Alexandre Dorval, ing., P.Eng.
Open Pit Mining Engineering Coordinator
G Mining Services Inc.

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CERTIFICATE OF QUALIFIED PERSON

Christian Beaulieu, P.Geo., M.Sc.

This certificate applies to the NI 43 101 Technical Report titled, "Pre-feasibility Study of the Kamistiatusset (Kami) Iron Ore Property, Newfoundland and Labrador, Canada" (the "Technical Report") prepared for Champion Iron Limited, dated March 14, 2024, with an effective date of December 22, 2023.

I, Christian Beaulieu, P.Geo., M.Sc., do hereby certify that:

1. I am currently under contract as a Consulting Geologist for G Mining Services Inc., with an office located at 5025, Lapinière Blvd, Suite 1010, Brossard, Québec, Canada, J4Z 0N5.
2. I graduated from the Université du Québec à Montréal, Canada with a B.Sc. (Geology) in 2006, and from the Université du Québec à Montréal, Canada with a M.Sc. in Earth Sciences (Mineral Geology) in 2010.
3. I am a Professional Geologist registered in good standing with the "Professional Engineers and Geoscientists of Newfoundland & Labrador" (PEGNL-Licence: 10653) and the "Ordre des géologues du Québec" (OGQ-Licence: 1072).
4. I have worked as a geologist for a total of 15 years since my graduation. I have practiced my profession continuously since 2009 and have extensive experience in geology and mineral resource estimation for various commodities in Canada, South America and West Africa.
5. I have read the definition of "qualified person" set out in the National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association and past relevant work experience, I fulfil the requirements to be a qualified person for the purposes of NI 43-101.
6. I am independent of the issuer applying all the tests in Section 1.5 of NI 43-101.
7. I am author and responsible for Chapters 4 to 12, (except 10.6) and 14. I am also a contributing author for the relevant portions of Chapters 1, 2, 25, 26 and 27 of the Technical Report.
8. I visited the Kami Property and core storage facility from November 24 to December 1, 2021 and from July 27 to July 28, 2022, to review information pertaining to the mineral resource estimate and to confirm drill logs, assay certificates, sample intervals, mineralization intervals inspection, independent sampling and field checks to validate drill collars and locate outcrops.
9. I have no prior involvement with the Property that is the subject of the Technical Report.
10. I have read NI 43-101 and the sections of the Technical Report for which I am responsible have been prepared following NI 43-101 rules and guidelines.
11. As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the portions of the Technical Report for which I am responsible not misleading.

Signed and sealed this 14th day of March 2024.

Original signed and sealed on file

Christian Beaulieu, P.Geo., M.Sc.
Consulting Geologist for G Mining Services Inc.
Minéralis Consulting Services Inc.

CERTIFICATE OF QUALIFIED PERSON

Mathieu Girard, P.Eng.

This certificate applies to the NI 43 101 Technical Report titled "Pre-feasibility Study of the Kamistiatusset (Kami) Iron Ore Property, Newfoundland and Labrador, Canada" (the "Technical Report"), prepared for Champion Iron Limited, dated March 14, 2024, with an effective date of December 22, 2023.

I, Mathieu Girard, P.Eng., as a co-author of the Technical Report, do hereby certify that:

1. I am a professional engineer currently under contract as a consulting Senior Metallurgical Engineer for Soutex Inc., located at 1990 rue Cyrille-Duquet, Local 204, Québec, Canada, G1N 4K8.
2. I received a bachelor's degree in Material and Metallurgy Engineering from Université Laval in 2000, and a master's degree in Metallurgical Engineering from Université Laval in 2004.
3. I am a member in good standing of the Ordre des Ingénieurs du Québec (OIQ #129366) and of the Professional Engineers and Geoscientists of Newfoundland & Labrador (PEGNL #09713).
4. I have over 20 years of experience in mineral processing operation support, optimization and design. I first worked for Algosys (now Ion) in 2002, then joined Soutex in 2005 as a metallurgist, and now work as an independent consultant since 2022.
5. I have read the definition of "Qualified Person" set out in the NI 43-101 – Standards of Disclosure for Mineral Projects (NI 43-101) and certify that, by reason of my education, affiliation with a professional association, and past relevant work experience, I fulfill the requirements to be a Qualified Person for the purposes of NI 43-101.
6. I am independent of the issuer applying all the tests in Section 1.5 of NI 43-101.
7. I am author and responsible for the preparation of Chapters 13 and 17 (except Sections 17.4 and 17.5). I am also a contributing author for the relevant portions of Chapters 1, 2, 25, 26 and 27 of the Technical Report.
8. I did not visit the property that is the subject to the Technical Report.
9. I have had no prior involvement with the property that is the subject of the Technical Report.
10. I have read NI 43-101 and the sections of the Technical Report for which I am responsible have been prepared in compliance with NI 43-101.
11. As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the portions of the Technical Report for which I am responsible not misleading.

Signed and sealed this 14th day of March 2024.

Original signed and sealed on file

Mathieu Girard, P.Eng.
Consultant for Soutex Inc.

AtkinsRéalis

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Montréal, QC H2Z 1Z3

CERTIFICATE OF QUALIFIED PERSON

Marie-Hélène Paquette, P.Eng.

This certificate applies to the NI 43-101 Technical Report titled "Pre-feasibility Study of the Kamistiatusset (Kami) Iron Ore Property, Newfoundland and Labrador, Canada" (the "Technical Report"), prepared for Champion Iron Limited, dated March 14, 2024, with an effective date of December 22, 2023.

I, Marie-Hélène Paquette, P.Eng., as a co-author of the Technical Report, do hereby certify that:

1. I am an engineer with the consulting firm AtkinsRéalis, located at 455 René-Lévesque Blvd. West, Montréal, Québec, Canada, H2Z 1Z3.
2. I am a graduate in civil engineering from Université de Sherbrooke (1993) and hold a master's degree in environmental management from Université de Sherbrooke (2010).
3. I am a member in good standing of the Professional Engineers and Geoscientists of Newfoundland and Labrador (#07899), and Ordre des ingénieurs du Québec (#112021).
4. My relevant experience includes the design of earthworks, the development of water management plans and the management of multi-disciplinary projects in the mining environment sector.
5. I have read the definition of "qualified person" set out in the NI 43-101 – Standards of Disclosure for Mineral Projects ("NI 43-101") and certify that, by reason of my education, affiliation with a professional association, and past relevant work experience, I fulfill the requirements to be a qualified person for the purposes of NI 43-101.
6. I am independent of the issuer applying all the tests in Section 1.5 of NI 43-101.
7. I am author and responsible for the preparation of Sections 16.7.5, 18.4.3 and 20.8. I am also co-author and responsible for the relevant portions of Chapters 1, 2, 25, 26 and 27 of the Technical Report.
8. I have visited the Kamistiatusset Property that is the subject of the Technical Report, on October 3 and 4, 2023 as part of this current mandate.
9. I have had no prior involvement with the Property that is the subject of the Technical Report.
10. I have read NI 43-101 and the sections of the Technical Report for which I am responsible have been prepared following NI 43-101 rules and guidelines.
11. As at the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the portions of the Technical Report for which I am responsible not misleading.

Signed and sealed this 14th day of March 2024.

Original signed and sealed on file

Marie-Hélène Paquette, P.Eng.
AtkinsRéalis

AtkinsRéalis

455 René-Lévesque Blvd. West
Montréal, QC H2Z 1Z3

CERTIFICATE OF QUALIFIED PERSON

Emmanuelle Millet, P.Geo.

This certificate applies to the NI 43-101 Technical Report titled "Pre-feasibility Study of the Kamistiatusset (Kami) Iron Ore Property, Newfoundland and Labrador, Canada" (the "Technical Report"), prepared for Champion Iron Limited, dated March 14, 2024, with an effective date of December 22, 2023.

I, Emmanuelle Millet, P.Geo., as a co-author of the Technical Report, do hereby certify that:

1. I am a Professional Geoscientist with the consulting firm AtkinsRéalis, located at 455 René-Lévesque Blvd. West, Montréal, Québec, Canada, H2Z 1Z3.
2. I hold a bachelor's degree in geology from Université de Pau et des Pays de l'Adour, France (2007) and hold a master's degree in earth sciences (hydrogeology) from Institut national de recherche scientifique, Québec (2013).
3. I am a member in good standing of the Professional Engineers and Geoscientists of Newfoundland and Labrador (#11078), and l'Ordre des Géologues du Québec (#02223).
4. My relevant experience includes hydrogeology and numerical modelling of groundwater flow and transport of contaminants.
5. I have read the definition of "qualified person" set out in the NI 43-101 – Standards of Disclosure for Mineral Projects ("NI 43-101") and certify that, by reason of my education, affiliation with a professional association, and past relevant work experience, I fulfill the requirements to be a qualified person for the purposes of NI 43-101.
6. I am independent of the issuer applying all the tests in Section 1.5 of NI 43-101.
7. I am author and responsible for the preparation of Sections 10.6 and 20.7. I am also co-author and responsible for the relevant portions of Chapters 1, 2, 25, 26 and 27 of the Technical Report.
8. I have visited the Kamistiatusset Property that is the subject of the Technical Report, on November 13 and 14, 2023, as part of this current mandate.
9. I have had no prior involvement with the property that is the subject of the Technical Report.
10. I have read NI 43-101 and the sections of the Technical Report for which I am responsible have been prepared following NI 43-101 rules and guidelines.
11. As at the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the portions of the Technical Report for which I am responsible not misleading.

Signed and sealed this 14th day of March 2024.

Original signed and sealed on file

Emmanuelle Millet, P.Geo.
AtkinsRéalis

CERTIFICATE OF QUALIFIED PERSON

Siavash Farhangi, P.Eng.

This certificate applies to the NI 43-101 Technical Report titled "Pre-feasibility Study of the Kamistiatusset (Kami) Iron Ore Property, Newfoundland and Labrador, Canada" (the "Technical Report"), prepared for Champion Iron Limited, dated March 14, 2024, with an effective date of December 22, 2023.

I, Siavash Farhangi, P.Eng., as a co-author of the Technical Report, do hereby certify that:

1. I am an engineer with the consulting firm WSP Canada, located at 6925 Century Avenue, Mississauga, Ontario, Canada, L5N 7K2.
2. I am a graduate in civil engineering from Sharif University of Technology (1998) and hold a master's degree in environmental engineering from University of Nottingham (2002) and a PhD degree in geotechnical engineering from University of Southampton (2006).
3. I am a member in good standing of Professional Engineers Ontario (#100119308) and Professional Engineers and Geoscientists Newfoundland and Labrador (#10954).
4. My relevant experience includes geotechnical investigation and design of tailings and waste rock storage facilities, and the management of multi-disciplinary projects in the mining environment sector.
5. I have read the definition of "qualified person" set out in the NI 43-101 – Standards of Disclosure for Mineral Projects ("NI 43-101") and certify that, by reason of my education, affiliation with a professional association, and past relevant work experience, I fulfill the requirements to be a qualified person for the purposes of NI 43-101.
6. I am independent of the issuer applying all the tests in Section 1.5 of NI 43-101.
7. I am author and responsible for the preparation of Section(s) 18.3, 20.5.2, 20.9.2 and 20.10. I am also co-author and responsible for the relevant portions of Chapters 1, 2, 25, 26 and 27.
8. I have not visited the Kami Property that is the subject of the Technical Report. The design lead from WSP, however, visited the Property on October 3 and 4, 2023, as part of this current mandate.
9. I have had prior involvement with the Property that is the subject of the Technical Report, as I was project manager for previous technical studies, but I did not act as a QP.
10. I have read NI 43-101, and the sections of the Technical Report for which I am responsible have been prepared following NI 43-101 rules and regulations.
11. As at the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the portions of the Technical Report for which I am responsible not misleading.

Signed and sealed this 14th day of March 2024.

Original signed and sealed on file

Siavash Farhangi, P.Eng.
WSP Canada

1100 Boul. René-Lévesque O
10e étage, Montréal, QC
H3B 4N4

CERTIFICATE OF QUALIFIED PERSON

Tarek Khoury, P.Eng., M.Eng.

This certificate applies to the NI 43-101 Technical Report titled "Pre-feasibility Study of the Kamistiatusset (Kami) Iron Ore Property, Newfoundland and Labrador, Canada" (the "Technical Report"), prepared for Champion Iron Limited, dated March 14, 2024, with an effective date of December 22, 2023.

I, Tarek Khoury, P.Eng., M.Eng., as a co-author of the Technical Report, do hereby certify that:

1. I am a Civil Engineer with the consulting firm SYSTRA Canada Inc., located at 1100 Boul. René-Lévesque O 10e étage, Montréal, Québec, Canada, H3B 4N4.
2. I am a graduate in civil engineering from Université de Montréal, École Polytechnique. I also hold a master's degree in civil engineering, specializing in construction management, from Concordia University.
3. I am a member in good standing of the Order of Engineers of Québec (OIQ #5054027).
4. My relevant experience includes working on railway feasibility studies, which included various engineering activities such as alignment design, track structure, cost estimates, material estimations, and project management activities. I have also been involved in detailed design projects, responsible for managing the delivery of various work packages for construction purposes. In addition, I participated in multiple construction projects in the functions of quality control, planning and coordination activities, site supervision, safety and coordinating multiple construction crews simultaneously.
5. I have read the definition of "qualified person" set out in the NI 43-101 – Standards of Disclosure for Mineral Projects ("NI 43-101") and certify that, by reason of my education, affiliation with a professional association, and past relevant work experience, I fulfill the requirements to be a qualified person for the purposes of NI 43-101.
6. I am independent of the issuer applying all the tests in Section 1.5 of NI 43-101.
7. I am author and responsible for the preparation of Section 18.7. I am also co-author and responsible for the relevant portions of Chapters 1, 2, 25, 26 and 27 of the Technical Report.
8. I have not visited the Kami Property that is the subject of the Technical Reports as it was not required for the purpose of this mandate.
9. I have had no prior involvement with the property that is the subject of the Technical Report.
10. I have read NI 43-101 and the sections of the Technical Report for which I am responsible have been prepared following NI 43-101 rules and guidelines.
11. As at the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the portions of the Technical Report for which I am responsible not misleading.

Signed and sealed this 14th day of March 2024.

Original signed and sealed on file

Tarek Khoury, P.Eng., M.Eng.
SYSTRA Canada Inc.

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List of Abbreviations and Units of Measurement

Abbreviation	Description
$ or CAN$	Canadian dollar
$/t	Canadian dollar per tonne
%	percent
% solids	percent solids by weight
°	degree
µm	micron
σ	Sigma
2-D	two dimensional
3-D	three dimensional
A	ampere
a	annum (year)
ABA	acid-base accounting
AG	autogenous grinding
Ag	silver
AHS	autonomous hauling solutions
AISC	all-in sustaining costs
Al_2O_3	aluminum oxide (alumina)
Alderon	Alderon Iron Ore Corp.
Allnorth	Allnorth Land Surveyors
Altius	Altius Minerals Corporation
AP	acid potential
APEGBC	Association of Professional Engineers and Geoscientists of British Columbia
APSI	Administration Portuaire de Sept-Îles
ARD	acid rock drainage
As	arsenic
asl	above sea level
ASX	Australian Securities Exchange
ATV	all-terrain vehicle
B	billion
B_MS_SCH	Biotite-muscovite schist
BBA	BBA Inc.
BC	British Columbia
bcm	banked cubic metre

Abbreviation	Description
BF/BOF	Blast Furnace and Basic Oxygen Furnace
BFA	bench face angle
BGI	Bell Geospace Inc.
BLR	Bloom Lake Railway
BWI	Bond work index
CANMET	Canadian Centre for Mineral and Energy Technology
CaO	Calcium oxide
CAPEX	Capital Expenditure
CDA	Canadian Dam Association
CEA	Canadian Environmental Assessment
CEAA	Canadian Environmental Assessment Act
CFA	Chemin de Fer Arnaud
CFR	cost and freight
CGS	centimetre–gram–second
Champion	Champion Iron Limited
CIF	Carbonaceous iron formation
CIM	Canadian Institute of Mining, Metallurgy and Petroleum
CIML	Champion Iron Mines Limited
Cliffs	Cliffs Natural Resources Inc.
cm	centimetre
COG	cut-off grade
con.	concentrate
CoV	coefficient of variation
CPT	cone penetration testing
CRM(s)	certified reference material(s)
CSIF	Silicate-carbonate iron formation
CSR	Corporate Social Responsibility
Cu	copper
CWI	crusher work index
d	day (24 hours)
DDH	diamond drillhole
DEM	Digital Elevation Model
DFO	Fisheries and Oceans Canada
DGI	DGI Geosciences Inc.
DGPS	Differential Global Positioning System
dia	diameter

Abbreviation	Description
dmt	dry metric tonne
DR	direct reduction
DRI/EAF	Direct Reduced Iron and Electric Arc Furnace
DRPF	Direct Reduced Pellet Feed
DSO	Direct Shipping Ore
DT	Davis Tube
DTH	down-the-hole (drilling)
DTT	Davis Tube Tails
DWT	drop weight test
EA	Environmental Assessment
EAC	Environmental Assessment Committee
EAF	Electric Arc Furnace
EBT	earnings before taxes
EBIT	earnings before interest and taxes
EBITDA	earnings Before Interest, Taxes, Depreciation, and Amortization
EC	Environment Canada
ECCC	Environment and Climate Change Canada
EDF	Environmental Design Flood
EGL	effective grinding length
EIS	Environmental Impact Statement / Study
EOY	end of year
EPCM	Engineering, Procurement and Construction Management
ETR	effective combined tax rate
EWTP	east water treatment plant
F_{100}	100% passing size - feed
F_{80}	80% passing size - feed
FCF	free cash flow
Fe	iron
Fe^{2+}	ferrous iron (iron(II))
Fe_2O_3	ferric oxide or Iron(III) oxide
Fe^{3+}	ferric iron (iron(III))
Fe_3O_4	iron (II,III) oxide
FeO	iron oxide or Iron(II) oxide
Fe_T	iron total
FID	Final Investment Decision
FOB	freight on board

Abbreviation	Description
FoS	factors of safety
FS	feasibility study
ft or '	foot (12 inches)
FTG	Full Tensor (Gravity) Gradiometry
FW	footwall
g	gram
G&A	general and administrative
G&W	Genesee & Wyoming
g/cm^3	gram per cubic centimetre
GCDWQ	Guidelines for Canadian Drinking Water Quality
GCL	geosynthetic clay liner
GCM	Global Circulation Model
GGI	Gravity Gradient Instruments
GIT	Geoscientists in Training
GMS	G Mining Services Inc.
gpm	gallons per minute
GPS	Global Positioning System
GSC	Geological Survey of Canada
GWh	giga watt hour
h	hour
H_2SO_4	sulphuric acid
ha	hectare
HBG_GN	Mafic intrusive dykes
HBIS	HBIS Group Co., Ltd.
HCT	humidity cell testing
HDPE	High-Density Polyethylene
Hem	Hematite
Hem_Fe	iron from hematite
HemFe	hematite Iron
HF	hydrogen fluoride
Hg	mercury
HIF	hematite iron formation
HLS	heavy liquid separation
HMIF	hematite iron formation, minor magnetite
hp	horsepower
HSIF	hematite-silicate iron formation

Abbreviation	Description
HV	high-voltage
IA	Impact Assessment
IAA	Impact Assessment Act
IAAC	Impact Assessment Agency of Canada
IBA	Impact Benefit Agreement
ID	identification
ID^2	inverse distance square
IDF	inflow design flood
IF	Iron Formation
IGS	Integrated Geometallurgical Simulator
in or "	inch
IOC	Iron Ore Company of Canada
IODEX	Iron Ore Index
IPCS	In-pit Crushing System
IR(s)	information request(s)
IRR	internal rate of return
IT	information technology
ITUM	Innu Takuaikan Uashat mak Mani-Utenam ("ITUM
JKMRC	Julius Kruttschnitt Mineral Research Centre
JV	joint venture
K	thousand
Kami	Kamistiatusset
Kami GP	Kami General Partner Limited
Kami LP	Kami Mine Limited Partnership
kg	kilogram
km	kilometre
km^2	square kilometre
kt	kilotonne
kV	kilovolt
kW	kilowatt
kWh	kilowatt hour
L	litre
Landdrill	Landdrill International Ltd.
lb	pound
LECO	Laboratory Equipment Company

Abbreviation	Description
LHIF	Lean hematite iron formation
LIDAR	Light Detection and Ranging
LIMS	Low Intensity Magnetic Separation
LM&E	Labrador Mining and Exploration Co. Ltd
LMIF	Lean magnetite iron formation
LOM	life of mine
LTE	long-term evolution
m	metre
M	million
M&I	Measured and Indicated
M_HZ	Mills Lake Hematite-rich domain
M_MM	Mills Lake Main Magnetite-rich Domain
M_UM	Mills Lake Upper, Secondary Magnetite-rich Domain
m^2	square metre
m^3	cubic metre
MAA	Multiple Accounts Analysis
Mag	magnetite
Magn_Fe	magnetite iron
MARC	maintenance and repair contract
mbg	metre below ground
MBR	membrane bioreactor
MDMER	Metal and Diamond Mining Effluent Regulations
MENA	Middle East and North Africa
mesh	US Mesh
MFQ	Minerai de Fer Québec
Mg	magnesium
mg	milligram
MgO	magnesium oxide
MHIF	magnetite iron formation, minor hematite
MIF	magnetite iron formation
min	minute
Mira	Mira Geoscience
ML	metal leaching
ML/ARD	metal leaching/acid rock drainage
MLA	Mineral Liberation Analyzer
mm	millimetre

Abbreviation	Description
Mn	manganese
MnO	manganese(II) oxide
MnO_2	Pyrolusite (Manganese dioxide)
MOWL	maximum operational water level
mph	miles per hour
MRE	mineral resource estimate
MRMR	Mineral Resource and Mineral Reserve
MS_B_SCH	Muscovite-biotite schist
MS_SCH	Muscovite schist
MSE	mechanically stabilized earth
Mt	million tonnes
MT	Mineral Technologies
Mt/y	million tonnes per year
MTO	material take-off
MVA	megavolt ampere
Mvar	megavolt ampere reactive
MW	megawatt
NAD	North American Datum (Topographical Surveying)
NAG	non-acid generating
NCC	Nunatukavut Community Council
NGO(s)	Non-Governmental Organization(s)
NIMLJ	La Nation Innu Matimekush-Lac John
NL	Newfoundland and Labrador
NL Hydro	Newfoundland & Labrador Hydro
NLDMAE	Newfoundland and Labrador Department of Municipal Affairs and Environment
Nm^3	normal cubic metre
NN	nearest neighbour
NNK	Naskapi Nation of Kawawachikamach
NOWL	normal operational water level
NP	neutralization potential
NPAG	non-potentially acid generating
NPR	neutralization potential ratios
NPV	net present value
NTS	National Topographic System of Canada
NW	northwest
OB	overburden

Abbreviation	Description
OEE	overall operating efficiency
OGQ	Ordre des Géologues du Québec
OHL	overhead lines
OIF	oxide iron formation
OK	ordinary kriging
OPEX	operating expenditure
OSA	overall slope angle
OT	operational technology
Other_Fe	other iron minerals
OTV	optical televiewer
P_{100}	100% passing size - product
P_{80}	80% passing size - product
PAG	potentially acid generating
Parrott	N.E. Parrott Surveys Limited
PCM	Procurement and Construction Management
PEA	preliminary economic assessment
PEGNL	Professional Engineers and Geoscientists of Newfoundland and Labrador
PFS	pre-feasibility study
PGA	peak ground acceleration
pH	hydrogen ion concentrations
PID	proportional–integral–derivative
POV	pre-operational verifications
ppm	parts per million
psi	pounds per square inch
QA	quality assurance
QC	quality control
QCIF	quartz-rich carbonaceous iron formation
QCSIF	quartz-rich carbonaceous silicate iron formation
QIO	Quebec Iron Ore
QNS&L	Québec, North Shore & Labrador
QP(s)	qualified person(s)
QSIF	quartz-rich silicate iron formation
RC	Rose Central
RC100	laboratory scale Reflux® Classifier
RD	bed density
RN	Rose North

Abbreviation	Description
ROM	run of mine
RPEEE	reasonable prospect of eventual economic extraction
rpm	revolutions per minute
RQD	rock quality designation
RWI	rod work index
s	second
SAR	wildlife species at risk
Sat	Satmagan
SD	Standard deviation
SEDAR	System for Electronic Document Analysis and Retrieval
SFPPN	Société ferroviaire et portuaire de Pointe-Noire s.e.c.
SG	specific gravity
SGS	SGS Minerals Services
SIF	silicate iron formation
SiO_2	silicon dioxide
SMC	SAG Mill Comminution
SPI	SAG power index
SPT	standard penetration test
Stantec	Stantec Consulting Ltd.
t	tonne (metric tonnes)
t/h	tonne per hour
t/y	tonne per year
Tacora	Tacora Resources
TDS	total dissolved solids
TFe	total iron content
TMF	tailings management facility
TSS	total suspended solids
TSX	Toronto Stock Exchange
TWM	Tailings and Water Management
US$	United States dollars
UTM	Universal Transverse Mercator Coordinate System
V	volt
VEC	valued ecosystem component
VIU	value in use
VoIP	Voice over Internet Protocol
VWP	vibrating wire piezometers

Abbreviation	Description
W:O	waste:ore ratio
WBS	work breakdown structure
WEC	work element coding
WGM	Watts, Griffis and McOuat Ltd.
wmt	wet metric tonne
WR	whole rock
wt	weight
wt%	weight percent
WTP	water treatment plant
WWSC	White Wolf Snowmobile Club
WWTP	west water treatment plant
XRD	X-Ray Diffraction
XRF	X-Ray Fluorescence
y	year (365 days)

1. Summary

1.1 Introduction

The Kamistiatusset ("Kami") Iron Ore Property is located southwest of the towns of Wabush and Labrador City in Newfoundland and Labrador and east of Fermont, Québec. The Property consists of four contiguous licenses and a mining lease forming one block and spans an area that extends approximately 10.5 km east-west and 13.5 km north-south in NTS map areas 23B/14 and 15 and centred at approximately 52°49'N latitude and 66°59'W longitude. The Property's perimeter is contiguous to Wabush Mine's mining lease (Lot #2 South) to the northeast, while the mining lease is 6 km from boundary. The Property is situated only 21 km southeast of the Company's operating Bloom Lake mine ("Bloom Lake"), in the Labrador Trough geological belt in southwestern Newfoundland, near the Québec border.

Champion Iron Limited ("Champion" or the "Company") acquired the Kami Project from Alderon on April 1, 2021.

In October 2022, the engineering consulting group BBA has been appointed to perform the present study for the development of the Kami Property (BBA/Authors, 2024) at the request of Champion.

The purpose of the present study is to review the studies and work done in the past and determine the feasibility of using the ore from Kami to produce a low-silica concentrate for the Direct Reduction ("DR") pellets market. To achieve that, Champion also appointed Soutex and Corem to perform a series of metallurgical testworks in 2022 and 2023.

In parallel, reviews of geological and mining aspects were carried out on the existing data, and redesign of the water management scheme, tailings management and other infrastructure was also done, again on the basis of data collected in the past by the previous owners.

The present Pre-feasibility Study summarizes the findings of these works.

1.1.1 Report Contributors

The major report contributors and their respective areas of responsibility are presented in Table 1-1.

Table 1-1: Report Contributors

Consulting Firm	General Overview of Responsibilities
BBA Inc.	▪ Report Integrator ▪ Site Main Infrastructure, including Process Plant, Water Management (East Area) ▪ Power Line from Flora Lake and Electrical Distribution ▪ Overburden, Ore and Waste Stockpiles ▪ Project Schedule and Risk Analysis ▪ Permanent and Construction Camp ▪ Capital and Operating Costs
G Mining Services Inc.	▪ Mineral Resources ▪ Mineral Reserves ▪ Mining Methods ▪ Mining Cost Estimates
Soutex Inc.	▪ Mineral Processing and Metallurgical Testwork ▪ Recovery Methods
AtkinsRéalis	▪ Water Management Infrastructures (West Area) ▪ Baseline Hydrogeology
WSP Canada Inc.	▪ Tailings Management Facility ▪ Site Geotechnical
SYSTRA Canada Inc.	▪ Railway - New Rail – Wabush/Pointe-Noire
CIMA+	▪ Port Infrastructure
Okane Consultants	▪ Rehabilitation and Closure Plan

1.2 Geology and Mineralization

The Property is situated in the highly metamorphosed and deformed metasedimentary sequence of the Grenville Province, Gagnon Terrane of the Labrador Trough ("Trough"). The Trough is comprised of a sequence of Proterozoic sedimentary rocks, including iron formation, volcanic rocks and mafic intrusions. Trough rocks in the Grenville Province are highly metamorphosed and complexly folded. Iron deposits in the Gagnon Terrane, (the Grenville part of the Labrador Trough) include those on the Property (Rose and Mills Lake), those in the Manicouagan-Fermont area (Lac Jeannine, Fire Lake, Mont-Wright, Mont-Reed, and Bloom Lake), as well as deposits in the Wabush-Labrador City area (Luce, Humphrey and Scully).

The high-grade metamorphism of the Grenville Province is responsible for recrystallization of both iron oxides and silica in primary iron formation, producing coarse-grained sugary quartz, magnetite, and specular hematite schist or gneiss (meta-taconites) that are of improved quality for concentration and processing. The Property is underlain by folded sequences of the Ferriman Group (previously Knob Lake Group) or Gagnon Group containing Wabush/Sokoman Formation iron formation and underlying and overlying units. The stratigraphic sequence varies in different parts of the Property.

The iron formation on the Property is of the Lake Superior-type. Lake Superior-type iron formation consists of banded sedimentary rocks composed principally of bands of iron oxides, magnetite and hematite within quartz (chert)-rich rock with variable amounts of silicate, carbonate and sulphide lithofacies.

The oxide iron formation ("OIF") consists mainly of semi-massive bands, or layers, and disseminations of magnetite and/or specular hematite (specularite) in recrystallized chert and interlayered with bands (beds) of chert with iron carbonates and iron silicates. All variations of the magnetite- or hematite-rich layers exist, mostly as a transition between the two endmembers. Other variants exist, generally with minor amount of magnetite and hematite, dominated by chert (lean iron formation), iron silicates, iron carbonates, iron silicates and carbonates, or quartz-rich iron formations. Grunerite is the most common mineral of the silicate iron formations and is often observed at the footwall for the Rose Central ("RC") mineralization. Some sub-members of the OIF contain increased amounts of hematite (specularite) associated with manganese silicates and carbonates.

In the Mills Lake area, approximately 3 km south-southeast of Rose, the iron formation consists of a gently east-northeast dipping tabular main zone with several parallel ancillary zones. The iron formation in the Rose area consists of a series of corrugated steeply plunging, northeast-southwest oriented sub-parallel upright to slightly overturned anticlines and synclines.

1.3 Exploration and Drilling

All recent exploration and drilling on the Property were completed either by Altius or Alderon. Altius commenced reconnaissance mapping and rock sampling during the summer of 2006. In 2007, their exploration program also included a high-resolution helicopter airborne magnetic survey and line cutting. The results of the 2007 program were positive and the airborne magnetic survey effectively highlighted the extent of the iron formation. Following the 2007 program, Altius acquired additional property and commenced an exploration program in 2008 consisting of rock sampling, line cutting, a ground gravity and magnetic survey, high-resolution satellite imagery, an integrated 3D geological and geophysical inversion model and 6,013 m of diamond drilling in 25 holes (including two re-drilled abandoned holes). Drilling confirmed the presence of iron oxide-rich iron formation and extended the known occurrences along strike and at depth. All 2008 exploration holes were drilled in BTW (42.1 mm) core diameter.

Following the acquisition of the Property by Alderon in 2010, exploration drilling commenced on June 1st of the same year. Following drilling campaigns took place in winter 2011 and in summer 2011-2012.

The first campaign, in summer 2010, focussed on the Rose Central and Mills Lake deposits; however, a few drillholes were targeted on the Rose North ("RN") and southwest Rose zones. A total of 25,900 m in 82 holes were drilled.

In the winter of 2011, Alderon’s drilling program consisted of 29 holes totalling 4,625 m on the Rose North deposit, with one hole drilled on Rose Central for metallurgical sampling.

The Summer 2011-2012 program started in June 2011 and continued through to the end of April 2012. The holes were drilled throughout the Rose Lake area and holes were also completed on the Mills Lake deposit. Exploration drilling aggregated to 101 exploration drillholes totalling 29,797 m. An additional 46 geotechnical holes under Stantec’s management, including several abandoned drillholes, were drilled for pit slope design and general site planning purposes. Four additional holes of the KXN-series were drilled from the north end of Mills Lake north towards the northern boundary of the Kami Property for condemnation purposes.

The purpose of the most recent drilling program was for mineral resource conversion and to provide more information for mine planning and metallurgical testwork.

Drilling campaigns by Alderon was carried out with NQ (47.6 mm), HQ (63.5 mm) and a combination of HQ-NQ core diameter.

No exploration or mineral resource diamond drilling was completed by Champion since the acquisition. As part of G Mining Services ("GMS") 2021 site visit, a sampling program was undertaken to evaluate the potential of iron-rich, value-added material mostly at the footwall of Rose Central. A total of 91 samples were collected, but none of these samples were used in the mineral resource estimate presented in this Report since they showed that the footwall unit was not mineralized in magnetite and/or hematite.

During the fall of 2023, hydrogeological and geotechnical field campaigns were simultaneously completed by AtkinsRéalis. The first objective of the hydrogeological campaign was to obtain additional hydraulic conductivity data in the bedrock units, and more specifically, to characterize the hydraulic conductivity of the fracture zones present in the Rose Pit area. Another campaign objective was to determine the current groundwater and surface water quality in the Rose Pit area. The results of the campaign are currently being analyzed and will be used in the next phases of the Project.

An aerial LiDAR survey was done on the Property in August 2023. Map from the LiDAR survey was delivered after the completion of the geological model and was not used in this study. Map will be used in the next study and for field preparation work.

1.4 Sample Preparation and Data Verification

Altius and Alderon used similar sample preparation and assaying methods with SGS Minerals Services of Lakefield (ON, Canada) as the primary laboratory for all routine XRF, Satmagan, iron oxide by Titration and Davis Tubes assays. Samples were crushed to 9 mesh (2 mm), then 500 g or 250 g riffle split for pulverization to 200 mesh (75 µm). Whole rock analysis was performed by lithium metaborate fusion XRF, FeO by H_2SO_4/HF acid digest-potassium dichromate titration, and magnetic Fe by Satmagan. A few samples were taken for S analysis by LECO, based on visual observations of potential sulphide material.

Core logging and sampling procedures were validated by GMS personnel during an extensive site visit where more than 30 drillholes were inspected for mineralized intervals, logging accuracy, sampling intervals and footwall and hanging wall rocks. During that visit, the existing geological models of Rose Central, Rose North and Mills Lake, recovered from Alderon, were reviewed against core observations of mineralized OIF intercepts. GMS also collected samples as independent checks. Sampling was found to be generally consistent with mineralized intervals, and independent samples did not show any bias or inconsistencies with accuracy and precision of the analysis methodologies.

1.5 Mineral Processing and Metallurgical Testwork

This Pre-feasibility Study ("PFS") is based on the historical metallurgical testwork and on the testwork performed specifically for this PFS. Results from this testwork were used to determine process performance parameters such as material throughput, Fe and weight recoveries, final concentrate grade (including key elements such as Fe, SiO_2, MnO) and particle size. The key process performance parameters were then used as the basis for establishing the mine plan, sizing of equipment and, ultimately, to estimate project capital and operating costs which, in turn, were used for performing the economic analysis of the Project for the PFS.

The testwork was performed in two distinct phases:

- Phase 1 aimed at validating and optimizing the process flowsheet designed in the previous studies using six drill core composite samples representing the six different mineralization (RC1, RC2, RC3, RN1, RN2 and RN3) weighing approximately 300 kg each;
- Phase 2 aimed at validating the final flowsheet performance by running continuous/semi-continuous pilot scale testwork using three composite samples weighing approximately two tons each.

The main tests performed consisted of the following:

- Ore mineralogical analysis for the six Rose deposit ore types from Phase 1 testwork;
- Gravity test program including rougher spirals and cleaner Reflux® Classifier testwork;
- Magnetic separation test program;
- Flotation testwork to produce a low-silica grade concentrate;
- Solid/Liquid separation testwork.

Sample were selected to be representative of the mineralogical types considering the available samples and the weight required. Phase 1 samples are covering the overall area, and some mineralization type comes from a single drillhole. Phase 2 samples are covering most areas for each mineralization type and present ore from various depths, which should increase their representativity of the ore body.

Mineralogical analysis provided important information to support the understanding of the mineralogical and metallurgical differences between the ore types found in the Rose deposit. It showed that the iron distribution in the minerals was very similar to the life of mine ("LOM"). The proportion of economic iron averaged 85.5%, close to the proportion of economic iron in the current LOM (89.8%).

All samples showed a fine liberation size, and observation of high proportion of fine iron oxide inclusions within quartz particles in the -425 +300 µm fractions supported the selection of a finer grind size (100% -600 µm) than the previous studies (100% -1,000 µm).

Rougher spirals optimization tests were conducted in closed loop on WW6 spirals during Phase 1 test program, and production runs were done afterwards to produce material for the next testing steps during Phase 1 and Phase 2 testwork. The results obtained were in line with the one obtained on spirals testwork performed in previous study. The rougher spirals testwork consistently generated a concentrate above 49% Fe with a Fe recovery above 80%, which is satisfactory considering the economical Fe level of the samples.

Due to its known efficiency at recovering fine iron particles compared to conventional spirals, it was decided to test the Reflux® Classifier at the cleaner stage. The Reflux® Classifier tests demonstrated better results than the combined cleaner and recleaner WW6 spirals performances tested in the previous Phases. Due to the pilot scale of the Reflux® Classifier device that was used (RC100), the number of tests performed was limited but allowed sufficient performances to include the Reflux® Classifier in the process flowsheet to clean the rougher spiral concentrate in one stage. The cleaner testwork showed a spiral rougher concentrate could be upgraded to a concentrate with less than 4.5% SiO_2 achieving Fe recoveries above 90%.

The magnetic separation circuit was tested through three pilot plant on the spiral tails. The performance of the magnetic separation circuit on the Reflux® Classifier overflow was extrapolated with a comparative analysis of the Davis Tube tests on the spiral tails. Pilot tests results showed that an increase in the cobber magnetic field and the removal of the cleaner LIMS allowed an increase in the magnetite recovery. Grinding at a P_{80} of 45 µm was required to achieve SiO_2 grade around 5% SiO_2.

Batch flotation tests were performed on gravity concentrate (cleaner Reflux® Classifier underflow) and magnetite separation circuit concentrate to produce a final concentrate suitable for the production of Direct Reduction pellets. The tests performed showed that the flotation of the gravity concentrate achieved an average SiO_2 grade of 1.8% at an average Fe recovery of 94% while the flotation of the magnetic concentrate achieved an average SiO_2 grade of 2.7% at an average Fe recovery of 98%.

The testwork performed during the PFS permitted to design a revised processing flowsheet that will enable the production of a low silica grade concentrate suitable for direct reduction. Based on the testwork results, recovery models were developed for the Fe and MnO and included in the process mass balance for the concentrator.

1.6 Mineral Resource Estimate

Mineralization at Rose and Mills Lake was modelled as magnetite- or hematite-rich layers, or a combination of both, based on the magnetite and hematite content, magnetite/hematite ratio, geological logging, manganese content, specularite occurrences and grain size. The model resulted in several sub-domains for Rose Central, Rose North and Mills Lake. Assays (Fe_2O_3, Magnetite Fe, Silicate/Carbonate Fe, Al_2O_3, CaO, MgO, MnO, SiO_2) were composited to 3.0 m run lengths, with residuals less than 1.0 m retained and included in the previous interval. No capping was applied to any of the elements interpolated.

Two sub-block and rotated block models were generated in Leapfrog Edge v.2021.1 for Rose (Rose Central and Rose North combined) and Mills Lake. A parent block size of 10 m x 20 m x 10 m was used for both block models, with a minimum sub-block size of 5 m x 10 m x 5 m triggered by the topography and overburden surfaces, the geological model, and the 6-m dilution skin around mineralized sub-domains.

Experimental variograms were produced for each sub-domains and each element, aligned with the clearest angle of continuity. Ordinary Kriging ("OK") was used to interpolate most domains and elements. For the domains SIF-RN1 and M_HZ and elements Al_2O_3 and MnO, grade was interpolated using the Inverse Distance square method ("ID^2").

Parents blocks were estimated using a four-pass estimation approach, with increasing ellipsoid size from 100-120 m x 60-90 m for the first pass to 300 m x 250 m for the fourth pass. The same sample search criteria were used for all domains and all elements with a maximum of three composites per hole, and a minimum of three drillholes for the first and second passes, and two drillholes for the third and fourth passes. The fourth pass is to ensure proper block population throughout the wireframe volumes. All interpolation used variable ellipsoid orientation ("dynamic anisotropy") based on the geometry of each domain. A visual validation was undertaken to ensure that ellipsoid orientation matches the orientation of the folds, and that no artefact were induced due to inconsistent ellipsoid orientation in folded areas. Hard boundaries were used for all sub-domains, except between RN2 and RN3A where a soft boundary was used, based on a gradational transition from hematite to magnetite dominance

Validation of block grades was undertaken using several methods for all sub-domains: visual checks in section and plan views, global comparison of block grades against Nearest Neighbour estimates ("NN") and composite grades, and local statistical validation with swath plots in all three directions.

Bulk densities were assigned on a block-by-block approach, using a regression formula against Total Fe for each sub-domain, by interpolation for waste material and by fixed value for the overburden and remaining waste material.

Block model grades for the Kami Project were classified according to the CIM Definition Standards for Mineral Resources and Mineral Reserves (2014) and adhere to the CIM Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines (2019). The classification also adheres with the JORC Code (2012).

The mineral resource classification considers various factors, such as variogram ranges, but is mostly based on average drillhole spacing, the number of samples used in the interpolation, confidence in the geological interpretation and recovery methods. All potentially limonite-rich blocks were classified as Inferred. In general terms, the following rules defined the resource classification:

- Measured Mineral Resources are defined where blocks have an average distance to the nearest three drillholes of less than 70 m.
- Indicated Mineral Resources are defined where blocks have an average distance to the nearest three drillholes of less than 150 m.
- Inferred Mineral Resources are defined where blocks have an average distance to the nearest three drillholes of less than 200 m. Limonite-rich and Rose North footwall (SIF_RN1) domains are classified as Inferred.

The proportion of Measured, Indicated and Inferred Mineral Resources reported reflects the confidence the Competent Person has on the deposit. The drill spacing is the main factor limiting a classification upgrade, whereas more metallurgical input is needed on limonite-rich areas. Overviews of block classification is shown in Figure 1-1 and Figure 1-2 for Rose (Rose Central and Rose North combined) and Mills Lake respectively.

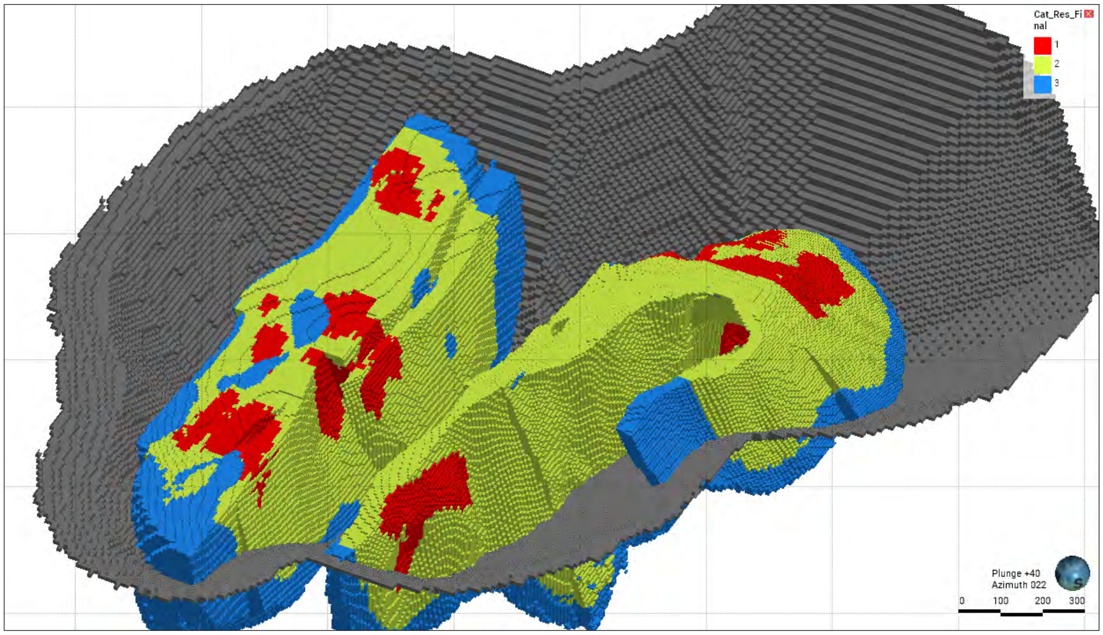


Figure 1-1: Isometric View of Rose Central (right) and Rose North (left)
Classification and Open Pit Optimization – View Looking Northeast. Measured in Red, Indicated in Yellow, and Inferred in Blue

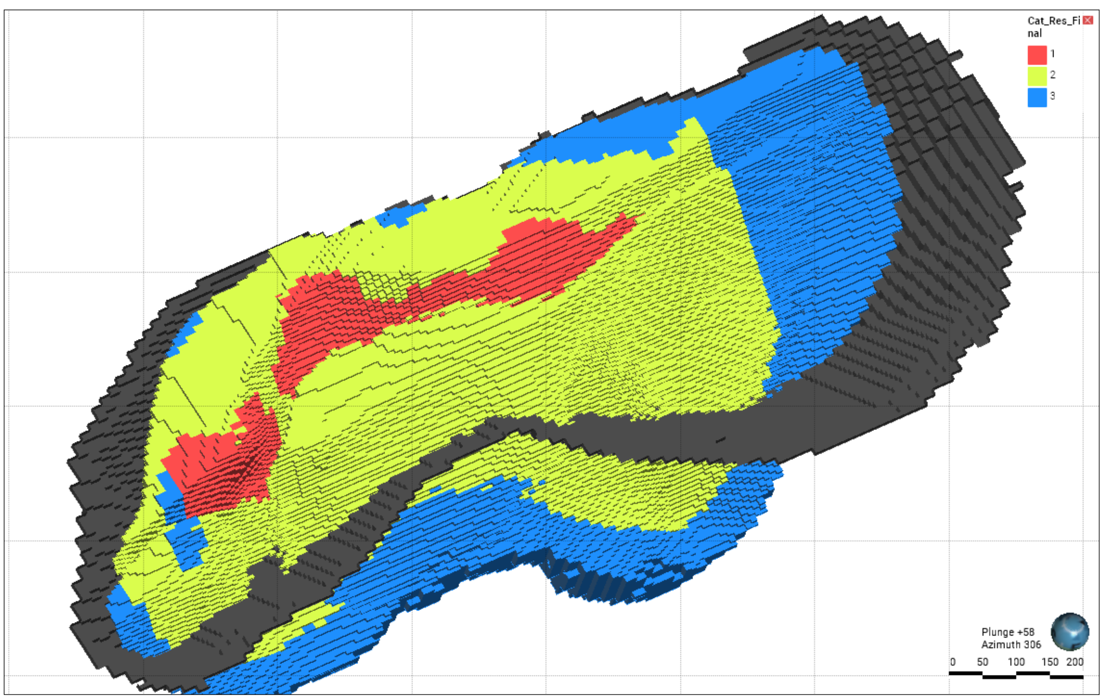


Figure 1-2: Isometric View of Mills Lake Classification and Open Pit Optimization
View Looking Northwest. Measured in Red, Indicated in Yellow and Inferred in Blue

The block model was re-blocked to a regular 10 m x 20 m x 10 m block size before import into GEOVIA Whittle software for pit optimization. To demonstrate Reasonable Prospects for Eventual Economic Extraction ("RPEEE"), the Mineral Resource stated herein is constrained by an optimized pit shell using the parameters tabulated in Table 1-2 and only Iron associated to Magnetite and Hematite was used as payable metals. The resulting cut-off was calculated at 7.35% Total Fe and raised to 15% Total Fe.

The Mineral Resource Estimate ("MRE") was prepared by GMS with an effective date of November 15, 2022. The QP has validated and verified the underlying data used to produce and classify this Mineral Resource Estimate.

The Mineral Resource is composed of two distinct deposits: Rose and Mills Lake. Rose, divided in Rose North and Rose Central, accounts for approximately 90% of the Mineral Resource Estimate. The Mineral Resource Estimate is constrained inside an optimized pit shell and is reported for recoverable minerals containing iron (magnetite and hematite).

Table 1-3 presents the mineral resource for the Kami Project, estimated at a cut-off grade of 15% Fe, inside an optimized open-pit shell based on a long-term reference iron price of CAN$124/dmt and CAN$26/dmt added as an iron concentrate premium for a concentrate at 65.2% Fe, for a total of CAN$150/dmt. An exchange rate of 1.30 CAN$/US$ was used. The open-pit Measured and Indicated Mineral Resource for the Kami Project, including the Rose and Mills Lake pits is estimated at 975.5 million tonnes ("Mt") with an average grade of 29.6% Fe, and an open-pit Inferred Mineral Resource at 163.0 Mt with an average grade of 29.2% Fe. Mineral resources that are not mineral reserves do not have demonstrated economic viability.

Table 1-2: Optimization Parameters

Pit Optimization Parameters		
Mineral Resources	Unit	Value
Crude Ore	Mt/year	26
Mining Recovery	%	97.50%
Process Recovery	%	85%
Fe Grade	% Fe	28.60%
Final Weight Recovery	%	36.40%
Fe Recovery	%	83.55%

Pit Optimization Parameters		
Revenues	**Unit**	**Value**
Concentration Ratio	t con./t ore	0.364
Fe Metal Mined	t metal/t ore	0.239
Concentrate Production	Mt con.	9.452
Concentrate Production Less Concentrate Losses (1%)	Mt con.	9.357
Concentrate Fe Grade	% Fe	65.20%
Concentrate Moisture Content	%	0.00%
CAN$ to US$	CAN$/US$	1.30
Reference Price (China sales Price) 65% Fe	$/dmt con.	150.00
DR Quality Premium	$/dmt con.	0
Si + Al + P Adjustment	$/dmt con.	0
Royalties & Ocean Freight	$/dmt con.	-37.00
Net Revenue (FOB Sept-Îles)	$/dmt con.	113.00
Railing and Ship Loading	$/dmt con.	-21
Net Revenue (FOB Kami)	$/dmt con.	92.00
Ore Value	$/dmt ore	33.44
Ore Based Costs	**Unit**	**Value**
Processing, Maintenance	$/dmt ore	3.85
G&A Costs	$/dmt ore	2.72
Tailings Sustaining Capital	$/dmt ore	0
Rehabilitation and Closure Cost	$/dmt ore	0.37
Total Ore-based Cost	$/dmt ore	6.93
Operating Margin	$/dmt ore	26.52
Operating Margin Rate (before mining)	%	79%
Mining Costs & Parameters	**Unit**	**Value**
Incremental Bench Cost	$/t/10 m	0.032
Reference Elevation	RL	655
Mining Costs	$/t mined	2.74

Table 1-3: Kami Mineral Resources

Classification	Mass (Mt)	TFe (%)	Fe in Mag (%)	Fe in Hem (%)	Fe in Mag+Hem (%)	MnO (%)	SiO_2 (%)
Measured	212.4	30.2	14.8	13.0	27.8	1.6	47.5
Indicated	763.0	29.5	16.2	10.0	26.2	1.5	47.6
M&I	975.5	29.6	15.9	10.7	26.6	1.5	47.6
Inferred	163.0	29.2	14.5	11.9	26.4	1.2	48.0

Notes on Mineral Resources:

1. The Mineral Resources described above have been prepared in accordance with the CIM Standards (Canadian Institute of Mining, Metallurgy and Petroleum, 2014) and follow the Best Practices outlined by CIM (2019).
2. The QP for this Mineral Resource Estimate is Christian Beaulieu, P.Geo., consultant for G Mining Services Inc. Mr. Beaulieu is a member of the Professional Engineers and Geoscientists of Newfoundland & Labrador (#10653) and of l'Ordre des géologues du Québec (#1072).
3. The effective date of the Mineral Resource Estimate is November 15, 2022.
4. The cut-off used to report Open Pit Mineral Resources is 15.0% total iron (TFe).
5. Density is applied by rock type and is related to the amount of iron in each block.
6. Pit optimization parameters are described as follows:
   i. Iron price of $150/dmt: $124/dmt of long-term reference price, and $26/dmt added as an iron concentrate premium (P65 index);
   ii. Concentrate grade of 65.2% Fe;
   iii. Exchange rate of 1.30 CAN$:US$;
   iv. Metallurgical recoveries of 83.55%;
   v. Mining costs of $2.74/t mined;
   vi. Total ore based costs of $6.93/dmt;
   vii. Overall slope angle varies from 48.4° to 51.6° for the footwall and hanging wall domains respectively.
7. Measured, Indicated and Inferred Mineral Resources have been defined mainly based on drillhole spacing.
8. Mineral Resources (Rose Central, Rose North and Mills Lake combined) have a stripping ratio of 2.0:1 (W:O).
9. The tonnages and grades outlined above are reported inside a block model with parent block size of 10 m x 20 m x 10 m, and subblocks of 5 m x 10 m x 5 m.
10. Tonnages have been expressed in the metric system and metal content as percentages. Totals may not add up due to rounding.
11. Mineral Resources are not Mineral Reserves as they have not demonstrated economic viability. The quantity and grade of reported Inferred Mineral Resources are uncertain in nature.
12. The qualified person is not aware of any factors or issues that materially affect the Mineral Resource Estimate, other than normal risks faced by mining projects in the province in terms of environmental, permitting, taxation, socio-economic, marketing, political factors, and additional risk factors regarding Indicated and Inferred resources.

1.7 Mining Methods

The Kami Project is planned as a conventional open pit mine combined with an In-pit Crushing System ("IPCS") for waste rock. Mining operations will utilize drills, haul trucks coupled with hydraulic shovels, and a semi-mobile waste IPCS, with the ore crusher located at the pit exit on the east side. The Project contains the Rose pit, which is to be split into three phases. The peak mining rate is expected to be 81.0 Mt/y over a LOM of 25 years. A total of 643 Mt of ore will be mined at an average total iron ore grade of 29.2% with a total of 1,019.5 Mt of combined waste and overburden, resulting in a stripping ratio of 1.6 tonnes of waste per tonne of ore mined.

Table 1-4: Mineral Reserve Estimate

Mineral Reserves by Category	Unit	Proven	Probable	Proven & Probable
Diluted Ore Tonnage	Mt	167	476	643
Diluted Iron Grade in Hematite	%Fe in Hem	13.84	10.6	11.4
Diluted Iron Grade in Magnetite	%Fe in Mag	13.18	15.1	14.6
Diluted Total Iron Grade	%TFe	29.7	29.0	29.2
Concentrate Tonnage	Mt	54.8	157.6	212.4
Concentrate Iron Grade	% Fe	67.6	67.6	67.6

Notes on Mineral Reserves:

1. The Mineral Reserve described above has been prepared in accordance with NI 43-101 Standards of Disclosure for Mineral Projects and the CIM definition of Standards for Mineral Resources and Mineral Reserves.
2. The QP for this Mineral Reserve Estimate is Alexandre Dorval, mining engineer at G Mining Services Inc. Mr. Dorval is a member of the Professional Engineers and Geoscientists of Newfoundland & Labrador (#11042), of Professional Engineers Ontario (#100214598) and of l'Ordre des Ingénieurs du Québec (#5027189).
3. Mineral Reserves based on an updated Lidar dated September 2011.
4. Mineral Reserves are estimated using a long-term iron price reference price (Platt's 62%) of US$ 80/dmt and an exchange rate of 1.3 C$/US$. An Fe concentrate price adjustment of US$ 20/dmt was added as an iron grade premium.
5. Bulk density of ore is variable but averages 3.1 t/m^3.
6. Cut-off grade of 15% TFe used to calculate reserves.
7. The average strip ratio is 1.6:1 W:O.
8. The Mineral Reserve includes a 1.4% mining dilution calculated using a dilution script.
9. The number of metric tonnes was rounded to the nearest thousand. Any discrepancies in the totals are due to rounding; with rounding following the recommendations detailed in National Instrument 43-101 – Standards of Disclosure for Mineral Projects ("NI 43-101").
10. See the appendix in the Company's quarterly activities report filed on January 31, 2024, on the ASX at www.asx.com.au *on January 31, 2024, for additional information regarding Joint Ore Reserves Committee ("JORC").*

1.8 Recovery Methods

The metallurgical test program conducted during the PFS allowed for the design of an optimized processing flowsheet. Process design criteria, material and water balance, equipment selection and sizing were developed and provide the basis for the processing plant and related capital and operating cost estimates for the Project.

Table 1-5 summarizes the general parameters upon which the concentration plant design has been based.

Table 1-5: Process Design Basis for Kami Concentrator

Parameter	Unit	Nominal Value	Design Value
Operating Schedule			
Annual Operating Time	d/y	365	-
Equipment Utilization - Crusher	%	65.0	-
Equipment Utilization - Concentrator	%	92.8	-
Mill Feed			
Mill Feed Annual Capacity	t/y	26,000,000	-
Mill Feed Rate	t/h	3,200	3,850
Mill Feed Fe Grade	%	29.2	-
Mill Feed Magnetic Fe Proportion	%	50.0	85.0
Concentrate			
Concentrate Annual Production	t/y	8,577,231	
Concentrate Production Rate	t/h	1,056	-
Concentrate Weight Recovery	%	33.0	-
Concentrate Fe Recovery	%	76.4	-
Concentrate Fe Grade	%	67.6	-
Concentrate SiO_2 Grade	%	2.1	-
Gravity Separation and Concentrate Flotation Circuit			
Gravity Circuit Feed	t/h	3,200	3,850
Gravity Circuit Concentrate Production	t/h	917	1,239
Magnetic Separation and Concentrate Flotation Circuit			
Cobber Concentrate	t/h	498	836
Magnetic Circuit Concentrate Production	t/h	139	237
Tailings Circuit			
Tailings generated	t/h	2,144	2,653

The process flowsheet and resulting plant design consists of the major processing areas as described below:

- The run of mine ("ROM") material crushing takes place in a single gyratory crusher located in the vicinity of the Rose deposit;
- Crushed material is conveyed using an overland conveyor that discharges onto a covered stockpile located ahead of the Kami concentrator;
- Crushed material from the stockpile is reclaimed onto a belt conveyor feeding the Autogenous Grinding ("AG") mill;
- AG mill discharge is screened using a two-stage screening circuit. Oversize from the scalping and classification screens is recirculated back to the AG mill;
- Slurry from the grinding and screening circuit is first subjected to gravity concentration using rougher spirals and cleaner Reflux® Classifier that produce a tailings stream and a gravity concentrate;
- The gravity concentrate is further reground in a tower mill closed-circuit and processed through an iron ore reverse flotation circuit that permits to produce a low-silica grade final gravity concentrate;
- Tailings from the gravity separation circuit are subjected to a magnetic separation process. The concentrate of the first magnetic separation stage, the cobber stage, is reground in two stages and magnetite is recovered gradually through two additional stages of low intensity magnetic separation ("LIMS");
- The magnetic concentrate is processed through flotation columns that permit to remove liberated silica through iron ore reverse flotation and produce a low-silica grade final magnetic concentrate;
- Concentrate from the gravity circuit is processed through cyclones to remove fine particles and the coarse underflow is dewatered using pan filters with steam injection. The fine overflow from the cyclones is combined with the fine concentrate from the magnetic separation circuit to be dewatered by thickening and press-filtration;
- Filtered concentrates are combined on a belt conveyor, which directs the product to the train load-out silo system;
- Tailings from the magnetic separation circuit (cobber, cleaner and finisher) are combined and treated through cyclones where they are dewatered, and coarse and fine fractions are separated. The coarse tailings (cyclones underflow) are pumped to the Tailings Management Facility ("TMF") and used for progressive dam construction. The fine tailings (cyclones overflow) are directed to a thickener where they are dewatered and subsequently pumped to the TMF and deposited based on the tailings deposition plan.

1.9 Project Infrastructure

1.9.1 Rose Pit, Rose North Overburden Stockpile and Rose South Waste Rock Stockpile Water Management Infrastructures – West Area

Management of the runoff and infiltration water in the Rose Pit will require the construction of water management infrastructures. To manage the runoff and infiltration in the Rose Pit, two permanent sumps will collect the contact-water and pump it to the Rose Pit Collection Pond, located south of the pit. This 4 Mm^3 collection pond will be created with the construction of two dams incorporating sealed foundation to the bedrock at the outlet of Elfie Lake and End Lake. The collection pond will also receive the runoff contact-water from the Rose North Overburden Stockpile and the Rose South Waste Rock Stockpile. Runoff from both stockpiles will be collected via collection ditches and ponds surrounding the stockpiles, then pumped to the collection pond. A treatment plant for total suspended solids ("TSS") with a capacity of 7,100 m^3/h will be located west of the collection pond, and the treated water will be discharged to Pike Lake South.

To intercept natural drainage flowing from south to north and preventing the flooding of the pit, a dam will be built downstream of Mid Lake, located south of the Rose pit. The clean (non-contact) water from Mid Lake will be diverted to Pike Lake South by pumping, with the possibility to treat it at the treatment plant beforehand, if required. In order to prevent non-contact water from entering the Rose Pit, four diversion ditches surrounding the pit will convey runoff water by gravity to Mills Lake, Mid Lake, and Pike Lake South.

A dike will be built towards the south portion of Pike Lake to secure mining operations. The south portion of Pike Lake South created by the Pike dike construction, will be dewatered and kept dry. This will move the lake away from the pit, reducing pressures and minimizing seepage towards the pit.

1.9.2 Process Plant and Other Infrastructures

The general infrastructure and those specific for the main process are listed below:

- The access road to the Property consisting of a new road, bypassing the Town of Wabush and connecting to Highway 500 and a secondary access to the west of the Property.
- The on-site road work leading from the Property limit to the concentrator and to the crusher and mining services area.
- The mine roads designed specifically for mine haul trucks and other mining equipment connecting the pit to the crusher, waste rock areas and to the mine services area.

- The mine services area consisting of the truck wash bay, mine garage, workshop, warehouse, employee facilities, diesel fuel tank farm and fueling station, etc.
- The IPCS consisting of a semi-mobile crusher, conveyor and spreader to convey the waste rock and build the waste stockpile.
- The overburden and ore stockpiles located near the open pit.
- The primary crusher building.
- The overland conveyor and crushed ore stockpile near the processing plant.
- The ore processing plant (concentrator) and ancillary facilities.
- The concentrate load-out system including concentrate conveyors.
- Parking areas for employees, light vehicles and heavy mining vehicles.
- The fresh water pumping station to be located southeast of Long Lake.
- A new high-voltage ("HV") power transmission line from Churchill Falls to new Flora Lake substation.
- A power transmission line from future Flora Lake substation to Kami and main electrical Kami substation.
- The TMF, water reclamation system and east water treatment plant ("EWTP").
- Permanent worker camp and facilities to be built on-site, about 1 km northeast of the process plant.

General infrastructures, such as boiler room, fire protection systems, telecommunication systems, and sanitary facilities are also included.

1.9.3 Tailings Management Facility

A 420.4 Mt TMF will be established at the site for the storage of tailings solids waste from the processing plant, as well as operational and stormwater management. Tailings slurry will be pumped from the plant in two streams (coarse and fines) at a ratio of 2 coarse for 1 fine and, an average discharge slurry density of 55%. Coarse tailings deposition will be completed using spigots from the crest of the dam. The water pond will be pushed progressively away from the dam, against the natural topography with the development of the tailings beach. The fine tailings stream will be deposited into the facility as a single point discharge.

The TMF will consist of a total of five centerline construction method dams built in nine total embankment stages over the life of the facility. A starter dam will consist of a liner with a sand filter, a transition zone and a downstream shell of mine waste rock to control potential seepage. The geotechnical filter and transition zones will be extended on the natural ground to provide a blanket drain to provide seepage control and filter compatibility with the foundations. The embankment raises will consist of a centerline construction method, including raises with the upstream shell zone constructed of coarse tailings. The filter and transition zones will be extended vertically while the downstream shell will continue to be constructed of non-acid generating ("NAG") mine waste rock. Embankment fill materials will be provided from the mining operations and potentially from local borrow sources.

Water management within the TMF will consist of operational and stormwater management. Inflows consist of runoff from direct precipitation, pumping from eight surrounding sumps and slurry water in the tailings discharge. Outflows consist of water retained in the deposited tailings, evaporation losses, and water pumped back to the process plant from the TMF. A normal operating water level (“NOWL”) is established for the pond. Water from the pond is pumped back to the plant for use in processing and excess water is directed to the EWTP before discharge to the environment when needed. Contingency containment is provided above the NOWL for containment of significant storms. A spillway is also provided to prevent water from overtopping the dam in the event of an extreme precipitation event.

Mine contact water, consisting of runoff and embankment seepage, will be collected with collection ditches established along the toe of the perimeter TMF dam. Water collected in the ditches will be directed to eight sumps at various topographic low points around the dams. Water collected at the sumps will be pumped back to the TMF Pond via a pump and pipeline system.

1.9.4 Rail Infrastructure

At the Kami mine site, railcars will be loaded with iron ore concentrate, and then the loaded trains will travel on a newly constructed rail line to connect directly to the Quebec North Shore & Labrador railway ("QNS&L"). Loaded trains will then travel south on the railway to reach the Chemin de fer Arnaud ("CFA") at the Arnaud Junction interchange near Sept-Îles, Québec, where the *Société Ferroviaire et Portuaire de Pointe-Noire* ("SFPPN") will take over the operation of transporting the loaded train to the port of Pointe-Noire and carry out the unloading process. Specifically, unloading will occur on a new loop track at the Pointe-Noire terminal. Once unloaded, the trains will return to the mine, traveling northbound on the CFA and QNS&L railways.

Train service for Champion will be made up of 240-car unit trains, which will continually cycle between the mine and the port. The 240-car train size is mandated by QNS&L for all new unit train operations on their railway. Train makeup will consist of top-loading gondola cars, similar to those already in use by the Company. Trains will be flood loaded in a loading tower at the Kami mine. At Pointe-Noire terminal, trains will be unloaded using rotary railcar dumpers.

The operations strategy being pursued for rail haulage includes a train service to be provided by QNS&L between the Arnaud Jct. interchange and the proposed Kami line in Wabush. From there, the empty train is handed to the operating crew based in Wabush, who will run the train to the Kami mine site for loading.

All three alignments are summarized in Table 1-6.

Table 1-6: Alignments Summary

Description	Kami Mine	Arnaud Junction	Pointe Noire
Length of Alignment	23.2 km	3 km	10.45 km
Minimum Curve Radius Proposed	200 m	300 m	190 m

In order to size the future fleet of railcars, the requirements for both the summer and the winter months were calculated. To transport 25 Mt/y (Kami + Bloom trains combined), it is estimated that Champion would have to operate 3.32 trains per day in the summer, and 2.50 trains per day in the winter. Based on the current total cycle time, it was found that, at full production rate, another five train sets would be required in addition to the current fleet of five train sets (Bloom).

While gathering inputs for the simulation with all stakeholders (current operators on Bloom Lake Railway ("BLR") and at the port terminal), a consensus emerged that the current cycle time could be easily improved at no cost notably by reducing the waiting times at Arnaud Junction and Bolger. Therefore, at this stage and for the initial phase of the Project (ramp-up), it was decided to retain a new fleet of four train sets. Further analysis will be required to confirm this fleet optimization.

Hence, considering a 5% of spare wagons, the new fleet for Kami would amount to 1,008 cars (4 x 240 + 5%).

As far as the maintenance facilities for the required rolling stock are concerned, an expansion of the existing workshop at Pointe-Noire was considered in addition to minor storage and other facilities at the Mine site and within its vicinity.

1.9.5 Port Infrastructure

The actual multiuser port terminal, which is owned by SFPPN, will be used to handle Kami's iron ore concentrate. Kami ore concentrate trains will be unloaded through a new rotary dumper and stacked in the Wabush Yard. The car dumper planned for the new requirement capacity will be a double car rotary type dumper capable to achieve a maximum dumping cycle rate of 80 cars per hour.

The iron ore concentrate is discharged into a receiving hopper and transfers onto a series of conveyors and conveyor transfer towers and then onto a stacker/reclaimer. The stacker/reclaimer can either stack out the iron ore concentrate in the storage yard or reclaim it and load it onto a discharge conveyor to be conveyed to the Port of Sept-Îles ship loading system.

A second bucket-wheel stacker/reclaimer will be required in the Wabush yard to avoid stopping vessel loading when train dumping is necessary. This stacker/reclaimer will be of similar capacity than the one recently installed in Wabush yard. The reason for this is to be able to match the design ship loader and car dumper rates of 8,000 t/h.

A second belt conveyor and a moving belt tripper connected to both stacker/reclaimers will allow the two belts to feed material to stacker/reclaimer along the full length of the storage yard.

An additional ore storage pad of approximately 30,000 m^2 is proposed on the west side of the Wabush yard. The storage pad will be designed to capture all storm water that lands on it. A drainage collection system will be constructed into the base of the ore storage pad.

In terms of berth capacity, the Company is discussing the condition for additional berth capacity with Port of Sept-Îles and has assumed, for the purpose of this study, conditions similar to its last agreement with the port adjusted for inflation.

1.10 Market Studies and Contracts

Accounting for approximately 8% of global emissions according to the World Steel Association, the steel industry is poised to transition towards greener practices. This shift will likely involve mitigating the reliance on coal in the steel production process. One proven way to reduce the use of coal and its environmental impact involves a shift away from the Blast Furnace and Basic Oxygen Furnace steelmaking processes (“BF/BOF”), opting instead for the Direct Reduced Iron and Electric Arc Furnace route (“DRI/EAF”).

Such a dynamic to decarbonize the industry, in combination with a notable increase in DRI/EAF steel production, is fueling demand for DR-grade pellet feed material similar to the Kami Direct Reduction grade Pellet Feed (“DRPF”). In fact, CRU projects the demand for DR pellet feed to reach 310 Mt by 2050. Simultaneously, based on currently committed projects, there is expected to be a shortfall in supply of DR quality pellet feed, with supply expected to reach approximately 100 Mt by 2050. As a result, several new DR-grade iron ore projects will need to come online to fill this gap.

Given the absence of dedicated indices for accurate valuation of DR pellet feed, industry practice involves utilizing a comparable benchmark when pricing the value of the Kami DRPF. The Platts TSI IODEX 65% Fe CFR China ("65% Fe Index" or "P65 Index") is thus examined for assessing the value of the Kami DRPF, with the inclusion of a premium to account for the superior characteristics of DR grade material. Additionally, a freight adjustment is necessary since the base 65% Fe index is currently centered on iron ore sales delivered to Qingdao on a cost and freight (“CFR”) basis. Various methods of estimating prices are accepted as industry standards, therefore a blend of these methods have been used to determine the long-term price.

Champion examined long-term forecasts from industry specialists and trailing average prices to assess the 65% Fe Index. After a comprehensive review of methods, a Base Case Scenario of US$120.00/dmt was determined as indicative of the future market dynamics.

Given the scarcity of iron ore pellet feeds and their favorable chemical properties for steelmakers, market participants commonly agree that DR grade iron ores should command an additional premium to the 65% Fe Index. The industry often employs the value in use ("VIU") methodology to determine this premium, relying on theoretical and chemical considerations. Furthermore, Champion also engaged with CRU to assess the premium based on an EAF VIU approach. Considering both methodologies, a premium of US$34.00/dmt over the 65% Fe Index is established as the foundation for the anticipated future premium.

Given the concentration of iron ore customers in Asia, the calculation of freight costs relies on the C3 Capesize Freight Index, reported daily by the Baltic Exchange. Due to the anticipated growth in DR/EAF steelmaking, the Kami DRPF is poised to predominantly cater to the MENA and Europe regions, while also being a preferred product in the Asian market. Based on an expected customer base, freight costs are projected to align with the C3 Index value. Long-term forecasts and historical prices indicate an average value of US$22.00/wmt for the C3 index in this study.

Given the proximity of the Kami Project to the Bloom Lake mine, situated a few kilometres southeast, existing contracts offer potential economies of scale. Nevertheless, a number of key contracts and agreements necessary for the development and operation of the Kami mine will need to be put in place.

1.11 Environment and Stakeholder Consultation

Mining projects in the province are subject to Environmental Assessment ("EA") under the Newfoundland and Labrador *Environmental Protection Act,* and associated Environmental Assessment Regulations. Mining projects in the province may also be subject to the federal Impact Assessment ("IA") process, which is regulated under the *Impact Assessment Act* (formerly the Canadian Environmental Assessment Act [CEAA]). The Project had previously completed a provincial and federal environmental impact assessment process, which concluded following issuances of a federal decision statement and provincial EA release.

The federal decision statement concluded that the Project is not likely to cause significant adverse environmental effects. Unlike the *Impact Assessment Act*, decision statements issued under CEAA did not include time limits within which the Proponent must substantially begin to carry out the designated project. Champion will continue to consult with the Agency and other federal regulators to confirm the validity of the previous decision statement and potential federal impact assessment requirements.

No expiry dates were included in the provincial EA release; however, Section 17 of the Environmental Assessment Regulations, 2003 indicates that there is a 3-year term (with potential extensions up to 6 years) within which a release from the Minister remains in force. After the expiration of this period, if the Project has not commenced, the release is considered to be void. As such, the provincial environmental assessment process will need to be restarted for the Project. Champion will initiate the provincial EA process by submitting an updated Project Registration to the Newfoundland and Labrador Environmental Assessment Division of the Ministry of the Environment and Climate Change in 2024.

As part of the 2014 provincial EA release and federal decision statement, provincial and federal conditions were issued for the Project. Champion is committed to meeting all applicable provincial and federal conditions and implementing the recommended mitigation measures and monitoring programs. Through the ongoing planning and advancement of the Kami Project, Champion has already begun to address some of these conditions, including model refinement of existing hydrogeological environment around the proposed open pit and advancing geochemical characterization of acid-rock drainage and metal leaching potential of waste rock.

The Kami Property is generally a greenfield site consisting of small lakes and rivers located within semi-forested, barren and wetland areas. Various environmental baselines studies for the Kami Project area have been undertaken prior to and since the previous Feasibility Study was prepared for the Project in 2018. In parallel to the provincial EA process, Champion will be applying for and obtaining environmental permits for the Project.

Champion has been consulting on the Project with Indigenous groups, the public and local community stakeholders since the acquisition of the Project in 2021. Champion has and will continue to conduct a wide range of consultation initiatives to ensure that Indigenous groups, the public and local community stakeholders are informed of the progress of the Project and afforded an opportunity to express any concerns. Information will be disseminated through digital and print media, e-mail, and face-to-face meetings. Consultation activities between Champion, Indigenous groups, the public and local stakeholders to date have been focused on introducing the updated Project and holding meetings to discuss concerns and expectations for consultation. Champion will continue to consult with Indigenous groups, the public and local communities stakeholders as the Project progresses through the Project Registration and provincial EA process,

Contact water stemming from Project facilities, notably Rose Pit, and from the overburden and waste rock stockpiles is not expected to generate any adverse environmental effects associated with acid rock drainage ("ARD") and metal leaching ("ML"). Given the fact that nitrogen-based explosives will be used during the blasting operations, Ammonia, Nitrates and TSS are assumed to be the parameters of concern. Any contact water will be collected, pumped and treated through the west water treatment plant ("WWTP") to meet environmental standards before being discharged to Pike Lake. Contact water originating from the tailings management facility will be collected, pumped and treated to the EWTP. Treated contact water will either be reused for processing or discharged to Long Lake.

Champion is developing a Rehabilitation and Closure Plan in accordance with the Newfoundland and Labrador Mining Act (SNL 1999 M-15.1 Sections 8, 9, and 10), and Mining Regulations (42/00 Section 7). The intent of the Rehabilitation and Closure Plan is to ensure long term physical and chemical stability at the operation’s ultimate closure while ensuring maximum benefits to the local area surrounding the mine site and the Province of Newfoundland and Labrador. The intent of the

Rehabilitation and Closure Plan is to limit long term potential impacts of the mining operation and associated facilities on the surrounding environment. The Rehabilitation and Closure Plan is being developed to support future land use of accessible environmental, recreational, and future development opportunities where possible across the rehabilitated site. The Rehabilitation and Closure Plan will be aligned with the provincial environmental assessment process.

1.12 Capital Cost

Initial capital costs and sustaining costs were developed by various engineering firms as per the following:

- BBA Inc. – Process plant and site Infrastructure;
- G Mining Services Inc. – Rose Pit mine development inclusive of major production equipment, operational blending stockpile, IPCS waste stockpile, blending stockpile, mobile equipment fleet, overburden stockpile and explosives management;
- WSP Canada Inc. – Tailings Management Facility;
- AtkinsRéalis Inc. – Rose Pit and Rose stockpiles water management infrastructure;
- SYSTRA Canada Inc. – Kami railway line to connect the mine south of Wabush to the QNS&L Railway line;
- Okane – Closure costs.

BBA was mandated by Champion to integrate third party estimates, to assist in development of indirect costs and to perform a contingency analysis.

The Technical Report reflects an advanced PFS with a target accuracy of +/-20%, based primarily on engineering deliverables developed to a Class 3 estimate, as defined in AACE International Recommended Practice No. 47R-11 for the Mine and Concentrator portions of the estimate and a Class 4 level estimate for Tailings and Water Management portion of the estimate.

The estimate is expressed in constant Canadian dollars with a base date of December 22, 2023.

The capital cost estimate, totalling CAN$3,864M, encompasses all capital expenditures anticipated during the pre-production years (Y-4 to Y-1) and the ramp-up year (Y-0) up to the commencement of ore feed. This comprehensive cost also includes initial operational expenditures incurred in the pre-production phase, such as mine pre-stripping, construction of the mine waste stockpile, initial Tailings Storage Facility ("TSF"), operational costs, and capital costs associated with the IPCS.

Note, costs anticipated to be incurred before Y-4 are categorized as sunk costs and, as such, are not included in the Project CAPEX estimate or the financial model. The excluded costs covering future studies and permitting expenses incurred prior to Project approval are estimated at $52M.

Contingency is based on a probabilistic range analysis using Monte Carlo simulation yielding contingency of 15.8% of direct and indirect costs at P50 and estimate accuracy to the extreme points of the simulation measured from P50 of -18.8%, +18.5%.

Table 1-7 provides a summary of capital costs by major area in constant dollars.

Table 1-7: Summary of Capital Costs by Major Area

Initial CAPEX	Unit	CAN$	US$
Mine Site	M	627	483
Mining Fleet	M	183	141
Mining Pre-production OPEX	M	64	50
Processing	M	1,135	873
Tailings & Water Management (TWM)	M	472	363
Pre-production OPEX	M	5	3
Other	M	41	32
Total Direct CAPEX	M	2,528	1,945
Owners Cost	M	105	81
Contingency	M	474	365
Others Indirect	M	551	424
Total Indirect	M	1,130	870
Total Direct and Indirect	M	3,659	2,815
Kami Railroad	M	205	158
Total CAPEX Initial CAPEX	M	3,864	2,972

Table 1-8 provides a summary of sustaining capital costs over the life of mine by major area in constant dollars.

Table 1-8: Sustaining Capital by Area Over the LOM

Sustaining CAPEX	CAN$ (M)	US$ (M)
Mine Site	325	250
Processing	137	105
Mining Fleet	589	453
Tailings and Water Management	900	693
Total Sustaining	1,952	1,502

1.13 Operating Cost

The operating cost estimate was based on Q4 2023 assumptions. The operating cost estimate does not include contingencies. Many items of the operating cost estimate are based on firm supply quotations, budgetary quotations, benchmarking from Bloom Lake operation and allowances based on in-house data. The overall estimate combined inputs from BBA, GMS, WSP, AtkinsRéalis, Okane, SYSTRA, Cima+ and on benchmarking of the Champion Bloom Lake operation.

Costs are based on the Ore Reserve Estimate and LOM plan, presented in Chapters 15 and 16, respectively.

All site staff are expected to work in 12-hour shifts on a 14 days (on) / 14 days (off) basis comparable to the Bloom Lake operation.

Table 1-9 shows estimated annual workforce requirements. The site's workforce peaks at 677 people between Years 7 and 16.

Table 1-9: Annual Site Workforce Requirements

Category	Unit	Labour Required
Mining	#/year	327
Processing	#/year	210
Tailings and Water Management	#/year	61
Minesite G&A	#/year	79
Total Labour Required	#/year	677

The energy rate was estimated by Champion based on the NL forward industrial rate energy forecast considering transmission demand charges, generation demand charges and an allowance for an expansion build to supply transmission and distribution infrastructure of electricity to the Kami Site. Based on the estimate, the average rate would be estimated at $52/MWh based on the forward average rate between 2030-2040, including the fixed transmission and generation charges at spot rate and an addition over the LOM to finance transmission infrastructure.

The diesel and fuel rates were based on comparative current prices per litre based on Champion's Bloom Lake rate in Québec and the rates in NL, adjusted for the expected taxes and credits according to the NL regulation. These rates have been prorated to Champion's Bloom Lake historical average 3-year trailing prices.

Rates used in the estimate are summarized in the Table 1-10.

Table 1-10: General Rate Assumption

Factor	Unit	Value
Production Life of Mine	year	25
Mining (Tonnes Ex-pit) - LOM	M dmt	1,645
Mill feed - LOM	M dmt	643
LOM Concentrate Production	M dmt	212
Clear Diesel	CAN$/L	1.51
Colored Diesel	CAN$/L	1.34
Gasoline	CAN$/L	1.24
Site Electricity price (on site)	CAN$/KWh	0.052

Estimated average operating costs over the LOM for the Kami Project are summarized in following Table 1-11.

Table 1-11: Total Estimated Average LOM Operating Cost ($/t dry concentrate)

Operating Cost Summary Over LOM	Unit	CAN$	US$
Mining Cost	$/dmt concentrate	22.41	17.23
Processing Cost	$/dmt concentrate	23.21	17.85
Tailings and Water Management	$/dmt concentrate	2.76	2.12
Minesite G&A	$/dmt concentrate	7.51	5.78
Logistics Port and Rail	$/dmt concentrate	20.19	15.53
Total Cash Cost (C1 Cost)	$/dmt concentrate	76.08	58.52
CSR and Bonding(1)	$/dmt concentrate	2.84	2.18
Sustaining CAPEX	$/dmt concentrate	9.19	7.07
CAPEX Leased(2)	$/dmt concentrate	1.44	1.11
Total All-in Sustaining Costs (“AISC”)	$/dmt concentrate	89.54	68.88

(1) Bonding closure cost are included, while closure cost itself is excluded from presented AISC. It is included in the financial model.

(2) Leasing interests are included in the model but not included in the illustrated table.

1.14 Economic Analysis

The economic and financial analysis of the Kami Project contained in this Technical Report was carried out using a discounted cash flow approach on a pre-tax and after-tax basis. The analysis is based on the Project Mineral Reserves, capital and operating costs assembled in the study, and market economic assumptions.

All costs are expressed in calendar Q4 2023 Canadian Dollars without allowance for inflation, escalation, currency fluctuation, or interest during construction. Unless otherwise indicated, all costs in this section of the Technical Report are expressed in Canadian dollars. An exchange rate of US$1 = CAN$1.30 US was retained based on the direct forward consensus and applies to revenues in US$ and the costs incurred in US$.

The financial performance of the Project was calculated based on 100% equity financing except select leased items, even though Champion may decide in the future to finance part of the Project with debt financing. The net present value ("NPV") was calculated based on the cash flow generated by the Project, on pre- and post-tax basis, based on a discount rate of 8%. The internal rate of return (“IRR”) on total investment was calculated on pre- and post-tax basis from the moment of the 1st cash outflow for construction. The Project payback is calculated on the undiscounted after-tax cash flow basis as of the construction end (first operating cash inflow).

The economic analysis was performed using the following key assumptions and basis:

Table 1-12: Key Assumptions and Basis

Key Assumptions Summary	Unit	LOM
Mineral Reserves	M dmt	643
Production Life of Mine	year	25
Average Annual Production Dry	M dmt	8.6
Average Annual Production Wet	M wmt	9.0
Average Fe In-situ Grade to Plant	%	29.2%
Average Fe Metallurgical Recovery	%	76.4%
Average Concentrate Grade Sold	% Fe	DR quality iron ore above 67.5%
Average Concentrate Moisture	%	4.5%
Average Stripping Ratio	Waste : Ore	1.6

Key Assumptions Summary	Unit	LOM	
Macroeconomic and Market Assumptions		CAN$	US$
P65 Index CFR China Iron ore price	$/dmt	156.00	120.00
Average Shipping Cost	$/wmt	28.60	22.00
Average Diesel Clear	$/L	1.51	1.16
Average Electricity	$/KWh	0.052	0.040
Average Foreign Exchange	CAN$:US$	1.30	
Mining Duties	%	15.0%	
Tax Rate Provincial and Federal	%	30.0%	
Discount Rate	%	8.0%	
Capital Costs		CAN$	US$
Construction Period	month	48	
Initial CAPEX	M	3,864	2,972
Total CAPEX Sustaining over LOM	M	1,952	1,502
Total Closure Costs at end of LOM	M	300	231
Operating Cost per Tonne Sold		CAN$	US$
Total Cash Cost (C1 Cost)	$/dmt	76.10	58.50
Total AISC (excluding royalty)	$/dmt	89.50	68.90

Project revenue is derived from the sale of iron ore concentrate into the international marketplace. Pricing was estimated on a CFR China basis and shipping. shipping. Two price scenarios have been considered and based on index data: (I) Base Case based on a conservative pricing dynamic, (II) Trailing 3-years price for CY21-CY23.

The Kami Project is subject to three levels of taxation, including federal income tax, provincial income tax and provincial mining taxes. BBA has relied on Champion's in-house taxation model and expertise for the calculation of income and mining taxes applicable to the cash flow. The effective combined tax rate ("ETR") under the base case scenario ranges approximately from mid-30% to approx. 40% depending on the profit margins. The ETR as per the base case scenario is approximately 37% of estimated eligible taxable Project Earnings before taxes ("EBT").

The summary of the financial evaluation for the Project are presented in Table 1-13 Cash flows on a pre-tax and after-tax basis have been discounted at an 8% discount rate using a mid-year convention to Project Year -4.

Table 1-13: Economic Summary

Economic Results	Base Price Scenario		Market Price Scenario (3-Year Trailing Scenario: CY2021-2023)	
	CAN$	US$	CAN$	US$
P65 Index CFR China Iron ore price	156.00	120.00	197.86	152.20
C3 Index Price ($/wmt)	28.60	22.00	31.20	24.00
Pre-tax				
NPV In M At 8% Discount Rate	1,482	1,140	4,034	3,103
IRR	12.1%		18.0%	
After-tax				
NPV in M at 8% Discount Rate	541	416	2,195	1,688
IRR	9.8%		14.8%	
Payback Period (year)	7		5	

The pre-tax base case financial model resulted in an internal rate of return of 12.1% and a net present value of $1,482M with a discount rate of 8%. On an after-tax basis, the base case financial model resulted in an internal rate of return of 9.8% and a net present value of $541M with a discount rate of 8%. The after-tax undiscounted payback period as of the first cash inflow is 7 years.

A sensitivity analysis has been carried out, with the base case described above as a starting point, to assess the impact of changes in total pre-production (initial) CAPEX, OPEX, product prices (price) and the USD/CAD exchange rate on the Project's NPV @ 8% and IRR. Each variable was examined one-at-a-time (price forecasts of the different concentrate products are varied together). The sensitivities are based on an interval of ±30% with linear increments of 10% and are presented in Figure 1-3 and Figure 1-4.

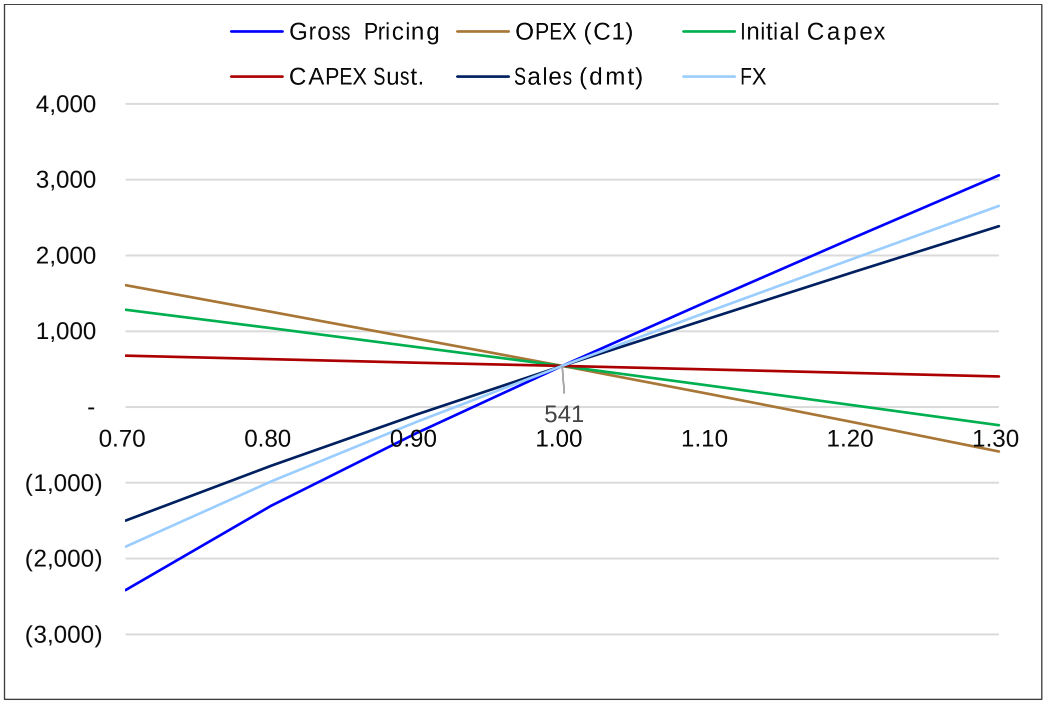


Figure 1-3: NPV ($M) Sensitivity Results (after-tax)

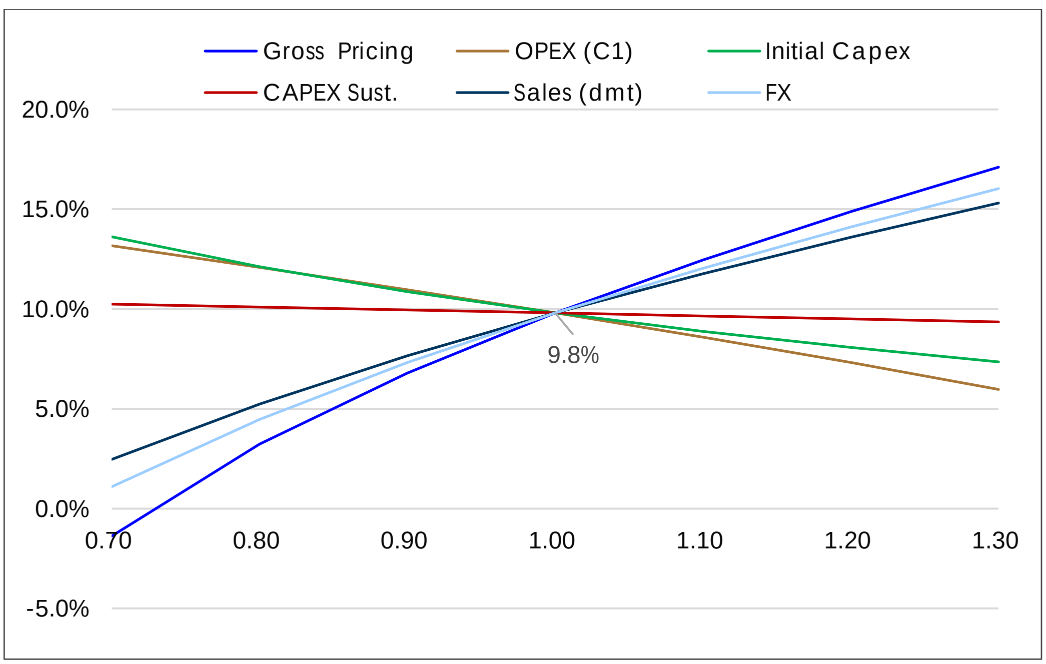


Figure 1-4: IRR Sensitivity Results (after-tax)

1.15 Project Schedule

The schedule was developed based on the information developed during this study. All dates in the milestone table below are expressed in terms of quarters relative to the start of production.

Table 1-14: Major Milestones

Milestones Description	Relative Date (Quarters)
Project Registration Submission	Q-27
EIS Decision on Project Registration	Q-26
Start Feasibility Study	Q-25
Draft EIS Guidelines	Q-25
EIS Submission	Q-23
Complete Feasibility Study	Q-21
Start Basic Engineering	Q-20
Start Detailed Engineering	Q-18
Certificate of Authorization Received	Q-16
Start Construction Early Work	Q-16
Construction Power Available	Q-13
Concentrator First Concrete	Q-12
Start Tailings Management Facility Construction	Q-12
First Room Available in Permanent Camp	Q-10
Permanent Camp Construction Completed	Q-6
Permanent Full Capacity Power Required	Q-3
Tailings Management Facility Ready for Year 1 Operation	Q-1
Concentrator Mechanical Completion	Q0
First Ton of Concentrate Produced	Q+1
Commercial Operation Achieved	Q+4

The Project's critical path goes through the permitting process expected to last 3 years, and the construction is expected to last 4 years.

1.16 Interpretations and Conclusions

1.16.1 Geology and Mineral Resources

The total Mineral Resource Estimate is reported inside optimized open-pit shells, based on a long-term reference iron price of CAN$150/dmt (P65 Index). The open pit Measured and Indicated Mineral Resources for the Kami Project, including the Rose and Mills Lake pits are estimated at 975.5 Mt with an average grade of 29.6% Fe, and an open pit Inferred Mineral Resource of 163.0 Mt with an average grade of 29.2% Fe. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.

The proportion of Measured, Indicated and Inferred Mineral Resources reported reflects the confidence the QP has on the deposit. The QP is also confident that the current method employed is a good representation of the iron deportment in economic minerals (magnetite and hematite) and that the geological model is a good representation of the geological complexity of the area.

The following is a list of recommended work to be completed to validate and improve current assumptions used for the Project:

- Conduct a relogging of the Rose North drill core targeting limonite/goethite weathering, with an emphasis on the exact location and the intensity of weathering.
- Conduct a structural study on NW-SE faulting currently interpreted in the geological model. Evaluate potential displacement and attitude of those potential faults with offset and localized diamond drilling.
- Relogging of waste units, particularly between Rose North and Rose Central (Menihek and Sokoman), with a particular attention to graphitic schist units and uniformization of logging codes and level of detail of unit intervals.

1.16.2 Mining

The Kami Project is planned as a mix of conventional open pit mine for the ore combined with an IPCS for the waste. The Project comprises the Rose Pit, which is split into one pit of three phases. The milling rate is planned at 26.0 Mt/y with a ramp up period of 1 year at 17.0 Mt/y. The mill will run for 25 years and produce 212.4 Mt of iron ore concentrate having an iron content above 67.5% Fe. The total stockpile will reach a total of 5.9 Mt to allow steady mill feed and blend. The maximum stockpile is reached at Year 6.

GMS has estimated the Mineral Reserves in accordance with CIM Standards and reported them in accordance with NI 43-101. The Mineral Reserve estimate was prepared under the supervision of Mr. Alexandre Dorval, P. Eng., Open Pit Mining Engineering Coordinator with GMS, who is an independent QP.

Further studies need to be done to validate the assumptions used for the Project, such as:

- Geotechnical drilling campaign and studies to confirm the open pit geotechnical parameters such as bench face angle, berm width, and geotechnical berms. This study should also provide a better understanding of overburden thickness in areas where few drillholes are available.
- Additional studies on Autonomous Hauling Solutions ("AHS").
- Mining study on the effects of the Pike Lake dike location on potential reserves and resources.
- Local-specific mining salary study to confirm the wages used for the cost estimation of labour.

1.16.3 Metallurgy and Mineral Processing

Mineralogical analysis conducted on the samples provided important information to support the understanding of the mineralogical and metallurgical differences between the ore types found in the Rose deposit. The proportions of economic iron in each sample are significantly lower than what was observed in previous phases but are closer to the proportion of economic iron in the current LOM (89.8%).

The metallurgical testwork performed showed that:

- The rougher spirals testwork consistently generated a concentrate above 49% Fe with a Fe recovery above 80% which is satisfactory considering the economical Fe level of the samples;
- The cleaner Reflux® Classifier performs better than the combined cleaner and recleaner WW6 spirals tested by Mineral Technologies in the detailed engineering phase;
- The cleaner Reflux® Classifier testwork showed a spiral rougher concentrate could be upgraded to a concentrate with less than 4.5% SiO_2 achieving Fe recoveries above 90%;
- The magnetic separation pilots showed that grinding at a P_{80} of 45 µm is required to achieve the target SiO_2 grade around 5% SiO_2;
- The flotation testwork on the gravity concentrate achieved an average SiO_2 grade of 1.8% at an average Fe recovery of 94%;
- The flotation testwork of the magnetic concentrate achieved an average SiO_2 grade of 2.7% at an average Fe recovery of 98%.

The testwork performed during the PFS permitted to design a revised processing flowsheet that will enable the production of a low silica grade concentrate suitable for direct reduction. Based on the testwork results, recovery models were developed for the Fe and MnO and included in the process mass balance for the concentrator and metallurgical performances. From there, variability of the iron feed grade and magnetic iron proportion from the different ore blends was taken into account in the stochastic simulations used for the design. This permitted a thorough definition of the future plant performance, with a nominal production of a 67.6% Fe iron concentrate, with combined silica and alumina grades below 2.4% and MnO content of 1.1% for an iron recovery of 76.4%,

In order to improve the developed flowsheet and process performances, the following additional testworks should be conducted:

- Reflux® Classifier testwork on rougher spirals concentrate at P100 = 600 µm to improve the performances achieved during the PFS;
- Reflux® Classifier testwork on rougher spirals concentrate at P100 = 212 µm to achieve a gravity concentrate below 2% SiO_2 with a recovery above 85%;
- Flotation tests on gravity and magnetic concentrate to improve the current performances;
- Investigate MnO reduction processes such as low- and high-intensity magnetic separation;
- Magnetic separation testwork using the circuit final flowsheet with a feed consisting of combined spiral tails and Reflux® Classifier's overflow;
- Testwork on fine filtering optimization with alternative technology to press filter.

In order to improve the developed flowsheet and process performances, the following additional process engineering work should be conducted:

- Develop an operation strategy to maximize the use of the magnetic separation circuit to stabilize and improve Fe recovery, SiO_2 grade and MnO reduction when the run of mine contaminants grade varies;
- Improve the confidence level on the magnetic Fe proportion in the feed to reduce the magnetic separation circuit size.

1.16.4 Site Infrastructures

The site infrastructure presented in this Pre-feasibility Study first consist in the primary crusher, the ore conveying system, IPCS for the waste and the mill feed stockpile near the concentrator. They also cover all the concentrator equipment, namely the AG mill and Ball Mill, the gravitational and magnetic separation systems, tertiary grinding, flotation and dewatering systems. Iron concentrate conveying system, emergency stockpile and loadout infrastructures are also included in this study. The powerline that supplies the Kami substation was also considered and is capable of providing the required power.

BBA is of the opinion that this study regrouped the required infrastructure for the operation of the Kami concentrator. However, a more in-depth review needs to be carried out during the Feasibility Study, in order to optimize all production systems. The powerline supplying the Kami substation will also have to be studied in more detail and its final route established taking into account all technical, social and environmental factors.

Furthermore, the following is a list of recommended works to be completed to validate and improve current assumptions used for the Project:

- Champion should identify a system for constraining the highest-risk waste rock material with respect to ML/ARD and identify when, in the mine life, it is expected to be stockpiled. Identifying the timing of the mining highest-risk material will be important to the underlying assumption that sufficient neutralization potential is available to neutralize acidity within the waste rock stockpile over the 25 years of mine life, and to avoid construction of the mine rock stockpile or TMF dam embankments with zones of PAG materials.
- A geotechnical study should be carried out to validate the constructability and long-term stability of the waste rock pile considering that it will be built with crushed rock rather than run of mine blasted material.
- Regarding the Automation and Telecom network, it is recommended to reduce the uncertainties to conduct a more detailed study of the LTE coverage for the entire site and the life cycle of the Project. This wave propagation study will review the quantity and location of additional communication towers including the future mine pits and evaluate the option of sharing the existing Champion Bloom Lake private LTE network with Kami.

As for the Electrical Powerline from Flora Lake, the following further steps are recommended:

- The location of Flora Lake's terminal station being still under evaluation, coordination with Newfoundland & Labrador Hydro will be required early in the Project to confirm the actual location.
- The power line between Flora Lake and Kami is passing near the Wabush airport. Coordination with authorities will therefore be required to approve the proposed routing.

- Environmental and social studies must also be carried out regarding the route of the transmission line to Kami.
- Technical studies, such as geotechnical, geomorphology, grounding, electric, corrosion, electromagnetic induction, climatic and LiDAR, must be conducted prior to pre-engineering.

1.16.5 Water Management

1.16.5.1 West Area

The Pre-Feasibility Study carried out for the water management in the West Area of the site focused on the Rose Pit area, the waste rock stockpile, and the overburden stockpile. The study concluded that several infrastructures are required to manage the water in this area. The preparation of a conceptual hydrogeological model allowed to estimate an expected pit infiltration rate of 40,000 m^3/d. A 4-Mm^3 collection pond located south of the pit and formed by the construction of two dams is planned to manage the water from the pit and the stockpiles. A treatment plant for TSS removal with a capacity of 7,100 m^3/h will receive the water from the collection pond. The water will then be discharged to the Pike Lake.

The study showed that other infrastructures will be required to manage non-contact water in the area, such as diversion ditches around the pit and stockpiles, the Mid Lake dam at the outlet of Mid Lake to prevent runoff from flowing in the pit and the Pike dike to move the lake away from the pit and secure operation.

It is recommended to continue the study at the feasibility level. This will allow more field information to be gathered, such as geotechnical data for the design of the earthworks, and to refine the expected pit infiltration rate with more field data and modelling. New hydrogeological field data will help reduce the risks related to the amount of water to manage.

Also the following is a list of new data acquisition and further work recommended for the Feasibility Study and next step of engineering design:

- Geotechnical information for the main dams and dikes: There are no geotechnical boreholes available in the alignment of all the water management infrastructures planned in the West Area of the site. A geotechnical campaign would allow for the addition of more accuracy to the design and confirm the necessity and type of foundation grouting required.

- Groundwater flow into the pit: The assumed water infiltration rate of 40,000 m^3/d needs to be refined with supplemental hydrogeological field data. It is recommended to carry out pumping tests to estimate the faults transmissivity in the vicinity of the Rose Pit and their possible connections to the surrounding lakes. An update of the hydrogeological model is recommended following these tests.
- Lakes sediment characteristics: Characterization of these sediments is important for estimating the degree of hydraulic connection between Pike Lake, Elfie Lake, End Lake, Mid Lake and the future pit.
- Effects of mining activity on Pike Lake: Following additional hydrogeological work, the potential effect of dewatering on Pike Lake water levels will be assessed by performing a water balance including groundwater and surface flows.
- Water Quality: Runoff water quality from the Rose Pit and from the overburden and waste rock stockpiles is, for the moment, based on data collected from the Bloom Lake mine. Following the ongoing geochemical assessment completion, the new information will need to be integrated in order to prepare better assumptions on the characteristics of the water to be treated.

It is also recommended to study possible optimizations on the Project during the next phase of engineering. The design being currently based on conservative assumptions, optimizations are proposed for the following aspects:

- Consider that the WWTP is in operation all year-round. The capacity of the Rose Pit collection pond could be reduced, without the need to accumulate pit dewatering water during the coldest winter months. Elfie and End Lake Dams' height would be reduced. Year-round treatment would also reduce the risk of affecting Pike Lake's water level with mining operations, allowing water to be pumped back into the lake all year-round to compensate for losses due to infiltration in the pit.
- Carry out a comparative study for the sealing of the Rose Pit collection pond (Elfie Lake and End Lake) between using jet grouting and grout curtain to seal the dikes or installing a geomembrane on the entire basin.
- Analyze various possible scenarios for the global site water management, in particular by evaluating the use of the tailings facility to manage water from the mine or the stockpiles, which could reduce the need for a large Rose Pit collection pond and associated treatment plant.

1.16.5.2 East Area

The Pre-feasibility Study carried out for the water management in the East Area of the site focused on the concentrator, the road network and the TMF. Several infrastructures are required to manage the water in the East Area.

Contact water, collected from roads and pads in this sector of the site, is directed to five basins, each with its own pumping system, then pumped as required to the TMF pond.

The TMF pond will collect direct precipitation and water discharged from the processing plant with the tailings. Runoff and seepage collection ditches will be constructed along the toe of the dam perimeter. Water collected in the ditches will be directed to eight pumping stations around the dams and pumped back to the TMF. Emergency spillways will be provided for each of the nine embankment stages to provide increased stability protection.

During the mine's operational phase, water will be pumped from the pond via a reclaim system back to the processing plant. Excess water will be pumped to the EWTP for TSS removal with a capacity of 1,500 m^3/h. The water will then be discharged to Long Lake.

The following is a list of recommended work to be completed to validate and improve current assumptions used for the Project:

- In order to properly evaluate the quality of the water to be treated from the TMF, it is recommended to conduct more testwork in the next phase of the Project.
- It is also recommended to obtain more data on TSS levels from similar operations to confirm the sizing of the EWTP.
- Finally, according to the TMF water balance in the current study, the EWTP would operate at a flow of 38,000 m^3/day during the month of May and June to handle additional water from freshet compared to 3,000 m^3/day in normal operation. As a recommendation, the water management strategy could be reviewed to spread the treatment of additional water from freshet over a longer period, thereby reducing the capacity of the EWTP.

1.16.6 Environmental Permitting and Stakeholder Management

The Project benefits from the advanced environmental assessment and permitting work completed by the previous owner. Preliminary meetings with regulatory agencies were held in order to define the permitting process for the updated project. Through these discussions and review of available guidance, the provincial environmental assessment process needs to be reinitiated.

Champion has been consulting on the Project with Indigenous groups, the public and local community stakeholders since the acquisition of the Project in 2021. Consultation activities between Champion, Indigenous groups, the public and local stakeholders to date have been focused on introducing the Project and holding initial meetings to discuss concerns and expectations for consultation. As the Project progresses through the Project Registration and provincial EA process, Champion plans to continue to engage with Indigenous groups, the public and local communities.

Champion is developing a Rehabilitation and Closure process with the intent of ensuring long-term physical and chemical stability while ensuring maximum benefits to the local area surrounding the mine site and the Province of Newfoundland and Labrador. The intent of the Rehabilitation and Closure Plan is to limit long-term potential impacts of the mining operation and associated facilities on the surrounding environment. The total cost for rehabilitation and closure has been estimated at approximately CAN$300M.

It is recommended to complete the Project Registration following the issuance of the Pre-feasibility Study to initiate the permitting process. Champion should continue working on addressing the conditions associated with the provincial Ministerial Release and federal Decision Statement from 2014 as part of future environmental assessment work.

The following is a list of recommended activities to perform in order to further progress with the Project definition:

- Champion has developed a conditions/commitments registry based on the conditions and commitments outlined in the federal decision statement and provincial EA release and these conditions/commitments should be used as planning and design tool to advance the updated Project.
- Federal and provincial regulations pertaining to environmental assessment, fish and fish habitat, and other environmental regulatory aspects have changed since the Project was previously assessed and permits issued. Champion should consult with regulatory agencies and continue to monitor and understand these changes to understand how they might influence the environmental assessment and permitting processes as the Project advances. Specifically, Champion should consult with the Impact Assessment Agency of Canada (“IAAC”) to verify the validity of the previous decision statement and clarify federal requirements, if any.
- Champion should consult with Indigenous groups, the public, local and community stakeholder and regulators regarding design changes or improvements made to the Project since it previously completed the provincial and federal EA process. As the Project progresses through the EA process, Champion should regularly engage all stakeholders to

provide updates on Project planning and schedule and to ensure existing agreements, permits, and relationships are maintained.

- Champion should initiate efforts and discussion with regulators to obtain permits requiring longer lead time to obtain in parallel to the provincial EA process. This could include federal permits like those issued under the Fisheries Act, or provincial permits, like those issued under the Water Resources Act.
- Champion should continue to advance baseline environmental studies to further characterize existing conditions within the local and regional environment of the Project. These baseline studies will further reduce uncertainty in project design, improve confidence in predicted environmental effects and can be used to support permitting applications. Recommendations related to hydrogeology, hydrology and surface water quality, geochemistry and closure are provided below.

1.16.7 Tailings Management Facility

The following recommendations are provided for the subsequent levels of design of the TMF:

- Review and update of the meteorological data for the site will be required as the Project is advanced. Consideration of future climate change should also be considered with the design.
- Complete a borrow source reconnaissance program to confirm findings of the desk top-level assessment completed as part of this study. The program would be used to collect samples for laboratory testing and to delineate the extents and corresponding volumes of borrow areas.
- An additional site investigation program is recommended. The program would be developed to assess the proposed northwest embankment that has been relocated from past layouts, the north embankment to determine depth of muskeg and swamp within the footprint area, and to investigate the subsurface conditions in the proposed areas of the spillways.
- Confirm/finalize timelines for coarse and fine tailings separation and tailings parameters from laboratory testing.
- Develop a site-specific seismic hazard potential and de-aggregation analyses.
- A dynamic cone penetration investigation program is recommended prior to the completion of Stage 1 deposition to characterize the tailings beach slope within the footprint area of the upstream shell of the embankment raise. Results of the investigation will be used to design the embankment raises and identify foundation preparation requirements on the tailings beach.

- Carry out a series of advanced laboratory triaxial testing to determine the state parameters of tailings (i.e., contractive vs. dilative), to assess the liquefaction potential, and to estimate the residual strength of materials. The results will be used to calibrate the future in situ testing including cone penetration testing ("CPT").
- Develop a waste rock management plan with consideration of materials to be used for construction of the dams that are non-acid generating and non-metal leaching.
- Review using a geosynthetic clay liner ("GCL") in addition to the high-density polyethylene ("HDPE") liner as a secondary containment for seepage management for the Stage 1 embankment.
- Evaluate tapering the east and south embankments based on the tailings beach profile to minimize embankment fill requirements in later embankment stages. This can also affect the post Stage 1 spillway invert placements.
- Evaluate using the maximum operational water level ("MOWL") in conjunction with the environmental design flood ("EDF") for stormwater management instead of the NOWL. This would provide additional storage for stormwater and may be viable as the perimeter embankment heights are controlled by the tailings beach post Stage 1 and has additional capacity. Also review the freeboard requirements with revised wind and wave set up with the MOWL.
- Develop detailed construction sequencing plan to fully understand the scope and risk of a construction season limited to non-freezing periods. The plan must include contingency measures if insufficient construction equipment is available for embankments construction/raising and long winter periods when berm construction may be delayed.
- Appropriate regulatory agencies must be consulted, and relevant permits and approvals must be acquired.

1.16.8 Railway – Mine to Port

In order to further refine and optimize the railway infrastructure and associated operations, the following recommendations are proposed:

- Acquisition of supplemental survey data (hydrography, topography and geotechnical) as documented in SYSTRA's report 23022-IFRT-0001_C (SYSTRA, 2023).
- Arbitration on optimal options at the Mine and Pointe-Noire sites.
- Integration of the results of the December 2023 geotechnical campaign at Pointe-Noire into the design.
- Further discussions with SFPPN regarding their maintenance strategy for Champion's rolling stock.

- Embedding any compensatory measures that current environmental studies may find relevant.
- Further explore cost optimization initiatives by bringing value engineering to the design (e.g., alternative rail options at the Port) and streamlining to operations (fleet size based on improved cycle time).

1.16.9 Civil Infrastructure – Roads and Pads

To further refine and optimize access and mining roads, pads, and stormwater management infrastructure, the following recommendations are proposed:

- Additional geotechnical investigations around the explosives area, shop/fuel pad, overburden area, camp, and communications tower would be beneficial to establish bedrock levels in those areas to optimize the design and obtain more accurate material estimates.
- Bulk sampling and laboratory testing of the borrow pit materials would be required to adequately characterize the physical and engineering properties of these materials to determine their viability as aggregate material.

1.16.10 Business Development

In the development of the Kami Project, Champion is to continue a multifaceted approach to ensure the Project's long-term success and business sustainability. Active engagement with stakeholders will be continued by Champion to maintain transparency, build trust, while also adapting to changing market demands. This will involve effective communication and the fostering of collaborative partnerships to address stakeholders concerns effectively.

Continuation of technical marketing efforts with clients will be key and the Project will benefit from the relations Champion fostered with clients across the world. Effective communication of the technical advantages and sustainability aspects of the product will differentiate the Company in a competitive market, fostering long-term partnerships and driving demand. Exploration of potential strategic joint venture ("JV") partners could provide access to additional resources and expertise, enhancing the Project's viability.

1.16.11 Project Economic Analysis

The economic and financial analysis of the Kami Project, as detailed in Chapter 22, utilizes a discounted cashflow approach on both pre-tax and after-tax bases and demonstrates the economic potential of the Project. The analysis is conducted in Q4 2023 Canadian Dollars without considering inflation, currency fluctuations and employs a US$1 = CAN$1.30 exchange.

The pre-tax base case financial model resulted in an internal rate of return of 12.1% and a net present value of $1,482M with a discount rate of 8%. On an after-tax basis, the base case financial model resulted in an internal rate of return of 9.8% and a net present value of $541M with a discount rate of 8%. The after-tax undiscounted payback period as of the first cash inflow is 7 years. Sensitivity analysis indicates the Project's NPV and IRR are most influenced by iron ore concentrate prices, USD:CAD exchange rates, and operating expenses, demonstrating the Project's susceptibility to market fluctuations yet underscoring its potential financial robustness under the outlined parameters.

1.16.12 Project Risks and Opportunities

During the Pre-feasibility Study, a number of risk management workshops were held where risks and opportunities were identified and rated by the Project key team members.

Table 1-15 lists the more significant risks the study team has identified and the mitigation strategies to reduce its impact.

Table 1-15: Project Risks (Preliminary Risk Assessment)

Area	Risk Description and Potential Impact	Mitigation Approach
Geology and Mineral Resources	1. Exact location of faults may locally impact mineralization continuity (attitude and thickness) and can be a geotechnical and safety risk. 2. Underestimation of limonite/goethite in Rose North.	1. Structural interpretation and localized diamond drilling to intercept interpreted faults. 2. Relogging of drill core with attention to heavily weathered material on drillholes missing quality information.
Open Pit Mine	1. Local community disturbed by mining activities.	1. Ensure proper mining procedures, develop control and monitoring plans.
Geotechnical and Hydrogeology	1. Inferior rock mass characteristics could locally result in shallower slopes, negatively impacting LOM due to surface constraints (Lakes, borders, claims, etc.)	1. Additional geotechnical drilling and studies to confirm the rock mass characteristics. 2. Continued hydrogeological studies.

Area	Risk Description and Potential Impact	Mitigation Approach
	2. Changes to current hydrogeological parameters. Could modify the amount of water to be pumped out of the mine. 3. Insufficient hydrogeological characterization leading to underestimation of groundwater inflows to the pit from Pike Lake.	3. Planned hydrogeological. investigations, including pumping tests and groundwater model updates. Review options to mitigate with pit sequencing. 4. Additional drilling and hydrogeological studies.
Site Infrastructure	1. Electrical Power availability is not confirmed. 2. Delays in construction of the 735 kV powerline by NL. 3. Increased cost of electrical power.	1. Develop and execute an agreement with NL Hydro during the feasibility study phase. 2. Review construction timeline during the FS stage and adjust Project schedule if required. 3. Discuss and execute an agreement with NL Hydro during the next study phase and incorporate results in OPEX evaluation.
Ore, Waste, and Water Management	1. ML/ARD (metal leaching/acid rock drainage) emanating from Rose South Stockpile.	1. Mitigated by an environmental component to block model and a waste rock management plan.
Construction (Costs and Schedule)	1. Shortage of direct and supervisory construction labour force.	1. Expand resource sourcing Canada-wide and adjust construction labour costs to incorporate extra travel time and expenses.
Environmental, Permitting and Social License	1. Project Registration triggers the need for an EIS and additional EIS guidelines/requirements are identified, extending the permitting period and/or the compensation plans. 2. Municipal, public or indigenous group opposition to the Project. 3. Insufficient precipitation data available to forecast effect of climate change.	1. Undertake reassessment of previous EIS scope with current plan to incorporate into Project Registration. 2. Engagement program underway with targeted approach for each consultation group/stakeholder. 3. Mitigated by year-round water treatment capacity for discharge to Pike Lake and/or Long Lake and conservative dimensioning of contact water storage capacity.

Area	Risk Description and Potential Impact	Mitigation Approach
Ore Shipping and Export	1. Freezing of concentrate during transportation because of combination of humidity of concentrate and low temperature at load-out. 2. Increased blockage at car dumper grizzly because of increased humidity level. 3. CAPEX & OPEX cost increase for using QNS&L rising tariff higher than estimated.	1. Identify the most efficient way to heat concentrate in winter and optimize/increase summer transportation and shipping. 2. Provide material specification to port facility and continue filtration testwork and develop strategy to decrease humidity level. 3. Approach QNS&L and prepare joint time and movement simulation.

Table 1-16 shows the more significant opportunity that the Project team has identified.

Table 1-16: Project Opportunities

Area	Opportunity Description and Potential Impact	Implementation Approach
Geology and Mineral Resources	1. Add material to the MRE at the southwestern extremity of Rose Central, where the ground and aerial magnetic surveys show a potential extension of the southern fold limb.	1. Exploration drilling campaign.
Open Pit Mine	1. Expansion of the mine closer to Pike Lake dyke and the geotechnic parameters to exploit potential ore reserves identified at the limit of Pike Lake that were not accessible without a dyke in place. 2. Superior rock mass characteristics could result in steeper slopes, positively impacting LOM and strip ratio. 3. Optimize pit slope design using updated structural model resulting in better LOM and lower strip ratio.	1. Implementation of findings of the geotechnical and hydrogeological studies.
Mineral Processing and Metallurgy	1. Opportunity to produce a final 2% silica grade concentrate without flotation.	1. Additional testwork in next phase.
Environmental, Permitting and Social License	1. Leveraging existing approval and relationships with Indigenous communities.	1. Engage with authorities.

1.16.13 Recommendations and Proposed Budget

As recommended in the sections above, additional work should be carried out to better define several aspects of the Kami Project. The first phase would consist of field work and additional testwork to collect sufficient data to perform value engineering/trade-off work to set the scenario to be evaluated during the Feasibility Study and to complete it based on the selected options. In parallel, an Environmental Impact Study will be conducted. This first phase is estimated at $36.2M.

Following positive Feasibility Study results and prior to coming to a Final Investment Decision ("FID"), it is recommended to go through a second phase, which will consist of basic engineering to minimize financial risk involved in performing sufficient engineering to obtain firm prices for the most critical components. This phase is estimated at $15.8M.

Table 1-17: Proposed Field Work, Value Engineering, Feasibility Study, Permitting and Early Works

Field Works	Cost (CAN$)
Phase I	
Rail & Port	
Geotechnical Work and Report	4,588,000
TMF	
Geotechnical Work and Report	925,000
Additional Testwork	75,000
Mining	
Hydrogeological Testwork and Report	5,825,000
Geotechnical Work and Report	575,000
Slope Stability Study	100,000
Dam and Water Management	
Geotechnical Work and Report	3,906,000
Process Plant	
Geotechnical Work and Report	100,000
Additional Testwork/Additional Material Needed(1)	3,800,000
Infrastructure (Civil)	
Geotechnical Work and Report	625,000
Infrastructure (Electrical/Power Line)	
Geotechnical Work and Report	200,000
Water Quality	
Additional Testwork	1,215,000

Field Works	Cost (CAN$)
Subtotal - Field Work & Tests	21,934,000
Value Engineering	2,000,000
Feasibility Study	3,200,000
Permitting and Land Acquisition	9,090,000
Total Phase I	36,224,000
Phase II	
Basic Engineering	15,818,500
Grand Total (Phases I & II)	52,042,500

(1) Including drilling to collect representative metallurgical samples.

1.16.14 Conclusions

A number of potential project risks have been identified during the course of this Pre-feasibility Study that can materially affect project execution and project economics.

However, based on the information available and the degree of development of the Project as of the effective date of this Report, the QP is of the opinion that the Project is technically and financially sufficiently robust to warrant proceeding to the next phase of project development, feasibility study.

2. Introduction

In October 2022, Champion Iron Limited ("Champion" or the "Company") commissioned the engineering consulting group BBA Inc. to perform this study and this Report was prepared at the request of the Company.

2.1 Scope of Study

The following Technical Report (the "Report") summarizes the results of the Pre-feasibility Study ("PFS") for the development of the Kamistiatusset ("Kami") Iron Ore Property in Western Labrador.

Champion is an Australian publicly traded company listed on the ASX and TSX under the symbol CIA, and on the OTCQX under the symbol CIAFF. The Company's head office, registered office and mailing address is Level 1, 91 Evans Street, Rozelle, New South Wales 2039, Australia.

The Company also has two offices in Canada:

Montreal	Toronto
Suite 3300	Suite 200
Canada, H3B 3X7	Canada, M5C 2T6
1155 René-Lévesque Blvd. Ouest	20 Adelaide Street East
Montréal, QC	Toronto, ON

This Technical Report titled "Pre-feasibility Study of the Kamistiatusset (Kami) Iron Ore Property, Labrador", concerning the development of the Kami Property Rose deposit (consisting of the Rose Central and the Rose North deposits, as referred to throughout this Report), was prepared by qualified persons ("QP") following the guidelines of the "Canadian Securities Administrators" National Instrument 43-101 (effective 2011), and in conformity with the guidelines of the Canadian Institute of Mining, Metallurgy and Petroleum ("CIM") Definition Standards for Mineral Resources and Reserves.

This Report is considered effective as of December 22, 2023.

2.2 Background and Project History

The area in which the Property is located has been explored since the 50's by various companies and government agencies. In 2004 and 2006, Altius acquired some claims and subsequently performed exploration and metallurgical beneficiation works.

In 2010, Alderon acquired the Property from Altius and also conducted exploration as well as development work that resulted in numerous studies. Among them:

- 2011 Preliminary Economic Assessment ("2011 PEA")
- 2012 Feasibility Study ("2012 FS");
- 2018 Updated Feasibility Study ("2018 FS")

On April 1, 2021, Champion acquired the Property from Alderon.

In October 2022, the engineering consulting group BBA was appointed to perform the present study for the development of the Kamistiatusset ("Kami") Iron Ore Property (BBA/Others, 2023) at the request of Champion.

The purpose of the present study is to review the studies and work done in the past and determine the feasibility of using the ore from Kami to produce a low-silica concentrate for the Direct Reduction ("DR") pellets market. To achieve that, Champion appointed Soutex and Corem to perform a series of metallurgical test works in 2022 and 2023.

In parallel, reviews of geological and mining aspects were carried out on the existing data, and redesign of the water management scheme, tailings management and other infrastructure was also done, again on the basis of data collected in the past by the previous owners.

The present Pre-feasibility Study summarizes the findings of these works.

2.3 Sources of Information

This Report is based in part on internal company technical reports, maps, published government reports, company letters and memoranda, and information, as listed in Section 27 "References" of this Report. Sections from reports authored by other consultants may have been directly quoted or summarized in this Report, and are so indicated where appropriate.

It should be noted that the authors have relied on selected portions or excerpts from material contained in previous NI 43-101 technical reports available on SEDAR (www.sedar.com). Other information used to complete the present PFS includes, but is not limited to, the following reports and documents:

- Mineral Resource block model provided by Alderon and audited in 2018 by WGM;
- SGS Minerals Services and Corem testwork results;
- Internal and commercially available databases and cost models;
- Canadian Milling Practice, Special Vol. 49, CIM;

- Various reports produced prior to 2018 by Stantec, Ausenco, Golder and others concerning rail and port facilities studies, environmental studies and permitting, site hydrology, hydrogeology and geotechnical, tailings management and site closure plan.
- New reports produced by:
  - AtkinsRéalis (site hydrology, hydrogeology and geotechnical) (AtkinsRéalis, 2023; AtkinsRéalis, 2024);
  - WSP (environmental studies and permitting, tailings management) (WSP, 2024a, b – reports in progress);
  - WSP (tailings management) (WSP, 2024c);
  - SYSTRA (studies on rail facilities at Kami and Pointe-Noire, Québec) (SYSTRA, 2023);
  - CIMA+ (port facilities at Pointe-Noire, Québec) (CIMA+, 2023).

2.4 Report Responsibility and Qualified Persons

The following individuals, by virtue of their education, experience and professional association, are considered QPs as defined in NI 43-101, and are members in good standing of appropriate professional institutions.

- André Allaire, P.Eng. — BBA Inc. (BBA)
- Alexandre Dorval, P.Eng. — G Mining Services Inc. (GMS)
- Christian Beaulieu, P.Geo. — Consultant for G Mining Services Inc. (GMS)
- Mathieu Girard, P.Eng. — Consultant for Soutex Inc. (Soutex)
- Marie-Hélène Paquette, P.Eng. — AtkinsRéalis (AtkinsRéalis)
- Emmanuelle Millet, P.Geo. — AtkinsRéalis (AtkinsRéalis)
- Siavash Farhangi, P.Eng. — WSP Canada Inc. (WSP)
- Tarek Khoury, P.Eng. — SYSTRA Canada Inc. (SYSTRA)

The preceding QPs have contributed to the writing of this Report and have provided QP certificates, included at the beginning of this Report. The information contained in the certificates outlines the sections in this Report for which each QP is responsible. Each QP has also contributed to figures, tables and portions of Chapters 1 (Summary), 2 (Introduction), 25 (Interpretation and Conclusions), 26 (Recommendations), and 27 (References). Table 2-1 outlines the responsibilities for the various sections of the Report and the name of the corresponding qualified person.

Table 2-1: Qualified Persons and Areas of Report Responsibility

Chapter	Description	Qualified Person	Company	Comments and exceptions
1.	Summary	A. Allaire	BBA	All QPs contributed based on their respective scope of work and the Chapters / Sections under their responsibility.
2.	Introduction	A. Allaire	BBA	All QPs contributed based on their respective scope of work and the Chapters / Sections under their responsibility.
3.	Reliance on Other Experts	A. Allaire	BBA	All Chapter 3
4.	Project Property Description and Location	C. Beaulieu	GMS	All Chapter 4
5.	Accessibility, Climate, Local Resource, Infrastructure and Physiography	C. Beaulieu	GMS	All Chapter 5
6.	History	C. Beaulieu	GMS	All Chapter 6
7.	Geological Setting and Mineralization	C. Beaulieu	GMS	All Chapter 7
8.	Deposit Types	C. Beaulieu	GMS	All Chapter 8
9.	Exploration	C. Beaulieu	GMS	All Chapter 9
10.	Drilling	C. Beaulieu	GMS	All Chapter 10, except Section 10.6
		E. Millet	AtkinsRéalis	Section 10.6
11.	Sample Preparation, Analyses and Security	C. Beaulieu	GMS	All Chapter 11
12.	Data Verification	C. Beaulieu	GMS	All Chapter 12
13.	Mineral Processing and Metallurgical Testing	M. Girard	Soutex	All Chapter 13
14.	Mineral Resource Estimate	C. Beaulieu	GMS	All Chapter 14
15.	Mineral Reserve Estimate	A. Dorval	GMS	All Chapter 15
16.	Mining Methods	A. Dorval	GMS	All Chapter 16, except Section 16.7.5
		M.-H. Paquette	AtkinsRéalis	Section 16.7.5
17.	Recovery Methods	M. Girard	Soutex	All Chapter 17, except Section 17.4 and 17.5
		A. Allaire	BBA	Section 17.4 and 17.5
18.	Project Infrastructure	A. Allaire	BBA	All Chapter 18 except Sections 18.3, 18.4.3, and 18.7
		S. Farhangi	WSP	Section 18.3
		M.-H. Paquette	AtkinsRéalis	Section 18.4.3
		T. Khoury	SYSTRA	Section 18.7
19.	Market Studies and Contracts	A. Allaire	BBA	All Chapter 19

Chapter	Description	Qualified Person	Company	Comments and exceptions
20.	Environmental Studies, Permitting, and Social or Community Impact	A. Allaire	BBA	All Chapter 20 except Sections 20.5.2, 20.7, 20.8, 20.9.2 and 20.10
		S. Farhangi	WSP	Sections 20.5.2, 20.9.2 and 20.10
		E. Millet	AtkinsRéalis	Section 20.7
		M.-H. Paquette	AtkinsRéalis	Section 20.8
21.	Capital and Operating Costs	A. Allaire	BBA	All Chapter 21 except Sections 21.1.10 and 21.3.3
		A. Dorval	GMS	Sections 21.1.10 and 21.3.3
22.	Economic Analysis	A. Allaire	BBA	All Chapter 22
23.	Adjacent Properties	A. Allaire	BBA	All Chapter 23
24.	Other Relevant Data and Information	A. Allaire	BBA	All Chapter 24
25.	Interpretation and Conclusions	A. Allaire	BBA	All QPs contributed based on their respective scope of work and the Chapters / Sections under their responsibility.
26.	Recommendations	A. Allaire	BBA	All QPs contributed based on their respective scope of work and the Chapters / Sections under their responsibility.
27.	References	A. Allaire	BBA	All QPs contributed based on their respective scope of work and the Chapters / Sections under their responsibility.

2.5 Terms of Reference

Unless otherwise stated:

- All units of measurement in the Report are in the metric system;
- All costs, revenues and values are expressed in terms of Canadian dollars ($ or CAN$), unless otherwise stated.
- All metal prices are expressed in terms of US dollars (US$), unless otherwise stated;
- Foreign exchange rates of US$1.00 = CAN$1.30, and EUR1.00 = CAN$1.57 were used.

Grid coordinates for the block model are given in the UTM NAD 83 and latitude/longitude system; maps are either in UTM coordinates or latitude/longitude system.

2.6 Site Visit

Several site visits were conducted by the QPs and the personnel of the various studies contributors in the last years.

The GMS team completed two site visits to the Project infrastructure and site. A first visit was held between November 24, 2021 and December 3, 2021. A second site visit was held on July 27 and July 28, 2022.

During the first site visit, the following GMS personnel were present:

- Christian Beaulieu, P.Geo.: November 24 to December 1, 2021;
- James Purchase, P.Geo.: November 24 to November 27, 2021;
- Karina Sarabia, P.Geo.: December 1 to December 3, 2021.

The purpose of this site visit was to collect information on: the geology of the deposit by drillhole inspection; inspect drill core storage and availability; collect independent QP samples; and validate geological interpretations.

During the second site visit, the following GMS personnel was present:

- Christian Beaulieu, P.Geo.: July 27 and 28, 2022;
- James Purchase, P.Geo.: July 27 and 28, 2022.

The objective of this site visit was to locate drillhole collars, collect GPS points and locate outcrops on the Property.

More recently, a site visit was conducted on October 3 and 4, 2023, by Champion, AtkinsRéalis, WSP and Okane. AtkinsRéalis was represented by Marie-Hélène Paquette, P.Eng., and WSP was represented by Ben Plumridge, P.Eng. The purpose of the visit was to fly the Kami site by helicopter to get a good overview on the location of future site infrastructure and to visualize site-specific constraints. A meeting was held to discuss the main findings of the visit.

Another visit was held by AtkinsRéalis representatives on November 13 and 14, 2023. The purpose of this visit was focused on hydrogeology. Emmanuelle Millet, P.Geo., and Geneviève Marchand, P.Eng. visited the site to get an overview of the Rose Pit location, discuss with the drilling team which were working on a hydrogeological campaign, review site specific issues related to hydrogeology, and meet with a potential drilling contractor for a future pumping tests campaign.

SYSTRA conducted two sites visits. The first took place from May 15 to18, 2023 at the Kami site and in Pointe-Noire, and was attended by Robert Damiano, Maya Dimitrova and Tarek Khoury. The second took place only in Pointe-Noire on October 30th, and was attended by Claude Messier and Mohamed El Otmani. During theses visits, meetings were held with the *Société ferroviaire et portuaire de Pointe-Noire* ("SFPPN") staff in Pointe-Noire and with Genesee & Wyoming in Wabush to better understand current and future rail operations. The objective was also to evaluate the best options for the proposed new routes.

As of the effective date of this Report, the following QPs did not visit the Property as it was not required for the purpose of this mandate:

- André Allaire, P.Eng., BBA;
- Mathieu Girard, P.Eng., Consultant for Soutex;
- Alexandre Dorval, P.Eng., GMS;
- Siavash Farhangi, P.Eng., WSP.

3. Reliance on Other Experts

In this Report, the qualified persons relied on the following external inputs:

The QPs have not independently reviewed ownership of the Project area and any underlying property agreements, mineral tenure, surface rights, or royalties, which were provided by Champion. The standing of the claims as of February 7, 2024 is detailed in Table 4-1 and were verified by Christian Beaulieu, QP, consultant for GMS. The Newfoundland Department of Industry, Energy and Technology oversees the issuance and renewal of licenses.

- Iron concentrate pricing was obtained by Champion based on 2023 market studies commissioned from CRU as well as from industry reports and data from Fastmarkets (Chapter 19);
- The development of the site layout to address environmental constraints was done in conjunction with Michel Groleau (Champion) and Jean-Marc Crew (WSP), external environmental consultant, and considered appropriate by BBA;
- Environmental permitting considerations were provided by Michel Groleau (Champion), and considered appropriate by BBA;
- Tax information used in the after-tax financial analysis was provided by Champion (Chapter 22), and considered appropriate by BBA.

Any statements and opinions expressed in this document are given in good faith and in the belief that such statements and opinions are not false or misleading at the effective date of this Report.

4. Property Description and Location

4.1 Property Location

The Property is located southwest of the towns of Wabush and Labrador City in Newfoundland and Labrador and east of Fermont, Québec (Figure 4-1). The Property consists of four contiguous licenses and a mining lease forming one block and spans an area that extends approximately 10.5 km east-west and 13.5 km north-south in NTS map areas 23B/14 and 15 and centred at approximately 52°49'N latitude and 66°59'W longitude. The Property's perimeter is contiguous to Wabush Mine's mining lease (Lot #2 South) to the northeast, while the mining lease is 6 km from the boundary. The Property is situated only 21 km southeast of the Company's operating Bloom Lake mine ("Bloom Lake"), in the Labrador Trough geological belt in southwestern Newfoundland, near the Québec border (Figure 4-2).

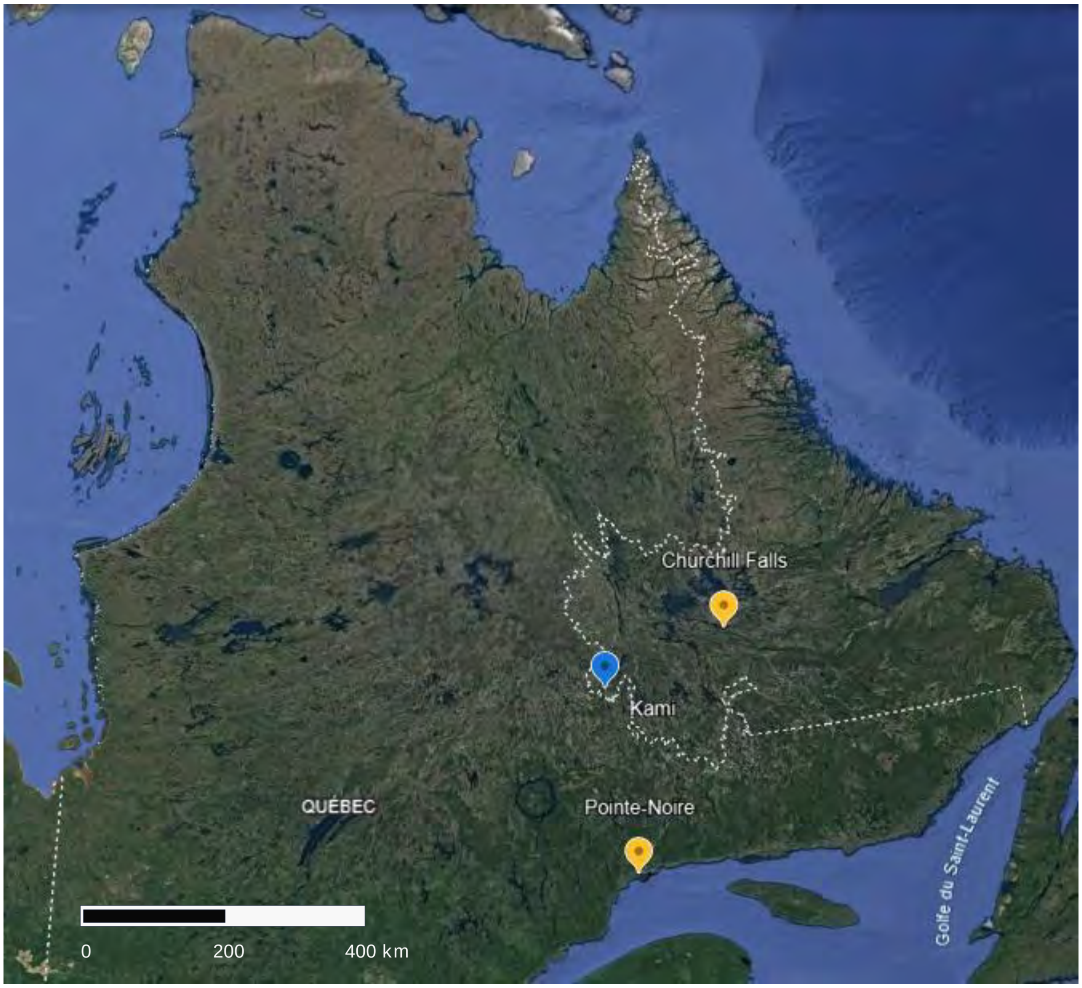


Figure 4-1: Property Location

Figure 4-2: Property Location Relative to Bloom Lake Mine

4.2 Property Description and Ownership

The Property is located in the Province of Newfoundland and Labrador ("NL"). All mining and processing operations will take place within NL provincial boundaries. According to the claim system registry of the Government of Newfoundland and Labrador, the Property is partially marked as registered to Kami General Partner Limited ("Kami GP") and partially to Champion Iron Mines Limited ("CIML"). The claims and lease registered to Kami GP are currently held by 12364042 CANADA INC., which, like Champion Iron Mines Limited, is a wholly owned subsidiary of Champion Iron Limited. The Property includes four map-staked licenses, namely 015980M, 017926M, 034335M and 036147M, totalling 447 claim units covering 11,175 hectares. These lands are all crownlands and their surface rights are held by the provincial government. The Property land holdings are shown on Figure 4-3. The QP has reviewed information pertaining to the licences on the Newfoundland & Labrador Mineral Rights Portal on February 7, 2024, and confirms the information stated herein.

Some claims located in the province of Québec were part of the Property, but were let go prior to Champion's acquisition.

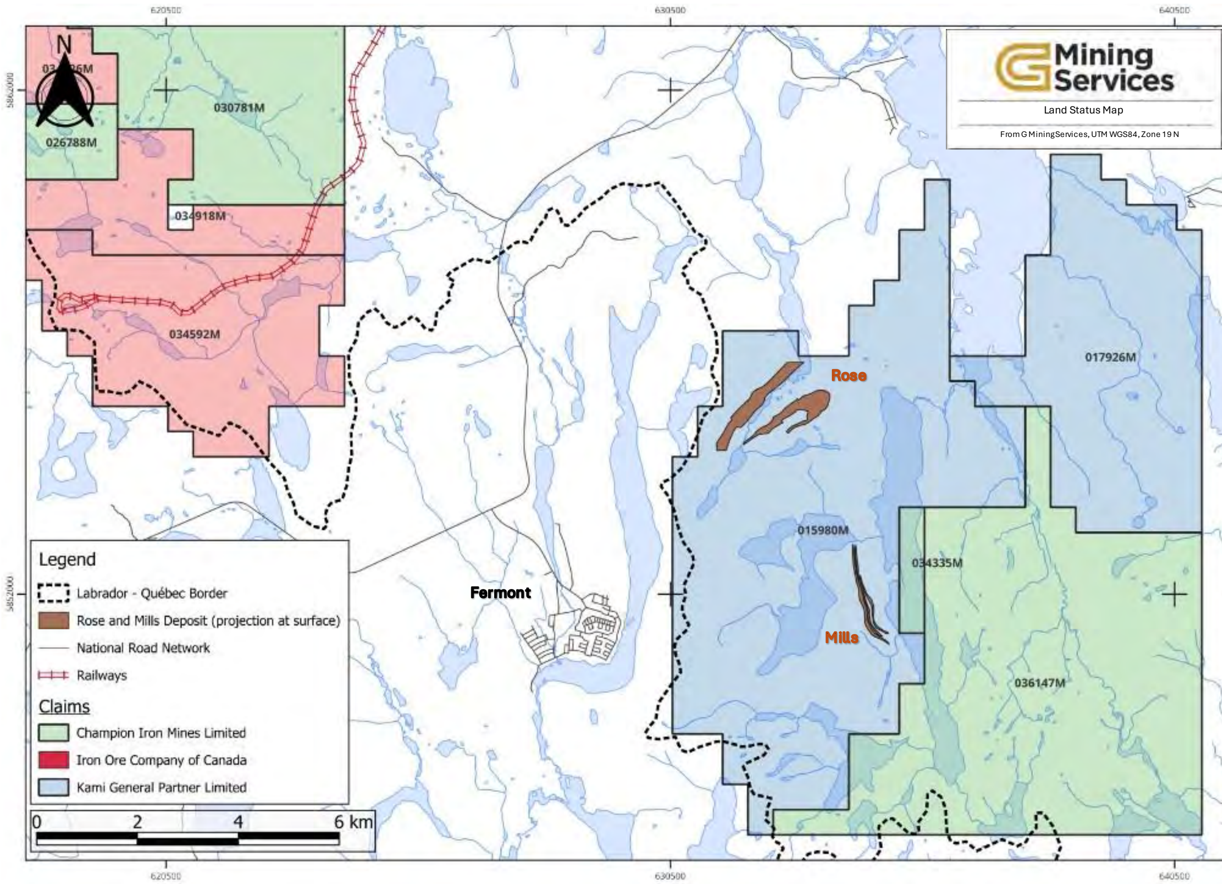


Figure 4-3: Land Status Map (Source: GMS, 2024)

The Property has not been legally surveyed, but the claims and licenses in Labrador were map-staked and are defined by UTM coordinates, therefore the Property location is considered to be accurate.

In Labrador, a mineral exploration license is issued for a term of 5 years. However, a mineral exploration license may be held for a maximum of 30 years, provided the required annual assessment work is completed and reported and the mineral exploration license is renewed every 5 years. Mandatory exploration expenses must be done before the end of each year to maintain good standing on the licenses. However, a security deposit can be deposited in lieu of exploration work, to be refunded once outstanding exploration work is complete. The Department of Industry, Energy and Technology oversees license issuance and renewals. The standing of the claims as of February 7, 2024 is detailed in Table 4-1.

Table 4-1: Kami Property Mineral Licenses

License	015980M	017926M	034335M	036147M
Claims	191	92	5	159
Area (ha)	4,775	2,300	125	3,975
NTS Area	23B14, 23B15	23B15	23B15	23B14, 23B15
Issue Date	Dec 29, 2004	Aug 30, 2010	Apr 24, 2022	Jun 18, 2023
Last Renewal Date	Dec 29, 2019	Aug 30, 2020	-	-
Upcoming Renewal Date	Dec 29, 2024	Sep 1, 2025	Apr 24, 2027	Jun 18, 2028
Amount Due	$38,200	$18,400	$125.	$3,975
Security Deposit	$0.00	$0.00	$1,000.00	$7,950
Expenditures Required	$67,301	$27,600	$2,225	$31,800.00
Expenditures Before	Dec 29, 2024	Aug 30, 2024	Apr 24, 2024	Jun 18, 2024
Report Due Date	Apr 27, 2024	Dec 28, 2024	Jun 24, 2024	Aug 19, 2024
Client Name	Kami GP	Kami GP	CIML	CIML
Owner	12364042 Canada Inc.	12364042 Canada Inc.	CIML	CIML

On February 17, 2014, Mining Lease #234 (15980M) and Surface Lease #142 were issued by the Newfoundland and Labrador Department of Natural Resources. The Mining Lease for mineral development and the Surface Lease cover the entire footprint of the mine and related infrastructure. The Mining Lease gives the Kami Mine Limited Partnership ("Kami LP") the exclusive rights to develop the mineral resource underlying the Kami Project. The Surface Lease provides the Kami LP with the surface rights covering the area of the Mining Lease and areas for siting the required infrastructure incidental to the development of the mine.

Mining Lease #234 (15980M) was issued for a period of 25 years and requires an annual rental payment of $42,389.24. Mining Lease #234(15980M) covers 403,707 hectares. Surface Lease #142 was issued for a period of 25 years and requires an annual rental payment of $126,650.97. Surface Lease #142 covers 4,235.809 hectares. All amounts are expressed in Canadian dollars.

The Project design may require that certain aspects of the infrastructure be located outside of the mineral property limits and assumes that Champion will be able to acquire surface rights for any such areas.

4.3 Property Agreements

On November 2, 2009, 0860132 B.C. Ltd. ("Privco", a company wholly owned by Mr. Mark Morabito) entered into an option agreement (the "Altius Option Agreement") pursuant to which Privco, or an approved assignee of Privco, had the exclusive right and option (the "Option") to acquire a 100% title and interest in the Property, subject to the terms and conditions of the Altius Option Agreement. In order to exercise the Option, Privco was required to (i) assign its interest in the Altius Option Agreement to a company acceptable to Altius, acting reasonably, that has its shares listed on the Toronto Stock Exchange or the TSX Venture Exchange ("Pubco"); (ii) fund exploration expenditures on the Property of at least $1,000,000 in the first year, and cumulative expenditures in the first 2 years of at least $5 million; and (iii) issue to Altius, after the satisfaction of certain financing conditions, shares of Pubco such that upon issuance, Altius would own 50% of Pubco's issued capital, on a fully diluted basis. In order to exercise the Option, Pubco was required to have initially raised not less than $5,000,000 in capital. All aforementioned amounts expressed in Canadian Dollars.

Altius retained a 100% interest in the Property until such time as Privco satisfied all of the conditions to exercise the Option. Privco had until November 2, 2011, to satisfy such conditions and exercise the Option. Upon exercise, Altius was required to transfer its 100% interest in the Property to Pubco and retained 3% gross sales royalty, in addition to the equity stake in Pubco described above.

Subsequently, Alderon was identified as "Pubco", and Privco satisfied the first condition of the Altius Option Agreement on December 15, 2009, when it entered into a share exchange agreement (the "Share Exchange Agreement") whereby Alderon would acquire all of the issued and outstanding shares of Privco from Mr. Morabito, in consideration of issuing 5,000,000 shares of Alderon to Mr. Morabito. Also on December 15, 2009, Alderon, Privco and Altius entered into an assignment agreement pursuant to which Alderon assumed the rights and obligations of Privco and Pubco under the Altius Option Agreement.

On January 15, 2010, Altius, Privco and Alderon amended the terms of the Altius Option Agreement to provide that upon the completion of a private placement by Alderon in February 2010, all financing conditions set forth in the Altius Option Agreement would have been satisfied. The amendment also clarified the calculation and number of Alderon's common shares to be issued to Altius and to achieve the ownership of 50% (fully diluted) of the issued and outstanding common shares of Alderon as of the specified date.

On March 3, 2010, Alderon completed the acquisition of Privco pursuant to the terms of the Share Exchange Agreement and acquired all of the outstanding common shares of Privco. In consideration, Alderon issued 5,000,000 common shares from treasury to Mr. Morabito.

On December 8, 2010, Alderon announced in a press release that Alderon had earned a 100% interest in the Property. In order to complete the exercise of the Option, Alderon issued an aggregate of 32,285,006 common shares from its treasury to Altius. Altius retains a 3% gross sales royalty relating to any potential future mining operations.

Alderon signed a subscription agreement (the "Subscription Agreement") dated April 13, 2012, and amended August 13, 2012, with HBIS Group Co., Ltd. ("HBIS"), formerly known as Hebei Iron & Steel Group Co., Ltd. Under the terms of the Subscription Agreement, HBIS agreed to make a strategic investment into both Alderon and the Property in an aggregate amount of $182.2 million, in exchange for 19.9% of the outstanding common shares of Alderon (the "Private Placement") and a 25% interest in a newly formed limited partnership that was established to own the Property. The parties also agreed upon the terms of all other material agreements governing the relationship between HBIS and Alderon and HBIS's agreement to purchase iron ore concentrate produced at the Property (the "Definitive Agreements").

On September 4, 2012, Alderon closed the Private Placement with HBIS. HBIS acquired 25,858,889 common shares at a price of CAN$2.41 per common share for gross proceeds to Alderon of approximately CAN$62.3 million, representing 19.9% of the issued and outstanding common shares. Alderon and HBIS also executed the remaining Definitive Agreements, including the Investor Rights Agreement dated August 31, 2012, the Off-Take Agreement dated August 31, 2012, and the agreements required to form and operate the limited partnership that will own the Property after the satisfaction of certain conditions. The limited partnership has been formed (Kami LP) and on March 15, 2013, Alderon transferred the Property to the Kami GP, which holds the Property for the benefit of the Kami LP. The aforementioned off-take agreement is discussed in more detail in Chapter 19 of this Report.

A wholly-owned subsidiary of Alderon is the manager of the Property and is entitled to a fixed annual management fee during the construction period of the Project. Once the Property has reached commercial production, the manager will receive a management fee on a per-tonne of iron ore concentrate basis.

Subsequent to the 2012 Feasibility Study (Grandillo et al., 2012), the Kami LP entered into several third-party agreements concerning title to or an interest in the Property. These agreements are outlined in Chapters 4 and 19 of this Report.

The consideration for the Acquisition consisted of $15.0M in cash, the extinguishment of approximately $19.4M of Alderon's secured debt (the "Secured Debt") and an undertaking in favour of the Receiver to make a finite production payment on a fixed amount of future iron ore concentrate production from the Kami Project. In connection with the Acquisition, Champion purchased the Secured Debt from Sprott Private Resource Lending (Collector), LP ("Sprott"). The Secured Debt was purchased for an aggregate consideration of 4,200,000 Champion's ordinary shares issued to Sprott and Altius Resources Inc., who held a participation in the Secured Debt.

As of December 2023, two agreements are related to the Property:

- Since December 2010, a 3% gross sales royalty payable to Altius Minerals Corporation Inc.
- Since April 2021, a production payment of $1/tonne of concentrate for the first 10 Mt, payable to Deloitte Restructuring Inc. as part of the dissolution process of Alderon, the Kami LP and Kami GP.

4.4 Permitting

The Property has been released from both provincial and federal environmental assessment processes. Prior to Project initiation, the Property will require a number of approvals, permits and authorizations. In addition, throughout construction and operation, compliance with various standards contained in federal and provincial legislation, regulations and guidelines will be required. Chapter 20 of this Report outlines the permits, approvals and authorizations that will be required prior to Project initiation.

5. Accessibility, Climate, Local Resources, Infrastructure and Physiography

This chapter was taken from the latest Kami NI 43-101 Updated Feasibility Study ("FS") prepared for Alderon Iron Ore Corp. (Grandillo et al., 2018) and revised and updated by GMS.

5.1 Access

The Property is accessible from Labrador City/Wabush, Newfoundland via 4x4 vehicle roads. All-Terrain Vehicle ("ATV") trails enable access to the remainder of the Property. Wabush is serviced daily by commercial airlines from Sept-Îles, Montréal, Québec City, Goose Bay, Deer Lake and St. John's (Figure 5-1).

Figure 5-1: Kami Project - Access Roads

5.2 Climate

The climate in the region is typical of north-central Québec/Western Labrador (sub-Arctic climate). Winters are harsh, lasting about 6 to 7 months with heavy snow from December through April. Summers are generally cool and wet; however, extended daylight enhances the summer workday period. Early and late winter conditions are acceptable for ground geophysical surveys and drilling operations. The prevailing winds are from the west and have an average of 14 km per hour, based on 30 years of records at the Wabush Airport.

5.3 Local Resources and Infrastructure

The Kami Property is adjacent to the towns of Labrador City and Wabush. In 2021, the population of Labrador City and Wabush was respectively of 7,412 and 1,964 residents. Together these two towns are known as Labrador West. Labrador City and Wabush were founded in the 1960s to accommodate the employees of the Iron Ore Company of Canada and Wabush Mines. A qualified workforce is located within the general area due to the operating mines and long history of exploration in this region.

Although relatively low-cost energy from a major hydroelectric development at Churchill Falls is currently transmitted into the region for the existing mines operations, the current availability of additional electric power on the existing infrastructure in the region is limited. Please refer to Chapter 18 of this Report for further details regarding electrical power.

The Kami site is also located in proximity to other key services and infrastructure. The current Prefeasibility Study (“PFS”) is based on Champion building a new rail loop at the Kami site and a connecting railway to access existing rail infrastructure owned and operated by Québec, North Shore and Labrador ("QNS&L”) for transportation of product to the port facility located in Pointe-Noire. Fresh water sources on the site are plentiful, although the plan is to maximize recycling and minimize dependence on fresh water. Even if a portion of the workers required for the construction and operation of the site will come from the local communities, a construction and a permanent camp is planned to be built at about 1-km from the concentrator to accommodate non-resident workers.

A preliminary site plan for the Project is presented in Chapter 18 of this Report.

5.4 Physiography

The Property is characterized by gentle rolling hills and valleys that trend northeast-southwest to the north of Molar Lake and trend north-south to the west of Molar Lake, reflecting the structure of the underlying geology. Elevations range from 590 m to 700 m asl.

The Property area drains east or north into Long Lake. A part of the Property drains north into the Duley Lake Provincial Park before draining into Long Lake.

In the central property area, forest fires have exposed outcrops; yet the remainder of the Property has poor outcrop exposure. The cover predominantly consists of various coniferous and deciduous trees with alder growth over burnt areas.

6. History

This chapter was taken from the latest Kami NI 43-101 Updated Feasibility Study ("FS") prepared for Alderon Iron Ore Corp. (Grandillo, et al., 2018), and revised and updated by GMS. Sections on the Property acquisition and on historical mineral resources & mineral reserves were added.

6.1 General

The earliest geological reconnaissance in the southern extension of the Labrador Trough within the Grenville Province was in 1914, by prospectors in their search for gold. Several parties visited the area between 1914 and 1933, but it was not until 1937 that the first geological map and report was published by Gill et al., 1937 (Rivers, 1980). The metamorphosed iron formation in the vicinity of Wabush Lake was first recognized by Dr. J.E. Gill in 1933. A few years later, the Labrador Mining and Exploration Co. Ltd. ("LM&E") evaluated the iron formation, but decided it was too lean for immediate consideration (Gross et al., 1972).

In 1949, interest in the Carol Lake area by LM&E was renewed and geological mapping was carried out in the Long Lake (also known as Duley Lake) - Wabush Lake area by H.E. Neal for the Iron Ore Company of Canada ("IOC"). The work was done on a scale of 1"=½ mile and covered an area approximately 8 km wide by 40 km long from Mills Lake northward to the middle of Wabush Lake. This work formed part of the systematic mapping and prospecting carried on by LM&E on their concession.

Concentrations of magnetite and specularite were found in many places west of Long Lake and Wabush Lake during the course of Neal's geological mapping. Broad exposures of this enrichment, up to 1.2 km long, assayed from 35% to 54% Fe and 17% to 45% SiO_2. Ten enriched zones of major dimensions were located and six of these were roughly mapped on a scale of 1"=200 ft. Seventy-four (74) samples were sent to Burnt Creek for analysis. Two bulk samples, each about 68 kg, were taken for ore dressing tests. One was sent to the Hibbing Research Laboratory and the other was sent to the Bureau of Mines, Ottawa. The material was considered to be of economic significance as the metallurgical testing indicated that it could be concentrated.

Geological mapping on a scale of 1"=½ mile was carried out by H.E. Neal in the Wabush Lake - Shabogamo Lake area in 1950. Neal (1951) also reported numerous occurrences of pyrolusite and psilomelane and botryoidal goethite being frequently associated with the manganese within the iron formation and quartzite.

Mills No. 1 was one of the iron deposits discovered in 1950 and was sampled and described at that time. A narrow irregular band of pyrolusite was reported to extend 457 m within a friable magnetite-hematite iron formation located 914 m southwest of the prominent point on the west side of Mills Lake (Neal, 1951).

In 1951, nearly all of the concession held by LM&E within the Labrador Trough was flown with an airborne magnetometer. This survey showed the known deposits to be more extensive than apparent, from surface mapping and suggested further ore zones in drift-covered areas (Hird, 1960).

In 1953, a program of geological mapping in the Mills Lake - Dispute Lake area was conducted by R.A. Crouse of IOC. Crouse (1954) considered the possibility of beneficiating ores within the iron formation and all high magnetic anomalies and bands of magnetite-specularite iron formation were mapped in considerable detail. Occurrences of friable magnetite-specularite gneiss containing enough iron oxides to be considered as beneficiating ore were found in several places west of Long Lake and northwest of Canning Lake. Representative samples assayed 18.55% to 43.23% Fe and 26.66% to 71.78% SiO_2 (Crouse, 1954). Seven zones of this material were located in the area. Three of these (one of which was Mills No. 1 deposit) were mapped on a scale of 1"=200 ft. On two of these occurrences, dip needle lines were surveyed at 122 m (400 ft) intervals. Forty-two (42) samples were sent to the Burnt Creek Laboratory for analysis. Three samples were sent to Hibbing, Minnesota for magnetic testing (Crouse, 1954). Crouse (1954) reported that at Mills No. 1, the ore was traced for a distance of 488 m along strike, with the minimum width being 107 m.

In 1957, an area of 86.2 km^2 to the west of Long Lake was remapped on a scale of 1"=1,000 ft and test drilled by IOC to determine areas for beneficiating ore. Dip needle surveying served as a guide in determining the locations of iron formation in drift-covered areas. According to Hird (1960), 272 holes, for a total of 7,985 m (26,200 ft) were drilled during the 1957 program (approximately 66 holes are located on the Property). Mathieson (1957) reported that there were no new deposits found as a result of the drilling, however, definite limits were established for the iron formation found during previous geological mapping. Three zones of "ore" were outlined, which included Mills No. 1 and an area of 19.1 km^2 was blocked out as the total area to be retained (Mathieson, 1957). According to Mathieson (1957), the Mills No. 1 zone was outlined by six drillholes and found to have a maximum length of 3,048 m (10,000 ft) and a maximum width of 610 m (2,000 ft). Mathieson (1957) describes mineralization to be composed of specularite with varying amounts of magnetite, grading on average 32.1% Fe. A search by Altius for the logs and/or core from the 1957 LM&E drilling program has not been successful. From local sources, it is known that all holes drilled in this area were of small diameter and very shallow (~30 m).

In early 1959, a decision was made by IOC to proceed with a project designed to open up and produce from the ore bodies lying to the west of Wabush Lake and a major program of construction, development drilling and ore testing was started in the Wabush area (Macdonald, 1960). Also that year, geological mapping (1"=1,000 ft.) and magnetic profiling were conducted by R. Nincheri of LM&E in the Long Lake Mills Lake areas. Zones of potential beneficiating ores were located to the southwest of Mills Lake (Nincheri, 1959).

In 1972, an extensive airborne electromagnetic survey covered 2,150 km^2 of territory and entailed 2,736 line-km in the Labrador City area. The area covered extended to the south from the extremity of Kissing Lake and to the north to the extremity Sawbill Lake, and from approximately the Québec-Labrador border west to the major drainage system, through Long Lake, Wabush Lake and Shabogamo Lake east. The survey was done by Sander Geophysics Ltd. (for LM&E) using a helicopter equipped with an NPM-4 magnetometer, a fluxgate magnetometer, a modified Sander EM-3 electromagnetic system employing a single coil receiver, and a VLF unit (Stubbins, 1973). Also, between 1972 to 1973, an airborne magnetic survey was conducted over the area by Survair Ltd., Geoterrex Ltd., and Lockwood Survey Corporation Ltd., for the Geological Survey of Canada (GSC, 1975).

In 1977, geological mapping was initiated by T. Rivers of the Newfoundland Department of Mines and Energy within the Grenville Province, covering the Wabush-Labrador City area. This work was part of the program of 1:50,000 scale mapping and reassessment of the ratio of mineral potential of the Labrador Trough by the Newfoundland Department of Mines and Energy. Mapping was continued by Rivers in Western Labrador from 1978 to 1980. As part of an experimental geochemical exploration program in Labrador by LM&E in 1978, many of the lakes in the Labrador City area were sampled, both for lake bottom sediments and lake water. Lake sediment samples were sent to Barringer Research Ltd., Toronto, Ontario, for a multi- element analysis. Water samples were tested at Labrador City for acidity, before being acidified for shipment. Some samples were also shipped to Barringer for analysis and some were analyzed in the IOC Laboratory in Sept-Îles. A sample portion was also sent to the Learch Brothers Laboratory in Hibbing Minnesota for additional analysis. On Block No. 24 (part of the Property), only one site was sampled. The sediment assay results indicated the sample was statistically "anomalous" in phosphorous. None of the water samples were defined as anomalous. It was concluded that the samples, as a group, were too widely scattered, and it was difficult to draw any firm conclusion from the results.

In 1979, a ground magnetometer survey was conducted on Block No. 24 (part of the Property). A total of four lines having a combined length of 3,500 m were surveyed on this block (Price, 1979). The standard interval between successive magnetometer readings was 20 m. Occasionally, over magnetically "quiet" terrain, this interval was increased. Whenever an abrupt change in magnetic intensity was encountered, intermediate stations were surveyed. According to Price (1979), the magnetometer profiles and observations of rare outcrops confirmed that oxide facies iron formation occurs on Block No. 24 (in the Mills No. 1 area of the Property). Also in 1979, one diamond drillhole was drilled by LM&E near the north end of Elfie Lake on the Property. The hole (No. 57-1) was drilled vertically to a depth of 28 m (Grant, 1979) and did not encounter the iron oxide facies of interest. In 1983, LM&E collared a 51 m deep DDH 137 m north of Elfie Lake (DDH No. 57-83-1). The drillhole encountered metamorphosed iron formation from 17 m to a depth of 51 m. Of this, only 2 m were oxide facies. Core recovery was very poor (20%) (Avison et al., 1984).

In 1981 and 1982, an aerial photography and topographic mapping program was completed by IOC to re-photograph the mining areas as part of its program to convert to the metric system. Two scales of aerial photography (1:10,000 and 1:20,000) were flown, and new topographic maps (1:2,000 scale) were made from these photos. The photography was extended to cover all the lease and license blocks in the Labrador City area (Smith et al. 1981; Kelly and Stubbins, 1983).

During the summers of 1977 and 1978, a lake sediment and water reconnaissance survey was undertaken over about one-half (134,000 km^2) of Labrador by the GSC, in conjunction with the Newfoundland Department of Mines and Energy. The survey was designed to provide the exploration industry with data on bedrock composition, and to identify metalliferous areas as large-scale prospecting targets (McConnell, 1984). Sampling continued in 1982 in southwestern Labrador. Water and sediments from lakes over an approximate area of 50,000 km^2 were sampled at an average density of one sample per 13 km^2. Lake sediment samples were analyzed for U, Cu, Pb, Zn, Co, Ni, Ag, Mo, Mn, Fe, F, As, Hg and L.O.I. In addition, U, F and pH were determined on the water samples (Davenport and Butler, 1983).

During 1985, field work by C. McLachlan of LM&E concentrated on the northern part of Block No. 24. A pace and compass grid was established near Molar Lake. Cross lines were added at 152 m (500 ft) intervals. The grid was used to tie in the sample sites and a systematic radiometric survey was performed. There were four soil samples and six rock samples (one analyzed) collected (Simpson et al., 1985). A possible source of dolomite as an additive for the IOC pellet plant was examined near Molar Lake. Simpson concluded from visual examination that the dolomite was high in silica.

In 2001, IOC staked a considerable portion of the iron formation in the Labrador City area, with the Kamistiatusset area being in the southern extent of the company's focus. Extensive geophysical testing was conducted over the area using airborne methods. The Kamistiatusset area and the area north of the Property were recommended as a high priority target by SRK Consulting Ltd., as part of the 2001 IOC Work Report reported in GSNL open file LAB/1369 (Cotnoir et al., 2002). However, no work was reported for the area.

In 2004, Altius staked 20 claims comprising license 10501M (predecessor to license 15980M). In the spring of 2006, Altius staked another 38 claims to the north, comprising license 11927M. License 10501M and license 15980M were subsequently replaced by license 15980M, which was acquired by Alderon from Altius. Details of Altius and Alderon exploration on the Property are set out in Chapter 9 of this Report.

On April 1, 2021, Champion completed the acquisition of the Kami Project and certain related contracts (the "Acquisition") pursuant to an asset purchase agreement among certain affiliates of the Company and Deloitte Restructuring Inc. (the "Receiver"), as receiver for Alderon Iron Ore Corp. and certain of its affiliates (collectively, "Alderon").

Alderon completed an updated feasibility study on the Kami Project in September 2018. The Company has initiated work to revise the Kami Project's scope and update the study, as it evaluates its growth alternatives within its property portfolio.

6.2 Historical Mineral Resources

In 2018, Alderon released an updated Feasibility Study ("2018 FS") in which a Mineral Resource and Mineral Reserve ("MRMR") was disclosed. The 2018 FS was prepared by BBA, in collaboration with GEMTEC, Golder and WGM. The effective date of the NI 43-101 technical report is September 26, 2018 and the report was issued on October 31, 2018 (Grandillo et al., 2018). Table 6-1 summarizes the Mineral Resources.

GMS was not able to exactly reproduce the historical Mineral Resource. It is our understanding that the mineral resource was constrained only by elevation; all blocks above 0 m elevation were judged to pass the Reasonable Prospect of Eventual Economic Extraction ("RPEEE"). No information is provided as to how Mills Lake was constrained to report Mineral Resources. To compare mineral resources, GMS opted to constrain the historical block model in GMS optimized shells (see Section 14.11.5).

In general, the geological modelling appears to be reasonable based data collected. GMS followed essentially the same path to determine sub-domains (or geometallurgical domains) with some modifications to boundaries. WGM assumed horizontal and vertical extents of up to approximately 350 m, where GMS assumed generally 150 m. Vertical extents are not judged to be problematic because all blocks below 0 m elevation were not in the historical mineral resource estimate.

The historical mineral resource model was built around a geological wireframe and blocks interpolated with the Inverse Distance Square method ("ID^2") on 3 m composite lengths. A three-step search ellipsoid approach was used based on variography of %TFe. Mineral resource classification was based on a "Distance Model", which represents the distance from actual data point in the drillhole to the block centroid. The elements interpolated are the following: TFe, MagFe, HemFe, MnO and SiO_2. It appears that HemFe was interpolated from the calculated values instead of calculating the value in the block model from TFe, MagFe and OtherFe interpolated values (OtherFe does not appear to have been interpolated in the historical block model).

To convert the historical mineral resource into a current mineral resource, RPEEE should be addressed with a pit optimization and the classification should be reviewed based on drill density, not only drilling distance. The latter modification should remove blocks that are judged to be overly extrapolated.

A qualified person or competent person has not done sufficient work to upgrade or classify the historical estimates as current "mineral resources" or "mineral reserves" or "ore reserves", as such terms are defined in NI 43-101 and the JORC Code (2012 edition), and it is uncertain whether, following evaluation and/or further exploration work, the historical estimates will be able to be reported as mineral resources, mineral reserves or ore reserves in accordance with NI 43-101 or the JORC Code (2012 edition). Champion is not treating the historical estimates as current mineral resources, mineral reserves, or ore reserves.

Table 6-1: Historical Mineral Resources. Cut-off Used of 15% TFe, Effective Date of December 17, 2012
(Source: Grandillo et al., 2018)

Category	Density (t/m^3)	Mass (Mt)	TFe (%)	Fe in Mag (%)	Fe in Hem (%)	MnO (%)
Rose Central						
Measured	3.46	249.9	29.4	17.6	8.1	1.60
Indicated	3.44	294.5	28.5	17.7	5.9	1.28
M&I	3.45	544.4	28.9	17.7	6.9	1.43
Inferred	3.45	160.7	28.9	16.9	7.1	1.44
Rose North						
Measured	3.48	236.3	30.3	13.0	14.7	0.87
Indicated	3.49	312.5	30.5	11.8	17.1	0.96
M&I	3.49	548.8	30.4	12.3	16.1	0.92
Inferred	3.42	287.1	29.8	12.5	15.5	0.76
Mills Lake						
Measured	3.58	50.7	30.5	21.5	7.0	0.97
Indicated	3.55	130.6	29.5	20.9	3.9	0.80
M&I	3.56	181.3	29.8	21.1	4.8	0.85
Inferred	3.55	74.8	29.3	20.3	2.7	0.67

7. Geological Setting and Mineralization

This chapter was taken from the latest Kami NI 43-101 Updated Feasibility Study ("FS") prepared for Alderon Iron Ore Corp. (Grandillo et al., 2018) and revised by GMS. A section of Lithological Library, comments and precisions were added to this chapter (Section 7.3).

7.1 Regional Geology

The Property is situated in the highly metamorphosed and deformed metasedimentary sequence of the Grenville Province, Gagnon Terrane of the Labrador Trough, adjacent to and underlain by Archean basement gneiss (Figure 7-1). The Labrador Trough, otherwise known as the Labrador-Québec Fold Belt, extends for more than 1,200 km along the eastern margin of the Superior Craton from Ungava Bay to Lake Pletipi, Québec (Neal, 2000). The belt is about 100 km wide in its central part and narrows considerably to the north and south. The Labrador Trough itself is a component of the Circum-Superior Belt (Ernst, 2004) that surrounds the Archean Superior Craton, which includes the iron deposits of Minnesota and Michigan. Iron formation deposits occur throughout the Labrador Trough over much of its length.

The Labrador Trough is comprised of a sequence of Proterozoic sedimentary rocks including iron formation, volcanic rocks and mafic intrusions. The southern part of the Labrador Trough is crossed by the Grenville Front representing a metamorphic fold-thrust belt in which Archean basement and Early Proterozoic platformal cover were thrusted north-westwards across the southern portion of the southern margin of the North American Craton during the 1,000 Ma Grenvillian orogeny (Brown et al., 1992). Rocks of the Labrador Trough in the Grenville Province are highly metamorphosed and complexly folded. Iron deposits in the Gagnon Terrane, (the Grenville part of the Labrador Trough) include those on the Property (Rose and Mills Lake), those in the Manicouagan-Fermont area (Lac Jeannine, Fire Lake, Mont-Wright, Mont-Reed, and Bloom Lake), as well as deposits in the Wabush-Labrador City area (Luce, Humphrey and Scully). The metamorphism ranges from greenschist through upper amphibolite into granulite metamorphic facies from the margins to the orogenic centre of the Grenville Province. The high-grade metamorphism of the Grenville Province is responsible for recrystallization of both iron oxides and silica in primary iron formation, producing coarse-grained sugary quartz, magnetite, and specular hematite schist or gneiss (meta-taconites) that are of improved quality for concentration and processing.

North of the Grenville Front, the Labrador Trough rocks in the Churchill Province have been only subject to greenschist or sub-greenschist grade metamorphism and the principal iron formation unit is known as the Sokoman Formation. The Sokoman Formation is underlain by the Wishart Formation (quartzite) and the Attikamagen Group including the Denault Formation (dolomite) and the Dolly/Fleming Formations (shale). In the Grenville part of the Labrador Trough where the Property is located, these same Proterozoic units can be identified, but are more metamorphosed and deformed. In the Grenville portion of the Labrador Trough, the Sokoman rocks are known as the Wabush Formation, the Wishart as the Carol Formation (Wabush area) or Wapusakatoo Formation (Gagnon area), the Denault as the Duley Formation and the Fleming as the Katsao Formation (Neal, 2000; Corriveau et al., 2007). The recent synthesis by Clark and Wares (2005) develops modern lithotectonic and metallogenic models of the Trough north of the Grenville Front. In practice, both sets of nomenclature for the rock formations are often used. Alderon and Altius have used the Menihek, Sokoman, Wishart, Denault, and Attikamagen nomenclature throughout their reports to name rock units on the Property. The regional stratigraphy is summarized in Table 7-1.

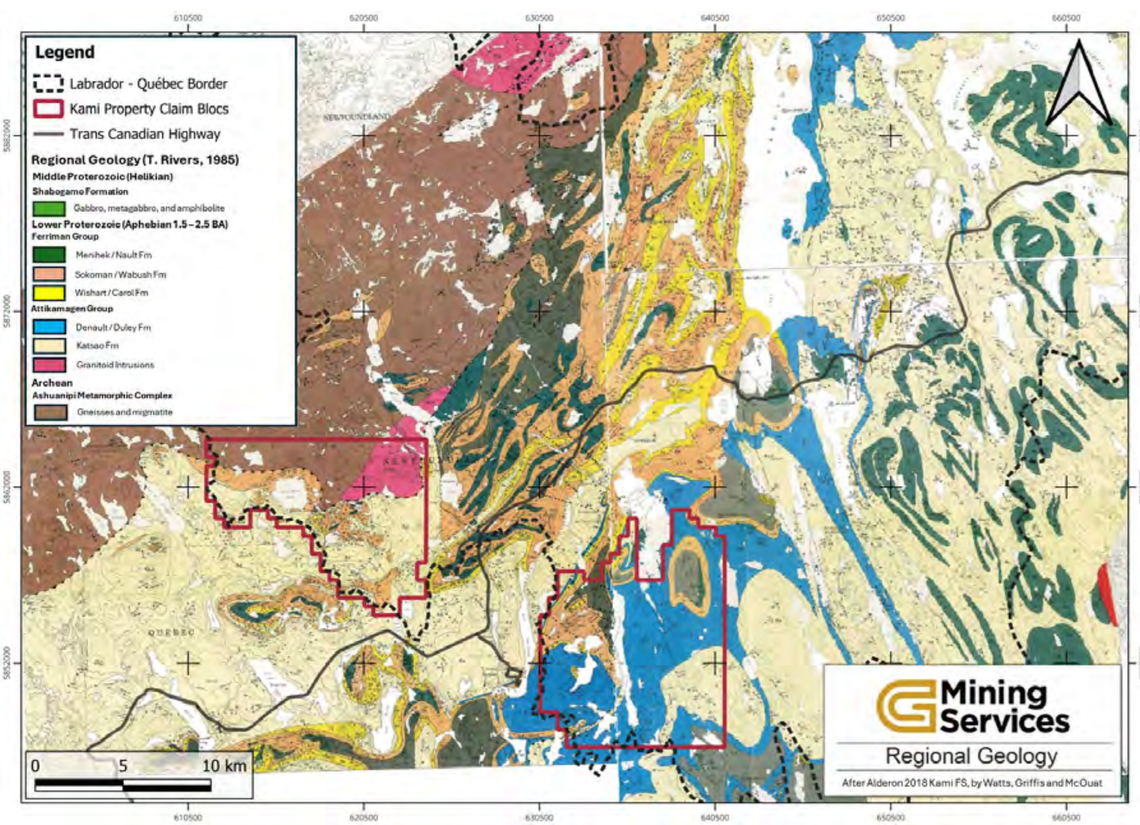


Figure 7-1: Regional Geology of the Kami Deposit Area
(Source: Rivers and Clark, 1980, Rivers, 1985a, Rivers, 1985b)

Table 7-1: Regional Stratigraphic Column, Western Labrador Trough

Description	Rock Type
Middle Proterozoic – Helikian	
Shabogamo Mafic Intrusives - Gabbro, Diabase	
Monzonite-granodiorite	
Intrusive Contact	
Paleoproterozoic – Aphebian	
Ferriman Group	
Nault Formation (Menihek Formation)	Graphitic, chloritic and micaceous schist
Wabush Formation (Sokoman Formation iron formation)	Quartz, magnetite-specularite-silicate-carbonate iron formation
Carol Formation (Wishart Formation)	Quartzite, quartz-muscovite-garent schist
Possible Unconformity – locally transitional contact?	
Attikamagen Group	
Duley Formation (Denault Formation)	Meta-dolomite and calcite marble
Katsao Formation (Fleming/Dolly Formations)	Quartz-biotite-feldspar schist and gneiss
Unconformity	
Archean	
Ashuanipi Complex	Granitic and Granodioritic gneiss and mafic intrusives

Note: The names in brackets provide reference to the equivalent units in the Churchill Province part of the Labrador Trough.

7.2 Property Geology

7.2.1 General

The most comprehensive mapping of this area was done by T. Rivers (Rivers, 1985a and Rivers, 1985b) as part of his Labrador Trough mapping program of the mid-1980s. Several maps of the area were produced, with the most applicable to this area being Maps 85-25 and 85-24 (1:100,000) covering National Topographic System Sheet 23B/14. Figure 7-2 is based mainly on River's work with modifications made by Alderon and Altius through mapping, drilling, and interpretation of geophysical survey results including the 2010 airborne gravity survey.

The Property is underlain by folded, metamorphosed sequences of the Ferriman Group and includes (from oldest to youngest): Denault (Duley) Formation dolomitic marble (reefal carbonate) and Wishart (Carol) Formation quartzite (sandstone) as the footwall to the Sokoman (Wabush) Formation. The Sokoman (Wabush) Formation includes iron oxide, iron carbonate and iron silicate facies and hosts the iron oxide deposits. The overlying Menihek Formation resulted from clastic pelitic sediments derived from emerging highlands into a deep-sea basin and marks the end of the chemical sedimentation of the Sokoman Formation.

Proterozoic biotite-garnet-amphibole dykes and sills cut through all formations.

Altius' exploration was focused on three parts of the Property known as the Mills Lake, Rose Lake and the Mart Lake areas. Alderon's 2010 to 2012 drilling was focused on the Rose Lake and Mills Lake areas. On some parts of the Property, the Sokoman (Wabush) Formation is directly underlain by Denault (Duley) Formation dolomite, and the Wishart (Carol) Formation quartzite is missing or is very thin. In other places, both the dolomite and quartzite units are present.

Alderon interpreted the Property to include two iron oxide hosting basins juxtaposed by thrust faulting. The principal basin, here named the "Wabush Basin", contains the majority of the known iron oxide deposits on the Property. Its trend continues NNE from the Rose Lake area, 9 km to the Wabush Mine and beyond the town of Wabush. The second basin called the "Mills Lake Basin", lies south of the Elfie Lake Thrust Fault and extends southwards, parallel with the west shore of Mills Lake. Each basin has characteristic lithological assemblages and iron formation variants.

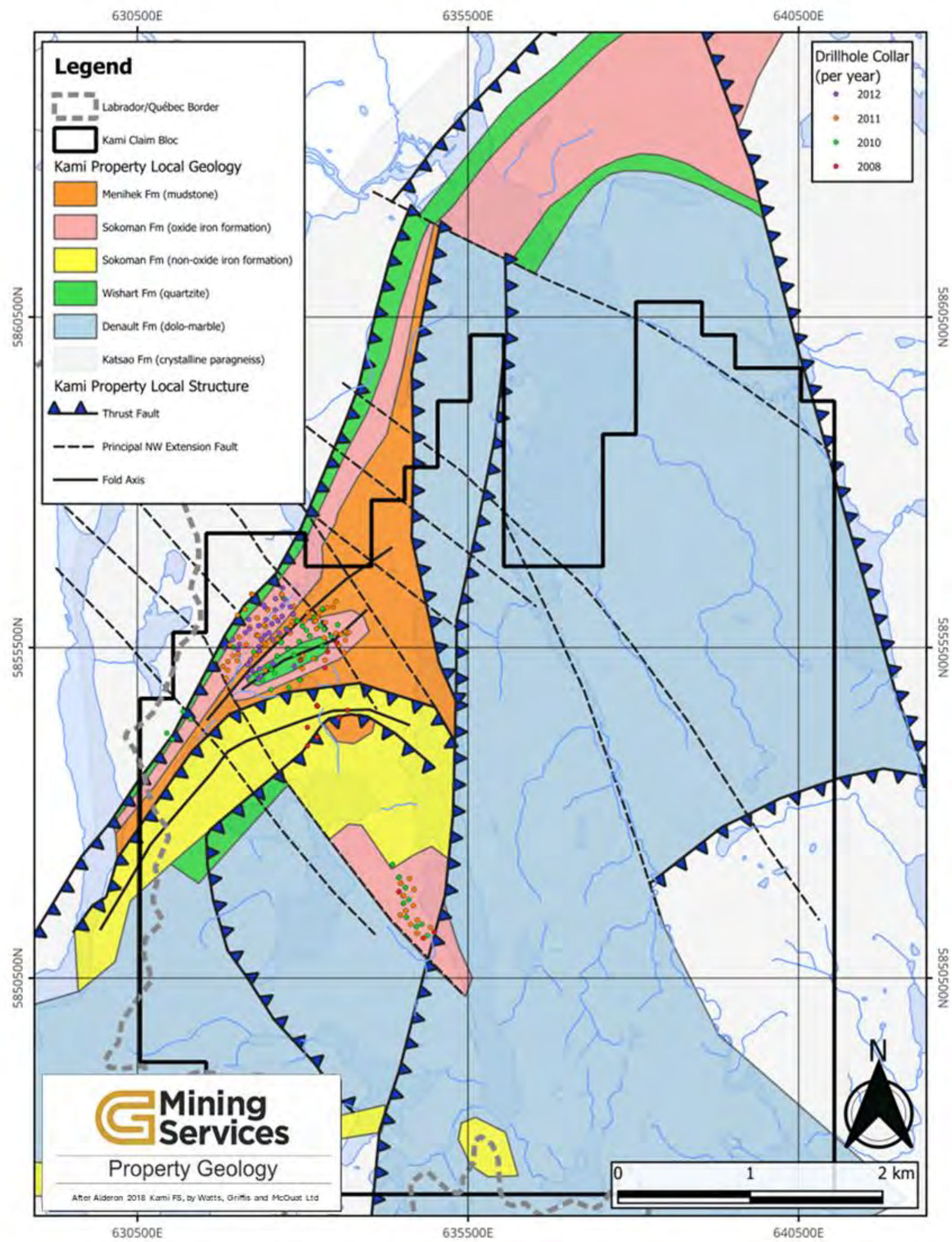


Figure 7-2: Property Geology (Source: modified from Grandillo et al., 2018)

7.2.2 East of Mills Lake

The portion of the Property east of the western shore of Mills Lake is dominated by gently dipping (15°-20°E) Denault Formation marble with quartz bands paralleling crude foliation. This block is interpreted as being thrust from the east onto the two basin complexes above. The marble outcrops across the width of licence 017926M with consistent east dips. The thickness exposed suggests that several thrust faults may have repeated the Denault Formation stratigraphy. On River's (1985) maps, this is shown as an unfolded syncline of Sokoman Formation, but mapping and shallow drilling by Alderon found Denault marble and minor Menihek Formation but no iron formation. Another area on licence 017926M, interpreted by Rivers (1985a, 1985b) as a syncline with Sokoman and Menihek formations in its core, did not show any airborne magnetic or gravity anomalies, and Alderon mapping found only dolomite marble.

Alderon initiated its 2010 program by re-logging Altius' drill core and replaced Altius' previous lithological codes with its own codes. Amphibolite dykes and sills cut through all other rock units but are particularly common in the Menihek Formation schists and are a consideration, as they may negatively impact the chemistry of iron concentrates made from mineralization containing these rocks that may be difficult to exclude during mining.

7.3 Mineralization and Structure

Mineralization of economic interest on the Property is oxide facies iron formation. The oxide iron formation ("OIF") consists mainly of semi-massive bands or layers, and disseminations of magnetite and/or specular hematite (specularite) in recrystallized chert and interlayered with bands (beds) of chert with iron carbonates and iron silicates. Several nomenclatures were used to code rock types depending on its magnetite and/or hematite content, with MIF and HIF as endmembers and MHIF and HMIF as intermediate members. Figure 7-3 show typical core photos examples of these endmembers. Where magnetite or hematite represents minor component of the rock comprised mainly of chert, the rock is named lean iron formation ("LMIF", "LHIF"). Where silicate or carbonate becomes more prevalent than magnetite and/or hematite, the rock is named silicate iron formation ("SIF") or carbonaceous iron formation ("CIF"), and/or silicate-carbonate iron formation ("CSIF") and its variants ("QSIF", "QCIF", "QCSIF" for quartz-rich variants). Figure 7-4 and Figure 7-5 show examples of some dominant variants, which are often difficult to discern visually. Mafic dykes ("HBG_GN" and variants) and muscovite and/or biotite schists ("B_MS_SCH", "MS_SCH", "MS_B_SCH") are also observed (see Figure 7-6 for typical examples). Throughout its field investigations, GMS found that logged rock types are often inconsistent from one hole to another. For example, several types of SIF were observed, some of which are similar to HBG_GN or CIF.

SIF consists mainly of amphibole and chert, often associated with carbonate and contains magnetite or specularite in minor amounts. The dominant amphibole on the Kami Property is grunerite. Where carbonate becomes more prevalent, the rock is named silicate- carbonate or carbonate-silicate iron formation. However, in practice, infinite variations exist between the OIF and silicate-carbonate iron formation composition end members. SIF and its variants and lean iron formation are also often interbedded with OIF.

The OIF on the Property is mostly magnetite-rich and some sub-members contain increased amounts of hematite (specularite). Hematite appears to be more prominent in Rose North mineralization than at either Rose Central or Mills Lake, but all zones contain mixtures of magnetite and hematite. At both Rose North and Rose Central and at Mills Lake, a bright pink rhodonite, which is a manganese silicate, is associated with hematite-rich OIF facies. Deeply weathered iron formation in the Rose North deposit also contains concentrations of secondary manganese oxides. There may also be other manganese species present.

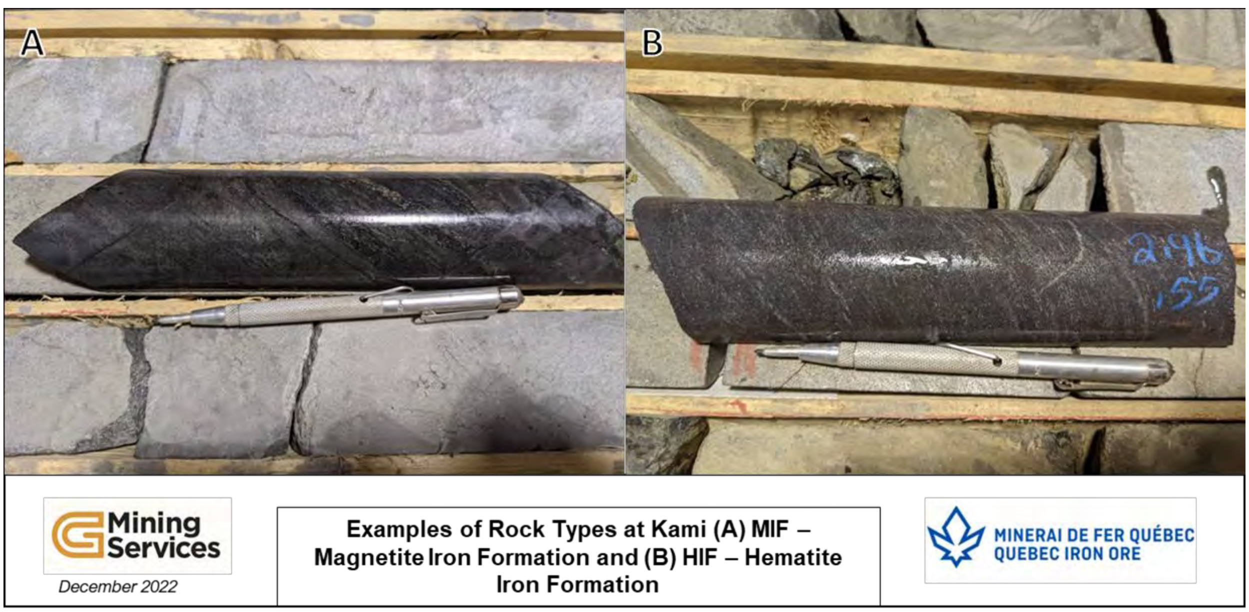


Figure 7-3: Examples of MIF and HIF at Kami

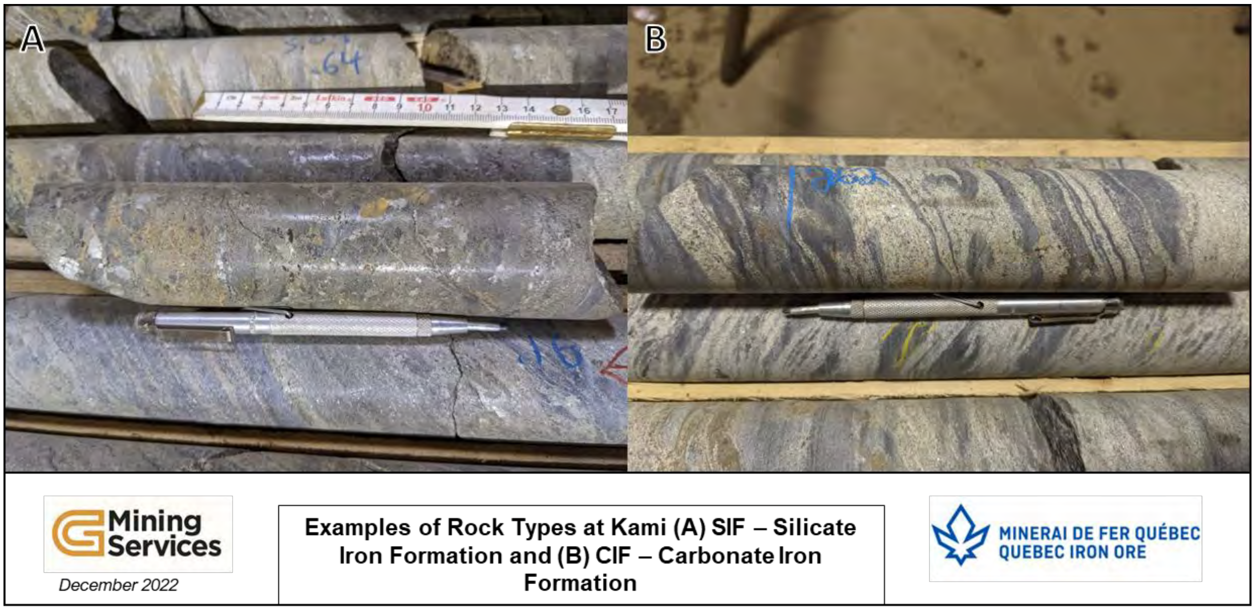


Figure 7-4: Examples of SIF and CIF

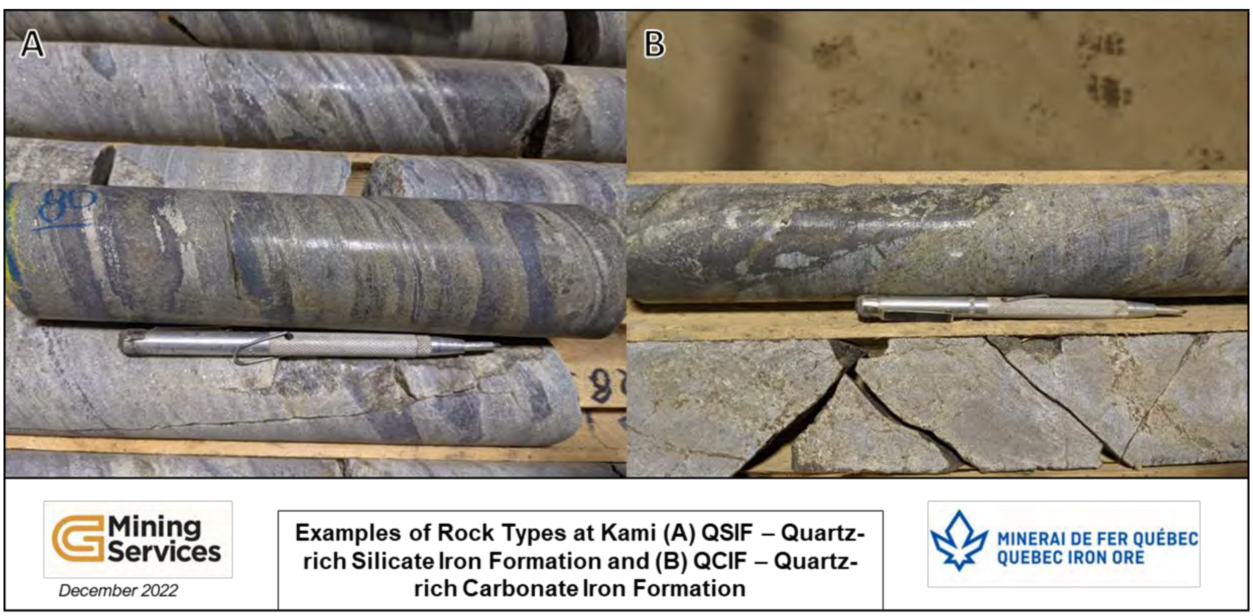
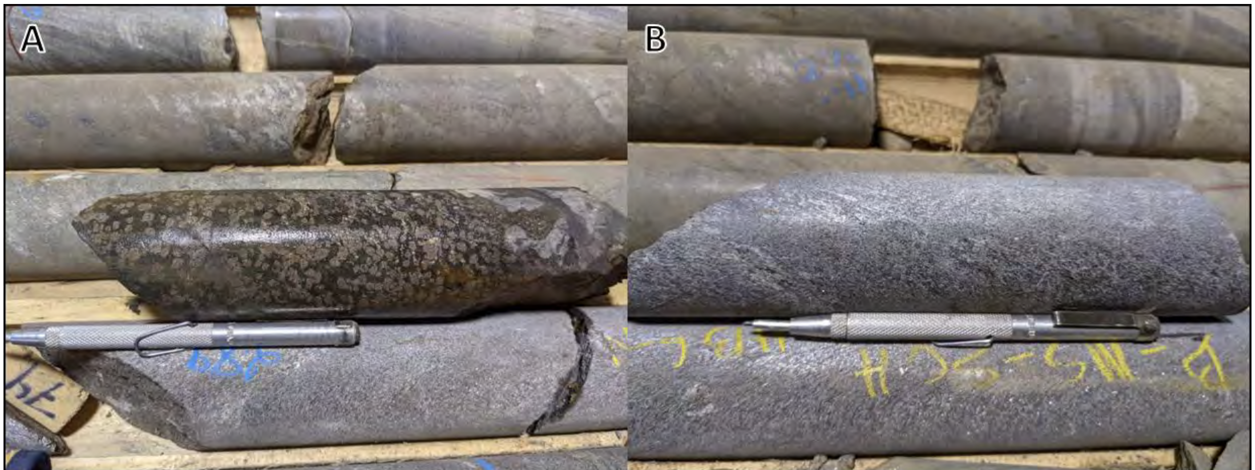


Figure 7-5: Examples of QSIF and QCIF



Mining Services
December 2022

Examples of Rock Types at Kami (A) HBG_GN – Mafic Dyke and (B) MS_B_SCH – Muscovite-Biotite Schist

MINERAI DE FER QUÉBEC
QUEBEC IRON ORE

Figure 7-6: Examples of HBG_GN and MS_B_SCH

7.3.1 Weathering

The iron deposits in the region have all been affected to some degree by deep humid weathering, likely an extension of the Cretaceous weathering that formed the so-called Direct Shipping Ore ("DSO") deposits around Schefferville, QC.

The weathering affects the Rose North limb from surface and continues below the base of the drilling at approximately -450 vertical m below surface. The weathering affects all rock types variably. According to Alderon's interpretation based on mineralogical and textural evidence, two stages of weathering have affected the rocks at Kami. The earlier stage appears to be neutral to slightly alkaline with low oxidation levels. This is expressed in the iron deposits by:

- Recrystallization of specular hematite to larger subhedral and euhedral crystals almost a magnitude larger than the original meta-taconite specular hematite;
- Leaching of quartz and carbonate from the non-oxide matrix;
- Destruction of Mn-silicate and carbonate minerals in the meta-taconite to Mn-oxides (psilomelane and pyrolusite) observed in several holes; and
- Destruction of Fe-silicates.

The host lithologies, including Menihek schist and Wishart quartzite, are typically altered to soft rock with the original textures preserved in the schist, similarly to saprolite weathering, and extensive leaching of quartz in the quartzite, leaving a quartz-muscovite-calcite powder or porous rock. The iron in the micas is not oxidized. This pattern was observed in the SW Rose drilling in 2010 with all units and in the Wishart quartzite and Katsao paragneiss in the footwall of the Rose North deposit.

The second stage of weathering is superimposed on the first and is more intense closer to the surface. It is characterized by the onset of veins and fractures merging to larger replacements of the original iron formation with Fe-hydroxide minerals such as limonite and goethite with minor earthy red hematite (see Figure 7-7 for a limonite-rich example, logged as SIF). The manganese oxides remain as powdery psilomelane and minor crystalline pyrolusite in leached vugs.

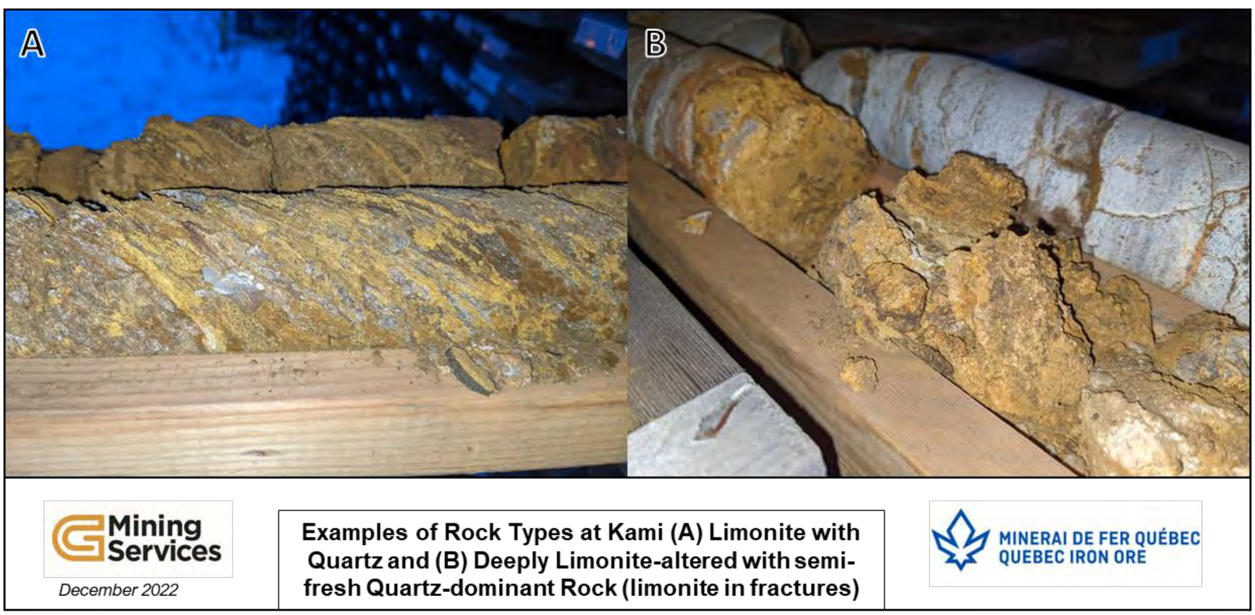


Figure 7-7: Example of Limonite-rich Rocks

The early-stage weathering forms thin replacements along fracture and fault surfaces aligned with the later NW-trending extensional faults that cut all units. The fault fillings are mainly a dark green "chlorite" type mineral that have not been identified. Adjacent to the fractures, iron silicate is changed to the same "chlorite", while carbonate grains are less affected. The fractures occasionally change along strike over a few metres to open space fillings that can contain fresh pyrite crystals, fine psilomelane powder, and calcite (but not quartz); limonite-goethite are scarce in these places.

Controls on the weathering patterns appear to be the reticulate pattern of older thrust faults parallel with the trend of the deposits crosscut by the younger NW faults. The two likely provided a connected system for deeper groundwater inflows at the root of the weathering zone.

The weathering may affect the metallurgy characteristics of the iron deposit by increasing the Fe grade by the loss of matrix, increasing porosity, reducing density and hardness, and creating Mn-oxides that can interfere with the extraction process.

7.3.2 Wabush Basin – Rose Deposits

The Wabush Basin on the Property contains (from south to north) the South Rose/Elfie Lake deposit, the Rose Central deposit ("RC") and the Rose North deposit ("RN"). These deposits represent different components of a series of gently plunging NNE-SSW upright to slightly overturned anticlines and synclines with parasitic smaller-scale folding. The Rose syncline appears to be dismembered by thrust faulting parallel to the D1 deformation from the SSE. The lateral extent of the southeast limb is limited, while the NW limb forms the long linear trend shown by the airborne magnetic and gravity anomalies and Rivers' (1985) maps. This fold system continues NNE from the western end of the Rose North deposit toward Long (Duley) Lake. The Wabush Mine deposit lies across the lake where the structure opens into a broad open syncline truncated by a northerly-trending late normal fault just west of Wabush.

The stratigraphy in the Rose area ranges from Katsao gneiss, north of the Rose syncline, up to the Menihek Formation mica schist. The contact between the Archean basement and the Denault marble is not exposed, nor has it been drilled to date. The Rose anticline exposes the Wishart Formation quartzite and drillholes also pass into Denault marble in the anticline core, and a thin Wishart unit abruptly passes down into Denault marble below the Mills Lake deposit. The contact relationship between the two units appears gradational to abrupt with increasing quartz at the base of the Wishart Formation. The Wishart includes muscovite + biotite-rich schist and variations in quartzite textures. It appears more variable than the large quartzite exposures near Labrador City.

The upper contact of the Wishart Formation is abrupt. The base of the overlying iron formation often starts with a narrow layer of Fe-silicate–rich iron formation. Alderon's exploration team correlated this member with the Ruth Formation. Locally this is called the Basal Iron Silicate Unit (Wabush Mines terminology). The thickness of this subunit ranges from 0 m to 20 m.

The Sokoman Formation in the Rose Lake area includes three iron-oxide-rich stratigraphic domains or zones separated by two thin low-grade units. This is similar to the sequence observed at the Wabush Mine. At Rose Lake, the low-grade units composed of quartz, Fe-carbonate plus Fe-silicates and minor Fe oxides are thinner and more erratically distributed than at the Wabush Mine. The three oxide divisions or domains in a gross sense are mineralogically distinct and were used as the basis for geometallurgical domains and for the subsequent Mineral Resource estimate. These are named RC-1, RC-2, and RC-3 from stratigraphic the base to the top.

RC-1, the lower stratigraphic level at Rose Lake, typically has substantially higher specular hematite to magnetite ratio. Magnetite content can be minimal to almost absent and is mostly restricted to the margins of the hematite unit, especially at the base of RC-1 where a thin magnetite-rich layer is frequently observed. The principal gangue mineral is quartz with a little carbonate or Fe-silicate. Crystalline rhodonite is locally common. Occasionally, magnetite can be observed replacing the hematite as crystalline clusters to 2 cm with rhodonite coronas. This is interpreted as indicating a broad reduction in Fe oxidation during the peak of metamorphism. The Mn-silicates appear to be cleanly crystallized with little entrainment of Fe oxides. Mn measured in Davis Tube magnetite concentrates, done as part of routine sample assaying, shows values up to 0.8% Mn; however, the overall amount of magnetite is low in the unit. In the Rose Central deposit, this unit appears to thin out along trend and depth to the SW. In the Rose North deposit, the equivalent RN-1 unit includes some secondary manganese oxides developed in the deeply weathered zone. Where the rock is fresh in Rose North, RN-1 and RC-1 rocks appear to have the same characteristics, except for the magnetite-rich layer rarely seen in RN-1.

RC-2, the middle domain, typically is comprised of a series of interlayered hematite-rich and magnetite-rich OIF units with magnetite being more prominent. The mineralization is somewhat enriched in manganese as rhodochrosite. Davis Tube concentrates from the routine Davis Tube tests done as part of the sample assay program show Mn in the 0.6-1.2% Mn range. Gangue minerals include quartz, Fe-carbonate, and modest amounts of Fe-silicate. In the Rose North area, the equivalent RN-2 is present in the same level with similar Total Fe and Fe in magnetite content.

RC-3, the upper domain at Rose Lake, typically has a much higher magnetite:hematite ratio than the other domains, with hematite being uncommon in any quantity. However, the overall total iron content ("%TFe") is the lowest of all three of the defined geometallurgical domains. The magnetite is typically finer grained, although it can be coarser in parasitic fold crests due to recrystallization. Characteristically, the Mn content of Davis Tube concentrates is relatively low at ~0.3% Mn. Upwards, this domain grades into assemblages containing less Fe oxide with increasing amounts of Fe-silicate and Fe-carbonate. In the Rose North limb, the equivalent RN-3 forms two bands: the lower one is more consistent in thickness throughout the drilled length of the deposit while an upper part is thicker to the northeast and thins to the SW.

The RN-1, RN-2 and RN3A/B domains are generally similar to RC-1, RC-2 and RC-3 respectively in their magnetite and/or hematite content. Deleterious elements, such as MnO, can behave differently. It may be caused by a different alteration or a lateral variation of sedimentary units. The reader should refer to Chapter 14 for descriptive statistics for each sub-domains.

The uppermost part of the Sokoman is principally composed of non-oxide facies. The thin magnetite layers that are present have the same level of Mn in magnetite bands as the RC-3 zone "typical" units. The contact with the overlying Menihek Formation is a diachronous transition of interlayered Sokoman chemical sediments and Menihek flysch mud. The contact may locally be tightly folded or faulted by post-metamorphic movement parallel with the foliation, but many of the contacts between the two formations are delicately preserved and appear to be "one-way" and not folded stratigraphy. It is probable that all three contact controls are in play.

The Wabush Basin in the southern part of the Property is bounded to the south by a major arcuate ESE to SW-trending thrust fault along Elfie Lake towards Mills Lake. The east margin is bounded by a northerly thrust fault from the east and on the west by a curious probable thrust fault within the Denault Formation that truncates an ENE-striking open anticline.

Figure 7-8 shows the drilling areas and deposit with reference to ground magnetics. Figure 7-9 shows a typical cross section (20E) of the Rose Central – Rose North deposits. The magnetic profile from the ground magnetic survey shows peaks that correlate with magnetite-hematite mineralization intersected in the drillholes. Each of these zones are interpreted as limbs of a series of NE-SW trending, upright to slightly overturned shallow NE plunging anticlines and synclines, but structural stacking may also play a role. Wishart Formation quartzite forms the core of the fold (intersected towards the bottoms of drillholes K-10-09, K-08-18, K-10-30 and K-10-35 on Section 20E) and Menihek Formations mica - graphitic schist is the stratigraphic hanging wall above the Sokoman Formation iron formation.

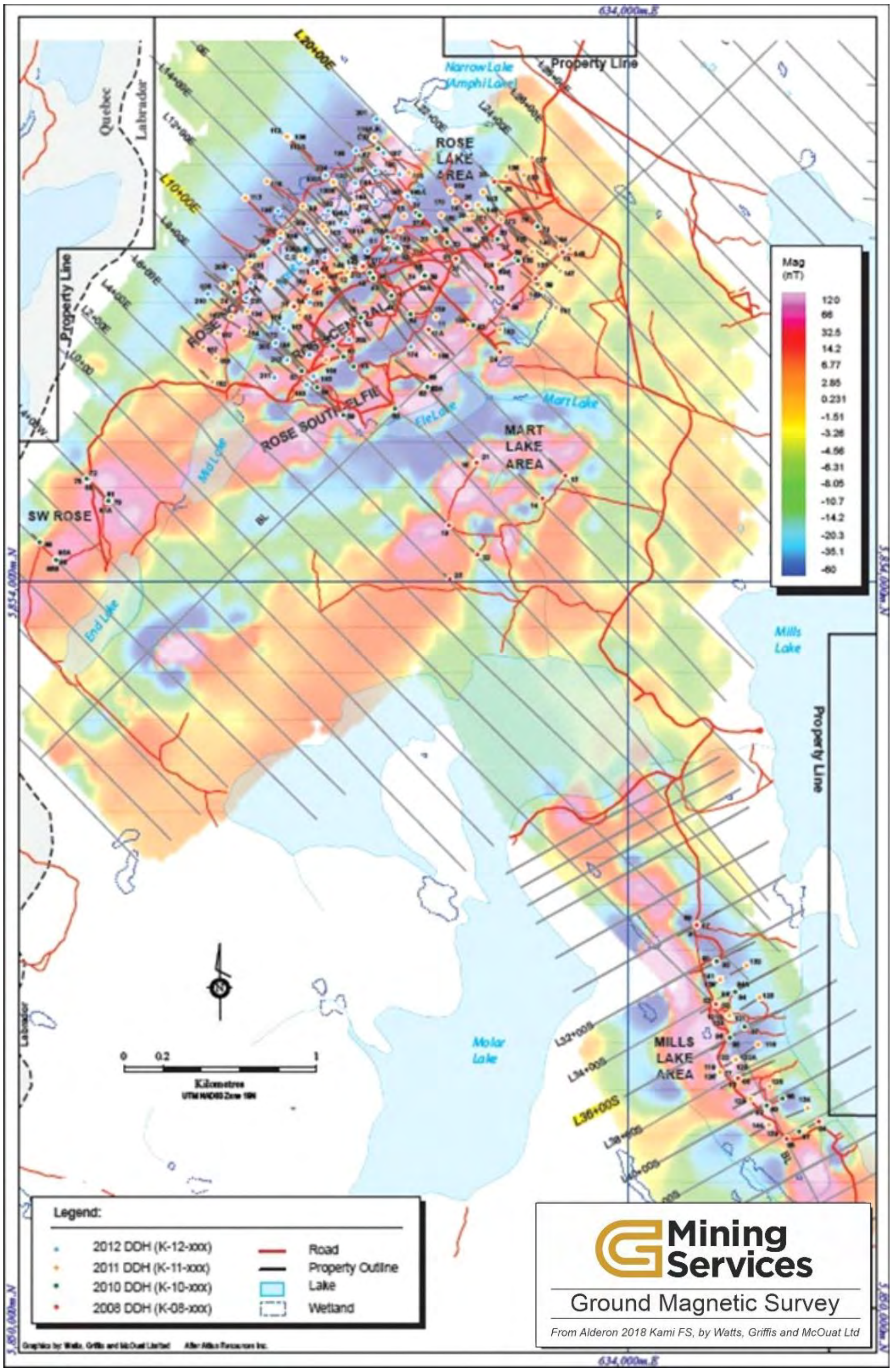


Figure 7-8: Ground Magnetic Survey with 2008-2012 Drillhole Locations
(Source: Grandillo et al., 2018)

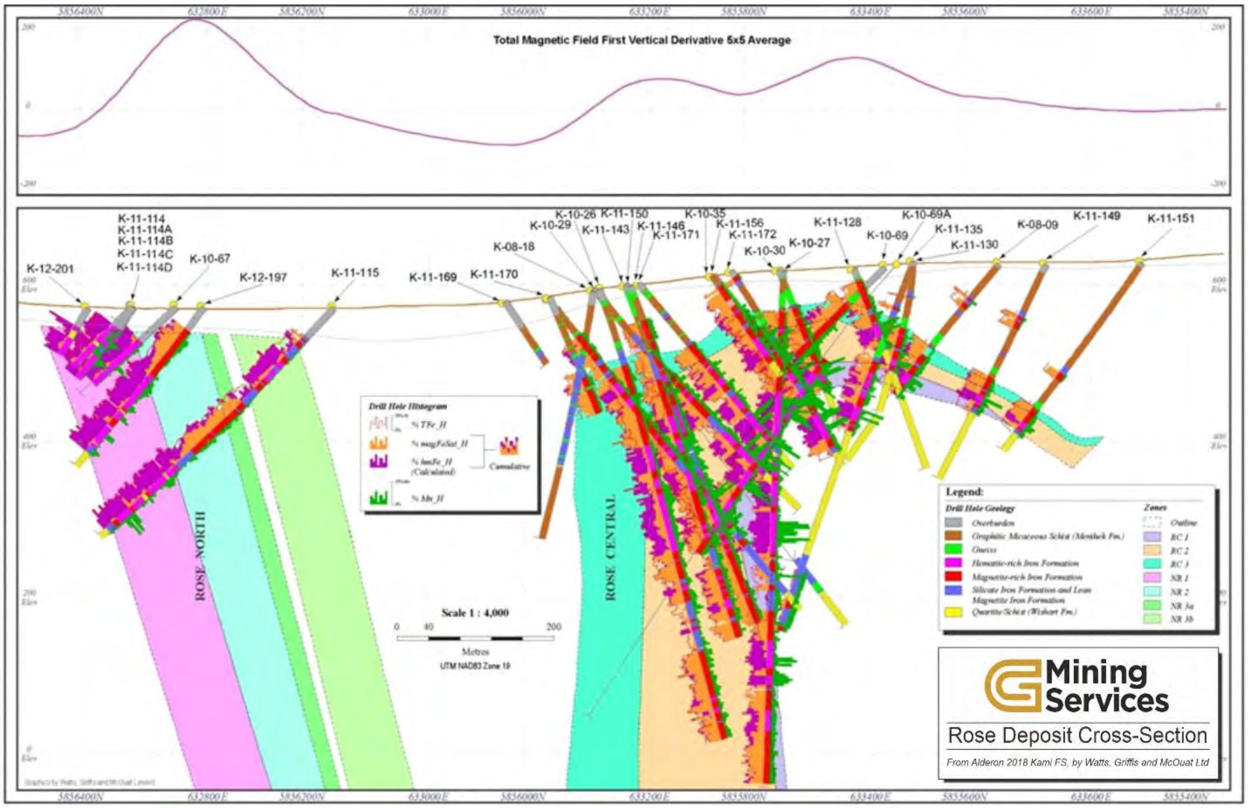


Figure 7-9: Rose Lake Area - Cross Section 20+00E
(Source: modified from Grandillo et al., 2018)

The true width of the Rose Central deposit as shown by the interpretation is varying between 60 m and 240 m on the western limb. However, widths of mineralization rapidly attenuate through the hinge into the South Rose zone or limb and there is no consistent relationship between drillhole intersection length and true width. The true width of the Rose North deposit is in the order of 230 m to 350 m. The Rose North and the Rose Central deposits appear to represent respectively the NW and SW limbs of the same tight syncline.

There is also another narrow, highly attenuated, and perhaps tightly folded limb of Sokoman Formation between the main Rose Central zone and the Rose North zone. The entire Rose system also appears to attenuate along strike to the SSW. While several magnetite- and hematite-rich intervals are present, it is very difficult to interpret geological continuity between drillholes. This sub-area may be affected by secondary S- and Z-shaped folds or parasitic folds.

The 2011-12 infill drilling campaign indicated the effects of late, NW-striking, sub-vertical normal faulting. Alderon's interpretation suggested scale of movement of typically 40 m to 180 m. The NW trend is sub-parallel with a major glaciation direction, thus obscuring these features. According to Alderon's interpretation, four of these faults cut the Rose deposit with interpreted offsets that appear to elevate the SW end of the Rose Central deposit and drop the NE anticline nose. These can be followed in topography and in detailed air-magnetic maps. The surface traces of these faults are shown on the property geology map (Figure 7-2).

In the main body of the Rose Central zone, manganese decreases in concentration from stratigraphic bottom towards the stratigraphic top and hematite also decreases in prevalence as magnetite-rich OIF becomes dominant. This same general pattern, perhaps not as obvious, is also present from footwall to hanging wall in the Rose North zone.

7.3.3 Mills Lake Basin – Mills Lake and Mart Lake Deposits

The Mills Lake Basin is developed south of the Wabush Basin. It is considered to be a separate basin because the amount and distribution of non-oxide facies iron formation is different from the Wabush Basin package at Rose and Wabush Mine.

The oldest lithology in the Mills Lake area is the Denault marble. It forms the core of the open anticline in outcrop west of the Mills deposit. The contact with the overlying Wishart is transitional to sharp. The Wishart is predominantly composed of quartzite with lenses of micaceous schists up to 20 m thick, especially towards the upper contact with the Sokoman Formation. The base of the Sokoman is marked by the discontinuous occurrence of a basal silicate iron formation that ranges from 0 m to 20 m true thickness. Alderon correlated this unit to the Ruth Formation.

The lower part of the Sokoman Formation is composed of Fe-carbonate-quartz facies iron formation ("IF") with scattered zones of disseminated magnetite. The OIF facies forms two coherent lenses traced over 1,400 m on the Mills Lake deposit. The same observation was made south of Mart Lake deposit after drilling in 2008 (Seymour et al., 2009). In the Mills Lake deposit, the lower oxide unit ("M_MM" and "M_HZ") is 30-130 m in true thickness, while the uppermost unit ("M_UM") is generally less than 40 m thick. In the Mart Lake zone, the two oxide layers are less than 30 m thick. They are separated by 20 m to 50 m of carbonate facies IF. Above the upper oxide lens, more carbonate facies greater than 50 m thick cap the exposed stratigraphy. Alderon reported that the carbonate facies units often show zones of Fe-silicates, which they interpreted as being derived from a decarbonation process during metamorphism leading to replacement textures. These observations could indicate that, at least in the Mills Lake area, the nature of Fe-silicates is principally metamorphic and not primary. Disseminated magnetite is a common accessory mineral associated with the Fe-silicates but is not economically significant at this low level of replacement.

The lower oxide facies at the Mills Lake deposit have three levels, or stratigraphic domains: a lower ("M_MM") and upper ("M_UM") magnetite dominant domain, a specular hematite with rhodonite domain ("M_HZ"), and an upper magnetite dominant domain. The two magnetite dominant domains show different amounts of manganese in magnetite-OIF with the upper portion being low in manganese and the lower one having moderate manganese enrichment. In the Mart zone, a similar pattern is apparent but the two magnetite-dominant OIF domains are more widely separated stratigraphically, are generally thinner, have lower Fe oxide grade, and the hematite member is less well developed.

Figure 7-10 is cross section 36E through the Mills Lake deposit showing the lower and wider lenses of iron formation intersected by three drillholes K-10-95, K-10-96 and K-10-97. The narrower upper lens is intersected only in the top of drillhole K-10-97. Also apparent is the narrow hematite dominant layer which occurs three quarters of the distance towards the top of the lower lens and divides the lower lens into three parts with a magnetic OIF dominant bottom and top. Similar to Rose Central mineralization, the core logging of various facies correlates well with hematitic Fe ("%HemFe") calculated from assays. Again, similar to mineralization in the Rose Central and Rose North zones, manganese is significantly higher in hematite-rich OIF than the magnetite-rich OIF.

The Mills Lake Basin outcrop is controlled by an ENE-trending asymmetrical open syncline overturned from the SSE with a steeper north limb and shallow-dipping (18°E) east-facing limb. The fold plunges moderately to the ENE. The Mills Lake Basin is fault-bounded. The northern limit of the basin is the Elfie Lake Thrust Fault pushed from the SSE where it rides over the Wabush Basin package. The east limit is an interpreted thrust fault from the east that pushes Denault marble over the Sokoman Formation. The SSE fault appears to be the older of the two. Based on Rivers' mapping and field observations by Alderon's staff, it would include the Mont-Wright deposit and several smaller iron deposits west of Fermont. The details of the basin dimensions are unknown.

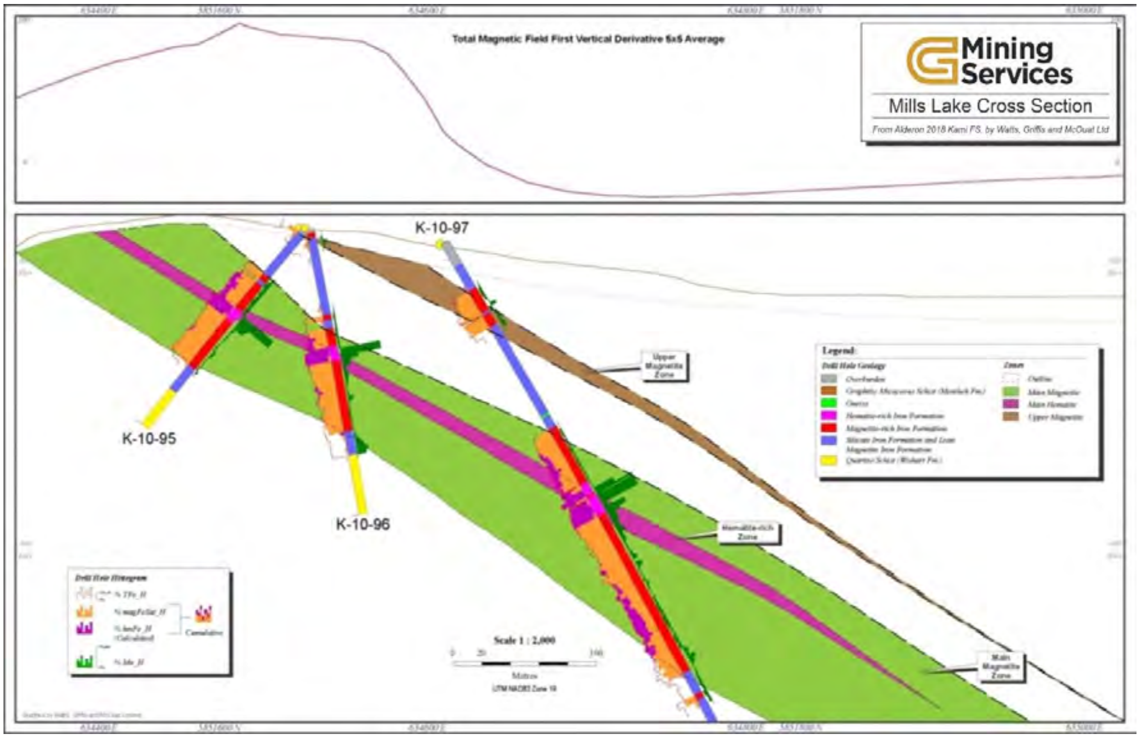


Figure 7-10: Mills Lake Area - Cross Section 36+00E
(Source: modified from Grandillo et al., 2018)

7.3.4 Mineralization by Rock Type

Samples logged and coded as magnetite-rich are indicated by assay results to contain more magnetic Fe than samples logged as hematite-rich or carbonate and silicate IF. Samples coded as hematite-rich contain more hematitic Fe. At both Rose and Mills, hematite-rich samples contain higher levels of manganese. This can be observed particularly in the groups coded as HIF and HSIF, respectively Hematite Iron Formation and Hematite-Silicate Iron Formation. Carbonate IF (CIF, QCIF) samples are generally higher in CaO, but some misclassification of QSIF may alter its CaO values. Mafic intrusive rocks (HBG-GN) contain higher levels of TiO_2, Al_2O_3 and Mg than IF. Quartz schists, which generally represent Wishart Formation, are high in SiO_2 and Al_2O_3, as are Menihek Formation samples. Denault Formation samples are high in CaO and MgO as this rock is marble or dolomitic marble. There are, however, some anomalies probably resulting from mis-logging. Dolomitic samples can be mis-logged as quartzite. Some intervals or samples logged as mafic dykes (HBG-GN) contain high levels of hematite Fe. Samples or units logged as “Lean” iron formation with a Leading “L” in Alderon’s lithology nomenclature often have assays with significant oxide-iron grade. The reader may refer to Section 11.5 for more details on summary statistics of major lithological units and the methodology used to determine Fe in hematite, magnetite and “other minerals”.

8. Deposit Types

This chapter was taken from the latest Kami NI 43-101 Feasibility Study ("FS") prepared by Alderon Iron Ore Corp. (Grandillo et al., 2018) and reviewed by GMS.

The iron formations of the Kami deposits are of the Lake Superior-type. Lake Superior-type iron formations consist of banded sedimentary rock composed principally of bands of iron oxides, magnetite and hematite within quartz (chert)-rich rock with variable amounts of silicate, carbonate and sulphide lithofacies. Such iron formations have been the principal sources of iron throughout the world (Gross, 1996). Table 8-1, after Eckstrand (1984), presents the salient characteristics of the Lake Superior-type iron deposit model.

Lithofacies that are not highly metamorphosed or altered by weathering and are fine grained are referred to as taconite. Metamorphosed taconites are known as meta-taconite or itabirite (particularly if hematite-rich). The iron deposits in the Grenville part of the Labrador Trough in the vicinity of Wabush and Mont-Wright, operated by IOC (Rio Tinto), ArcelorMittal, Quebec Iron Ore and Tacora are meta-taconite. The iron formations on the Property are Lake Superior-type meta-taconite.

For non-supergene-enriched iron formation to be mined economically, iron oxide content must be sufficiently high but also amenable to concentration (beneficiation). The concentrates produced must be low in deleterious elements such as silica, aluminum, phosphorus, manganese, sulfurs, and alkalis. For bulk mining, the silicate and carbonate lithofacies and other rock types interbedded within the iron formation must be sufficiently segregated from the iron oxides. Folding can be important for repeating iron formation and concentrating iron formation beds to create economic concentrations of iron.

Table 8-1: Deposit Model for Lake Superior-Type Iron Formation after Eckstrand (1984)

Commodities	Fe (Mn)
Examples: Canadian - Foreign	▪ Knob Lake, Wabush Lake and Mont-Wright areas, Québec and Labrador. ▪ Mesabi Range, Minnesota; Marquette Range, Michigan; Minas Gerais area, Brazil.
Importance	Canada: the major source of iron. World: the major source of iron.
Typical Grade, Tonnage	Up to billions of tonnes, at grades ranging from 15 to 45% Fe, are averaging 30% Fe.
Geological Setting	Continental shelves and slopes possibly contemporaneous with offshore volcanic ridges. Principal development in middle Precambrian shelf sequences marginal to Archean cratons.

Commodities	Fe (Mn)
Host Rocks or Mineralized Rocks	Iron formations consist mainly of iron and silica-rich beds; common varieties are taconite, itabirite, banded hematite quartzite, and jaspilite; composed of oxide, silicate and carbonate facies and may also include sulphide facies. Commonly intercalated with other shelf sediments: black
Associated Rocks	Bedded chert and chert breccia, dolomite, stromatolitic dolomite and chert, black shale, argillite, siltstone, quartzite, conglomerate, red beds, tuff, lava, volcaniclastic rocks; metamorphic equivalents.
Form of Deposit, Distribution of Ore Minerals	Mineable deposits are sedimentary beds with cumulative thicknesses typically from 30 m to 150 m and strike lengths of several kilometres. In many deposits, repetition of beds caused by isoclinal folding or thrust faulting has produced widths that are economically mineable. Ore mineral distribution is largely determined by primary sedimentary deposition. Granular and oolitic textures are common.
Minerals: ▪ Principal Ore Minerals ▪ Associated Minerals	Magnetite, hematite, goethite, pyrolusite, manganite, hollandite. ▪ Finely laminated chert, quartz, Fe-silicates, Fe-carbonates and Fe-sulphides; primary; or ▪ Metamorphic derivatives.
Age, Host Rocks	Precambrian, predominantly early Proterozoic (2.4 to 1.9 Ga).
Age, Ore	Syngenetic, same age as host rocks. In Canada, major deformation during Hudsonian and, in places, Grenvillian orogenies produced mineable thicknesses of iron formation.
Genetic Model	A preferred model invokes chemical, colloidal and possibly biochemical precipitates of iron and silica in euxinic to oxidizing environments, derived from hydrothermal effusive sources related to fracture systems and offshore volcanic activity. Deposition may be distal from effusive centres and hot spring activity. Other models derive silica and iron from deeply weathered land masses, or by leaching from euxinic sediments. Sedimentary reworking of beds is common. The greater development of Lake Superior-type iron formation in early Proterozoic time has been considered by some to be related to increased atmospheric oxygen content, resulting from biological evolution.
Ore Controls, Guides to Exploration	1. Distribution of iron formation is reasonably well known from aeromagnetic surveys. 2. Oxide facies is the most economically important, of the iron formation facies. 3. Thick primary sections of iron formation are desirable. 4. Repetition of favorable beds by folding or faulting may be an essential factor in generating widths that are mineable (30 m to 150 m). 5. Metamorphism increases grain size, improves metallurgical recovery. 6. Metamorphic mineral assemblages reflect the mineralogy of primary sedimentary facies. Basin analysis and sedimentation modeling indicate controls for facies development and help define location and distribution of different iron formation facies.
Author	G.A. Gross

9. Exploration

This chapter was taken from the latest Kami NI 43-101 Updated Feasibility Study ("FS") prepared for Alderon Iron Ore Corp. (Grandillo et al., 2018), updated by Champion and reviewed by GMS.

9.1 General

Historic exploration is summarized under the History section of the Report (Chapter 6). Altius' initial exploration was in 2006, culminating in a diamond drilling program in 2008. Alderon conducted its first exploration program in the summer of 2010. GMS understands that no exploration has been conducted on the Property since 2012 other than a sampling campaign in 2021 (Section 9.6) and a new LIDAR survey in 2023.

9.2 Altius Exploration Programs 2006-2009

Reconnaissance mapping and rock sampling commenced during the summer of 2006 and was completed during the 2007 field season. In 2006, ten samples of outcrops and boulders were assayed at SGS Lakefield for major elements. Grab samples yielded iron values typical of oxide facies iron formation. Further outcrop sampling was completed during the 2008 program. A total of 63 rock samples were collected, 29 of which were for chemical analysis, while the remaining were collected for physical properties testing. The 2007 samples were sent to Activation Laboratories in Ancaster, Ontario, and assayed for major elements, FeO and total sulfur. Nine rock samples from the Mills Lake area returned Fe values ranging from 9.7% Fe to 43.6% Fe and manganese values ranging from 0.43% Mn to 13.87% Mn. From the Molar Lake area, five rock samples were collected yielding 13.7% Fe to 23.6% Fe and 0.1% to 0.69% Mn. From the Elfie Lake area, two grab samples were collected that respectively returned assay results of 25.9% Fe and 0.95% Mn and 17.9% Fe and 1.07% Mn. From the Mart Lake area, one sample was collected that yielded 16.3% Fe and 0.15% Mn. From the Rose Lake area, a few outcrops over a strike length of approximately 430 m were grab sampled. Values ranged from 5.6% Fe with 9.73% Mn from a sample near the iron formation – Wishart Formation contact to 29.7% Fe with 1.05% Mn from a magnetite specularite sample of iron formation.

Altius' 2007 exploration program also included a high-resolution helicopter airborne magnetic survey carried out by Mcphar Geosurveys Ltd. The purpose of the airborne survey was to acquire high resolution magnetic data to map the magnetic anomalies and geophysical characteristics of the geology. The survey covered one block. Flight lines were oriented northwest-southeast at a spacing of 100 m. Tie lines were oriented northeast-southwest at a spacing of 1,000 m. A total of 905-line-km of data were acquired. Data was acquired by using precision differential GPS positioning. The rock samples were collected from the Property and sent for physical properties testing to support interpretation of the airborne magnetic survey results.

The results of the 2007 exploration program were positive with rock samples returning favorable iron values and the airborne magnetic survey effectively highlighting the extent of the iron formation. Following the 2007 exploration program, licenses 013935M, 013937M, 010501M, 011927M, 012853M and 012854M were grouped to form license 15037M and licenses 14957M, 14962M, 14967M and 14968M were staked.

The 2008 exploration program on the Property consisted of physical properties testing of the rock samples collected in 2007, line cutting, a ground gravity and magnetic survey carried out by Géosig of Québec City, Québec, a high-resolution satellite imagery survey (Quickbird), an integrated 3D geological and geophysical inversion model and 25 holes totalling 6,129.49 m of diamond drilling. The drilling program was designed to test three known iron ore occurrences on the Property (namely Mills Lake, Mart Lake and Rose Lake) that were targeted through geological mapping and geophysics.

The ground gravity and total field magnetic surveys were conducted along 69.8 km of cut gridlines spaced from 200 m to 400 m apart and oriented northwest southeast. Gravity surveying and high-resolution positional data were collected at 25 m intervals. The magnetic survey stations were spaced at 12.5 m along the lines.

Mira Geoscience ("Mira") was contracted to create a 3D geological and geophysical inversion model of the Property. Mira was provided with the geological cross sections, airborne and ground geophysics data and the physical rock properties from each of the different lithologies. The 3D geological and geophysical model was completed to help with target definition and drillhole planning.

Drilling confirmed (see the following sections in this Report) the presence of oxide-rich iron formation at the three iron occurrences and was successful in extending the occurrences along strike and at depth. Drilling was also fundamental in testing stratigraphy and structure to help refine the geological and structural models for each area to aid in drillhole targeting.

9.3 Alderon's Summer 2010 Exploration Program

The 2010 exploration program started on June 1, 2010 and finished December 1, 2010. The program consisted mainly of a drilling program described under Drilling (Chapter 10), but also included an airborne geophysical survey covering the three licenses Alderon holds in Newfoundland and Labrador and the re-logging and lithology re-coding of Altius' 2008 drill core. The airborne geophysical survey consisted of 1,079-line km of gravity and magnetic surveying covering a 130 km^2 area.

The geophysical survey measuring the gradient of the gravity field and magnetics was carried out by Bell Geospace Inc. ("BGI") of Houston, Texas and flown over the Property from November 8 through November 11, 2010 onboard a Cessna Grand Caravan. The crew and equipment were stationed in Wabush. The survey was flown in a north-south direction with perpendicular tie lines. Eighty-five survey lines and 13 tie lines were flown. The survey lines were 100 m apart on the western side of the survey area, and 300 m apart on the eastern side. The tie lines were 1,000 m apart. The survey lines varied from 10.3 km to 12.4 km in length, and the tie lines varied in length from 5.5 km to 11.7 km.

The survey plan defines a flight path that maintains a constant elevation from the ground for the entire length of each survey line. However, it is not always possible to maintain the constant clearance because of variations in terrain relief. Ground clearance does not vary greatly in this survey due to the lack of severe terrain features and ground clearance ranged from 60 m to 187 m.

Magnetic data was acquired with a cesium vapor sensor. A radar altimeter system was deployed to measure the distance between the airplane and the ground. Along with the plane's altitude acquired via GPS, radar altimetry data was used to produce a Digital Elevation Model ("DEM"). The Full Tensor Gravity Gradiometry (Air "FTG") system contains three Gravity Gradient Instruments ("GGIs"), each consisting of two opposing pairs of accelerometers arranged on a rotating disc.

Processing of the gravity data includes line leveling, terrain correction and noise reduction. Measured free air and terrain corrected maps for each of the six tensor components were provided.

9.4 Alderon's Winter 2011 Exploration Program

Alderon's winter 2011 program consisted of a drilling program on the Rose North deposit. Drilling started in early February and was completed on April 6. Alderon also completed a LIDAR (Light Detection and Ranging) and air photo survey.

9.5 Alderon's 2011-2012 Exploration Program

Alderon's 2011-2012 exploration program consisted mostly of a drilling program described in Chapter 10 of this Report. The program started in June 2011 and continued through April 30, 2012, with a break between summer and winter for the frost. Drilling comprised infill holes on both the Rose and Mills Lake areas, as well as geotechnical drillholes and metallurgical testwork. Geological reconnaissance mapping was completed in several areas south and east of the Rose deposit, principally for condemnation study around the proposed mine site civil works.

A 20 cm per pixel aerial orthorectification LIDAR photography survey was flown over the Property in August and September 2011. Aéro-Photo (1961) Inc. of Québec City, Québec, performed the work. Allnorth Land Surveyors' ("Allnorth") of Kamloops, BC, participated in establishing ground control points. A follow-up flight over the original Kami Property was completed in fall 2012 using the same 20 cm resolution to document the reclamation works conducted on the 2008-2012 drill areas.

9.6 Champion Exploration Program

As part of the GMS 2021 site visit (see Chapters 2 and 12), a sampling program was undertaken to evaluate the potential of iron-rich, value-added material mostly at the footwall of Rose Central (footwall of RC-1). A total of 91 samples were collected and sent to SGS Québec for XRF, magnetic iron (Satmagan) and FeO (Titration) analyses (see preparation and analysis protocols described in Chapter 11). The unit targeted was the silicate iron formation ("SIF") or the carbonaceous iron formation ("CIF"), which exhibited high iron content (Total Fe). Results showed that SIF/CIF samples at the footwall of RC-1 had an average iron content associated to magnetite and hematite of less than 3% Fe. None of these samples were used in the mineral resource estimate presented in Chapter 14 since they showed that the footwall unit was not mineralized in magnetite and/or hematite.

An aerial LIDAR survey was done on the Property in August 2023. XEOS Imaging Inc. was mandated to perform the work. The Piper Navajo plane flew over the Property equipped with the laser scanner Riegl VQ-780ii at 2,000 KHz and a localization system GPS/IMU AeroControl-II. The deliverable was a topographic contour map with a resolution of 50 cm.

The map from the LIDAR survey was delivered after the completion of the geological model and was not used in this study. This map will be used in the next study and for field preparation work.

10. Drilling

This chapter was taken from the latest Kami NI 43-101 Updated Feasibility Study ("FS") prepared for Alderon Iron Ore Corp. (Grandillo et al., 2018) and revised by GMS. Section 10.6 was added by AtkinsRéalis.

10.1 Historic Drilling

According to Hird (1960), 272 holes aggregating a total of 7,985 m (26,200 ft) were drilled during IOC's 1957 program. Approximately 66 of these holes were located on the Property. Mathieson (1957) reported that there were no new deposits found with the drilling. However, definite limits were established for the iron formation outcrops found during previous geological mapping.

In 1979, one diamond drillhole was drilled by LM&E near the north end of Elfie Lake. The hole (No. 57-1) was drilled vertically to a depth of 28 m (Grant, 1979) and did not encounter oxide iron formation. In 1983, as reported by Avison et al., 1984, LM&E collared a 51 m deep (168 ft) diamond drillhole 137 m north of Elfie Lake (DDH No. 57-83-1). The drillhole encountered iron formation from 17 m to a depth of 51 m. Of this, however, only 2 m was oxide facies. Core recovery was very poor (20%).

10.2 Altius 2008 Drilling Program

Altius' 2008 drilling program consisted of 25 holes totalling 6,013 m testing the Mills Lake, Mart Lake and Rose Lake iron occurrences (see Chapter 7). Table 10-1 provides a summary of 2008 drilling by target zone. Descriptions of mineralization and estimated true widths are discussed under Mineralization (Chapter 7 of this Report). Drilling was carried out between June and October by Lantech Drilling Services of Dieppe, New Brunswick, using a Marooka mounted JKS300 drill rig. A second, larger drill rig was added to the program in September, to help complete the program before freeze-up. The second rig was a skid mounted LDS1000 towed by a Caterpillar D6H dozer. Both drills were equipped for drilling BTW sized core. Drilling took place on a two-shift per day basis, 20 hours per day, and 7 days per week. The remaining 4 hours were used up with travel to and from the drill site and shift change.

Core was removed from the core tube by the driller's helper at the drill and placed into core trays labelled with hole and box number. Once the tray was filled, (approximately 4 m to 4.5 m per box), it was secured at both ends, labelled and set aside. Core was picked up at the drill site by Altius personnel each day. Core was transported from the drill site to a truck road using all-terrain vehicles and a trailer. Core was then transferred to truck belonging to Altius and transported directly to Altius' secure core facility in Labrador City. A geologist was always on site at the core facility to receive the core deliveries. Core boxes were then checked for proper labelling and correct positioning of tags. The core was measured and the downhole depth marked on the end of each tray with an orange China marker. Box numbers, intervals and Hole ID were recorded on a spreadsheet and on aluminum tags, which were subsequently stapled to the tray ends for proper cataloguing. All core was photographed, both wet and dry, in groups of four trays by a geotechnician or geologist.

Table 10-1: 2008 Drilling Summary by Deposit

Deposit or Zone	Number of Holes	Metres
Rose Lake	12	3,549.2
Mills Lake	6	834.2
Mart Lake	7	1,629.3
Total	25	6,012.6

10.3 Alderon 2010 Summer Drilling Program

The 2010 drilling program consisted of a total of 82 drillholes aggregating 25,900 m NQ diamond drilling. The objective of the program was to delineate an Inferred iron oxide Mineral Resource of 400-500 Mt on two areas: the Rose Central and Mills Lake deposits. The drilling included testing the Rose North Lake zone, the Southwest Rose Lake zone and the Elfie Lake/South Rose zone. The 2010 program included: borehole geophysics on many of the 2008 and 2010 holes, detailed 3D, Differential Global Positioning System ("DGPS") surveying of 2008 and 2010 drillhole collars, and logging and sampling of drill core including the re-logging of 2008 drillholes.

Landdrill International Ltd. ("Landdrill") based in Notre-Dame-du-Nord, QC, was the Drill Contractor for the entire campaign. Throughout the campaign, between three and five diamond drill rigs were operating simultaneously. Some rigs were brought in for special purposes, like a heli-supported drill for several holes on Rose North and a track-mounted drill to access an area with a restricted access permit. A total of 82 holes were collared, but only 72 holes were drilled to the desired depths, with the remaining holes being lost during casing or before reaching their target depth because of broken casing, detached rods, bad ground condition, etc. Table 10-2 provides a summary of 2010 drilling by target zone.

Alderon managed the drilling and core logging for the Project from June 2010 through May 2012. The core was brought in twice daily at shift changes to Alderon's core facility located in a building in Labrador City, NL. Public access to the core facility was restricted by signage and generally closed doors. Only Alderon or its contractor's employees were allowed to handle core boxes or to visit the logging or sampling areas inside the facility.

Table 10-2: 2010 Drilling Summary by Deposit

Deposit or Zone	Number of Holes	Metres
Rose Lake	56	20,351.7
Mills Lake	16	4,124.7
SW Rose	10	1,423.9
Total	82	25,900.3

Several Rose drillholes also tested the Rose North zone at depth, allowing for a preliminary evaluation.

The drilling campaign consisted of three continuous, and at times, simultaneous phases of exploration:

1. The drilling began on the northeast extent of the Rose Central Lake trend (L22E) and progressed southwest along the established 200 m spaced northwest-southeast oriented gridlines to Section L8E. Each section was drilled and interpreted with the interpretation extrapolated and integrated into previous sections.
2. Towards the middle of the program, drilling expanded to test the Rose North and Southwest Rose zones, also following 200 m spaced lines. This expansion was done by increasing the number of drills on the Property to allow focus to continue on the Rose Central zone. The Rose North and Southwest Rose zones were difficult to test due to the topography, thick overburden and swampy terrain.
3. The last phase of exploration focused on the Mills Lake deposit and utilized two drill rigs (one heli-supported, the other self-propelled track driven) over 8 weeks.

Drilling on the Southwest Rose zone was limited to two cross sections. Drilling was difficult due to a combination of thick overburden (37-65 m vertical depth) with deep saprolitic weathering. Core recovery ranged from adequate to very poor. The weathering decreased at depths below 170 vertical metres, but most holes did not achieve that depth. Drilling on this target was suspended due to poor production.

Drilling on the Rose North zone was limited to two sites due to accessibility. The terrain overlying this target is a swampy lowland surrounding a shallow lake. Several holes testing the Rose Central deposit were extended to test the deeper portions of this north zone and indicate this zone requires additional drilling and may significantly contribute to the overall Rose Lake tonnage. This target is best tested during a winter program when the area is frozen and more readily accessible.

Core recovery was generally very good throughout the drilling focused on the Rose and Mills Lake deposits and is not a factor of the Mineral Resource Estimate for this drilling campaign. Core recovery is often poor for the drilling on the Rose North zone due to intensive weathering along fault systems. The Southwest Rose zone is not part of the present Mineral Resource Estimate.

10.4 Alderon 2011 Winter Drilling Program

The program began in early February and was completed in the middle of April. A total of 4,625 m and 29 drillholes were completed, including several holes that were lost and had to be re-drilled. All drilling except for one hole was done on the Rose North deposit. This one hole, K-11-117 (336 m) was completed on the Rose Central deposit and was for the purpose of collecting a sample for metallurgical testwork. It was a twin of K-10-42. Landdrill was the drilling contractor for this program.

Core recovery continued to be poor for the winter 2011 limited, near-surface drilling on the Rose North Zone due to intensive weathering along fault systems. The poor core recovery is a factor influencing categorization of the Rose Mineral Resources, particularly in the Limonite zone.

10.5 Alderon Summer 2011 – 2012 Drilling Program

The summer 2011-2012 program started in June 2011 and continued through the end of April 2012. The holes were drilled throughout the Rose Lake area and several holes were also completed on the Mills Lake deposit. Total exploration drilling aggregated to 101 exploration drillholes for a total of 29,797 m drilled. An additional 46 geotechnical holes under Stantec's management, including several abandoned drillholes were drilled for pit slope design and general site planning purposes. Four additional holes of the KXN-series were drilled from the north end of Mills Lake north towards the northern boundary of the Kami Property for condemnation purposes.

The purpose of the 2011-2012 drilling program was to advance the Project to feasibility stage by upgrading the classification of Mineral Resources and to provide more information for mine planning and metallurgical testwork. No additional exploration drilling has been completed after this program.

Table 10-3 provides a summary of the summer 2011-2012 Exploration Program holes by mineralized zone. Drilling was done by both Cabo Drilling Corp. out of its Montreal office (Mills Lake deposit) and Major Drilling International Inc., based in Sudbury, ON (Rose deposit & KXN holes).

Table 10-3: Summary of Summer Exploration 2011-2012 Drilling

Prospect	Count Of Hole ID	Sum of Depth
Mills Lake	18	2,842.6
Rose North	46	14,009.3
Rose Central	33	112,327.7
Rose Lake	4	617
Total	101	29,796.6

Geotechnical boreholes were completed as part of the Overburden Pit Slope design program and as part of the Site-Wide Geotechnical Feasibility Study to provide a general overview of the site. Both components were managed by Stantec. The drilling was completed by Lantech and all of the geotechnical drillholes were vertical. This stage of the site-wide geotechnical investigation was completed in the fall of 2011 and covered five broad areas based on the following infrastructure groupings: crusher area, access road area, process plant area, rail loop and tailings impoundment.

Additional stages of field investigations in support of detailed design were planned during and after the 2018 Feasibility Study. Preliminary field data gathered during these investigations has been utilized in support of the 2018 Feasibility Study for other Project tasks. These tasks included the Tailings and Waste Rock Management feasibility level design and the site location optimization and foundation design for the crusher and process plant information. These Stantec holes penetrated 5 m into bedrock. These rock cores were logged by Alderon's exploration staff following normal protocols providing geological mapping information in areas of the Property with very little outcrop exposure.

The condemnation KXN-series holes were drilled from the north end of Mills Lake north, towards the northern boundary of the Kami Property. These holes were aligned west with -50 to -60 inclination.

KXN-01 and KXN-02 were drilled to test modest magnetic anomalies underlying the proposed civil works for the Kami mine development (condemnation drilling). Both encountered low-grade magnetite-rich mineralization coincident with the anomaly in the Sokoman Formation. Oxidized faults caused the termination of the holes before completely crossing the iron formation. The units were interpreted as dipping sub-vertically and the drillhole traces crossed the projected magnetic anomalies. KXN-03 and KXN-04 continued north of the first two along the same trend that was detailed by airborne magnetic geophysics. KXN-04 was lost in the fault zone. The interpretation was a tight fold aligned north-south with a probable steep dip to the east. Both holes collared in Denault marble then passed into strongly iron-oxidized faults. Neither gave a sufficient test of the potential width of the Sokoman Formation stratigraphy.

10.6 Champion Hydrogeology Drilling Campaign

During the fall of 2023, hydrogeological and geotechnical field campaigns were simultaneously completed by AtkinsRéalis. The first objective of the hydrogeological campaign was to obtain additional hydraulic conductivity data in the bedrock units, and more specifically, to characterize the hydraulic conductivity of the fracture zones present in the Rose Pit area. Another campaign objective was to determine the current groundwater and surface water quality in the Rose Pit area. During the campaign, the following activities were carried out:

- Five geotechnical boreholes were drilled within the pit area (KGT-series): two boreholes in the centre of the pit near Rose and Pike Lake (KGT-23-03 and KGT-23-02 respectively), and three boreholes in the eastern part of the pit (KGT-23-01, KGT-23-04 and KGT-23-05).
- Optical and acoustic televiewer surveys were conducted in every KGT-borehole to identify fractured zones.
- Packer tests (Lugeon type) were performed in every KGT-borehole to estimate bedrock hydraulic conductivity.
- Packer tests (rising-head and falling-head tests) were performed with a slug at various intervals in three of the five boreholes (KGT-23-02, KGT-23-03 and KGT-23-04), where the lugeon injection limit was reached.
- Six vibrating wire piezometers ("VWP") were installed at three different depths in KGT-23-02 and KGT-23-03 to monitor groundwater fluctuations.
- Five automated pressure transducers were installed in five of the previously drilled ROB-series observation wells (ROB-11-05B, ROB-11-07, ROB-11-11, ROB-11-12, ROB-11-15) to provide a continuous record and an insight on the seasonal groundwater level fluctuations in the till and at the contact of the till and bedrock units over time.
- Groundwater sampling was carried out during September and October 2023 to determine the current water quality in the till and bedrock units underlying the Rose Pit area. The groundwater samples were submitted to Bureau Veritas for analysis of general chemistry and dissolved metals. An understanding of groundwater chemistry is required to assess the potential effects of mine-related seepages, and for the potential on-site development of water supply wells. Samples were obtained from 17 wells located throughout the site. Samples were taken from a variety of wells including, ROB-series observation wells, K-series exploration boreholes and KGT-series geotechnical boreholes to obtain samples representative of site conditions. Three surface water samples were collected from Rose Lake, Pike Lake and Pike Stream to compare with groundwater quality.

The results of the campaign are currently being analyzed and will be used in the next phases of the Project.

10.7 Drillhole Collar Surveying

Drillhole collars for the 2008 program were spotted prior to drilling by chaining in the locations from the closest gridline picket and drilling azimuths were established by lining up the drill by sight on the cut gridlines. For subsequent programs, similar practice was maintained but for areas where no cut lines were available, the drills were lined up using handheld GPS. Drill inclinations or drillhole collar dips for all programs were established using an inclinometer on the drill head.

Once a drillhole was finished, the Drill Geologist placed a fluorescent orange picket or painted post next to the collar labelled with the collar information on an aluminum tag. Generally, casing was left in the ground where holes were successful in reaching bedrock. The X, Y and Z coordinates for these collar markers were surveyed using handheld GPS.

Formal precision surveying of the 2008 program drillhole collar locations was not completed until the end of the 2010 drilling program. At the end of the 2010 drilling campaign, the X, Y and Z coordinates of all the new drillholes and the 2008 drillholes were precisely surveyed using a DGPS dual frequency receivers in Real-Time Kinematic mode by the land surveying firm N.E. Parrott Surveys Limited ("Parrott") of Labrador City, NL, and tied into the federal geodesic benchmark. Most of the 2008 and 2010 collars were identified and surveyed during the first (October 23rd to 27th) or second (December 5th) surveying campaign. Two collars, K-08-05 and K-10-43 could not be located.

At the end of the 2011 winter program, Parrott surveyed the 2011 winter collars for position and azimuth. Collars for four of the drillholes (K-11-103, 105, 109 and 111) could not be located and were not surveyed. Their locations are defined by setup coordinates. The drillhole dips in the database are currently those measured at drillhole setup.

At the end of the 2011-2012 summer program, 94 collars from the 2011-2012 drilling campaign as-well-as 46 collars from earlier programs were surveyed by Allnorth. Seven of the 2011-2012 drillholes were not surveyed because they could not be accurately located in the field. Of these 46 previous program collars, all but one had been previously surveyed by Parrott. Allnorth and Parrott results are in excellent agreement.

10.8 Downhole Attitude Surveying

Downhole attitude surveys using Flexit or Reflex EZ-Shot instruments were performed routinely during drilling in 2008 at intervals of 50 m downhole. Azimuth, inclination and magnetic field data were recorded by the driller in a survey book kept at the drill. A copy of the page was taken from the book, placed in a plastic zip lock bag and placed in the core box and the test was recorded by the geologist. These instruments use a magnetic compass for azimuth, so the azimuth readings from Alderon's Property are of no value because of the strong ambient magnetic environment, but the drillhole inclinations are of value and are retained in Alderon's database.

Towards the end of Alderon's 2010 program, the gyro surveying of completed drillholes was started using a north-seeking gyroscope instrument. This gyro surveying was done as a part of the borehole geophysics program conducted by DGI Geosciences Inc. ("DGI"). The surveys were done immediately after the termination of the drillhole while the drill rig was still on site. The downhole attitude surveys were performed with the rods inside the borehole to prevent the borehole from collapsing, thus minimizing risk to the equipment. The 2010 gyro surveying program included returning to 2008 program drillholes for gyro surveying, when possible. However, for the 2008 drillholes, only casing shots were completed to eliminate the risk of open-hole logging.

During the 2010 surveying, it was detected that the true azimuth information produced by the gyro did not match the planned azimuths of the drillholes. It was found that a sensor was defective and was replaced. It was found that measurements made before the sensor was replaced had a good relative azimuth, but not a good true azimuth.

Alderon elected to use the planned azimuths as the collar azimuths of all of the 2008 and 2010 drillholes and adjust the DGI gyro downhole azimuths to the planned collar azimuths. These corrections were also applied to the Optical Televiewer ("OTV") structure data to compute orientations for the picked structures.

No downhole geophysical surveys were conducted as a part of the 2011 winter drilling program.

DGI continued to provide advanced geophysical (described in Section 10.9) and gyro downhole surveying for Alderon for the summer 2011-2012 drilling program. Survey parameters remained as they are described for the 2010 program. DGI, in addition to completing gyro surveys on the summer 2011–2012 drilling campaigns, also completed casing shots for a number of earlier drillholes where azimuth information was poorer quality due to instrument breakdown during the 2010 program.

The results are a survey file where collar locations have been completed on different occasions by different contractors using several different methods. Alderon subsequently processed the various generations of data to arrive at a best set of coordinates and downhole attitude survey results.

10.9 Geophysical Downhole Surveying

DGI, from 2010 through the 2011–2012 summer drilling programs, employed a multi-parameter digital logging system designed by Mount Sopris Instrument Co. Along with gyroscopic downhole drillhole attitude surveying, the multi-parameter probe measured radioactivity (natural Gamma method), density (Gamma-Gamma method), multiple electromagnetic parameter (poly-Electric Prob), and captured high-resolution 360-degrees imagery of the boreholes. This multi-parameter surveying was attempted on most drillholes of the Property. However, some drillholes could not be surveyed because of difficult ground conditions. Rose North drillholes were generally not surveyed.

The gamma-gamma density probe measures rock density, as a function of porosity, fluid content and mineralogical composition. The presence of heavy elements increases the density signature of the rocks. It is used to derive lithologies porosity, which is defined as the ratio of pore volume to total volume of the rock. It also identifies open fractures towards achieving quantitative in- situ density.

The Magnetic Susceptibility probe delineates lithology by analyzing changes in the presence of magnetic minerals. Magnetic susceptibility data can illustrate lithological changes and degree of homogeneity and can be indicative of alteration zones. Susceptibility data was used in conjunction with assay data to develop an equation converting magnetic susceptibility (CGS units) to a % magnetite content value estimate.

The OTV provides a detailed visualization of the borehole by capturing a high-resolution image of the borehole wall with precise depth control. The OTV captures a high-resolution 360º image perpendicular to the plane of the probe and borehole. This allows borehole bedding and fractures to be inspected by a direct camera angle. This 360° high-resolution image can be used to identify measure and orient bedding, folding, faulting and lithological changes in the borehole. The use of a gyro provides the relative orientation data to correct the image and feature orientation. 2-D and 3D projections of this data provide a variety of interpretive options for analysis.

The OTV data is reported as true azimuth and as true dip. It should be noted that true azimuth for the feature is the azimuth of the dip direction rather than the strike of the feature. The strike azimuth for a feature is 90° from the value reported in the true azimuth data column.

Once a final data set was completed, a statistical characterization was performed using the physical properties data.

The gamma-gamma density information was used by GMS as a measure of rock density for the Mineral Resource Estimate. Some discussion of this data is provided in Chapters 11 and 14. GMS did not complete a thorough review of all of the downhole geophysical information.

10.10 Comments on Altius and Alderon Drilling

In 2008, drillhole collars were surveyed using handheld GPS. Casings were left in the ground so the collars could be resurveyed at a later date. As part of the 2010 program, Alderon resurveyed all of Altius' collars using a DGPS, except for two that could not be located.

In 2008, downhole surveying was done using a Flexit instrument. This instrument determines azimuths based on a magnetic compass. Altius ignored azimuth readings from the instrument and used only the inclination information from the survey. During the summer 2011-2012 program, Allnorth and DGI completed positional and downhole attitude surveys, or at least casing shots for many of these drillholes to generate more accurate information and replaced previous information in the database with the new results where available.

Some holes still remain without downhole or collar azimuth surveys because these holes could not be found or re-entered. For some drillholes, collar azimuths by different contractors and methods do not match well and, for these cases, Alderon has generally elected to go with collar azimuths that were invariantly propagated down the holes based on surveyed or non-surveyed azimuths closest to planned azimuths. The QP believes that these missing survey data will have minimal effect on the Mineral Resources for various reasons (see Chapter 12).

Since the acquisition by Champion, no exploration diamond drilling has been completed. All drilling information pertaining to the Mineral Resource estimation presented in this Pre-feasibility Study ("PFS") is based on information from previous owners. An extensive site visit by the Mineral Resource QP allowed to validate the sampling methods by inspection of more than 30 drillholes for mineralization and footwall/hanging wall rocks, and by the collection of independent QP samples (see Chapter 12). Relogging and sampling of potentially value-added material was also completed (see Section 9.6 of this Report).

11. Sample Preparation, Analyses, and Security

This chapter has been revised from the chapter originally prepared by WGM in the Updated Feasibility Study ("FS"), NI 43-101 Technical Report released in October 2018 (Grandillo et al., 2018). No new drilling was added to the Project since the previous Technical Report pertaining to the Mineral Resource. Fragmentary new sampling in waste units was judged to be not material to be added to the current MRE. The graphs and tables present an overview of all QA/QC data available at the effective date of this Report. Information presented herein was supplied by Champion.

A detailed description of the sample preparation, analysis, and security procedures for the diamond drillhole ("DDH") drilling programs performed by previous owners at the Kami Iron Ore Project ("Kami" or the "Project") between 2008 to 2012 is presented in the following sections.

The qualified person ("QP") reviewed all available data relating to sampling, analytical, security and quality assurance-quality control ("QA/QC") protocols.

As all geological information and core data is available for validation, drilling programs conducted by previous owners on the Property were used in this Mineral Resource Estimate completed by G Mining Services Inc. ("GMS").

11.1 Laboratories Accreditation and Certification

Drill core samples collected and prepared by Altius and Alderon were submitted to SGS Minerals Services Lakefield ("SGS" or "Lakefield Lab"), which is an accredited laboratory.

SGS Lakefield laboratory is ISO/IEC 17025:2017 accredited. ISO/IEC 17025:2017 sets the national standard of excellence for the competence of testing and calibration laboratories. This accreditation officially recognizes Lakefield Lab as fully capable and competent and assures customers that the lab will produce valid and reliable results. As such, accredited laboratories must follow specific guidelines and procedures for sample preparation, testwork and assaying. BBA were present during some of the testwork and believes that the assaying and testwork have been performed in conformity with applicable industry standards and procedures.

11.2 Core Handling, Sampling and Preparation

The description and discussions herein for sampling are for the drilling programs conducted from 2008 to 2012 by Altius and Alderon and are derived mostly from reports and protocol documents completed by or for Altius and Alderon.

11.2.1 2008 Altius

11.2.1.1 Drill Core Handling and Logging

Rock quality designation ("RQD"), specific gravity and magnetic susceptibility measurements were completed for each drillhole and recorded on spreadsheets. A measurement of specific gravity was obtained from each lithological unit for each drillhole by selecting short pieces of whole or split core and weighing each in air and in water. Magnetic susceptibility was measured using a magnetic susceptibility KT-9 Kappameter (distributed by Exploranium G.S. Limited) and one measurement was recorded every metre as an approximation of magnetic susceptibility.

The core was logged by a geologist and descriptions were recorded on logging sheets. All geological and geotechnical information was compiled digitally at the end of each day.

11.2.1.2 Sampling Method and Approach

Sample intervals were determined on a geological basis, as selected by the drill geologist during logging and marked out on the drill core with a China marker during descriptive logging. All lithologies estimated to contain abundant iron oxide were sampled. In addition, two 3 m samples on either side of all "ore grade" iron formation were taken, where possible, to bracket all "ore grade" iron formation sequences.

Core was first aligned in a consistent foliation direction. Iron formation was sampled at 5 m sample intervals where possible, except where lithological contacts are less than 5 m. Less than 50% of samples are 5 m in length.

Three-part sample tickets with unique sequential numbers were used to number and label samples for assaying. One tag containing information about the sample (such as date, drillhole ID, interval and description) was kept in the sample log book. A second tag was stapled into the core box at the beginning of the sample interval. A third tag was stapled into the plastic poly bags containing the sample for assaying. Sample numbers and intervals were entered into a digital spreadsheet.

Core was sawn in half using a rock saw at the Altius core facility by an Altius geotechnician. One half of the core comprising the sample was placed into the labelled sample bags and stapled closed immediately after the sample was inserted. The remaining half of the split core was returned to the core tray and inserted in its original order and orientation and retained for future reference. Where duplicate samples were required, quarter samples were taken after being re-sawn in half. Each sample was then secured within plastic pails labelled with the sample number. Lids were secured on the pails and the pails were then taped closed for extra security. The pails were placed onto pallets where they were subsequently shrink-wrapped and also secured with plastic straps for loading onto transport trucks for shipment to SGS Lakefield.

11.2.1.3 Core Storage

After the completion of core logging and sampling, core trays containing the reference half or one-quarter split core and the unsampled sections of whole core were stacked on timber and rebar core racks at the Labrador City core facility.

11.2.2 2010-2012 Alderon

11.2.2.1 Drill Core Handling and Logging

Geologists in the 2010 program included Elsa Hernandez-Lyons, William Strain and Bryan Sparrow ("GIT-PEGNL"), and were supervised by Edward Lyons, a member of the Association of Professional Engineers and Geoscientists of British Columbia ("APEGBC"), the Professional Engineers and Geoscientists of Newfoundland and Labrador ("PEGNL"), and the *Ordre des Géologues du Québec* ("OGQ"). In winter 2011, the logging geologists included Vlad Strimbu and Steve Janes, and were supervised by Edward Lyons. The summer-fall 2011 and winter 2012 drill campaigns were logged by Elsa Hernandez-Lyons, Vlad Strimbu and Steve Janes, and were supervised by Edward Lyons.

After the core was placed in the core trays, the geologists checked the core for meterage blocks and continuity of core pieces. The geotechnical logging was done by measuring the core for recovery and RQD. This logging was done on a drill run block-to-block basis, generally at nominal three metre intervals. Core recovery and rock quality data were measured for all holes. Drill core recovery was close to 100% for every 3 m run. The RQD was generally higher than 92%. Lower values were observed and measured for the first 3 m to 5 m of some holes where the core was slightly broken and occasionally slightly weathered. Near faults and shears RQD dropped somewhat but was rarely below 65%. This mainly occurs in the schistose stratigraphic hanging wall Menihek Formation rather than in the iron formation. Additional geotechnical data for fractures, joints, and shears was collected from 2010 August, following the procedures described by Stantec for pit shell design parameters. All data was entered in the AcQuire database on site.

The core was logged for lithology, structure and mineralization, with data entered directly into laptop computers using MS Access forms developed by Alderon geomatics staff. In summer 2012, the MS Access database was migrated to the AcQuire system using the previous logging parameters. The geology of the iron formation was captured using a facies approach with the relative proportions of iron oxides, as well as the major constituent gangue components of the iron formation using a Fe-oxides–Quartz–Fe-silicates–Fe-carbonates quaternary diagram developed by Mr. Lyons. Other formations were logged based on descriptions and lithological variations.

Drillhole locations, sample tables, and geotechnical tables were originally created in MS Access, then later migrated into AcQuire.

Prior to sample cutting, the core was photographed wet and dry. Generally, each photo includes five core boxes. A small white dry erase board with a label is placed at the top of each photo and provides the drillhole number, box numbers and From-To intervals in metres for the group of trays. The core box was labelled with an aluminum tag containing the drillhole number, box number and From-To in metres stapled on the left (starting) end. Library samples of whole core measuring approximately 0.1 m were commonly taken from drillholes to characterize each lithological unit intersected. Once the core logging and the sampling mark-up was completed, the boxes were stacked in core racks inside the core facility. After sampling, the core trays containing the remaining half core and the un-split parts of the drillholes were stored in sequence on steel core racks in a locked semi-heated warehouse located in the Wabush Industrial Park. The warehouse contains the entire core from Altius' 2008 and Alderon's 2010–winter 2011 drilling campaigns. The exterior roofed core racks contain the core post-April 2011 to the end of the drilling program in May 2012.

11.2.2.2 Sampling Method and Approach

The Alderon core sampling method was similar to the previous Altius approach. The sample intervals were delimited at meterage blocks, every 3.0 m, with adjustment in interval length in accordance with lithology and mineralization contacts. Samples were generally 3.0 m long and the minimum sample length was set at 1.0 m. Zones with unusual gangue minerals (e.g., Mn) or abnormally high carbonate concentrations were treated as separate lithologies during sampling.

The bracket or shoulder sampling of all "ore grade" mineralized intervals by low grade or waste material was promoted. The protocol developed for the program also stated that silicate-rich and silicate iron formation constrained within iron oxide formation should be sampled, unless exceeding 20 m in intersection length. When less than 20 m waste intervals were observed within iron formations, then only the low/nil grade waste intervals marginal to OIF were to be sampled using the bracket methodology described herein.

In-field Quality Control materials consisting of blanks, Certified Reference Materials or Standards and quarter core duplicates were inserted into the sample stream with a routine sequential sample number at a frequency of one per ten routine samples. The duplicates were placed in the sample number sequence within nine samples of the location of its corresponding original sample. The duplicates do not necessarily directly follow their corresponding original.

Similar to the 2008 Altius practices, the 2010–2012 procedures entailed the use of three tag sample booklets. Geologists were encouraged to use continuous sequences of sample numbers. The geologists were instructed to mark the Quality Control ("QC") sample identifiers in the sample books prior to starting any sampling. The sample intervals and sample identifiers were marked by the geologist onto the core using an indelible pen or wax marker. The sample limits and sample identifiers were also marked on the core tray.

Sampling dates, drillhole numbers, sample intervals (From, To) and sample types (split core, Blank, Duplicate or Standard with identifier) were registered directly in the sample booklets by the geologists. The first detachable ticket recording the sample From-To was stapled into the core tray at the start of the sample interval. Quality Control sample tags were also stapled into the core tray at the proper location. Quarter core Duplicates were flagged with flagging tape to alert the core cutters.

The core cutters sawed the samples coaxially, perpendicular to the foliation/banding orientation, as indicated by the markings, and then placed both halves of the core back into the core tray in original order. The sampling technicians completed the sampling procedure, which involved bagging the samples.

The second detachable sample tags were placed in the plastic sample bags; these tags do not record sample location. As an extra precaution against damage, the sample number on these tags was covered with a small piece of clear packing tape. The sample identifiers were also marked with indelible marker on the sample bags. The bags were then closed with a cable tie or stapled and placed in numerical order in the sampling area to facilitate shipping. The samplers inserted the samples designated as Field Blanks before shipping.

Samples were loaded into pails or barrels and strapped onto wood pallets for shipping. In early 2012, at the request of SGS Lakefield, samples were put in wooden crates built on the pallets in order to reduce lifting injuries at the receiving laboratory. This protocol was followed through the remainder of the program. Pails, barrels, and crate-pallets were individually labelled with the laboratory address and the samples from each shipment were recorded. The pallets were picked up at the core facility with a forklift and loaded into a closed van and carried by TST Transport to SGS Lakefield via Baie Comeau, Québec and Montréal.

11.3 Laboratory Sample Preparation and Assaying

SGS Lakefield at its Lakefield, Ontario, facility was the primary assay lab. SGS Lakefield is an accredited laboratory meeting the requirements of ISO 9001 and ISO 17025. SGS Lakefield is independent of both Altius and Alderon. All in-lab sample preparation for both Altius and Alderon was performed by SGS Lakefield at its Lakefield facility.

11.3.1 2008 Altius Preparation and Assaying

All of Altius' drill core samples were crushed to 9 mesh (2 mm) and 500 g of riffle split sample was pulverized to 200 mesh (75 µm) and subject to a standard routine analysis including whole rock ("WR") analysis by lithium metaborate fusion XRF, FeO by H_2SO_4/HF acid digest-potassium dichromate titration providing a measure of total Fe^{++}, and magnetic Fe and Fe_3O_4 by Satmagan. Neither the Satmagan nor the FeO determinations were completed on all in-field QA/QC materials. A group of 14 samples were analyzed for S by LECO, with sample selection based on visual observation of sulphide in the drill core. A total of 676 samples including in-field QC materials were sent for assay. Total QC samples (standards, blanks and duplicates) account for 10% of the total routine samples.

11.3.2 2010-2012 Alderon Sample Preparation

SGS Lakefield remained the primary laboratory for Alderon's 2010–2012 exploration programs. Sample preparation for assaying included crushing the samples to 75% passing 2 mm; a 250 g (approximate) sub-sample was then riffled out and pulverized in a ring-and-puck pulverizer to 80% passing 200 mesh. Standard SGS Lakefield QA/QC procedures were applied. These included crushing and pulverizing screen tests at 50 sample intervals. Davis Tube tests were also performed on selected samples. The material for the Davis Tube tests was riffled out directly from the pulverized Head samples and therefore the grind was not necessarily optimized to reflect potential mine processing plant specifications or optimum liberation requirements.

Table 11-1 summarizes the quality control samples inserted in the sample stream during the 2008 to 2012 drilling programs.

Table 11-1: Quality Control Sample Summary – 2008 to 2012 Drilling Programs

Quality Control Sample Type	Count
FER-4 CRM (XRF)	243
FER-4 CRM (Satmagan)	241
FER-4 CRM (FeO)	182
SCH-1 CRM (XRF)	221
SCH-1 CRM (Satmagan)	208
SCH-1 CRM (FeO)	160
Field Blanks (XRF)	434
Field Blanks (Satmagan)	427
Field 1/4 Core Duplicate (XRF and Satmagan)	439
Field 1/4 Core Duplicate (FeO)	347
Inspectorate Check Assays (TFe)	268

11.3.3 Alderon 2010-2012 Sample Assaying

Alderon's 2010 to 2012 drill core sample assay protocol was similar to the Altius 2008 protocol with WR analysis for major oxides by lithium metaborate fusion XRF requested for all samples and magnetic Fe or Fe_3O_4 determined by Satmagan. In 2010, however, FeO was not determined on all Heads. For a proportion of 2010 samples, FeO was determined on Heads by H_2SO_4/HF acid digest-potassium dichromate titration, as previously done. Generally, where FeO on 2010 Heads was not completed, Davis Tube tests were performed. Sample selection criteria for 2010 samples for Davis Tube testwork included magnetite by Satmagan greater than 5%, or hematite visually observed by the core logging geologists. Where Davis Tube tests were completed, Davis Tube magnetic concentrates were generally analyzed by XRF for WR major elements. During the first half of the 2010 program, FeO was also determined in Davis Tube Tails. Alderon made this switch in methodology because it believed Davis Tube Tails were being over washed. For the winter 2011 program, Davis Tube tests were completed on all samples containing appreciable magnetite, but no determinations of FeO on Davis Tube Tails ("FeO DTT") were performed. For the summer 2011–2012 programs, FeO was determined on all Head samples, but again no FeO determinations on Davis Tube Tails were completed.

In addition to the "routine" assaying, in 2010, 175 half split core samples, most of which were 0.1 m in length, were sent to SGS Lakefield for bulk density determination by the weighing-in-water/weighing-in-air method. The purpose of this work was to provide rock density for different rock types and types of mineralization to calibrate DGI's downhole density probe. These samples were taken from the upper 0.1 m long intervals of routine assay sample intervals, each generally 3 m to 4 m long. After SGS Lakefield completed the bulk density tests, these core pieces were returned to the field so they could be placed back into the original core trays. In addition to the bulk density testwork, 33 sample pulps had specific gravity ("SG") determined by the gas comparison pycnometer method.

In 2010, Alderon also cut 58 new samples from the 2008 drill core that had not been previously sampled and assayed. A total of 5,501 routine samples and field-inserted QA/QC materials had Head Assays by XRF completed.

For the 2011 winter program, a total of 947 samples including in-field QC materials were sent for Head assaying to SGS Lakefield. No Secondary Laboratory assaying was done but re-assays of a selection of previous samples was completed.

For the summer 2011 to 2012 programs, 6,287 routine core samples, plus field-inserted QA/QC samples were assayed for WR-XRF, Satmagan and FeO on Heads. In addition, 3,221 samples had Davis Tube tests completed. Davis Tube concentrates were analyzed by WR-XRF. FeO was not determined on Davis Tube products

11.4 Quality Assurance/Quality Control (QA/QC)

Kami's QA/QC program carried out by previous operators (Altius and Alderon) between 2008 and 2012, included the insertion of field blanks, field duplicates and certified reference materials ("CRMs" or "standards") into the sample stream sent to the SGS laboratory in Lakefield.

As part of its internal quality assurance and control program, Lakefield Laboratory also conducted blanks, duplicates and quality control checks to detect any contamination or inaccuracies during the analytical program on the Project samples.

In 2011, the Project QA/QC program also included a selection of pulps, which were sent to a secondary independent Laboratory (Inspectorate – ISO 17025 accredited laboratory), located in Vancouver, B.C.

In late 2012, another check assay program was undertaken at AcmeLabs in Vancouver, B.C. AcmeLabs is also accredited under ISO 9001:2000 and ISO/IEC 17025. Since GMS was not able to recover this dataset, results are not presented in this Report.

Both Inspectorate and AcmeLabs were independent of Alderon.

11.4.1 2008-2012 QA/QC Results

During 2008 to 2012 sampling programs, both companies, Altius and Alderon, alternately inserted blanks, field duplicates and CRMs samples every 10th routine sample. The material used for blanks was a relatively pure quartzite and was obtained from a quarry outside of Labrador City. Duplicate samples were collected by quarter sawing the predetermined sample intervals and using ¼ core for the duplicate sample, ¼ for the regular samples, and the remaining half core was returned to the core tray for reference.

The three certified standards samples, supplied by CANMET ("Canadian Centre for Mineral and Energy Technology") laboratory, used in the sample batches were: TBD-1, SCH 1; and FER-4. Each pre-packaged material was placed in a regular sample bag with a routine sequential sample number.

Table 11-2 shows the CANMET certified and recommended values for the CRMs submitted within the Project sampling programs.

Table 11-2: Certified Reference Materials used for the 2008-2010 QA/QC Programs

CRM	Material Description	Certified and Recommended Values					
		%Fe	%FeO	%SiO_2	%Mn	%P	%S
SCH-1	Schefferville Hematite IF	60.73	NA	8.087	0.7770	0.054	0.007
TDB-1	Saskatchewan - Diabase	10.40	NA	50.20	0.1577	0.080	0.030
FER-4	Sherman Mine Ontario – Cherty Magnetite IF	27.96	15.54	50.07	0.1470	0.057	0.110

Figure 11-1 to Figure 11-3 show Fe% results from both XRF and Satmagan analytical methods, for the CRM samples submitted during the 2008 to 2012 drilling campaigns. Results are only shown for CRM FER-4 and SCH-1, as there are few instances of TDB-1.

The standard SCH-1 was obtained from an iron mine located in Schefferville, Québec, and is composed of hematite with a mixture of unidentified hydrous oxides of iron, minor magnetite, and trace pyrolusite. The gangue consists mainly of quartz with minor amounts of feldspar and traces of biotite, chlorite, and amphibole.

FER-4 certified material was taken from the Sherman Mine property at Temagami, Ontario. This CRM was obtained from a cherty magnetite iron-formation containing chloritic tuff, and quartz is the most abundant mineral. Hematite is present as dusty inclusions in the quartz, and Jasper layers as micro-laminae.

Certified Reference Materials values are not available for MagFe and determination of MagFe in the Standards was not completed for all programs.

In general, CRMs (FER-4 and SCH-1) and field blank materials performed well as shown in their respective control charts. Average values are close to the Certified Reference recommended values summarized in Table 11-2. As shown in Figure 11-3, MagFe values are generally well replicated and translate well the source material of each CRM.

For the SCH-1 CRM, tolerance limits are judged to be too restrictive with a 95% confidence interval of 0.09% Fe to be used as a failure threshold. To assess the variability of the laboratory, GMS instead used the standard deviation of the assayed CRMs and found that results are generally well centered around the average. Furthermore, The QP is of the opinion that a 60.73% Fe CRM is not representative of the Kami deposit. GMS recommends using a CRM closer to the actual grades of the deposit for diamond drill core assays. This will reduce the risk of contamination and have a better representation.

The FER-4 CRM were compared to the actual standard deviations of the laboratories and found that values are well centered around the certified value and mostly within two standard deviations.

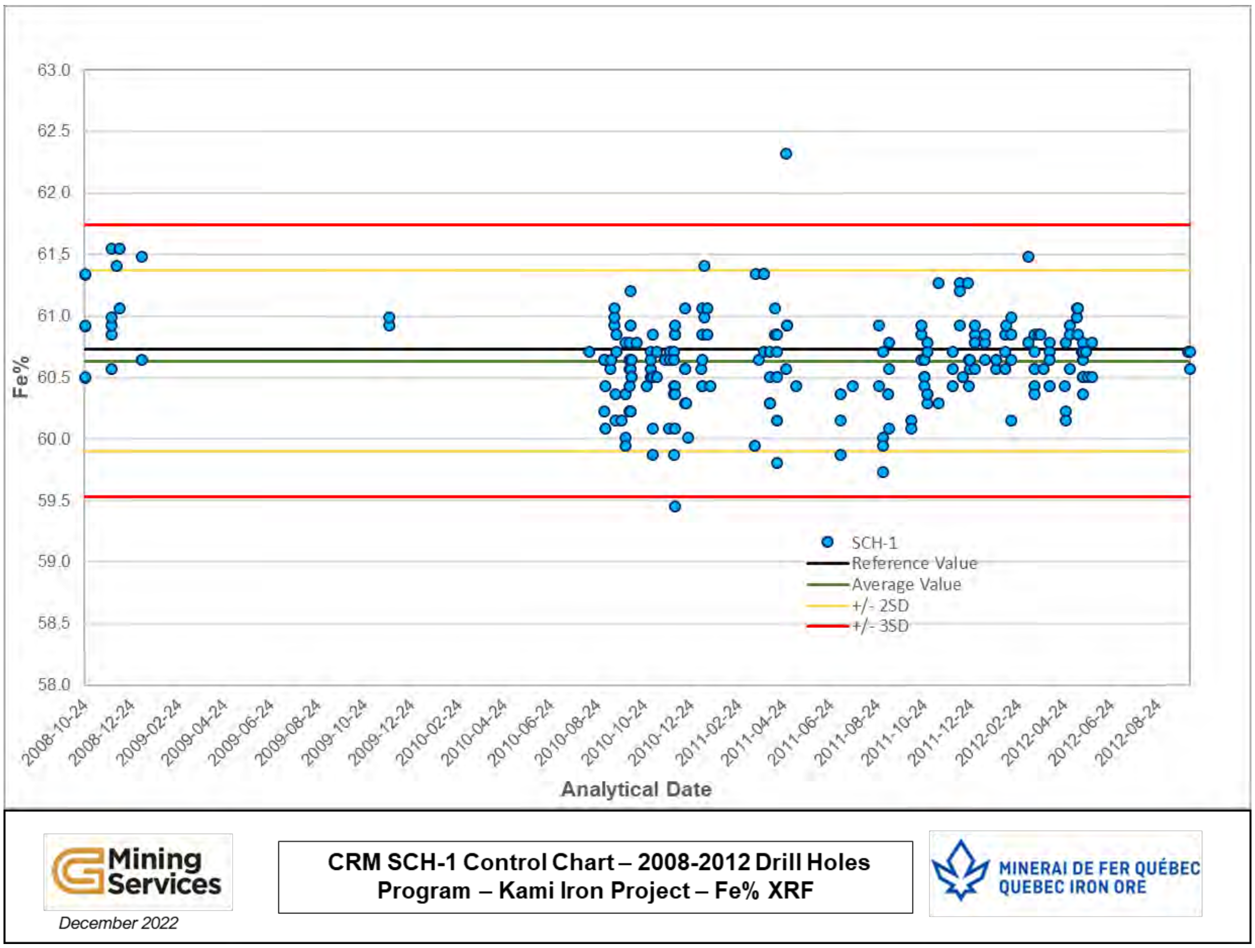


Figure 11-1: Certified Reference Materials (SCH-1) Performance Chart of Fe% (WR-XRF)
2008 to 2012 Drilling Programs

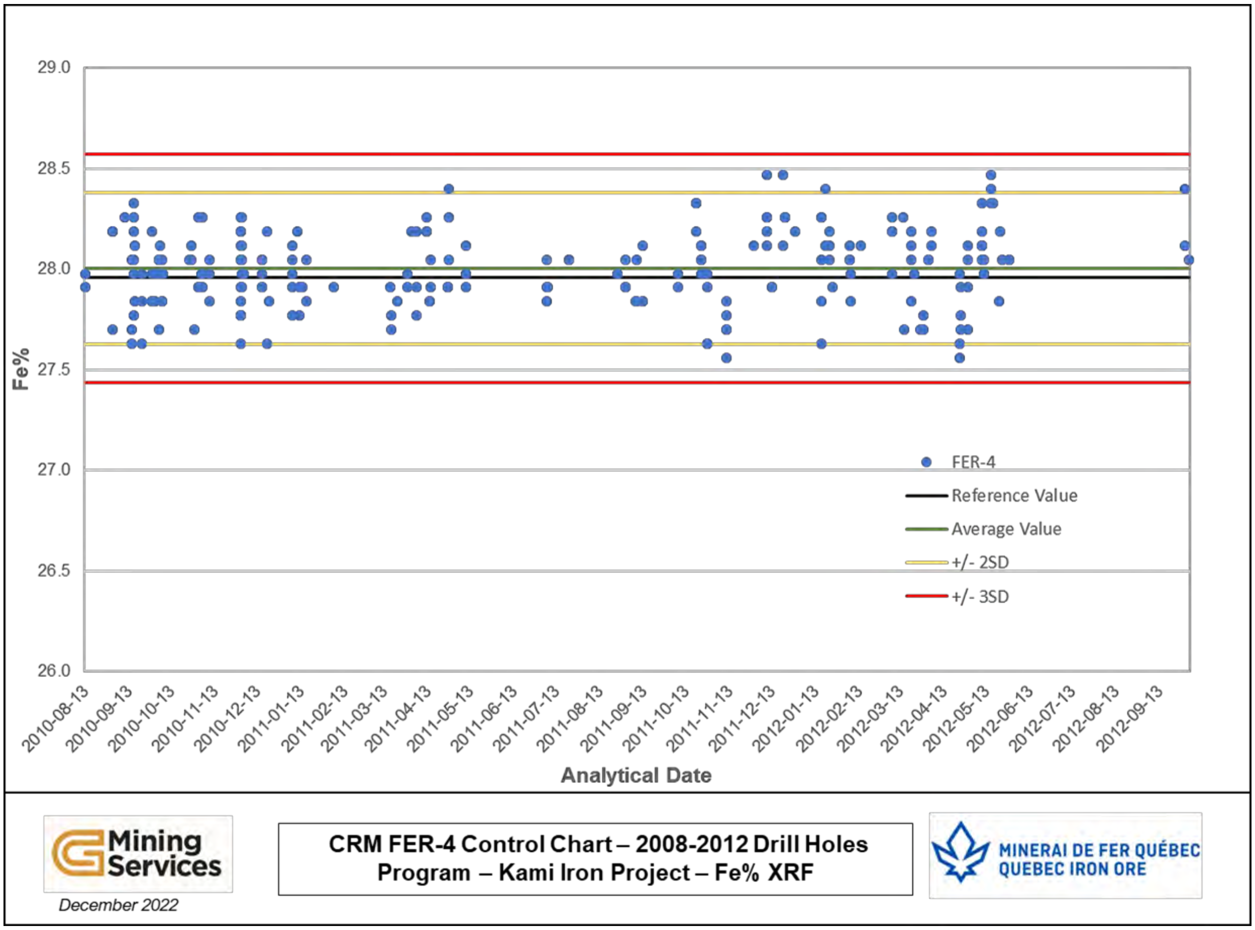


Figure 11-2: Certified Reference Materials (FER-4) Performance Chart of Fe% (WR-XRF)
2008 to 2012 Drilling Programs

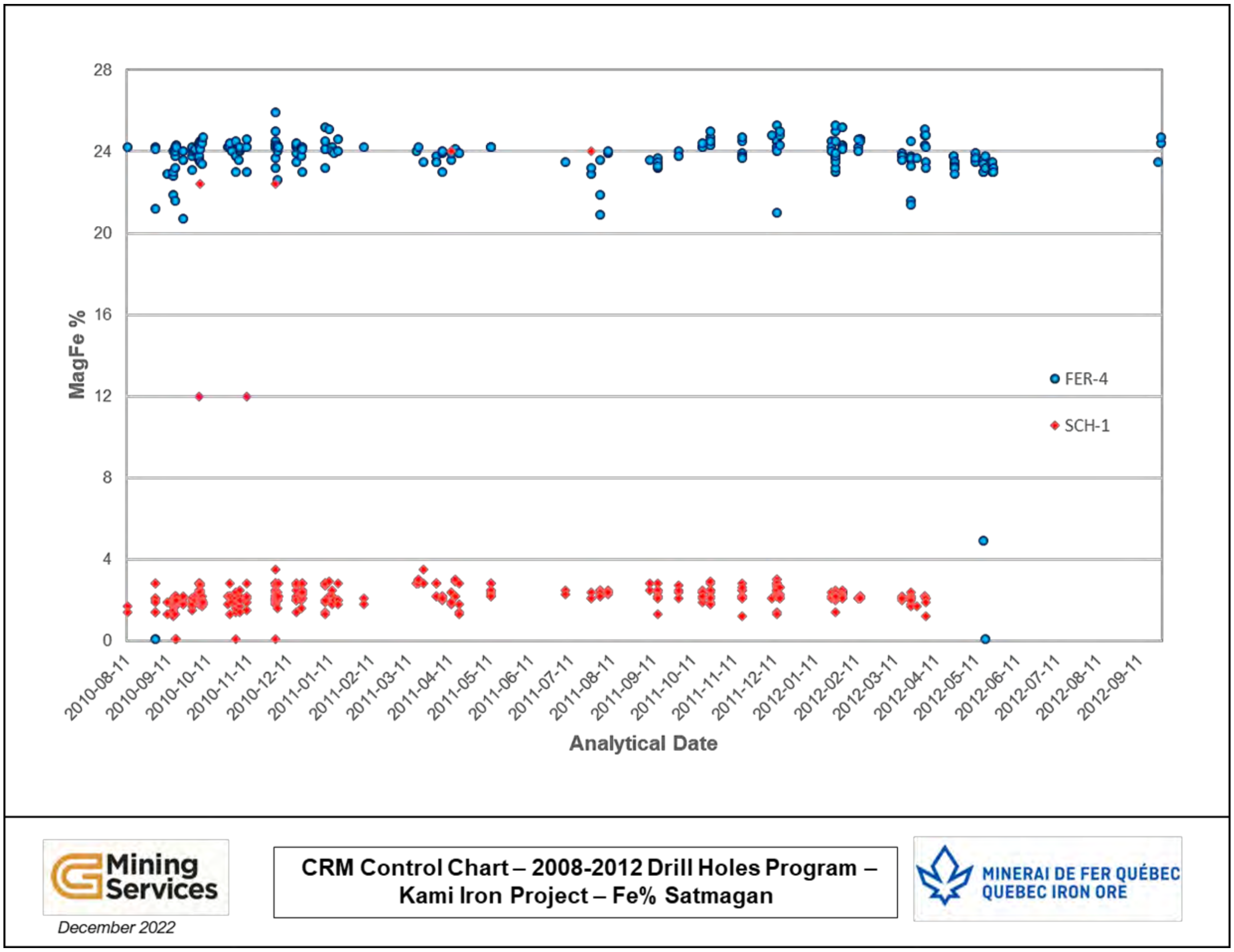


Figure 11-3: Certified Reference Materials Control Chart of Fe% (Satmagan) 2008 to 2012 Drilling Programs

Figure 11-4 plots the results of field blanks inserted within the QA/QC program conducted during 2008 to 2012. As illustrated, the blanks performance is considered very good with most of the Fe_2O_3% results resulting in less than 1% Fe_2O_3. Table 11-3 shows the global statistics of 868 field blank samples. The majority of the silica grades are above 98.0%, and both MgO and CaO are below 0.1%.

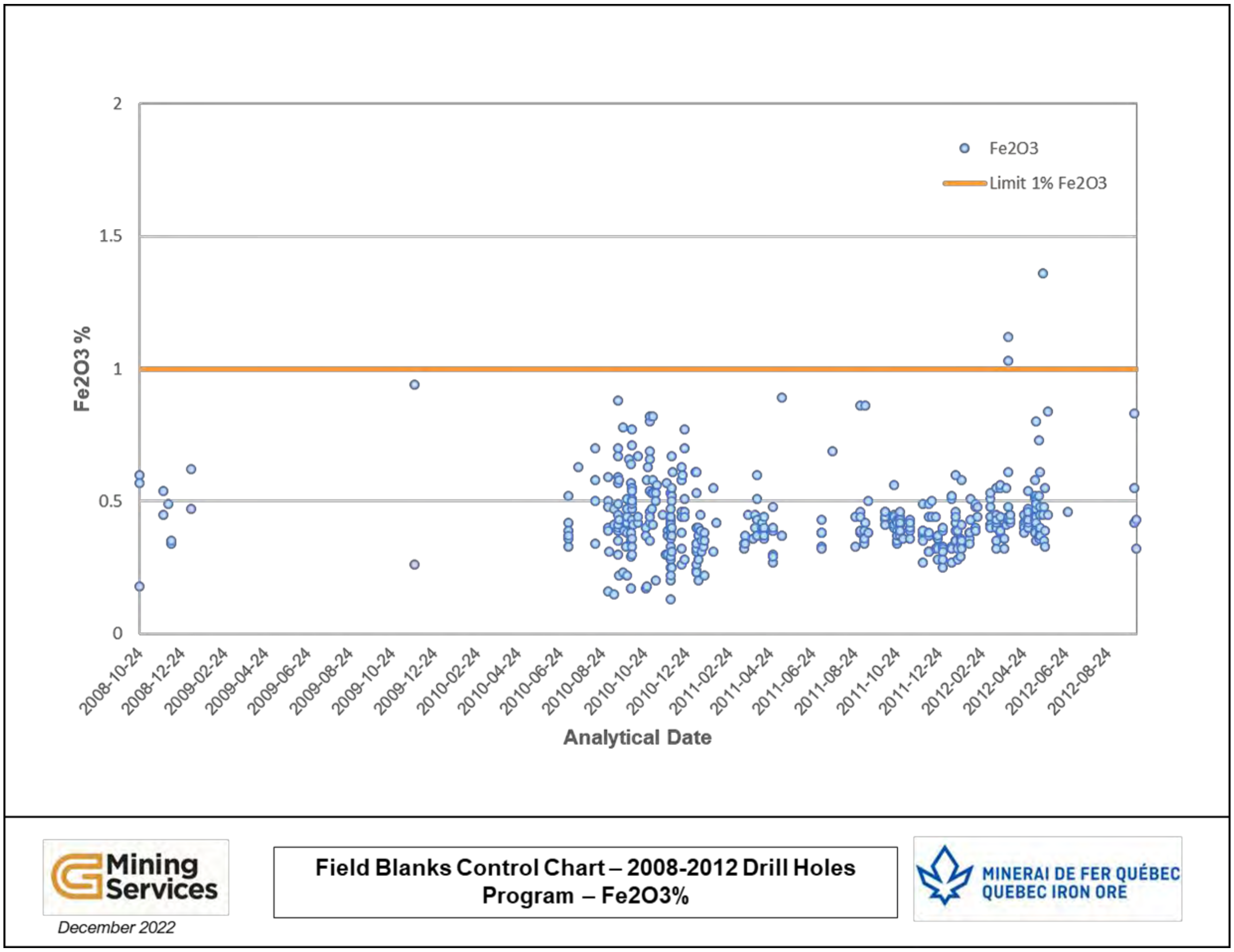


Figure 11-4: Field Blanks Control Chart of Fe_2O_3% – 2008 to 2012 Drilling Programs

Table 11-3: Descriptive Statistics for Field Blanks – 2008 to 2012 Drilling Programs

Descriptive Stats	*Al2O3_pct*	*CaO_pct*	*Fe2O3_pct*	*K2O_pct*	*MgO_pct*	*Na2O_pct*	*SiO2_pct*	*TiO2_pct*
Mean	0.39	0.02	0.44	0.01	0.04	0.02	98.98	0.01
Median	0.33	0.02	0.41	0.01	0.04	0.01	99.1	0.01
Standard Deviation	0.23	0.02	0.14	0.02	0.03	0.02	0.79	0.00
Sample Variance	0.05	0.00	0.02	0.00	0.00	0.00	0.63	0.00
Minimum	0.07	0.01	0.13	0.005	0.01	0.005	96.2	0.005
Maximum	1.26	0.37	1.36	0.36	0.2	0.21	101	0.03
Sum	335.14	21.66	378.6	11.51	36.64	17.98	85917.6	9.07
Count	434	434	434	434	434	434	434	434
Confidence Level(95.0%	0.02	0.00	0.01	0.00	0.00	0.00	0.05	0.00

Based on GMS observations, the main issue would be a potential mixing of samples during the SATMAGAN analysis of CRMs, as seen in Figure 11-3 where some FER-4 have a magnetite content close to SCH-1, and vice-versa.

Figure 11-5 to Figure 11-7 presents the total Fe% and Fe% contained in magnetite from analysis of quarter core duplicates conducted during the 2008-2012 drilling programs using the Satmagan, FeO and Davis Tube methods. Overall, duplicate and original values have a high correlation and no significant bias is observed.

Some outliers are observed in the comparison plots, which may be related to human or laboratory preparation or analytical errors. Outliers that can be attributed to mislabel or mixing of samples should be validated and corrected in the database.

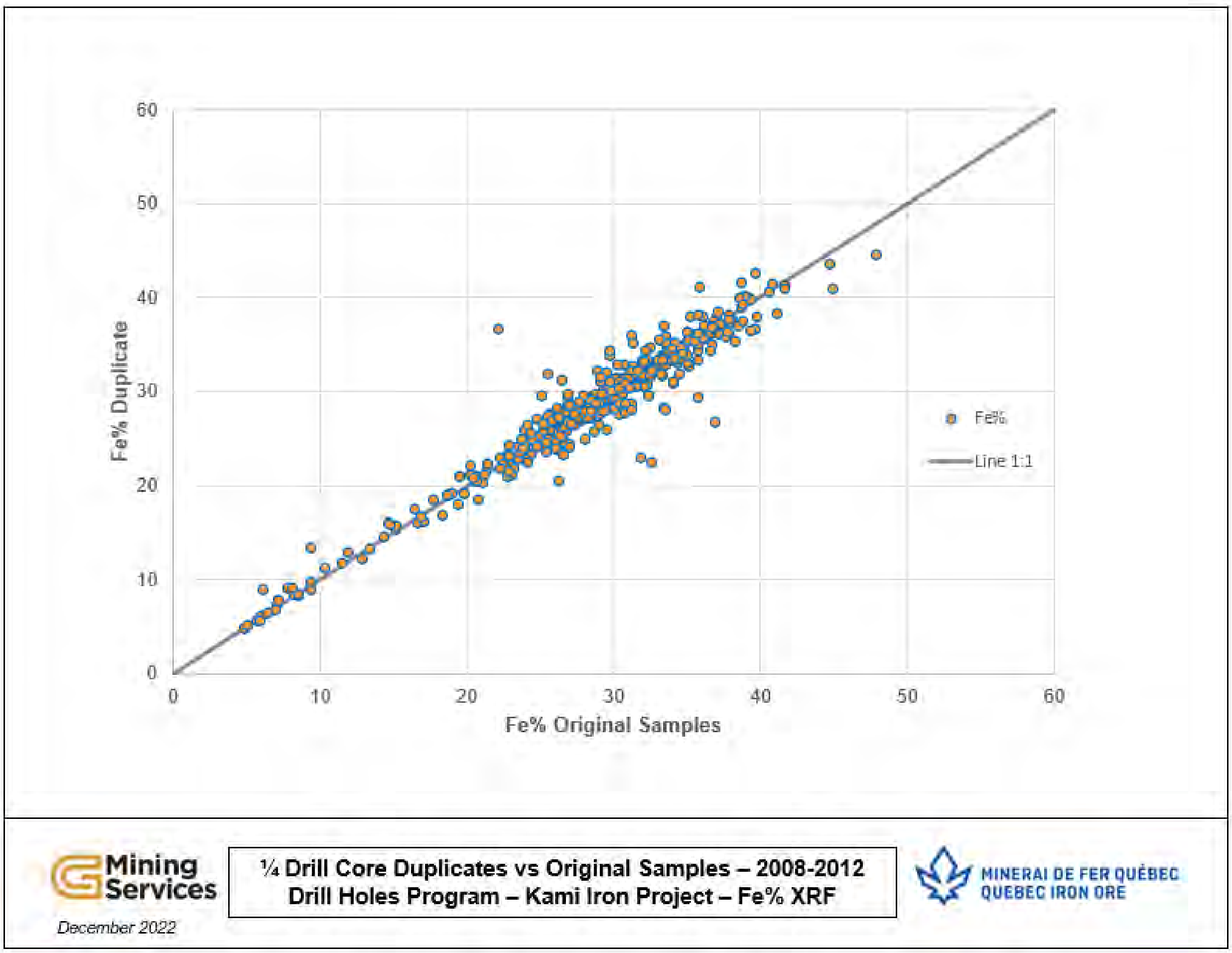


Figure 11-5: Duplicate ¼ Drill Core Check Samples - %TFe (WR-XRF)
2008 to 2012 Drilling Programs

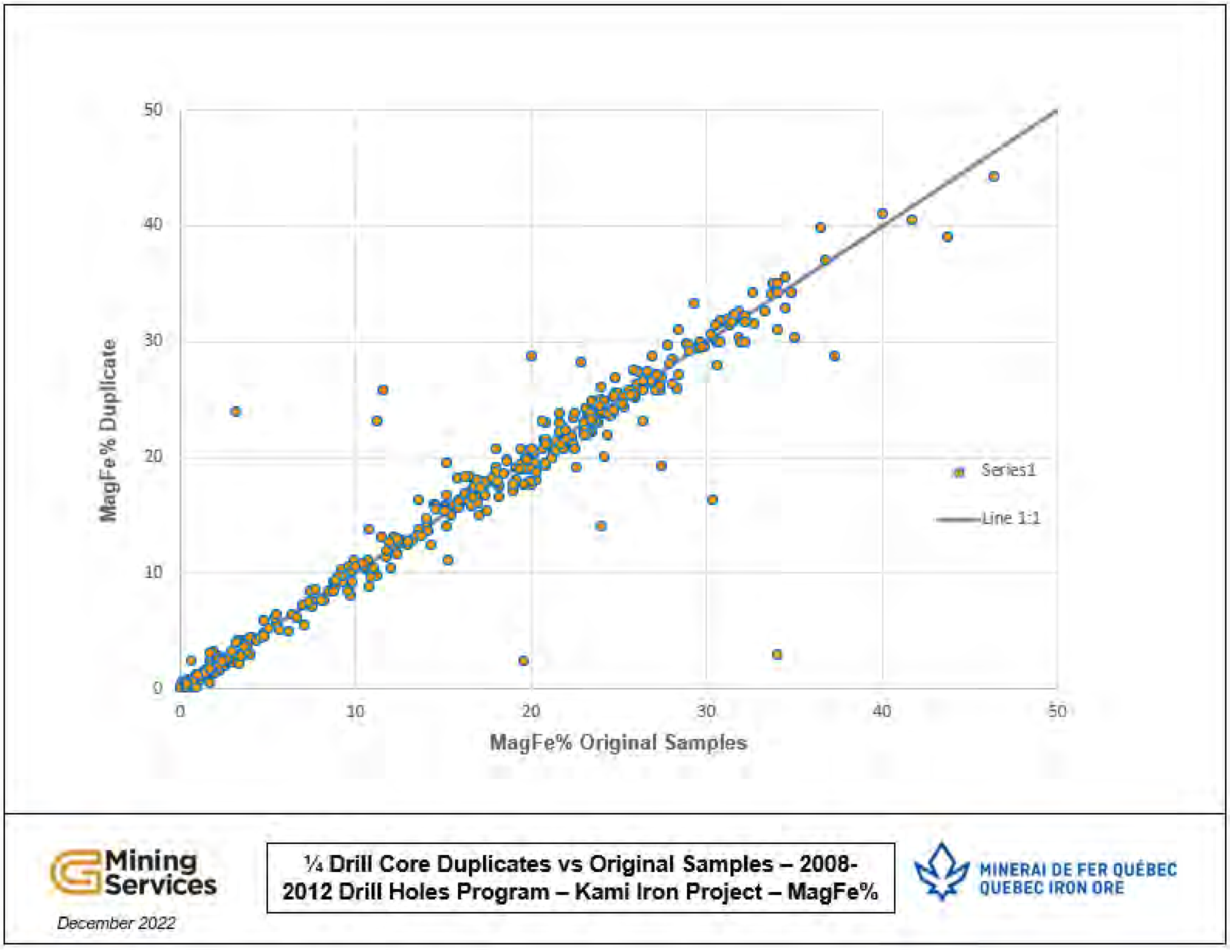


Figure 11-6: Field Duplicate ¼ Drill Core Check Samples – %MagFe (Satmagan)
2008 to 2012 Drilling Programs

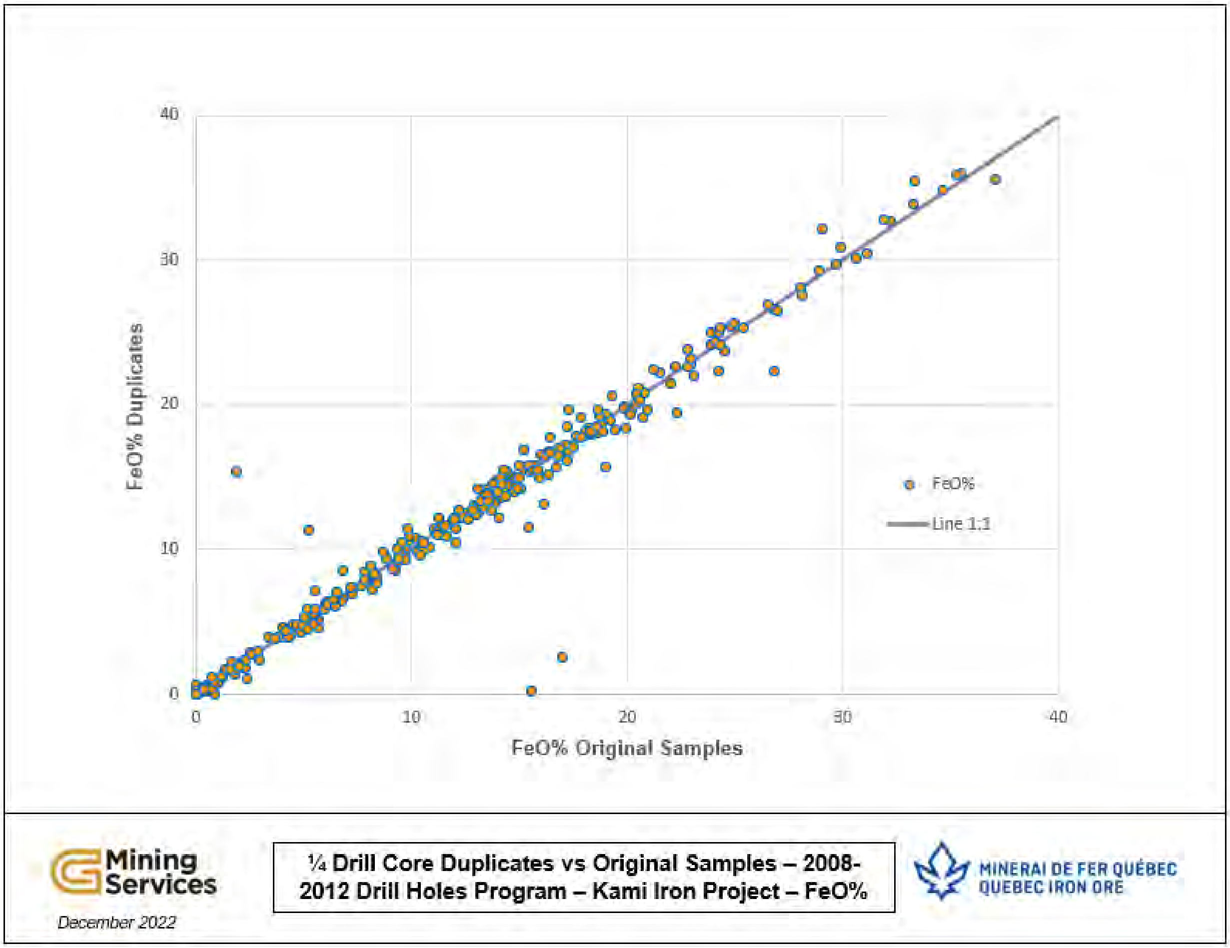


Figure 11-7: Duplicate ¼ Drill Core Check Samples - %FeO – 2008 to 2012 Drilling Programs

11.4.2 Secondary Laboratory – Inspectorate Check Assay Program 2011

In January 2011, as a QA/QC check assay required program, a total of 268 pulps from ten drillholes carried-out at the Project in 2010 and representing different types of lithology and mineralization were sent to Inspectorate Laboratory (a Bureau Veritas Company group), an independent and certified Laboratory located in Vancouver, CA.

Whole Rock ("WR") Analysis by X-ray fluorescence ("XRF"), Sulphur (S) with LECO, FeO by potassium dichromate titration and Satmagan was completed. Initially, the FeO analysis was completed using HCL-H_2SO_4 digestion and subsequently, some samples were reanalyzed using HF-H_2SO_4 digestion. Figure 11-8 to Figure 11-12 show Inspectorate check assays results compared with SGS Lakefield's original values present in the Kami master database.

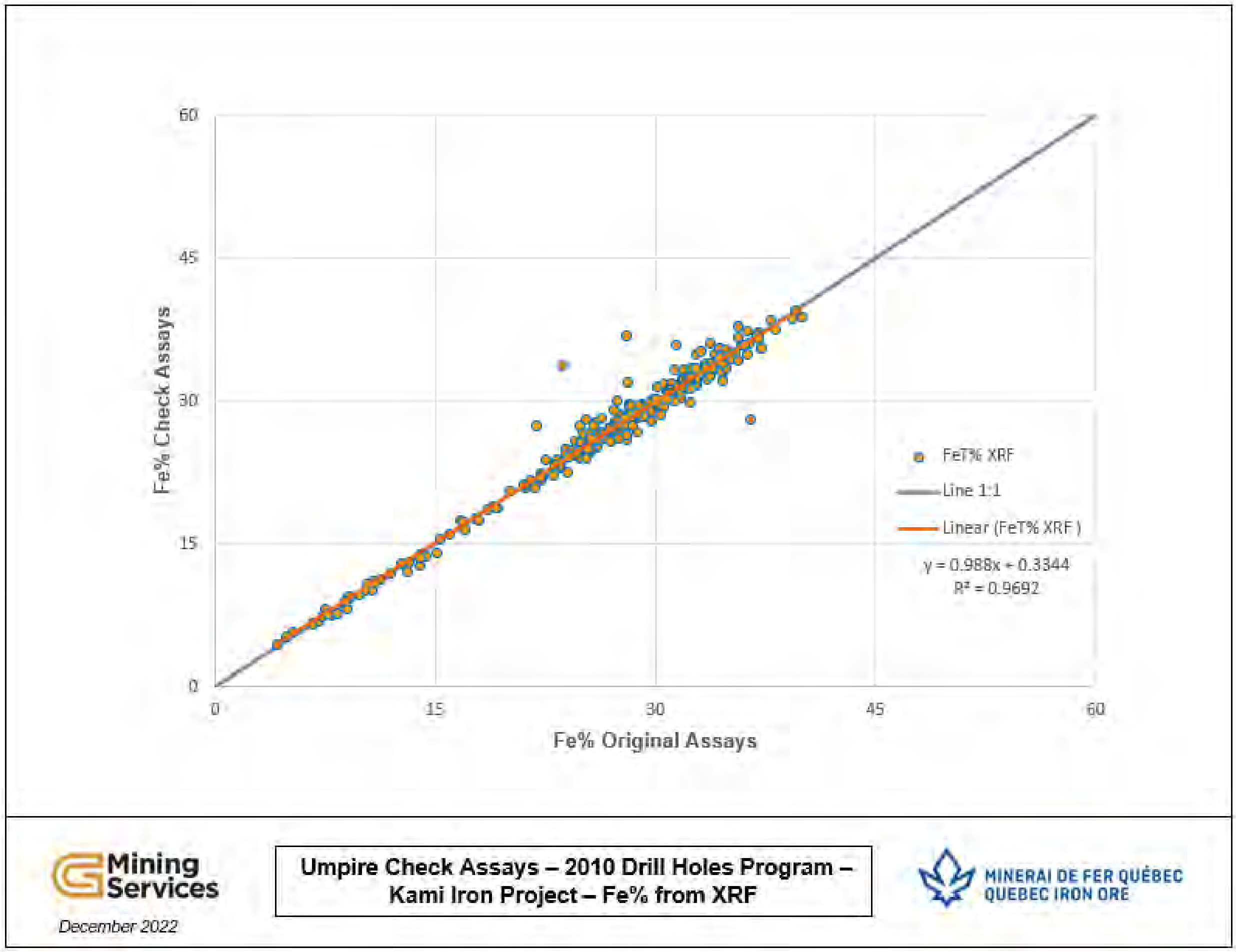


Figure 11-8: Inspectorate vs. SGS Lakefield Check Assay Results (%TFe)

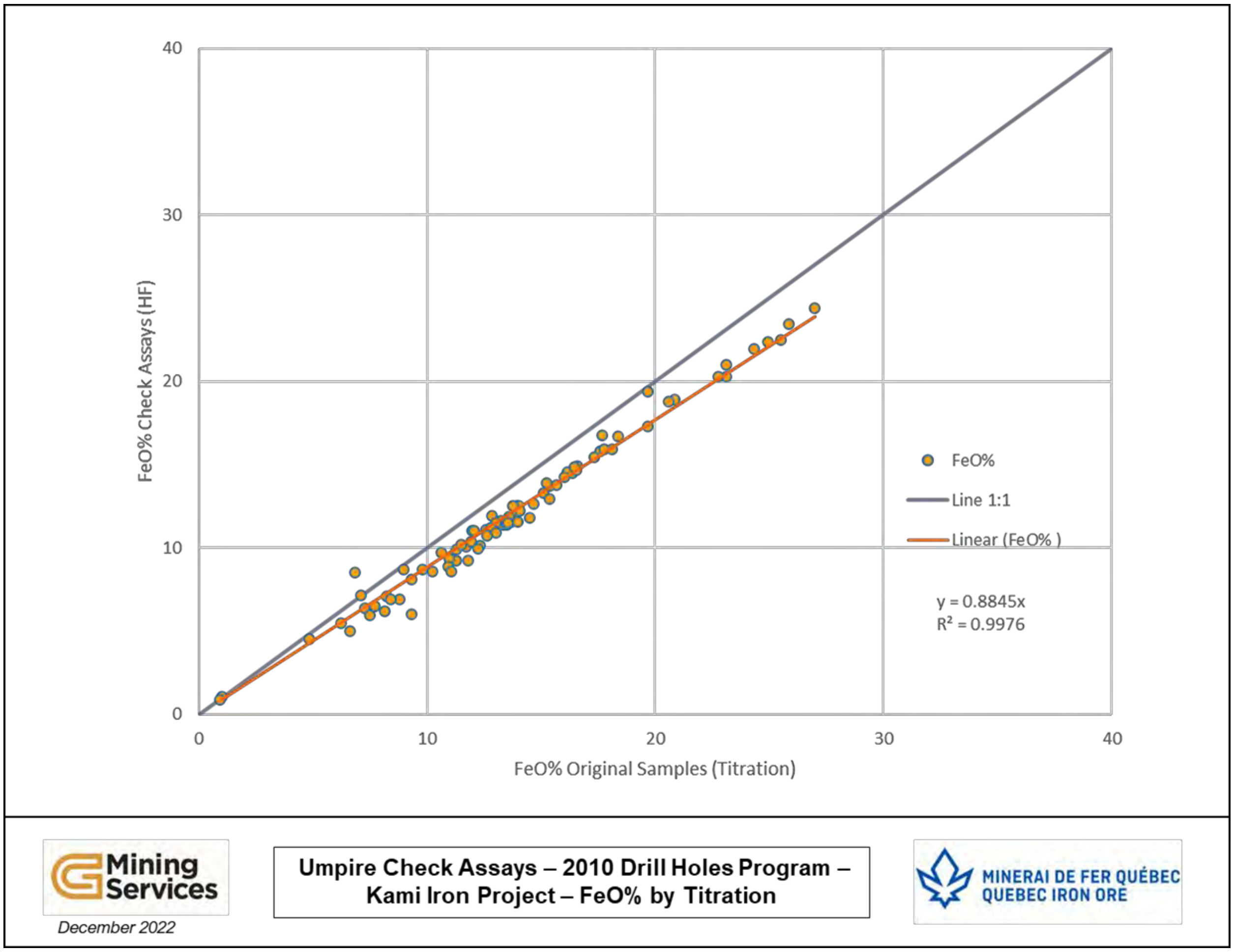


Figure 11-9: HF-H_2SO_4 Digestion from Inspectorate vs. Titration SGS Lakefield Check Assay Results (%FeO)

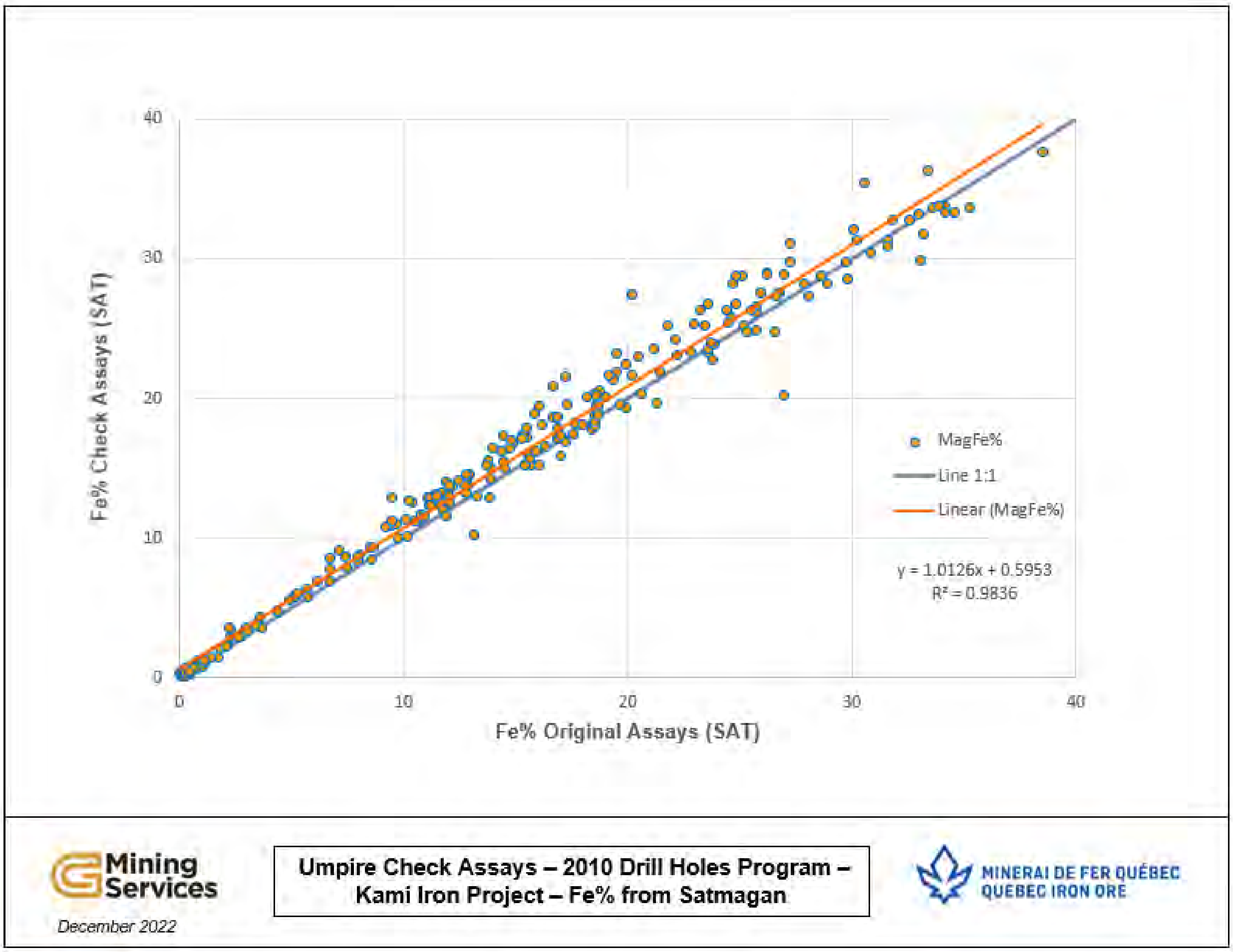


Figure 11-10: Inspectorate vs. SGS Lakefield Check Assay Results (Fe% by Satmagan)

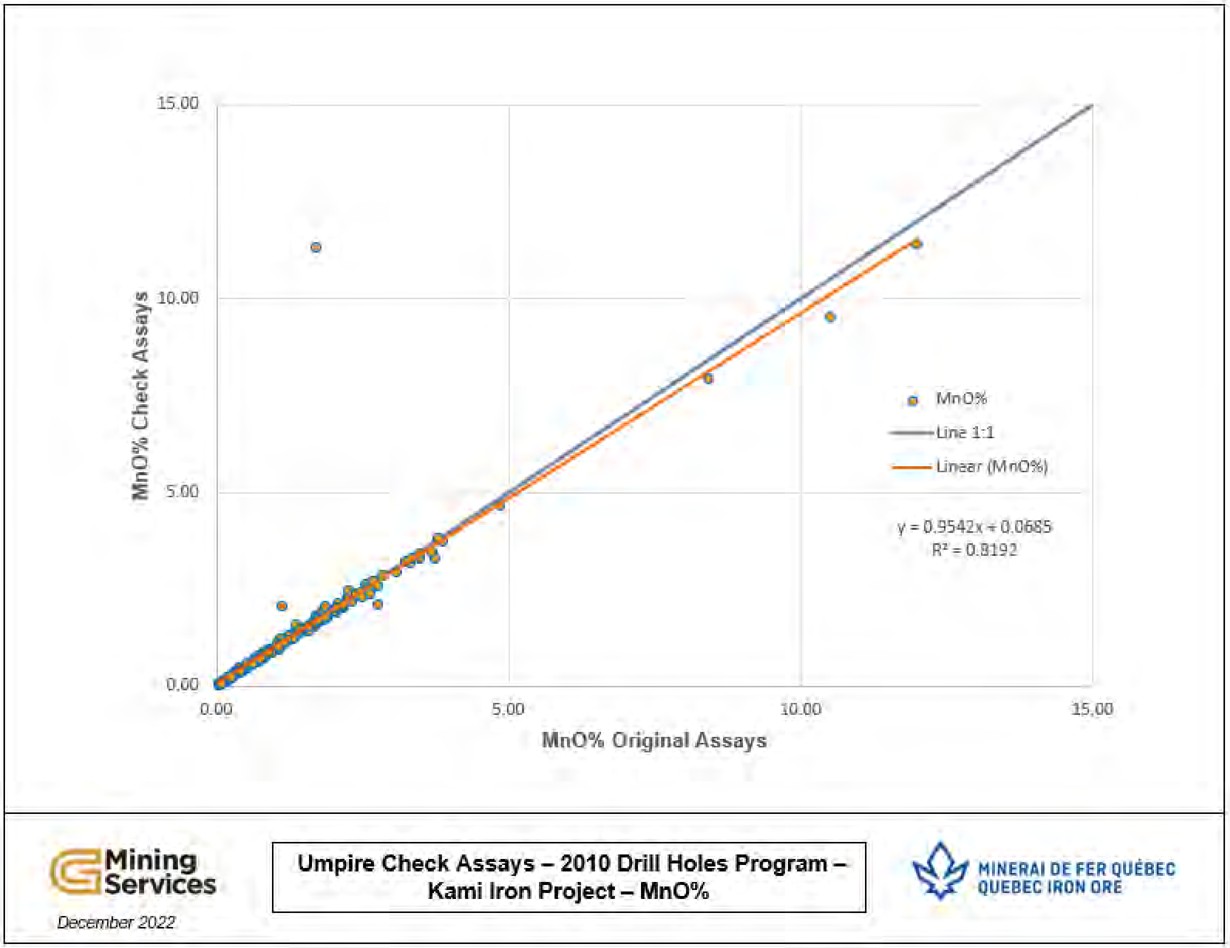


Figure 11-11: Inspectorate vs. SGS Lakefield Check Assay Result (%MnO)

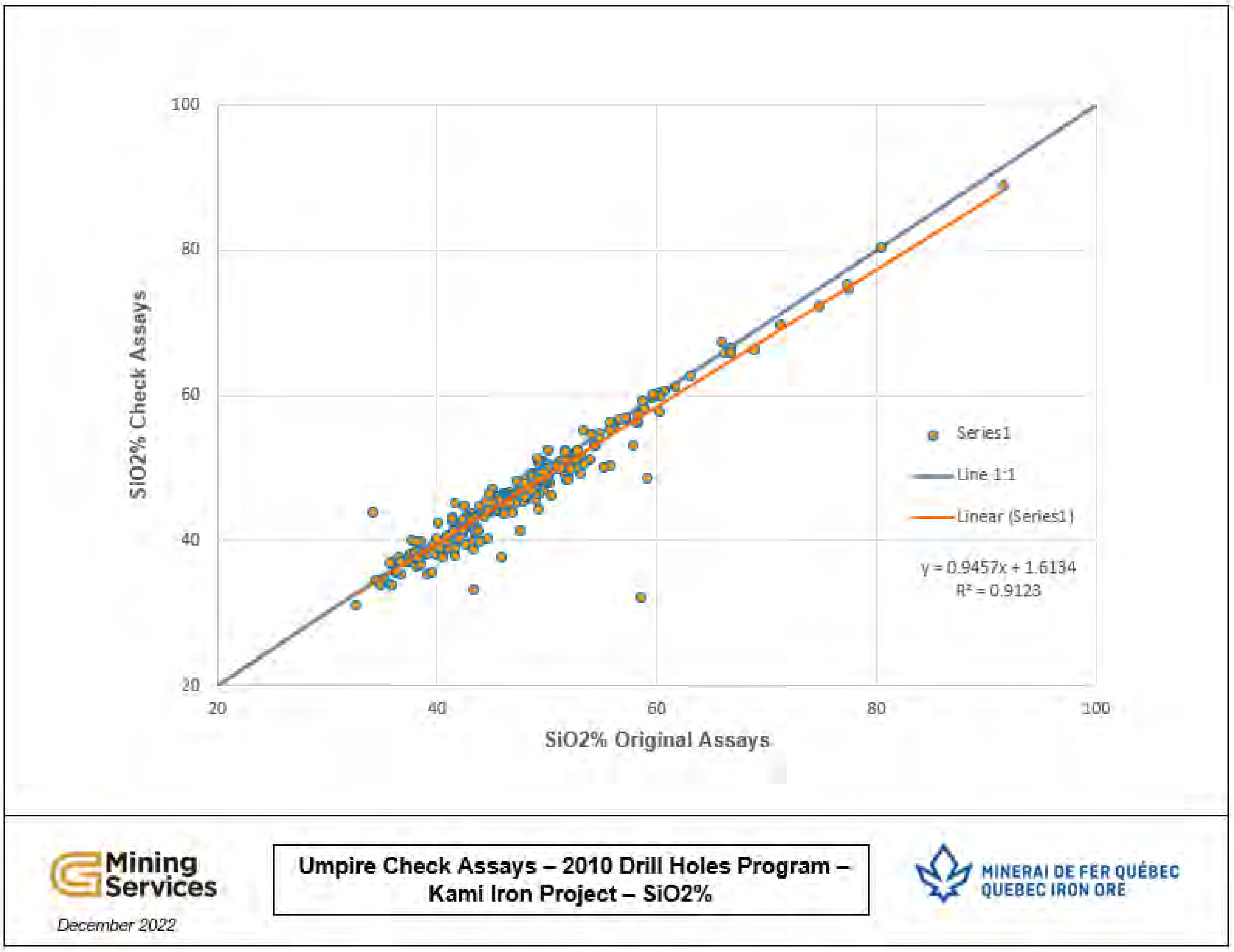


Figure 11-12: Inspectorate vs. SGS Lakefield Check Assay Results (SiO_2%)

The umpire check assay program indicates that SGS Lakefield's XRF assays results of Fe, SiO_2 and MnO are reliable and unbiased. The FeO results from Inspectorate are strongly correlated with original SGS Lakefield results, but are biased slightly lower. The Satmagan assays completed at Inspectorate are also highly correlated with original SGS Lakefield results but are systematically biased slightly higher as shown by the data trendline.

The pulp duplicates were also assayed for sulphur (S) at Inspectorate Lab. A total of 264 S check assays were compared with original values present in the Kami's master database. Results obtained at the umpire lab confirm that mineralization is generally low in sulphur, but occasional intervals with 1% to 3% S are present within the deposit.

It is the QP's opinion that the presence of sulphides in some drill cores should be reviewed and validated by the geological team to get a better image of the influence of the S content present in the deposit, but which is believed to be globally minor.

11.4.3 General Comments

Davis Tube tests were completed in the 2010 and 2011 drilling program samples using pulverization to 80% passing 70 microns neglecting any liberation studies or relevance to any iron ore processing flowsheets. Most of the tests were completed on Rose Central samples. Davis Tube magnetic concentrates were generally assayed for major elements by XRF. For some samples, Davis Tube Tails were analyzed for FeO. For a proportion of these samples, particularly hematite-rich samples, no XRF analysis on products was possible because the magnetic concentrate produced was too small or non-existent.

Results for the Davis Tube tests results show the expected high iron recoveries were achieved for magnetite-rich samples and lower recoveries for hematite-rich samples. Clearly, sample pulverization, 80% passing 70 microns, has resulted in a high degree of magnetite liberation. The liberation assay and mineralogical characteristics of the Davis Tube concentrates (because of the fine grinding) may however be misleading compared to the actual recoveries in an operating mine setting with a commercial processing plant. Iron concentrations in magnetic concentrates from magnetite-rich rocks are generally high, averaging close to 70% and ranging from 64% to 72%. Silica values for magnetite-rich lithologies range from 0.4% to 8% but generally average approximately 2%. Manganese in magnetic concentrates is weakly to moderately correlated with manganese in Head samples, but patterns are irregular.

11.5 Iron in Magnetite, Hematite and Other Minerals

Analytical methods presented in this section (XRF, Satmagan, FeO by Titration and FeO by Davis Tube) do not permit a direct measurement of iron associated with hematite (Hem_Fe). Total iron (TFe) is derived from XRF, iron associated with magnetite (Magn_Fe) is derived from Satmagan, and iron associated with iron carbonates, silicates and sulphides (Other_Fe) is derived from Titration (or Davis Tube). To estimate Fe associated with hematite, two different methods were used depending on the type of testwork available. The following assumptions were made in the calculations:

- Magnetite has the following distribution: 66% Fe^{3+} and 33.3% Fe^{2+};
- All Fe in iron silicates, carbonates and sulphides are Fe^{2+};
- Hematite and magnetite are the only two iron oxide in mineralization;
- Calculated hematite will also comprise iron hydroxides such as limonite and goethite.

Limonite and goethite are not present in Rose Central and Mills Lake deposits, but deeply weathered areas are observed at Rose North. WGM noted that this weathering is particularly present in mineralization close to surface and, in association with the Rose Lake drainage system, contributes to hydrological issues regarding pit development. GMS also noted with core observations that units logged as SIF in Rose North were systematically altered to limonite and/or goethite. To circumvent this potential issue, GMS defined a Limonite domain using weathering codes and field observations, including the SIF-RN1 domain. All blocks falling within this domain would later be downgraded to Inferred Mineral Resources.

To calculate Hem_Fe, the Magn_Fe and Other_Fe must first be calculated. Hem_Fe is obtained by substracting Magn_Fe and Other_Fe from TFe.

The first step is to calculate iron contained in magnetite with the following formula:

$$Magn\_Fe = \frac{Fe3O4\ (from\ Satmagan)}{1.3820}$$

The second step is to calculate the iron contained in "other" iron minerals (iron silicates, carbonates and sulphides) following these steps, depending on which testwork is available:

1. Calculate iron from other iron minerals (Other_Fe) using the titration assays,
2. Where titration assays are unavailable, calculate iron from other minerals (Other_Fe) using the Davis Tube tests,
3. Merge the two calculations into a single Other_Fe attribute, with higher precedence to titration tests.

Iron by trirtation measures the Fe^{2+} available in a sample and reposts it as FeO. This step calculates the Fe^{2+} in the sample that is associated with "other" iron minerals and compensating for the Fe^{2+} in magnetite. When titration in unavailable, Davis Tube ("DT") tests are used to determine Fe^{2+} associated with "other" iron minerals. This manipulation is possible because FeO analysis was generally made on the Davis Tube tails. This is done by calculating the recovery of Davis Tube Tails and multiplying it by the Fe^{2+} available in a sample (FeO_NonMag_pct below). The formulas used are presented below:

$$1 - Other\_Fe(Titration) = \frac{FeO(by\ titration)}{1.2865} - (Magn\_Fe \times 0.333)$$

$$2 - Other\_Fe\ (DT) = \frac{NonMag\ weigth\ (from\ DT)}{NonMag\ weigth\ (From\ DT) + Mag\ weigth\ (from\ DT)} \times \frac{FeO\ (from\ DT\ Tails)}{1.2865}$$

The last step is to derive the Fe associated with Hematite (and also limonite and goethite) using the following equation:

$$Hem\_Fe = Total\ Fe\ (from\ XRF) - Magn\_Fe - Other\_Fe$$

Where Other_Fe or Hem_Fe would result in a negative value, it was replaced by 0. In a very few cases, Other_Fe would result in an anomalously negative value. The scarcity of very low values is not judged to have an impact on the mineral resource and the distribution of negative values is generally in areas low in iron silicates and carbonates.

A compilation of dominant rock types in the database is presented in Table 11-4 and is compared against routine sample assays and calculations described in this section. Most of the oxide iron formation units (HIF, HMIF, MHIF) show a Fe deportment mostly in hematite and magnetite, with less of 1% in iron silicates and carbonates. The only oxide iron formation with higher iron silicates and iron carbonates is the MIF with an average of 4.10% Fe. Inaccuracy in assay results, especially when combining different methodology, may also account for some a portion of the "Other_Fe". The major mineral in "Other_Fe" is interpreted to be grunerite, an iron silicate. GMS observed this mineral in some of the SIF lithologies of Rose Central. Iron sulphides have not been extensively observed during core observations. Generally, logging codes are very well portrayed by iron in magnetite and/or in hematite. It is also clear that rock types with high content of "other minerals" such as QCIF and QSIF have a low hematite and magnetite combined content. While SIF may have a slightly higher hematite content, the value is influenced by SIF from Rose North, which have a high limonite and/or goethite content, undiscernible from hematite with this technique.

11.6 Specific Gravity and Bulk Density

In 2010, Alderon completed bulk density measurement on 175, half-split core samples over two drillholes (most are 0.1 m in length). The purpose was to calibrate the downhole density probe over several rock types. The bulk densities were determined at SGS Lakefield using the weigh-in-water/weight-in-air method. All sampled intervals represent the upper portion of each interval of routine assay samples that are generally 3 m to 4 m in length. Bulk density measurements are generally not representative of the complete interval and are too limited (two drillholes tested) to be used in the model.

Alderon also completed SG measurements on 33 routine sample reject materials at SGS Lakefield using the gas comparison pycnometer method. When compared to %TFe, a good correlation is observed, as seen from Figure 11-13. On the same figure, near density probe measurements are plotted with global similar values.

It is common for deposits with high iron content (or any dense mineral) to observe a correlation between bulk density or SG and %TFe assays. The correlation between the SG and probe densities correlates well enough to establish a predictive formula based on %TFe. Several tests were run with SiO_2, MnO and/or MgO, but the better best-fit models better than using TFe only were difficult to achieve. Figure 11-14 and Figure 11-15 show the correlation between the DGI downhole probe density and the total iron content of each interval for Rose and Mills Lake deposits. To complete this, 3 m composites of DGI probe near and far density measurements (0.10 m length) were created. Analytical results were then transferred to that newly created table. Correlations are robust enough to be used in a model (see Section 14.6 of this Report). A single predictive formula was generated for each of the following units: Rose Central, Rose North iron formations, Rose North Limonite domains, Mills Lake magnetite domains (M_MM and M_UM) and Mills Lake hematite domain (M_HZ). Far density measurements were used in limonite areas to better assess porosity and void in this often heavily altered domain.

Table 11-4: Summary of Major Components for Dominant Rock Types in the Rose Deposit (Central and North)

Lithological Code	Count	TFe	Magn_Fe	Hem_Fe	Magn+Hem Fe	Other_Fe	Al_2O_3	CaO	MgO	MnO	SiO_2
MIF	3,880	28.90	23.12	1.79	24.91	4.10	0.30	3.10	2.36	1.15	47.21
MHIF	1,090	31.33	18.98	11.43	30.42	0.93	0.21	1.98	1.33	1.59	47.05
HMIF	1,405	32.03	9.08	22.34	31.42	0.61	0.16	1.54	0.95	1.50	47.28
HIF	1,383	33.03	1.57	31.03	32.60	0.32	0.15	1.08	0.99	2.99	45.07
MSIF	172	31.44	17.69	1.02	18.71	12.87	0.33	3.40	2.38	1.43	42.93
LMIF	240	23.16	11.78	2.45	14.23	9.00	0.47	3.40	2.87	0.89	53.36
QCIF	501	17.59	1.77	4.04	5.81	11.86	0.49	4.79	3.61	0.76	55.15
QSIF	302	21.42	2.45	4.20	6.65	14.84	0.91	4.32	4.06	0.97	50.71
SIF	189	26.98	2.37	5.78	8.15	18.85	1.15	3.24	4.19	1.85	43.80

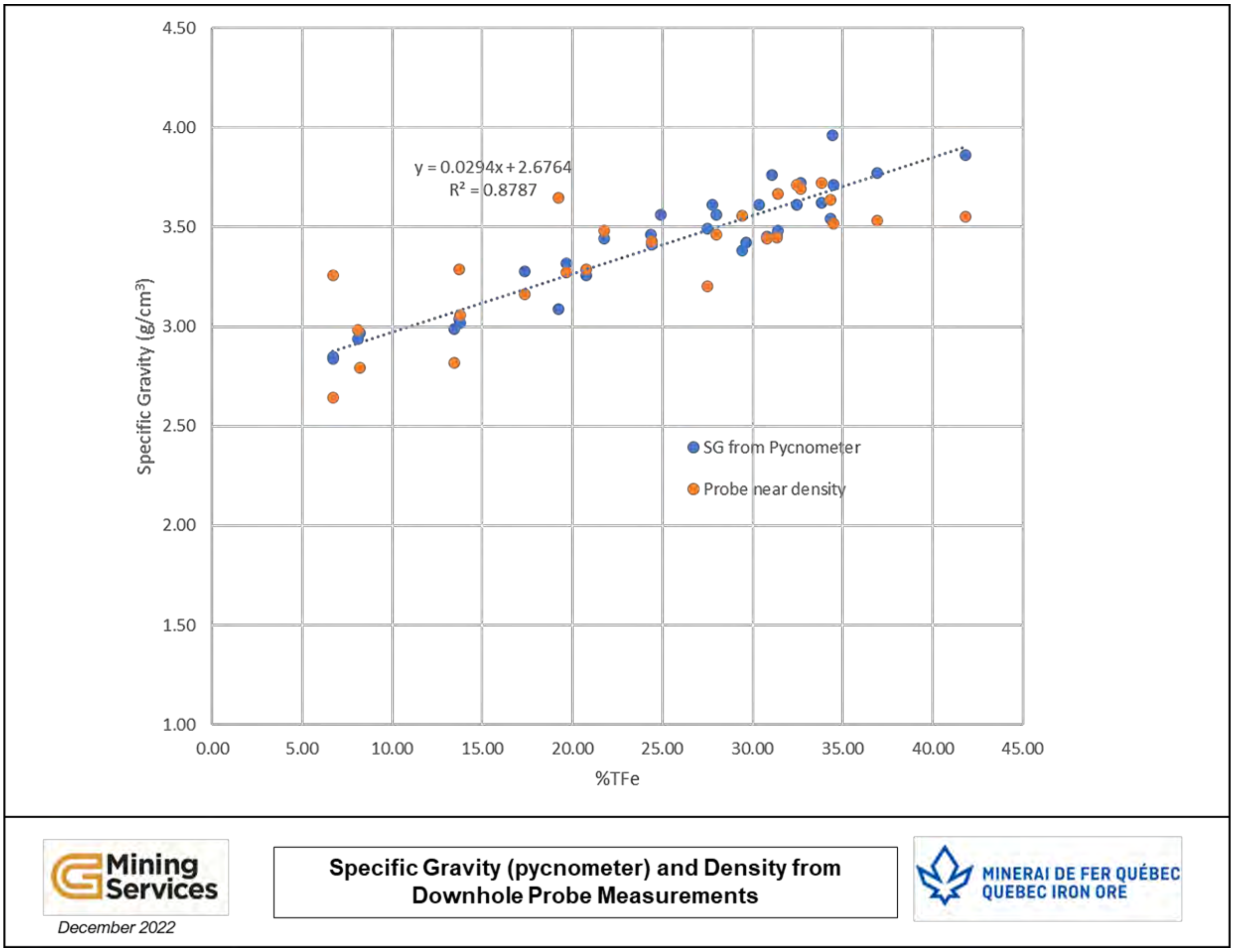


Figure 11-13: Specific Gravity by Pycnometer and Density from DGI Probe against %TFe

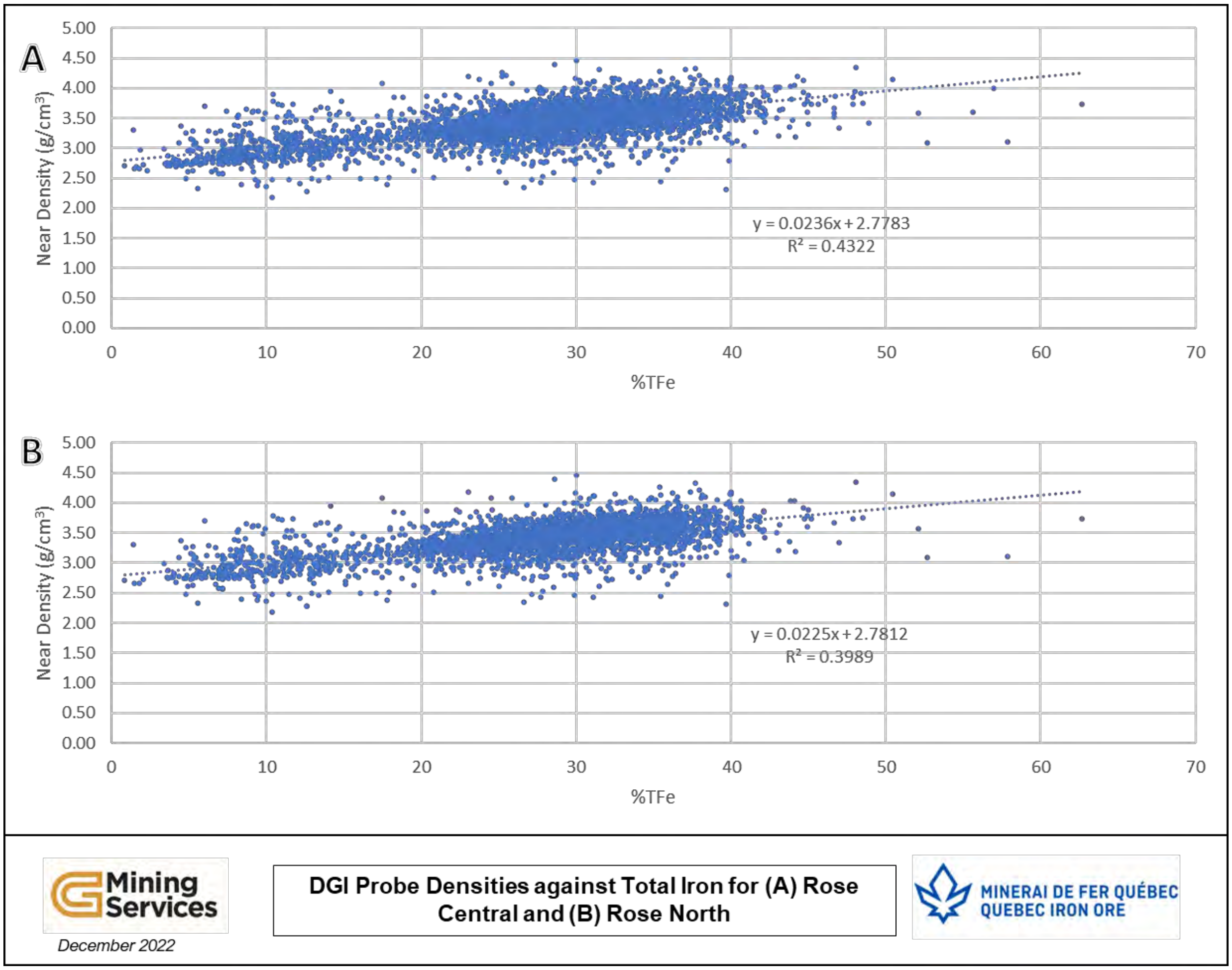


Figure 11-14: Probe Density and %TFe for (A) Rose Central and (B) Rose North

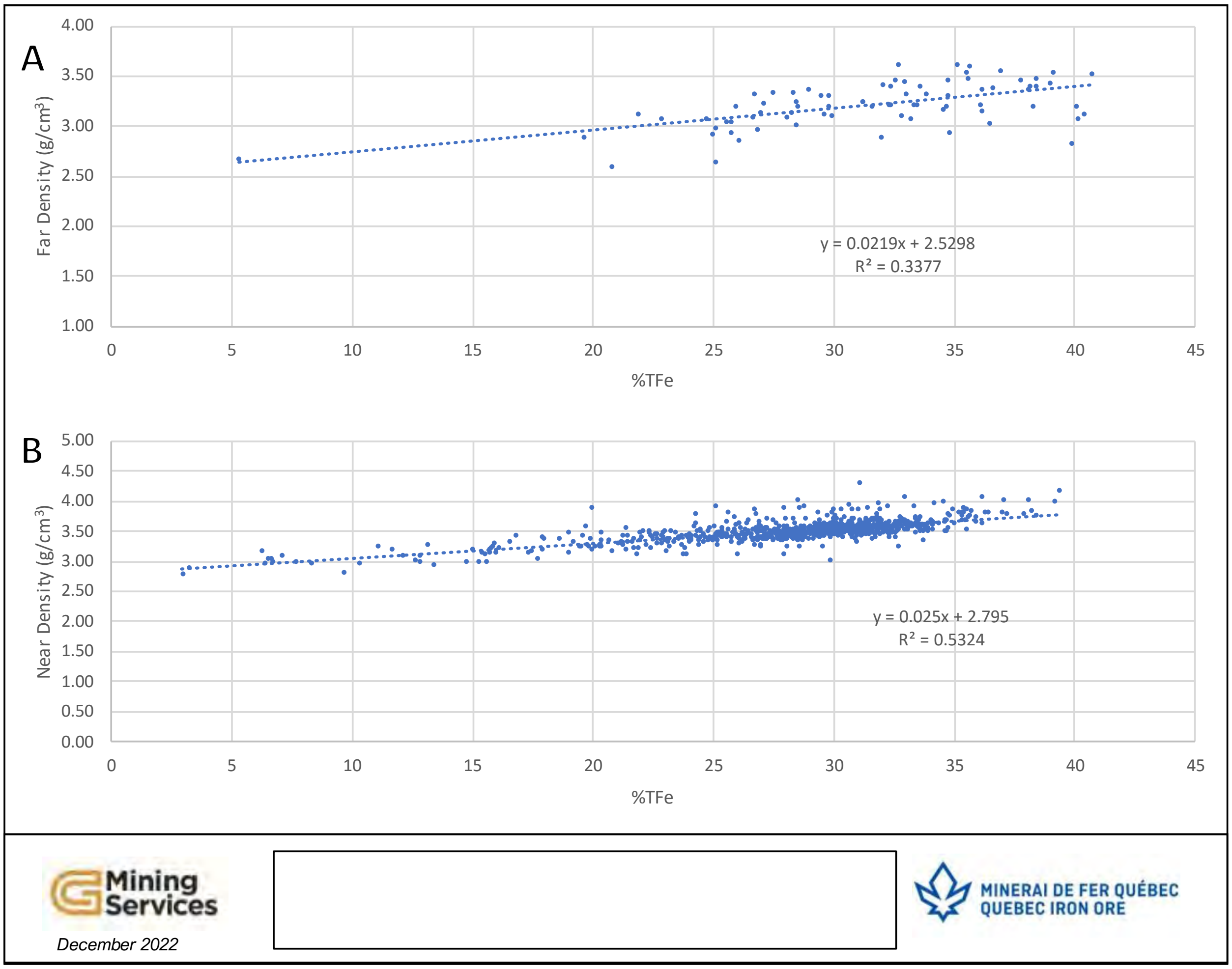


Figure 11-15: Probe Density and %TFe for (A) Rose North Limonite Domain; and (B) Mills Lake Magnetite Domains

11.7 QP Conclusion

In the opinion of the QP, the sampling preparation, security and analytical procedures implemented by Altius and Alderon are consistent with generally accepted industry best practices and are therefore adequate.

The QP recommends in the future to insert reference material that are more representative of the mineralization of the Kami deposit.

12. Data Verification

12.1 Database Verifications

The drillhole database was extracted from a SQL database and was provided by Champion to GMS. The database was validated by inspecting the following information: drillhole collar, deviation surveys, hole length, assays, and lithology. Drillhole collar and deviations were validated and checked for lithological consistency in Leapfrog Geo®. Only one near-vertical drillhole was found inconsistent with nearby drillhole information (K-10-27). Given the uncertainty of a hole drilled along strike of a geological unit, it was discarded during geological modelling and grade interpolation. The impact of removing this hole was judged to be minimal given it is in a densely drilled area. It was also found that for approximately 40 drillholes of the database, the only downhole survey available was the collar deviation. While this is not recommended, the QP believes that the impact should be minor and not material to the mineral resource estimation for the following reasons: most of the holes are below 200 m depth, general deviation of nearby holes is not important, and there was no issue during the geological modelling phases. Furthermore, the sedimentary, continuous, low-variance nature of the deposit should not be strongly impacted by some holes with imprecise downhole locations, especially when they are surrounded by well surveyed holes. No other major issues were found during this validation.

The assay database was compared with the original laboratory certificates. Approximately 10% of the original XRF (Fe_2O_3, SiO_2, MnO), Satmagan and FeO (Titration) was checked against the original assay certificates. No major issues were found in the course of this validation.

Since all the drilling information from 2008 and 2011 were also available in an MS Access database, it was also compared with the SQL database. No errors or major issues were found.

To validate results of Total Iron associated to magnetite, a comparison was made between the results from Satmagan (MagFe_Sat) and Davis Tube (magnetic portion) tests. The correlation between the two measurement techniques is very good with a correlation factor (R^2) of 0.99 and a near 1:1 regression formula (Mag_Fe DT = 1.007 * Mag_Fe Satmagan). Figure 12-1 shows the correlation between those two datasets (7,415 assays).

The QP is of the opinion that the database is in good standing and can be used for a mineral resource estimate. GMS recommends for future drilling or sampling campaigns using a high-grade certified reference material that is more suitable with the grades of the Kami deposit (as detailed in Chapter 11).

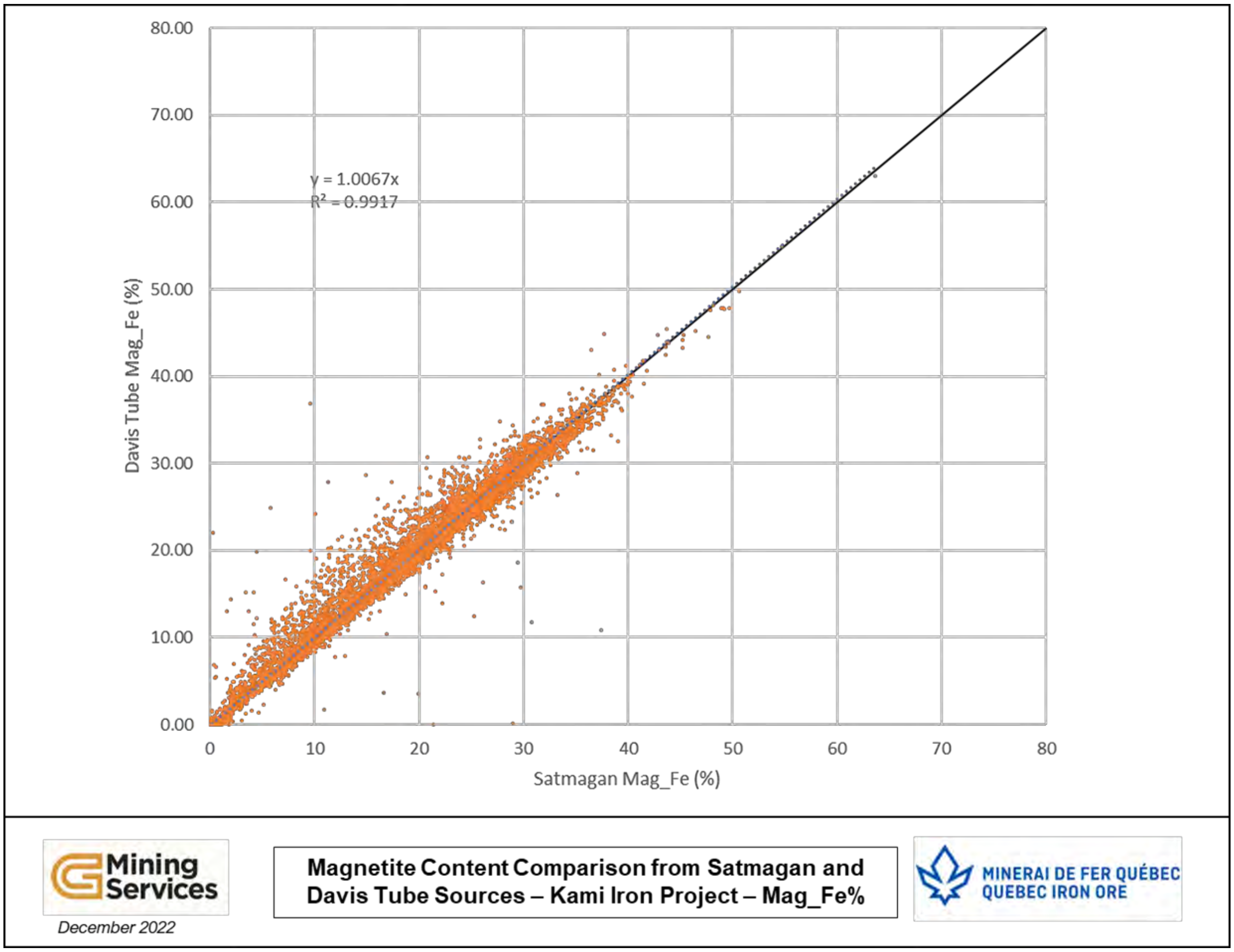


Figure 12-1: Iron from Magnetite Comparison between Satmagan and Davis Tube Tests

12.2 Site Visits

The GMS team completed two site visits to the Project infrastructures and site. A first visit was held between November 24, 2021 and December 3, 2021. A second site visit was held on July 27 and July 28, 2022.

During the first site visit, the following GMS personnel was present:

- Christian Beaulieu, P.Geo.: November 24 to December 1, 2021;
- James Purchase, P.Geo.: November 24 to November 27, 2021;
- Karina Sarabia, P.Geo.: December 1 to December 3, 2021.

The purpose of this site visit was to collect information on the geology of the deposit by drillhole inspection, inspect drill core storage and availability, collect independent QP samples and validate the geological interpretations.

During the second site visit, the following GMS personnel was present:

- Christian Beaulieu, P.Geo.: July 27 and 28, 2022;
- James Purchase, P.Geo.: July 27 and 28, 2022.

The objective of this site visit was to locate drillhole collars, collect GPS points and locate outcrops on the Property.

12.2.1 Drillhole Collars and Outcrops

A total of eight diamond drillhole collars were located on the field, marked with a handheld GPS (Garmin® GPSMap 64X) and compared with the surveyed coordinates. Table 12-1 shows a comparison of the database and the QPs coordinates. Differences are judged to be acceptable considering the lower precision of the handheld GPS. All drillholes were properly identified (except for K-12-185), with a marking on the casing cover or with a monument. An example of two properly identified drillhole collars are illustrated in Figure 12-2.

A few outcrops were also located and identified as magnetite-rich banded iron formation (Figure 12-3).

Table 12-1: GPS Field Checks of DDH Collars (NAD83, UTM Zone 19N)

Hole-ID	Field GPS (m)		Database (m)		Difference (m)		
	East	North	East	North	East	North	∆XY
K-10-28	632,990	5,855,828	632,990.72	5,855,827.07	0.72	-0.93	1.18
K-10-32	633,056	5,855,761	633,057.57	5,855,759.87	1.57	-1.13	1.93
k-10-33	632,998	5,855,820	633,000.06	5,855,817.60	2.06	-2.40	3.16
K-10-40	632,671	5,855,581	632,672.64	5,855,580.14	1.64	-0.86	1.85
K-10-46	632,675	5,855,577	632,675.91	5,855,577.03	0.91	0.03	0.91
K-11-131	632,813	5,855,825	632,814.71	5,855,824.61	1.71	-0.39	1.75
K-11-172	633,336	5,855,882	633,338.08	5,855,879.66	2.08	-2.34	3.13
K-12-185(1)	632,845	5,856,007	632,846.18	5,856,006.45	1.18	-0.55	1.30

(1) Note: K-12-185 casing was not identified. The ID was assumed based on its location.

Figure 12-2: Example of Drillhole Collars (K-10-32 and K-11-172)

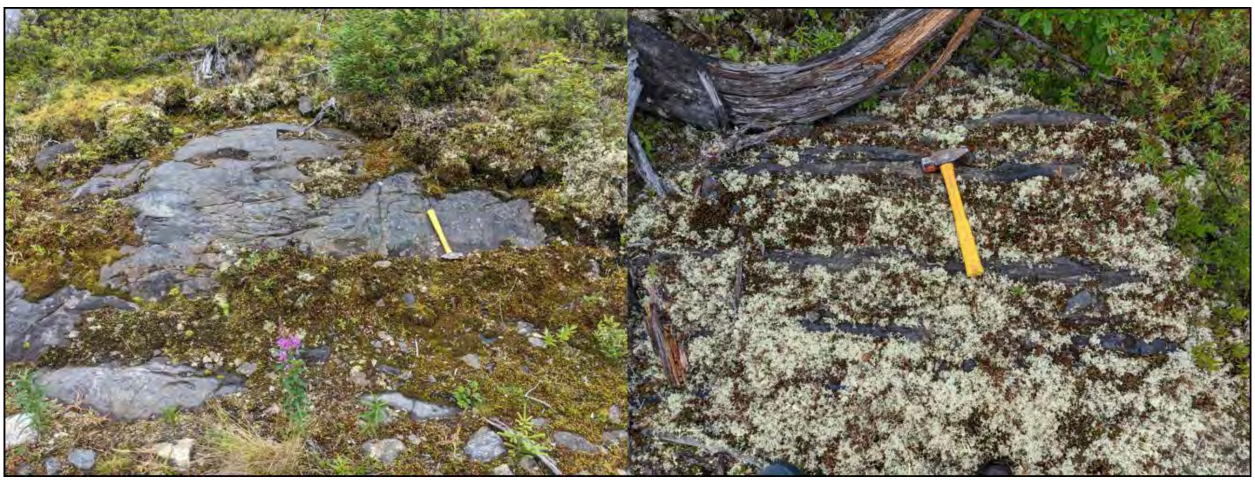


Figure 12-3: Magnetite-rich Banded Iron Formation (hammer as scale)

12.2.2 Core Inspection and Independent Sampling

During the first site visit, the QP inspected approximately 30 drillholes, focussing on mineralized zones and potential added-value material at the footwall of Rose Central (footwall of RC1). Most logged units were observed, ranging from hematite-rich to magnetite-rich BIF (HIF, HMIF, MHIF, MIF), as well as unmineralized units such as SIF, HBG_GN, CIF, QCIF, QSIF, QZT and SCH. Some instances of limonite-goethite intervals were also observed and were mainly associated with the footwall of Rose North (SIF-RN1), located at the western end of the deposit, at depth. The reader should refer to Section 7.3 for the lithological library collected as part of this site visit. While most of the banded-iron formations are generally well logged and contacts with mineralization well placed, the ancillary units acting as waste material were often found to be inconsistent. For example, several different rock types were labelled as SIF. GMS recommends conducting a review of the logging and standardizing rock types to properly identify waste units. Furthermore, in the course of this inspection, GMS found that there is no potential upside in adding waste units to the mineralization model (i.e., no significant hematite and/or magnetite outside of iron formation units).

As part of the core inspection, the QP selected 19 independent samples. Selected half core samples were manually split with a hydraulic splitter into quarter core. Samples were bagged, sealed with a labelled security tag and sent to an independent laboratory (SGS Canada, Québec City). The samples were analyzed for the following: major elements (LIMS), such as Fe_2O_3, SiO_2 and MnO, Fe^{+2} by titration, magnetite content with Satmagan as Fe and sulphur analysis (LECO). The results of the independent QP sampling are presented in Figure 12-4, Figure 12-5 and Figure 12-6 for Fe_2O_3, SiO_2 and MnO respectively. Correlations between the original sampled half core with corresponding quarter core are judged to be within acceptable ranges. Iron from magnetite (Satmagan) and FeO (titration) were also validated with globally excellent correlations, as seen from Figure 12-7 and Figure 12-8. Tolerances of +/-20% around the 1:1 line are shown for reference.

Additional tests were also conducted on a sub-selection of five samples for semi-quantitative mineralogy analysis (XRD). An apparent bias is found between the magnetite XRD analysis and the Satmagan counterpart (Figure 12-9). No conclusions on a real bias can be drawn from this given the very small population of samples and the comparison being between half-core and quarter-core samples. Hematite+Goethite shows similar behaviour from XRD and Titration analysis, regardless of the sampling population (Figure 12-10).

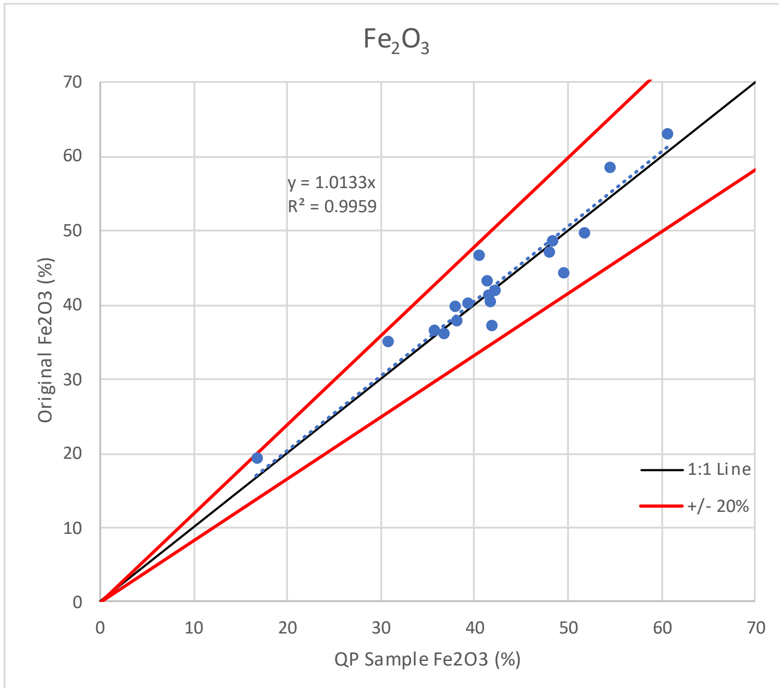


Figure 12-4: Fe_2O_3 Comparative Graph – QP Independent Sampling

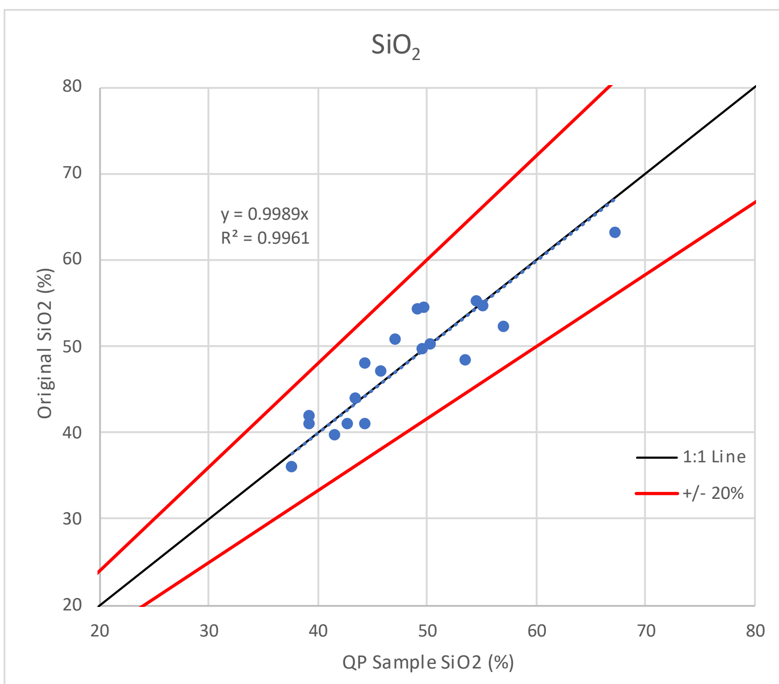


Figure 12-5: Si_2O Comparative Graph – QP Independent Sampling

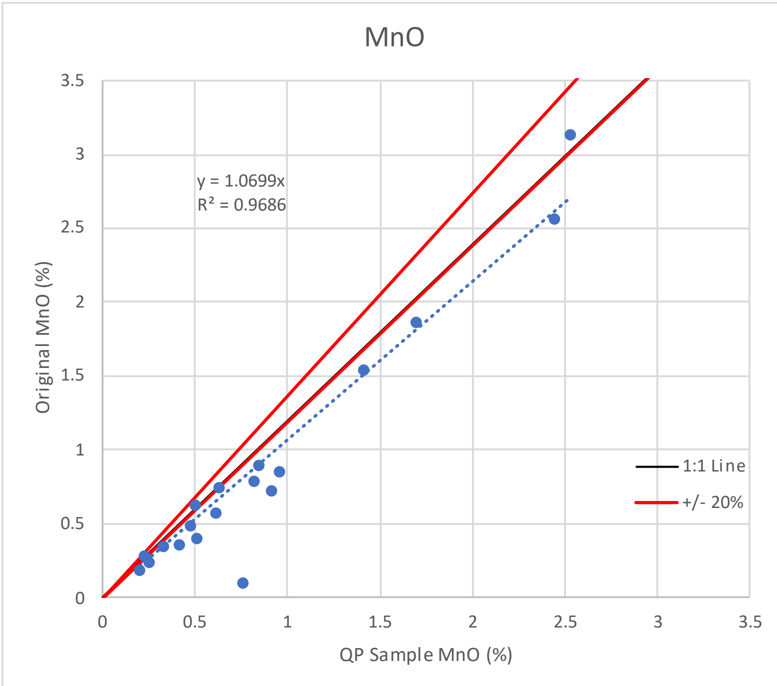


Figure 12-6: MnO Comparative Graph – QP Independent Sampling

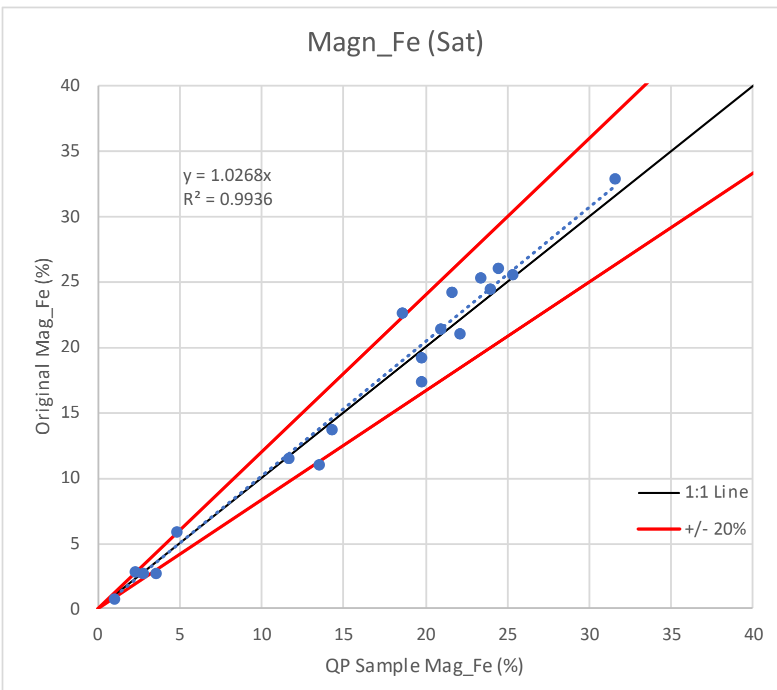


Figure 12-7: Iron from Magnetite (Satmagan) Comparative Graph - QP Independent Sampling

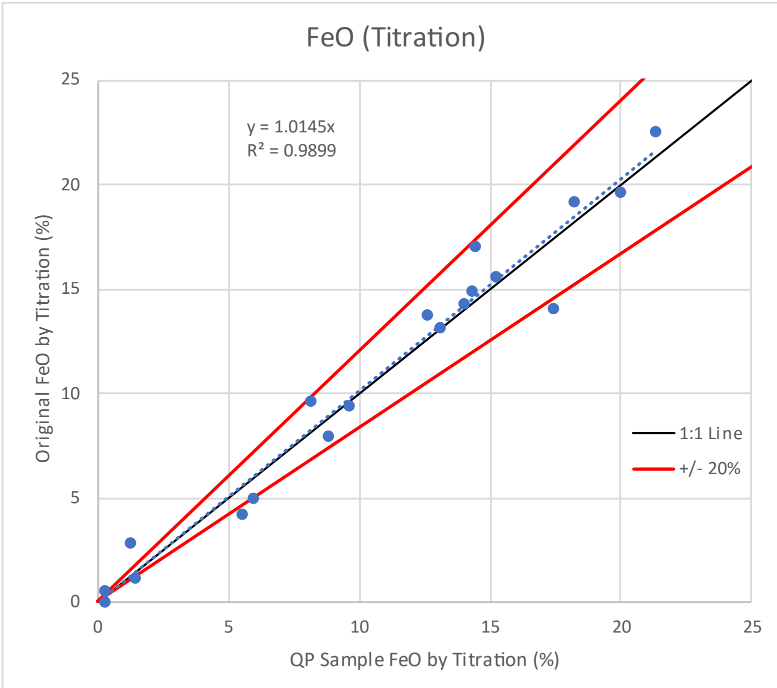


Figure 12-8: FeO by Titration Comparative Graph – QP Independent Sampling

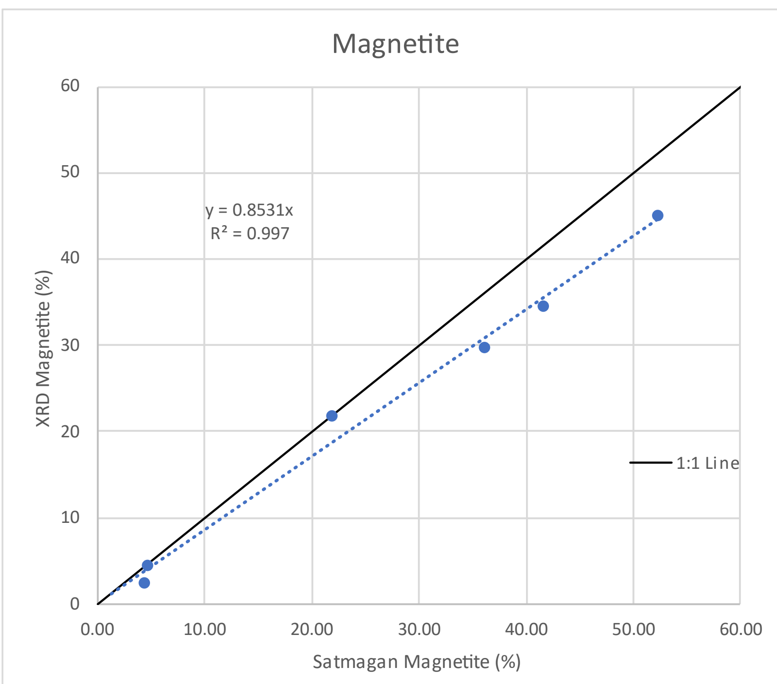


Figure 12-9: Magnetite from XRD and Satmagan Comparative Graph – QP Independent Sampling

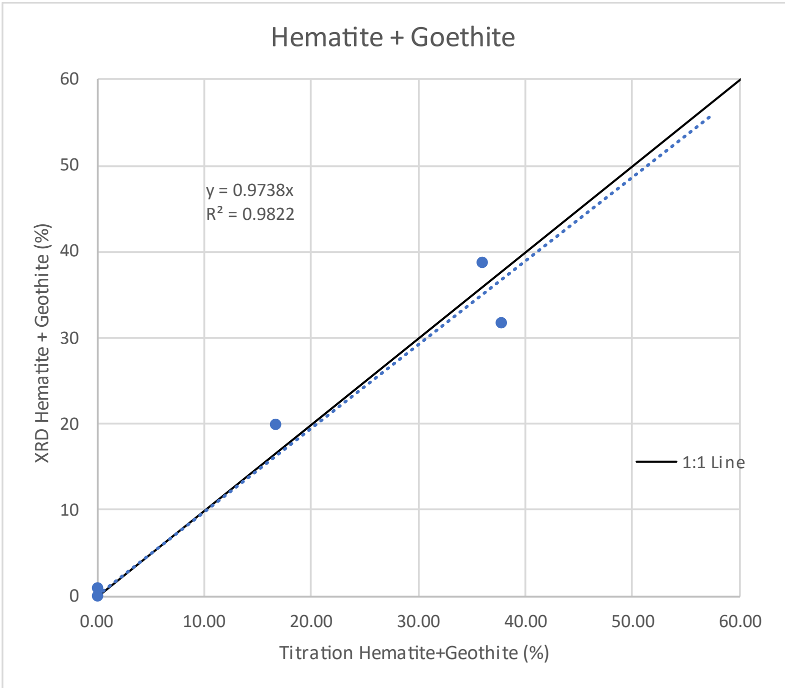


Figure 12-10: Hematite+Goethite/Limonite from XRD and Titration Comparative Graph – QP Independent Sampling

Drill core storage is generally well organized, easily accessible, with storage both indoor and outdoor in covered metal racks. A few drillhole cores were not accessible due to dense vegetation and snow between racks. All drillhole ID's were found in inspected core racks. Some core boxes were empty with no proper labels, probably for duplicate checks, metallurgical, environmental and/or prior independent sampling. It was suggested to Champion to run a complete inventory of available core and update the database accordingly.

12.3 QP Conclusion

The database validation process, drill core inspection, independent QP sampling, outcrop inspection, and diamond drillhole collar locations confirmed the validity of the drilling database and supporting information using the mineral resource estimate. no major issues were found during data validation, both digitally and on the field.

13. Mineral Processing and Metallurgical Testwork

This Pre-feasibility Study (“PFS") is based on the historical metallurgical testwork and on the testwork performed specifically for this PFS. Results from this testwork were used to determine process performance parameters such as material throughput, Fe and weight recoveries, final concentrate grade (including key elements such as Fe, SiO_2, MnO) and particle size. The key process performance parameters were then used as the basis for establishing the mine plan, sizing of equipment and, ultimately, to estimate project capital and operating costs which, in turn, were used for performing the economic analysis of the Project for the PFS.

Following a high-level description of the Kami Deposit characteristics, the sections below first present a summary of the historical testwork followed by a detailed review of the testwork carried out specifically for the PFS.

13.1 Kami Deposit Mineralogical Characterization

The mineralogical and metallurgical characteristics of the Kami deposit will ultimately determine process performance as well as final product specifications. The Kami mineral body can be classified into three general mineralization types; a hematite-rich component with a relatively small quantity of magnetite, a mixed hematite and magnetite component and a predominantly magnetite-rich component. All three mineralization types have been observed in the Rose Central (“RC”) and the Rose North (“RN”) sectors, which make up the Rose deposit. As a result, the Kami mineral body is considered having six different rock types as described below:

- RC1: This unit of the Rose Central sector consists mainly of hematite with manganese ("Mn") in silicate gangue (rhodonite) and generally contains less than about 5% magnetite, except at the margins where it can be up to 25%.
- RC2: This unit of the Rose Central sector consists of a mixture of magnetite with variable amounts of hematite in interbedded layers. The amount of magnetite is greater than hematite. The amount of Mn in the magnetite ranges between 0.7% to more than 3%. The Mn also occurs as Mn-carbonate (rhodochrosite).
- RC3: This unit of the Rose Central sector is composed mainly of magnetite, with generally less than about 5% hematite. It contains some Mn in the magnetite, up to 0.7%, generally occurring as an interstitial element in the magnetite.
- RN1: This unit of the Rose North sector consists of a higher relative percent of hematite in the Rose North sector of the Rose deposit. The Mn minerals are oxidized to psilomelane and rarely pyrolusite ("MnO_2").

- RN2: This unit of the Rose North sector consists of intermixed hematite and magnetite with the latter dominating. Mn frequently appears as powdery psilomelane and occasional crystalline pyrolusite in limonite-goethite cavities.
- RN3: This unit of the Rose North sector consists predominantly of fine-grained magnetite with minor hematite.

13.2 Historical Testwork

The historical testwork used for this PFS is the following:

- 2009 Altius Resources metallurgical testwork:
  - Reference: McKen and Wagner, September 18, 2009.
- 2011 Alderon - PEA Study metallurgical testwork:
  - Reference: Davies and Lascelles, August 23, 2011(a).
  - Reference: Davies and Lascelles, September 9, 2011(b).
- 2012 Alderon - Feasibility Study metallurgical testwork:
  - Study Report Reference: Grandillo, A., Live, P., Powell, J., Deeting, P., Kociumbas, M., Risto, R.W., Merry, P., January 9, 2013.
  - Testwork Report Reference:
    - Davies and Imeson, December 3, 2012(a).
    - Lee, November 23, 2012.
- 2013-2014 Alderon - Detailed Engineering confirmatory metallurgical testwork that was included in the 2018 Feasibility Study:
  - Study Report Reference: Grandillo, A., Cassoff, J., Powell, J., Kociumbas, M., Merry, P., October 31, 2018.
  - Testwork Report Reference:
    - Bokela, June 14, 2013.
    - Bulled, October 1, 2014.
    - Davies and Imeson, May 17, 2013.
    - Davis and Imeson, May 5, 2014.
    - Mineral Technologies, August 5, 2013.
    - School of Metallurgical and Geological Engineering, June 2014.
    - Tenova_1, November 7, 2013.
    - Tenova_2, November 7, 2013.

Table 13-1 presents a summary of the historical testwork performed. For more detailed information on the historical testwork, refer to the specific documents listed.

Table 13-1: Historical Testwork Summary

Historical Study	Sample	Testwork
2009 Altius Resources	(1) Rose Central Composite	▪ Quantitative Mineralogical Analysis ▪ Gravity Separation (Mozley) ▪ Magnetic Separation (Davis Tube, LIMS) ▪ Grindability (RWI, BWI)
2011 Alderon - PEA Study	(3) Rose Central (RC1, RC2, RC3) (1) Mills (Quantitative Mineralogical Analysis)	▪ Quantitative Mineralogical Analysis ▪ Gravity Separation (Heavy Liquid Separation, Wilfley Table) ▪ Magnetic Separation (Davis Tube) ▪ Grindability (DWT, SMC, CWI, RWI, BWI)
2012 Alderon - Feasibility Study	(61) Rose Central (RC1, RC2, RC3) (63) Rose North (RN1, RN2, RN3) (6) Mills	▪ Quantitative Mineralogical Analysis ▪ Gravity Separation (Wilfley Table, Heavy Liquid Separation) ▪ Magnetic Separation (Davis Tube, LIMS tests ▪ Grindability (SPI, MacPherson, SMC, CWI, RWI, BWI, SAG Design) ▪ Tailings Thickening (Static/Dynamic Settling-Thickening, UF Rheology) ▪ Integrated Geometallurgical Simulator (IGS) simulations.
2013-2014 Alderon - Detailed Engineering	(-) Rose Central (RC1, RC2, RC3) (-) Rose North (RN1, RN2, RN3)	▪ Gravity and Magnetic Separation Semi-pilot ▪ Gravity Separation (Spirals) ▪ Concentrate Filtration ▪ Tailings Thickening ▪ Sintering ▪ Integrated Geometallurgical Simulator (IGS) simulations.

13.3 2023 Pre-feasibility Study Testwork

13.3.1 Testwork Plan

The PFS test program for the Rose deposit was defined with the objective of looking at alternative flowsheets to maximize the value of the Project obtained from previous studies and to assess the capability of producing a low silica concentrate suitable for direct reduction.

The testwork was performed in two distinct phases:

- Phase 1 aimed at validating and optimizing the process flowsheet designed in the previous studies using six drill core composite samples representing the six different mineralization (RC1, RC2, RC3, RN1, RN2 and RN3) weighing approximately 300 kg each;
- Phase 2 aimed at validating the final flowsheet performance by running continuous/semi-continuous pilot scale testwork using three composite samples weighing approximately 2 t each.

Samples were selected to be representative of the mineralogical types considering the samples available and the weight required. Figure 13-1 and Figure 13-2 present Phase 1 and Phase 2 sample locations.

It can be observed that Phase 1 samples are covering the overall area, and that some mineralization type comes from a single drill hole. Phase 2 samples are covering most areas for each mineralization type and present ore from various depths, which should increase their representativity of the ore body.

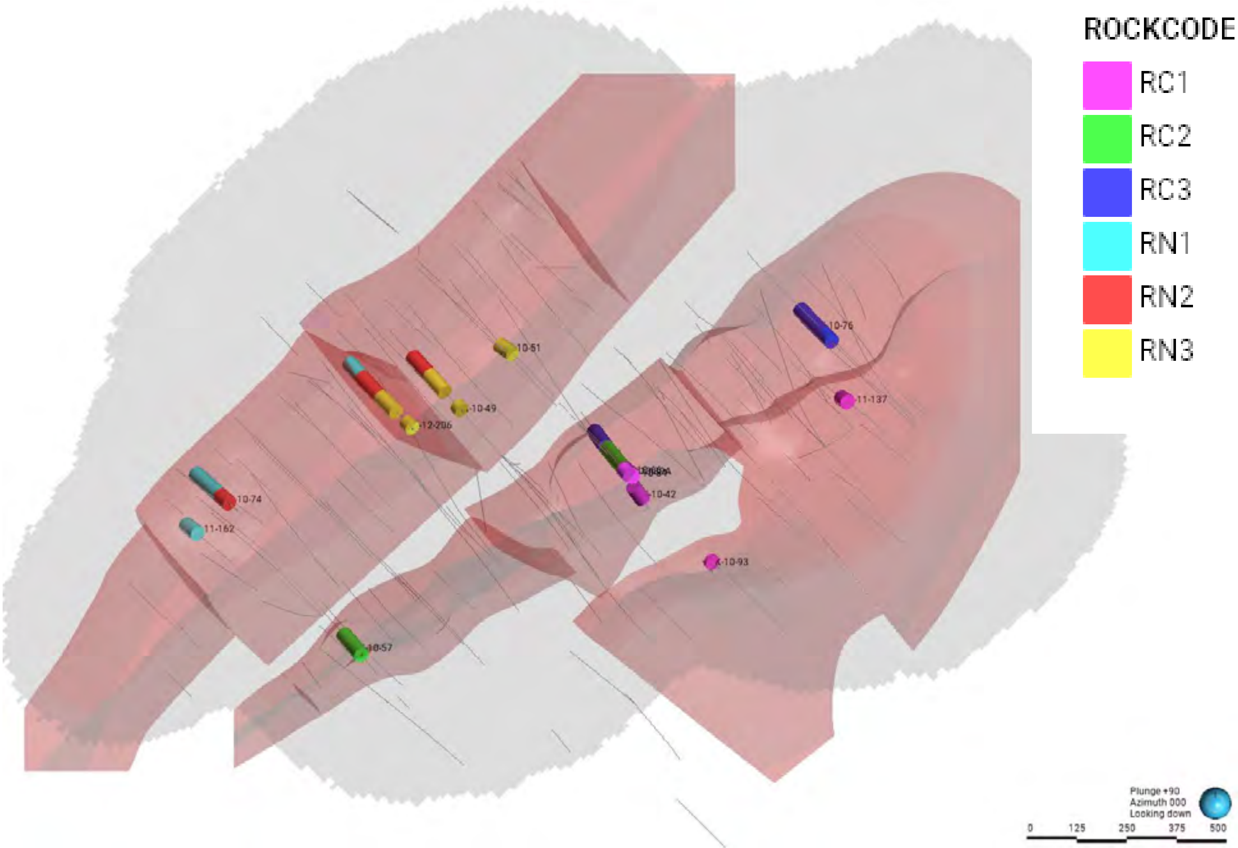


Figure 13-1: Phase 1 Sample Locations

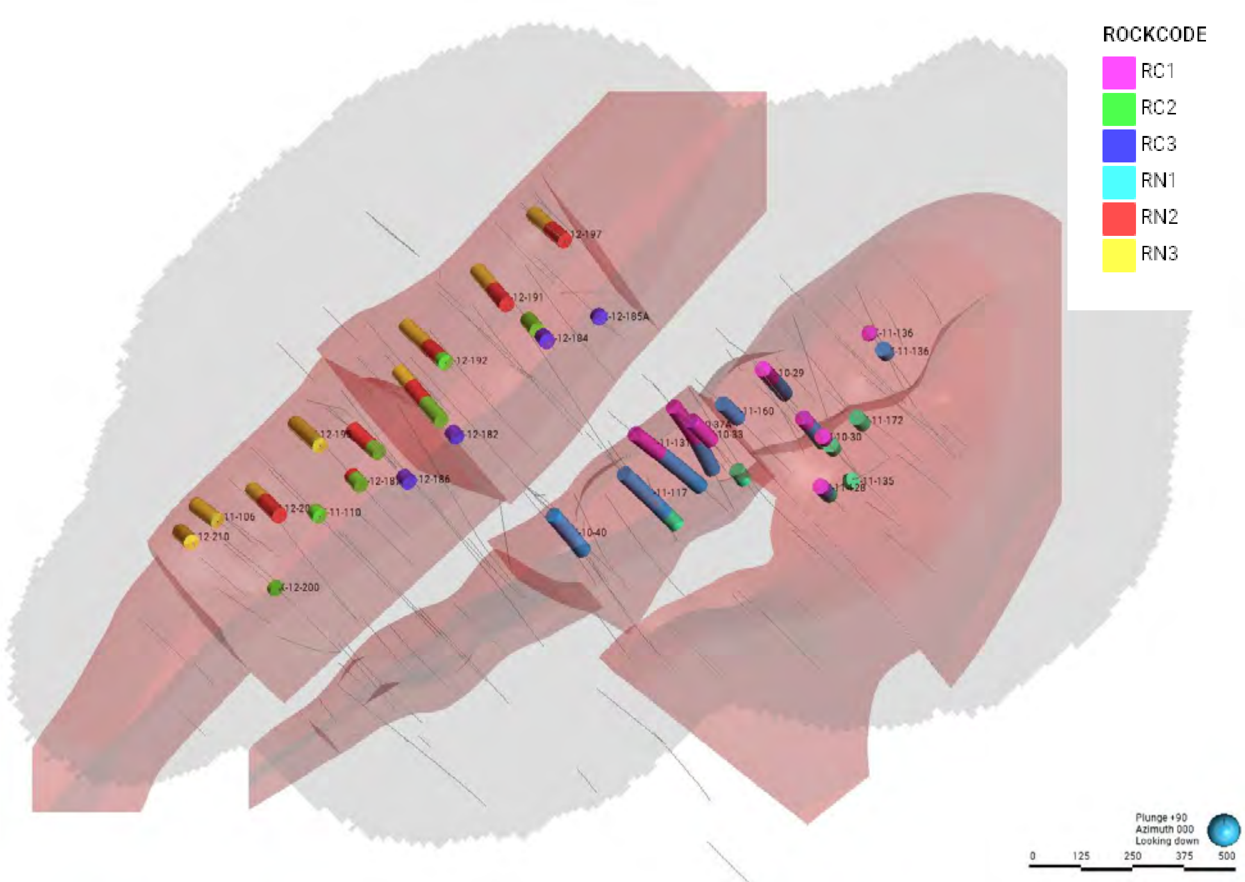


Figure 13-2: Phase 2 Sample Locations

Completed testwork description as well as testwork results are presented in the following two reports prepared by Corem: (Corem, 2023) and (Corem, to be published).

13.3.1.1 Phase 1: Flowsheet Optimization

Phase 1 aimed at improving the flowsheet and optimizing operating parameters.

The flowsheet improvements foreseen during the planning of the optimization testwork were:

- Improvement of the rougher spiral performance;
- Replacement of the cleaner and recleaner spirals stage by a cleaner Reflux® Classifier stage or a cleaner hindered settler stage;
- Assessing the need of a scavenger circuit for the fine hematite recovery;
- Flotation tests on gravity and magnetic circuit concentrates to reduce final SiO_2 grade.

Drill core material corresponding to six different mineralization types from the RN and RC deposits were used (as shown on the above Figure 13-1). The weight of each sample is reported in Table 13-2.

Table 13-2: Phase 1 Sample Weights

Ore Type	Weight (kg)	Proportion (%)
RC1	313.9	16.9
RC2	315.9	17.0
RC3	306.8	16.5
RN1	306.2	16.5
RN2	300.1	16.2
RN3	312.6	16.8
Total	1,855.5	100.0

Detailed characterization and spirals tests were conducted on the individual mineralization samples before being mixed in approximately equal proportions to form a composite sample. The composite was produced to generate sufficient mass for the downstream circuit testwork. Figure 13-3 summarizes the work carried out in Phase 1.

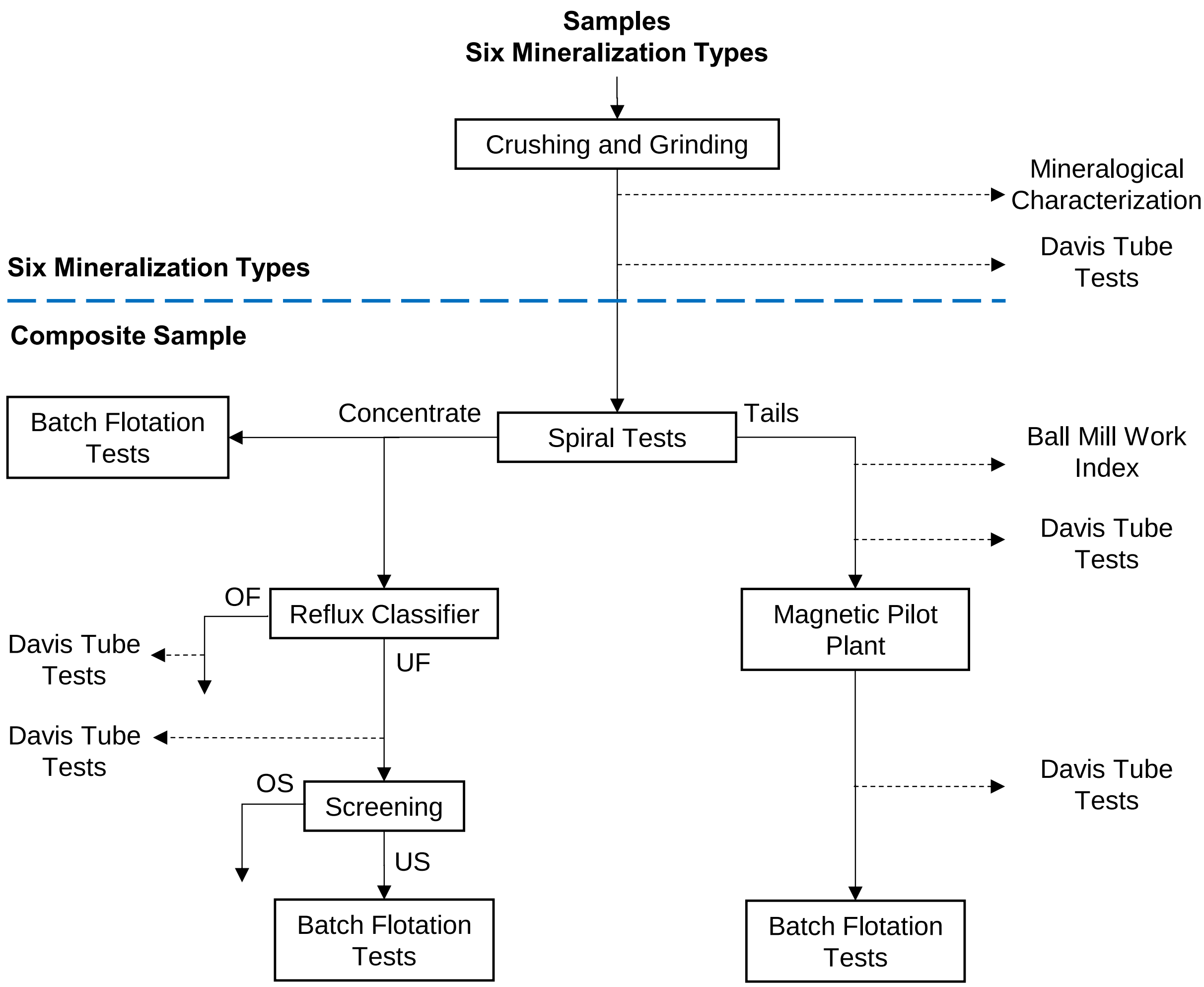


Figure 13-3: Overview of the Work Performed in Phase 1

13.3.1.2 Phase 2: Performances Determination

Phase 2 aimed at validating the final flowsheet performances by running continuous/semi-continuous pilot scale testwork using composite samples.

Drill core material corresponding to the six different mineralization types from the RN and RC deposits (as shown on Figure 13-2) each weighing between 400 kg to 1,500 kg for a total of 5,516 kg was used for the Phase 2 testwork. Three composite samples were created as follows:

- Year 01-05: Composite with the mass proportion of the first 5 years of operation as defined in the mine plan available at the time the composite was generated (FS 2018):
  - The composite contains more RN1 units and less RC2 units than Year 01-05 or the average PFS mine plan. The RN1 unit contains more total and hematite iron than the RC2 unit (Section 13.3.2);
  - The composite contains more RN units (65%) than the Year 01-05 or the average PFS mine plan (50%). The RN units are less liberated than the RC units;
  - Although the Year 01-05 composite does not have the same mineralization unit proportions as the average mine plan, it is considered representative of the mixed RN and RC material that will be fed to the concentrator. The High RC and High RN composites permitted to evaluate the individual performances of the RN and the RC units in the flowsheet.
- High RC: Composite with all the RC units left to maximize the use of the sample available. The composition was comparable with Years 6-7-8 of the mine plan available at the time the composite was generated (FS 2018):
  - The RC mineralization proportions of the composite are in line with the PFS mine plan.
- High RN: Composite with all the RN units left to maximize the use of the sample available. The composition was comparable with Years 3-4 of the mine plan available at the time the composite was generated (FS 2018).
  - The RN mineralization proportions of the composite are in line with the PFS mine Plan.

Table 13-3 presents the mineralization type proportions of the composite samples.

Table 13-3: Phase 2 Composite Sample Weights

Rock Type	Unit	Composite			Mine Plan	
		Year 01-05	High RC	High RN	Year 01-05	LOM
Weight						
RC1	kg	87	305	0	-	-
RC2	kg	358	1,132	0	-	-
RC3	kg	212	499	0	-	-
RN1	kg	588	0	687	-	-
RN2	kg	408	0	508	-	-
RN3	kg	197	0	535	-	-
Total	kg	1,850	1,936	1,730	-	-
Proportion						
RC1	%	5	16	0	7	8
RC2	%	19	58	0	27	28
RC3	%	11	26	0	16	14
RN1	%	32	0	40	19	19
RN2	%	22	0	29	20	16
RN3	%	11	0	31	11	16
Total	%	100	100	100	100	100

Figure 13-4 summarizes the work carried out in Phase 2.

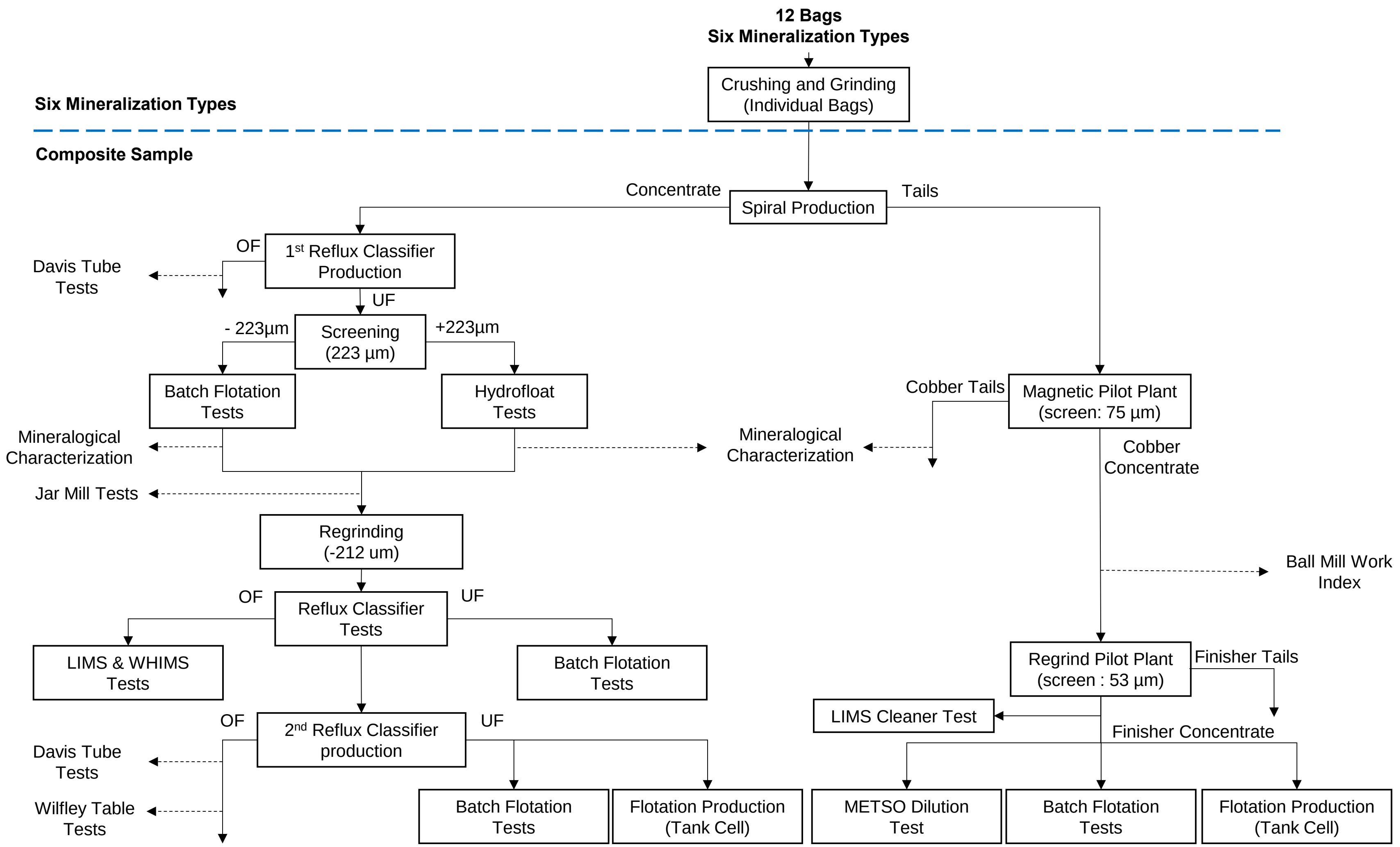


Figure 13-4: Overview of the Work Performed in Phase 2

13.3.2 Mineralogical Analysis Results

A quantitative mineralogical characterization was performed with a Mineral Liberation Analyzer ("MLA") on nine size fractions of head samples for each mineral type within the Rose deposit used for Phase 1 testwork. Details of the results of this testwork can be found in Corem report titled Pilot Scale Testing for Kami Project - Phase 1 (Corem, 2023). Table 13-4 shows the mineralogical components present in the six Phase 1 samples, while Table 13-5 shows the Fe distribution of the mineralization types of the Rose deposit.

Table 13-4: Phase 1 Rose Deposit Modal

Mineral	Unit	RC1	RC2	RC3	RN1	RN2	RN3
Hematite	%	34.3	7.6	2.4	34.9	9.6	4.1
Magnetite	%	9.5	26.3	35.2	7.9	29.2	26.0
Iron Oxides	%	43.7	33.9	37.6	42.7	38.7	30.1
Goethite	%	0.2	1.2	1.4	7.2	4.3	5.4
Quartz	%	34.1	42.4	39.1	47.3	42.2	42.3
Ca Amphiboles	%	4.0	2.9	1.7	0.1	0.6	0.8
FeMg Amphiboles	%	4.1	7.4	5.6	0.6	5.0	7.1
Micas	%	0.6	0.6	0.5	-	0.3	0.3
Other Silicates	%	4.3	0.1	0.3	-	0.1	0.3
Ankerite Low Fe	%	5.3	5.7	7.5	-	3.6	4.4
Ankerite Mid Fe	%	2.4	2.6	3.7	-	1.7	6.4
Ankerite High Fe	%	0.3	2.4	1.5	-	2.3	2.1
Siderite	%	0.2	0.2	0.4	0.3	0.3	0.3
Ca Carbonates	%	0.2	0.1	0.2	-	-	-
Mn Oxides	%	0.4	0.2	0.2	1.4	0.6	0.2
Ti Minerals	%	-	0.1	-	0.1	0.1	-
Sulphides	%	0.1	0.1	0.3	0.0	0.2	0.1
Others	%	0.1	0.1	-	-	-	-
Total	%	100.0	100.0	100.0	100.0	100.0	100.0
% Economical Fe	%	93.0	86.3	88.4	85.7	85.0	78.2

Table 13-5: Rose Deposit LOM Fe Mineral (without Dilution)

Mineral	Unit	RC1	RC2	RC3	RN1	RN2	RN3	Total
Hematite	%	34.2	10.2	3.4	40.5	11.0	8.2	16.5
Magnetite	%	8.3	25.6	28.6	6.5	26.2	22.5	20.8
Iron Oxides	%	42.5	35.8	32.1	47.0	37.3	30.7	37.3
% Economical Fe	%	95.8	87.7	81.9	99.4	90.1	83.4	89.8

As it can be observed:

- The iron distribution in the minerals of the Phase 1 samples is very similar to the LOM:
  - RC3 sample has more magnetite, total and economical Fe than the LOM;
  - RN1 sample has less hematite, total and economical Fe than the LOM;
  - RN3 sample has less economical Fe than the LOM.
- Iron oxides (hematite and magnetite) were the main economic minerals;
- RC1 and RN1 have the highest Fe oxide content;
- RC1 and RN1 contain the highest proportion Fe as hematite, while RC3 and RN3 the highest proportion of Fe as magnetite;
- RC2 and RN2 have a low proportion of Fe as hematite, lower than observed in the previous studies. The values are, however, similar to the overall composition of these mineralization types in the LOM;
- The goethite contents were low in the RC samples, but they were quite high in the RN samples. Goethite was only observed in RN1 sample in the previous studies;
- The main gangue minerals were quartz, calcic amphiboles, ferromagnesium amphibole and ankerite;
- The RC1 and RN1 samples presented the highest content of manganese minerals with up to 4.2 wt% of rhodonite ($(Mn,Fe,Mg,Ca)SiO_3$) in the former (accounted for in the category "other silicates") and pyrolusite (MnO_2) (1.4 wt%) in the latter. Mn Oxides content in the RN samples is significantly lower than for the previous studies, which presented not reasonable representative levels.
- The proportion of economic iron, i.e., Fe oxides, in each sample is as low as 78.2% of the total iron in the RN3 sample up to 93.0% of the total iron in RC1 sample, with an average proportion in the sample at 85.5%. The proportions are:
  - Significantly lower than what was observed in previous phases where RC1, RC2, RN1 and RN2 presented all above 94% of Fe oxides;
  - Closer to the proportion of economic iron in the current LOM (89.8%).

Fe-oxide liberation curves are shown in Figure 13-5. As for previous studies, the Rose North units are generally less liberated than the Rose Central units.

The evaluation of the liberation of iron oxides by size fractions showed the liberation degree drop below 80% for the +212 µm fraction. Moreover, the observations made on the -425 +300 µm fractions highlighted the high proportion of fine iron oxide inclusions within quartz particles, therefore resulting in a population of iron oxides and quartz with a poor liberation. Selection to go to a finer grind (100% -600 µm, refer to Section 13.3.3.1) than the previous studies (100% -1,000 µm) is supported by this observation and previous mineralogical characterization.

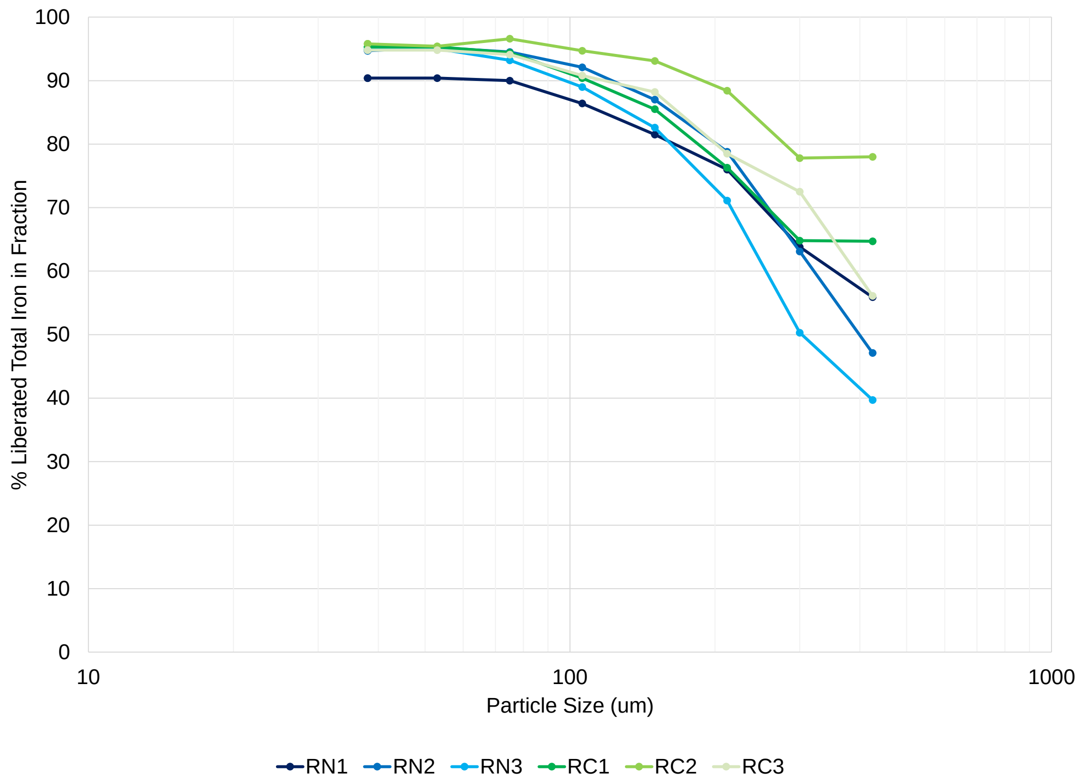


Figure 13-5: Fe-Oxide Liberation Curves for all Phase 1 Rose Deposit Samples

13.3.3 Beneficiation Testwork

13.3.3.1 Sample Preparation

Special attention was dedicated to the sample preparation for the beneficiation testwork. Previous testwork showed a high level of fine particles in the spiral feed with low recovery of those fine particles by the rougher spirals. The presence of a high level of fine particles in the feed was attributed to the use of samples that had been prepared for analytical work (-2 mm core rejects) and that already contained a significant amount of fines (Davies and Imeson, 2013) (Davies and Imeson, 2014).

The 2023 testwork was performed on ¼ core samples. A stage grinding procedure was developed to generate a particle size distribution approaching a reference curve of the MacPherson Test (Davies and Imeson, 2012a). This curve was provided as a reference for an iron ore with a similar hardness than Kami. This curve was targeted as the P_{80} was coherent with the value obtained with the IGS simulations (Bulled, 2014).

Figure 13-6 displays the particle size distribution of the ground ¼ core samples obtained with the developed grinding procedure and Table 13-6 summarizes the results. It can be observed that:

- The generated curves have generally more +300 µm particles than the target;
- The generated curves have generally more -75 µm particles than the target;
- The P_{80} varied from 315 µm to 375 µm.

The generated particles size distributions are:

- Finer than the target;
- Coarser than the curve obtained with the MacPherson test (Davies and Imeson, 2012a);
- Coarser than the IGS simulations predictions;
- Similar to what was tested in 2012 for the Feasibility Study.

Considering this, the size distributions obtained were considered satisfactory to represent the generated particle distribution with an AG mill.

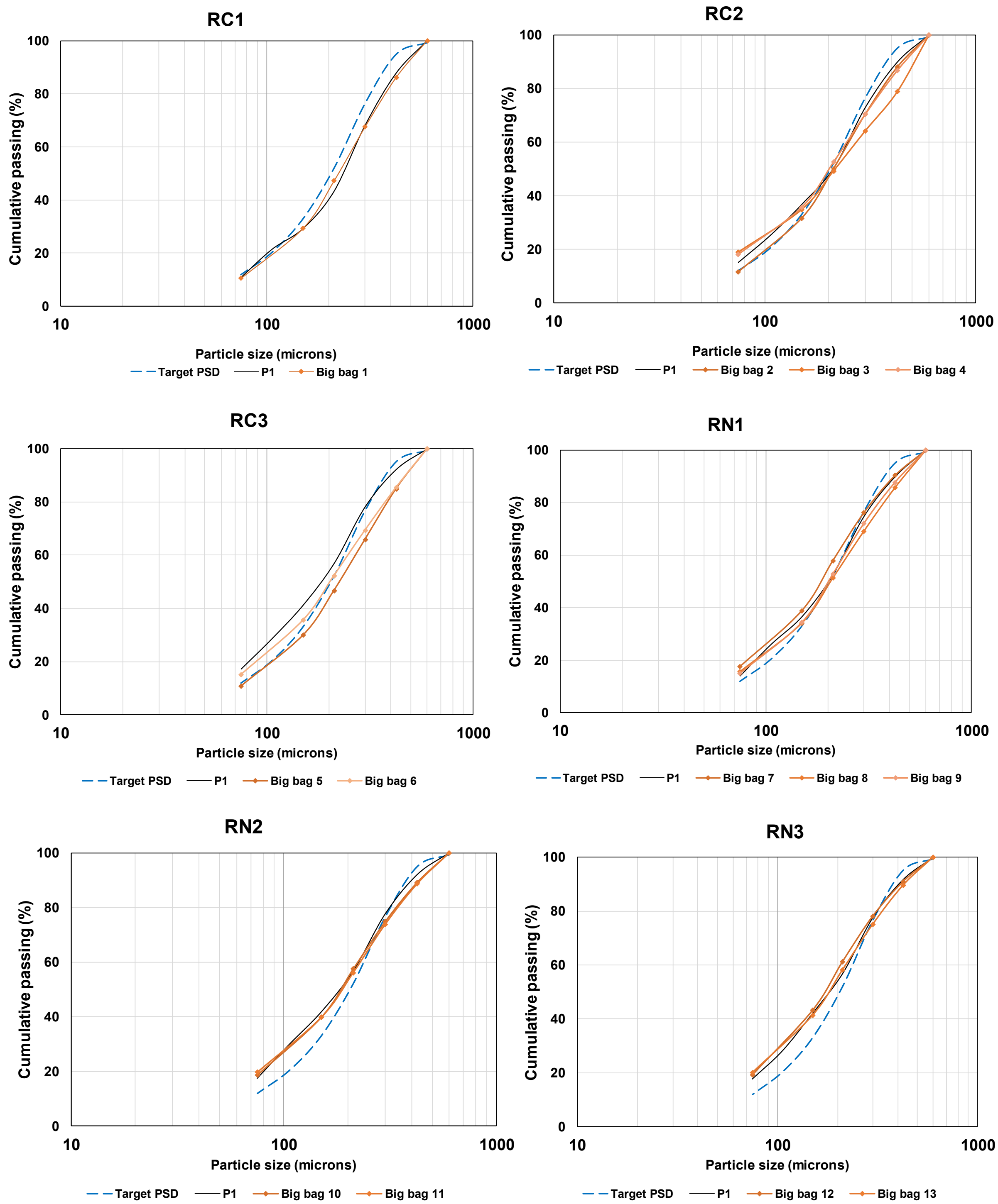


Figure 13-6: Particle Size Distribution of Core Sample Ground Products

Table 13-6: Passing Fraction at 300 and 75 µm of the Core Sample Ground Products

	Phase 1			Phase 2		
Sample	Passing 300 µm (%)	Passing 75 µm (%)	P_{80} (µm)	Passing 300 µm (%)	Passing 75 µm (%)	P_{80} (µm)
Target	76.6	11.9	323	76.6	11.9	323
RC1	68.1	10.9	375	67.6	10.5	383
RC2	73.1	15.2	351	70.5	11.5	368
RC3	78.3	17.3	315	66.0	10.9	392
RN1	74.8	14.1	343	76.1	17.5	334
RN2	77.7	17.4	320	74.9	18.7	345
RN3	77.7	17.7	320	78.2	19.4	318

Table 13-7 and Table 13-8 present the Phase 1 and Phase 2 head assays while Table 13-9 presents the reference Pre-feasibility Study values. The proportion of total iron under the magnetite form is presented as "Fe Mag".

Table 13-7: Phase 1 Sample Head Assays

Sample	Fe_T (%)	Mag. (%)	SiO_2 (%)	MgO (%)	CaO (%)	MnO (%)	C_T (%)	S (%)	Fe Mag. (%)
RC1	31.7	11	40.6	2.17	2.45	4.50	0.97	0.05	25.1
RC2	27.1	24	49.3	2.14	3.10	1.57	1.33	0.03	64.2
RC3	29.4	33	44.1	2.44	3.79	1.22	1.72	0.07	81.3
RN1	33.1	7	49.6	0.10	0.06	0.96	0.07	0.01	15.3
RN2	29.8	26	47.9	2.09	1.81	0.95	1.30	0.03	63.2
RN3	24.0	19	51.9	2.64	3.40	0.58	1.77	0.04	57.4
Average	29.2	20.0	47.2	1.9	2.4	1.6	1.2	0.04	51.1
Weighted	28.8	20.6	48.2	1.9	2.4	1.4	1.2	0.03	53.1

Table 13-8: Phase 2 Sample Head Assays

Sample	Fe_T (%)	Mag. (%)	SiO_2 (%)	MgO (%)	CaO (%)	MnO (%)	C_T (%)	S (%)	Fe Mag. (%)
Year 01-05	32.6	22	44.5	1.30	1.72	1.42	0.94	0.03	48.4
High RC	33.3	28	39.6	1.98	3.10	2.22	1.42	0.05	60.0
High RN	31.7	19	48.2	0.94	0.95	0.98	0.68	0.01	44.3

Table 13-9: Pre-feasibility Study Rose Deposit Values

Item	Fe_T (%)	Mag. (%)	SiO_2 (%)	MgO (%)	CaO (%)	MnO (%)	C_T (%)	S (%)	Fe Mag. (%)
RC1	31.2	8.3	41.4	2.4	2.7	4.5	-	-	19.2
RC2	29.3	25.6	45.5	2.1	3.4	2.0	-	-	63.4
RC3	28.2	28.6	47.0	2.6	3.8	0.9	-	-	73.5
RN1	33.2	6.5	49.2	0.2	0.1	1.6	-	-	14.2
RN2	29.7	26.2	50.5	1.7	1.3	0.9	-	-	64.1
RN3	26.4	22.5	52.4	2.0	2.2	0.6	-	-	61.7
LOM	29.2	20.2	48.0	1.8	2.3	1.5	-	-	50.1
Year 01-05	29.1	19.6	48.1	1.6	2.1	1.6	-	-	48.8

It can be observed for PFS samples:

- Phase 1 individual types of mineralization show major element grades similar to those of the LOM;
- Phase 1 samples, when mixed, show similar grades to those of the LOM and Year 01-05;
- Phase 2, Year 01-05, sample contains more Fe and less contaminants than the mine plan. Results must be normalized for Fe head grade.

13.3.3.2 Pre-concentration

A study was performed to evaluate the potential for pre-concentration on the Phase 1 samples to reduce the quartz content. To do so, the -3,350 µm, +1,700 µm and -1,700 µm, +1,180 µm fractions were studied using a stereomicroscope to assess the liberation of iron oxides as well as quartz. Based on the observations made with the stereomicroscope, none of the Phase 1 samples were suitable for a pre-concentration stage. Indeed, quartz and iron oxides were almost systematically associated with each other, with only very low proportions of liberated particles.

13.3.3.3 Rougher Spirals Testwork

To increase the design level of confidence of the 2012 Feasibility Study proposed gravity circuit, Mineral Technologies ("MT") was requested to carry out a spiral testing program to evaluate industrial scale spiral model performance as well as the performance of the specific circuit configuration over a range of Kami ore types (Mineral Technologies, 2013).

As part of this Detailed Engineering Confirmatory Beneficiation testwork, the WW6 and HC33 spirals were tested by Mineral Technologies. The results showed a slightly better performance for the WW6 albeit at a lower feed rate. However, the difference was not deemed sufficient to warrant choosing the WW6 over the HC33 in the rougher stage.

For the PFS testwork, it was decided to test the WW6 spiral at the rougher based on the following:

- MT testwork showed a slightly better Fe recovery performance for the WW6 spiral at the rougher stage;
- The testwork showed a better SiO_2 rejection performance for the WW6 spiral;
- The HC33 shows its best Fe recovery performances at 3.5 t/h/start, which represents a sizing that will not bring significant floor space savings over the WW6 tested at 2.5 t/h/start, if any.

13.3.3.3.1 Phase 1: Close Loop Optimization Testwork

The six core sample ground products (Section13.3.1.1) were used for the rougher spiral testwork, which was divided in two steps: closed loop circuit testwork and a production run.

Phase 1 testwork first step was to perform optimization tests in a closed loop circuit at 2 t/h/start, thereby allowing to minimize the amount of required feed material. The six core sample ground products were each tested at three different wash water levels. Splitters and cutters were adjusted manually on the spiral.

Figure 13-7 shows a schematic of the spiral circuit used for the closed loop rougher spiral testwork.

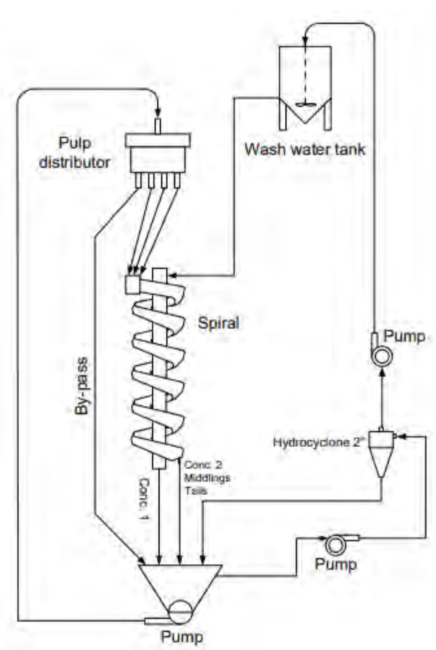


Figure 13-7: Phase 1 Closed Loop Rougher Spiral Testwork Setup

Four products were generated and analyzed during the optimization testwork:

- Concentrate 1: Material recovered from the cutter every turn of the spiral;
- Concentrate 2: Material recovered before the innermost splitter at the bottom of the spiral;
- Middlings: Material recovered between the innermost and the middle splitter at the bottom of the spiral;
- Tails: Material recovered after the outermost splitter at the bottom of the spiral.

Data reconciliation was done using Bilmat™.

The reconciled closed loop rougher spiral testwork results are presented in Table 13-10. The main observations are:

- Rougher spiral performance differs widely from one mineralization type to the other:
  - RC1 and RN1 units perform better. Those units also have the highest Fe head grades and hematite content;
  - RC2 and RN3 samples have the lower performance. Those units also have the lowest Fe head grades and low hematite content;
  - Rose Central sample performs slightly better than Rose North samples, which is coherent with the lower liberation observed on those units.
- Measured head grade in close loop is very variable and not equal to the head sample. Segregation of the feed in close loop has been observed in other testwork. As a result, performance can be used for comparison purposes, but absolute value should be validated with open circuit tests, or normalized in regard to Fe grades;
- A rougher concentrate around 50% Fe grade can be achieved with Fe recovery between 73.5% (RN3) and 94% (RC2).

The close loop testwork results were used to define the production operating points.

Table 13-10: Phase 1 Reconciled Closed Loop Rougher Spiral Testwork Results

Sample	Test #	WW Rate (t/h)	Feed Grade		Concentrates 1 + 2				
					Weight (%)	Fe_T		Magnetite	
			Fe_T (%)	Mag. (%)		Grade (%)	Rec. (%)	Grade (%)	Rec. (%)
RC1	1	1.5	31.3	11.5	59.4	47.9	91.1	16.7	86.3
	2	2.0	37.4	13.5	68.5	51.4	94.3	18.1	91.7
	3	1.0	35.9	13.5	82.6	42.0	96.7	15.5	94.7
RC2	4	1.5	29.7	24.2	51.0	48.5	83.3	41.1	86.7
	5	1.0	34.0	26.1	80.3	40.0	94.6	30.9	95.1
	6	2.0	30.5	24.4	48.8	51.0	81.6	42.4	84.6
RC3	7	1.5	32.4	38.2	53.4	51.8	85.4	64.4	90.1
	8	1.0	30.9	35.8	59.6	45.3	87.3	54.5	90.7
	9	2.0	28.7	33.3	41.8	54.3	79.2	68.2	85.6
RN1	10	1.5	33.4	7.8	55.6	50.5	84.2	11.7	83.2
	11	1.0	36.3	9.3	71.3	47.6	93.4	12.2	93.5
	12	2.0	36.9	10.0	58.5	53.4	84.6	14.2	83.4
RN2	13	1.5	32.3	28.3	52.7	52.1	85.0	48.1	89.4
	14	1.0	33.4	28.5	60.5	49.1	89.0	43.2	91.9
	15	2.0	31.5	28.0	47.1	54.7	81.8	51.9	87.3
RN3	16	1.5	28.5	25.4	44.0	49.5	76.5	49.2	85.1
	17	1.0	29.2	26.0	71.9	36.6	90.3	33.7	93.2
	18	2.0	29.0	25.7	42.3	50.6	74.0	50.6	83.2

13.3.3.3.1 Phase 1: Production

Phase 1 testwork second step was to perform a spiral production run with the remaining weight of the core sample ground products mixed and homogenized to create a composite sample to generate as much material as possible for the next testwork steps.

The composition of the generated composite is presented in Table 13-11. It can be observed that the RC1 ore type is overrepresented and the RC2 underrepresented when compared to the PFS Mine Plan. It may result in better gravity circuit performance and lower magnetic circuit performance than the average Mine Plan blend.

Table 13-11: Phase 1 Production Sample

Ore Type	Phase 1 Composite		Min Plan
	Weight (kg)	Proportion (%)	LOM (%)
RC1	252.7	16.7	7.6
RC2	262.9	17.3	28.3
RC3	243.7	16.1	13.6
RN1	249.7	16.5	18.8
RN2	246.2	16.2	15.7
RN3	261.9	17.3	16.0
Total	1,517.1	100.0	100.0

The production run was performed in an open loop circuit at 2 t/h with a percentage of solids adjusted at 40% and a wash water flow rate set at 1.5 t/h, selected from the best test conditions achieved during closed-loop testing.

Figure 13-8 shows a schematic of the spiral circuit used for the rougher spiral production testwork.

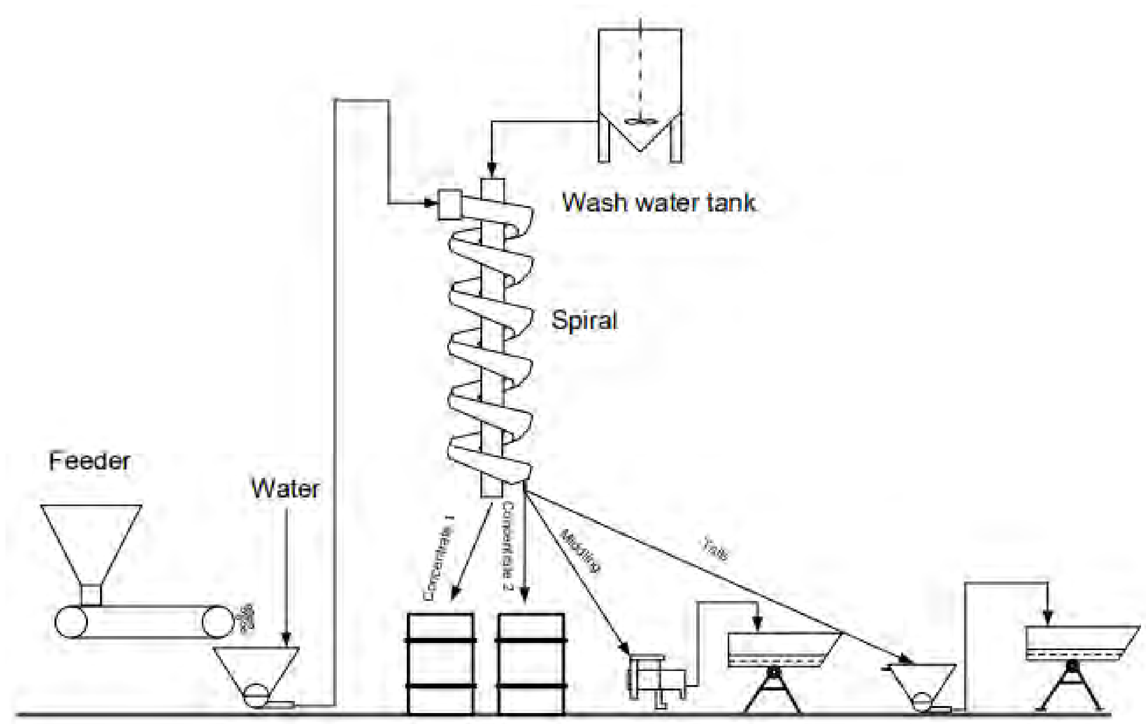


Figure 13-8: Phase 1 Rougher Spiral Production Testwork Setup

The four products described in the close loop testwork were generated and analyzed during the production run, i.e., Concentrate 1, Concentrate 2, Middlings and Tails. As for the closed-loop tests, data reconciliation was done using Bilmat™.

The reconciled rougher spiral production run testwork results are presented Table 13-12 and complete Phase 1 testwork results are presented on Figure 13-9. The main observations are:

- Rougher spiral production performance is within the close loop test performed on the individual mineralization type;
- Based on Figure 13-9, the Phase 1 composite grading 30.8% Fe led to the production of a 50% Fe grade rougher concentrate with recovery of 84.5%, which was coherent with the results obtained on the individual mineralization types.

Table 13-12: Phase 1 Reconciled Rougher Spiral Production Run Testwork Results

Products	Weight Yield (%)	Fe_T		Mag.		Main Impurities			
		Grade (%)	Rec. (%)	Grade (%)	Rec. (%)	SiO_2 (%)	MgO (%)	CaO (%)	MnO (%)
Concentrate 1	39.5	57.1	73.3	44	78.6	12.7	1.1	1.2	1.5
Concentrate 2	5.3	41.7	7.2	29	7.1	27.2	2.4	2.8	2.8
Middlings	10.6	17.1	5.9	9	4.3	58.2	3.0	3.9	2.5
Tailings	44.6	9.4	13.7	5	10.0	73.7	2.2	3.0	1.3
Spiral feed	100.0	30.8	100.0	22	100.0	45.5	1.9	2.4	1.6
Conc. 1 + 2	44.8	55.2	80.4	42	85.7	14.4	1.3	1.4	1.7
Middlings + Tails	55.2	10.9	19.6	6	14.3	22.8	1.6	1.9	1.8

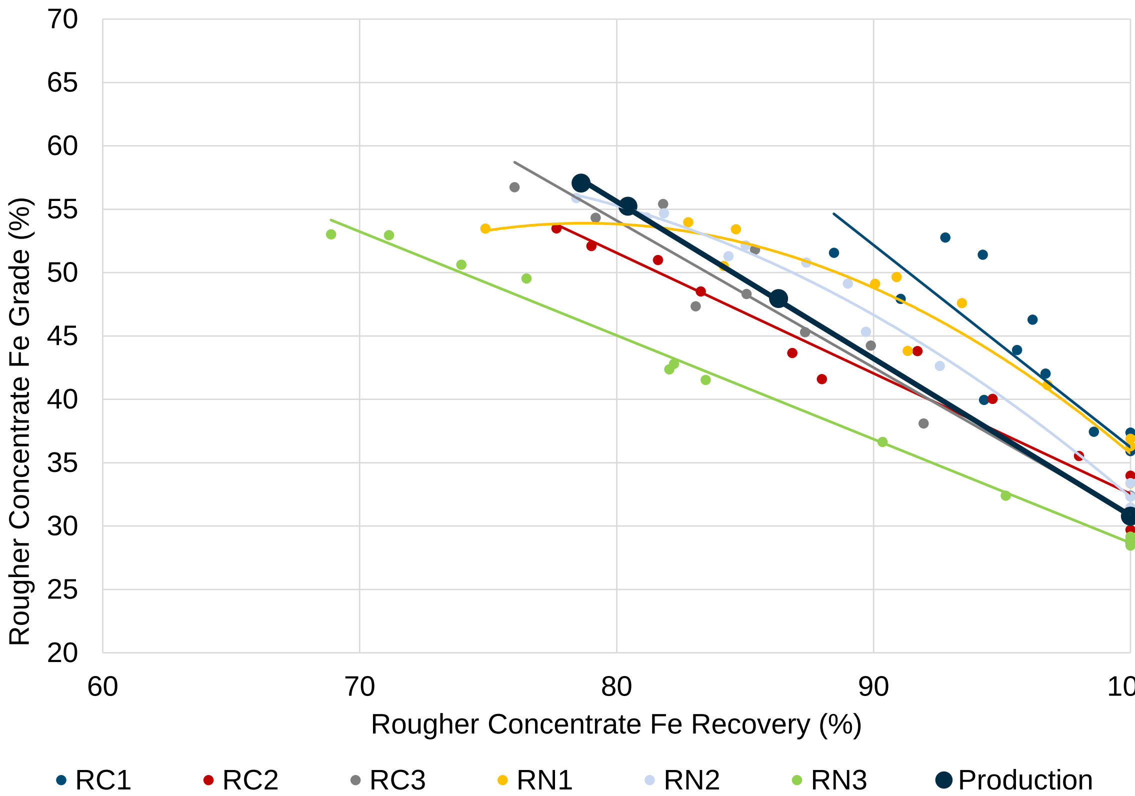


Figure 13-9: Phase 1 Reconciled Rougher Spiral Testwork Results

13.3.3.3.2 Phase 2: Production

Phase 2 testwork was to repeat the spiral production run performed in the second step of the Phase 1 testwork, using the same operating conditions, to produce material for downstream concentration stages.

The three Phase 2 composite samples (Section 13.3.1.2) were run through the open loop circuit shown in Figure 13-10.

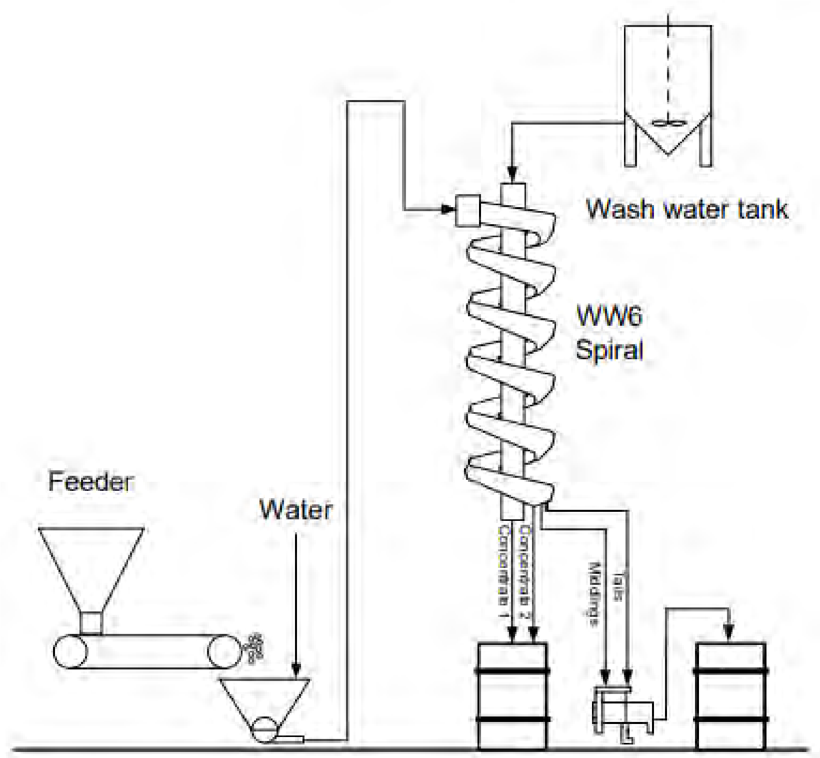


Figure 13-10: Setup for the Phase 2 Rougher Spiral Production Testwork

Two products were generated and analyzed during the production run:

- Concentrate: Material recovered from the cutter every turn of the spiral and before the innermost splitter at the bottom of the spiral;
- Tails: All material recovered after the innermost at the bottom of the spiral.

Compared to Phase 1 products, concentrates 1 and 2 were directly mixed and similarly for the middlings and tails, to obtain a total concentrate and a total tails sample.

Reconciliation was done using Bilmat™. The reconciled rougher spiral production run testwork results are presented in Table 13-13 and complete Phase 2 testwork are presented on Figure 13-11. The main observations are:

- Phase 2 samples performed slightly less than Phase 1 production, but the results are coherent;
- High RN sample is the one providing the lower performance, as expected based on its composition (refer to Table 13-8) and Phase 1 results;
- Year 01-05 sample had higher iron and magnetite grades;
- High RC sample had the highest weight yield, the lowest iron grade and the most impurities;
- Phase 2 samples had similar results to those of Phase 1 individual lithologies.

Table 13-13: Phase 2 Reconciled Rougher Spiral Concentrate Production Run Testwork Results

Composite Sample	Weight (%)	Fe_T		Mag.		Main Impurity Grades			
		Grade (%)	Rec (%)	Grade (%)	Rec (%)	SiO_2 (%)	MgO (%)	CaO (%)	MnO (%)
Year 01-05	50.9	53.1	82.0	36.4	85.0	17.9	0.9	1.1	1.5
High RC	58.0	49.1	85.9	37.5	86.1	20.7	1.5	2.1	2.2
High RN	51.6	50.5	82.4	31.0	83.9	22.7	0.8	0.8	1.2
Production Phase 1	44.8	55.2	80.4	42.0	85.7	14.4	1.3	1.4	1.7

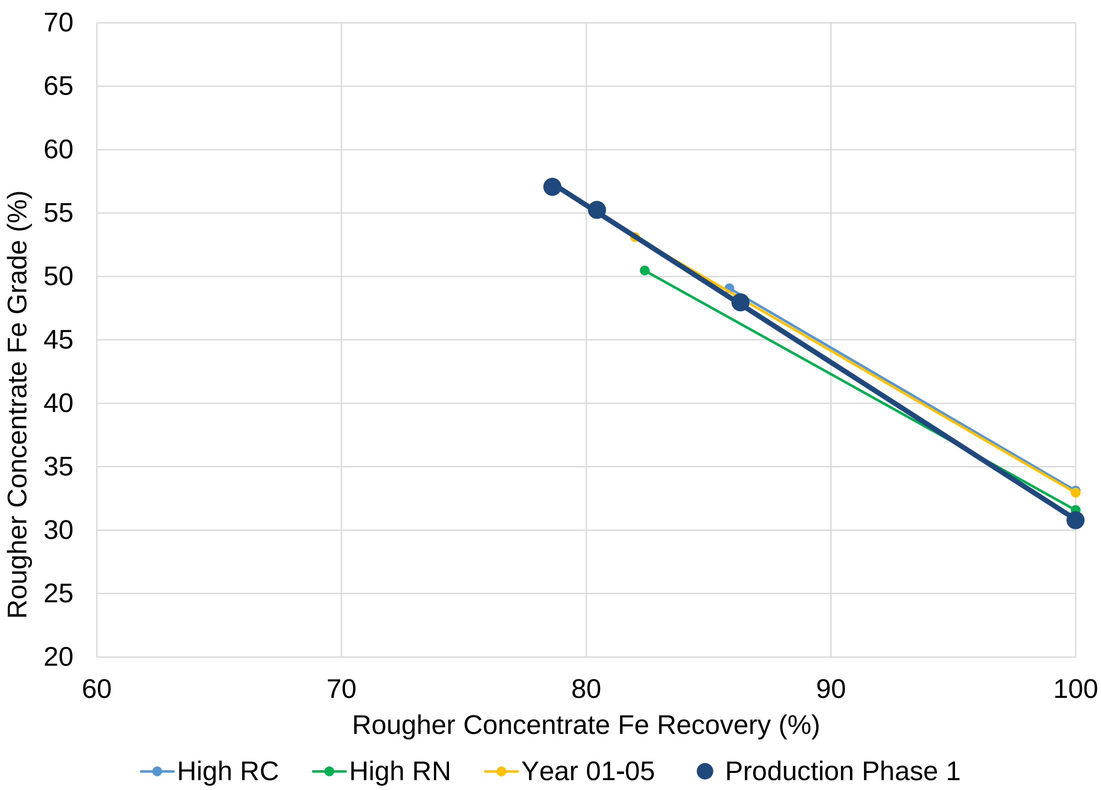


Figure 13-11: Phase 2 Reconciled Rougher Concentrate Spiral Testwork Results

13.3.3.3.3 Conclusion

The following conclusions are made:

- The spiral testwork in close loop showed a wide range of performance and product quality depending on the mineralization units, as observed in previous studies;
- The close loop testwork results overperformed the open circuit testwork, but the results are in the same neighbourhood;
- Fe recovery tends to increase with Fe feed grade. Although it was not observed in previous studies, this behaviour is commonly observed in iron ore processing;
- The results obtained are in line with the one obtained on spirals testwork performed in previous study;
- The rougher spirals testwork consistently generated a concentrate above 49% Fe with a Fe recovery above 80%, which is satisfactory considering the economical Fe level of the samples.

Figure 13-12 presents a summary of the performances of the rougher spiral testwork.

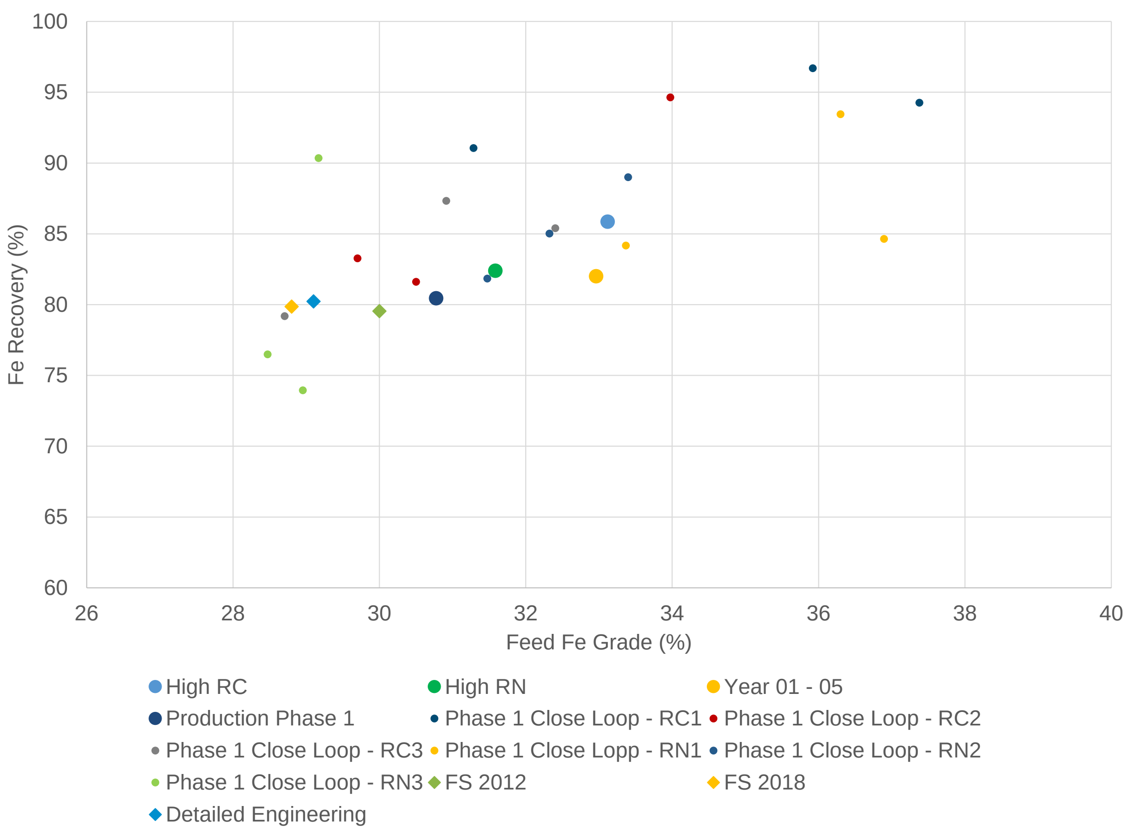


Figure 13-12: PFS Rougher Spiral Testwork Results Summary

13.3.3.4 Reflux® Classifier Testwork

The Reflux® Classifier is a relatively new equipment initially developed for coal and heavy minerals industries. In recent years, some research institutions like Corem have investigated its applicability to iron ore and Kami Project neighbour operations have tested the technology and included it in their processing flowsheet, such as the Bloom Lake Phase 2 Concentrator.

The Reflux® Classifier is an innovative device, a hybrid between a fluidized bed separator (vertical part) and a lamella settler (inclined part). The separation within the vertical part is mainly governed by the hindered settling mechanisms and thus by the terminal velocities of the particles (which are closely related to their size). The relative inefficiency of this part for fine heavier particles and coarse lighter particles that have the same terminal velocity is compensated for by the inclined part, formed by closed spaced inclined channels.

Due to these features, the Reflux® Classifier technology is known to better recover fine iron particles than more conventional gravity concentration equipment such as spirals. For these reasons, testing the Reflux® Classifier was included in the PFS testwork plan. It was decided to test the Reflux® Classifier at the cleaner stage first and decide afterwards on the requirement of testing a hindered settler based on results.

The Reflux® Classifier presented the potential to generate a cleaner concentrate at a grade that could be processed by flotation in one stage due to high recovery of fine iron. The envisioned flowsheet with a hindered settler would include the scavenging of the overflow for fine iron recovery.

A laboratory scale Reflux® Classifier ("RC100") was used for the testwork. It had a cross section area of 0.1 m x 0.1 m, vertical section height of 1 m, and channel length of 1 m inclined at 70° to the horizontal, with nominal channel spacing of 6 mm. The laboratory unit was expected to be less efficient than full-production units due to its small cross sectional area, which meant significant wall effect, i.e. a particle resting near the wall experiences a lower local fluid velocity, allowing it to slide down the incline more easily and join the fluidized bed below. Therefore, the laboratory results would represent a conservative performance data.

13.3.3.4.1 Phase 1

Following the Phase 1 spiral production run, a final spiral concentrate was formed by blending and homogenizing the initial spiral concentrates 1 and 2 (Table 13-12).

The Reflux® Classifier was set up in an open circuit, as shown in Figure 13-13.

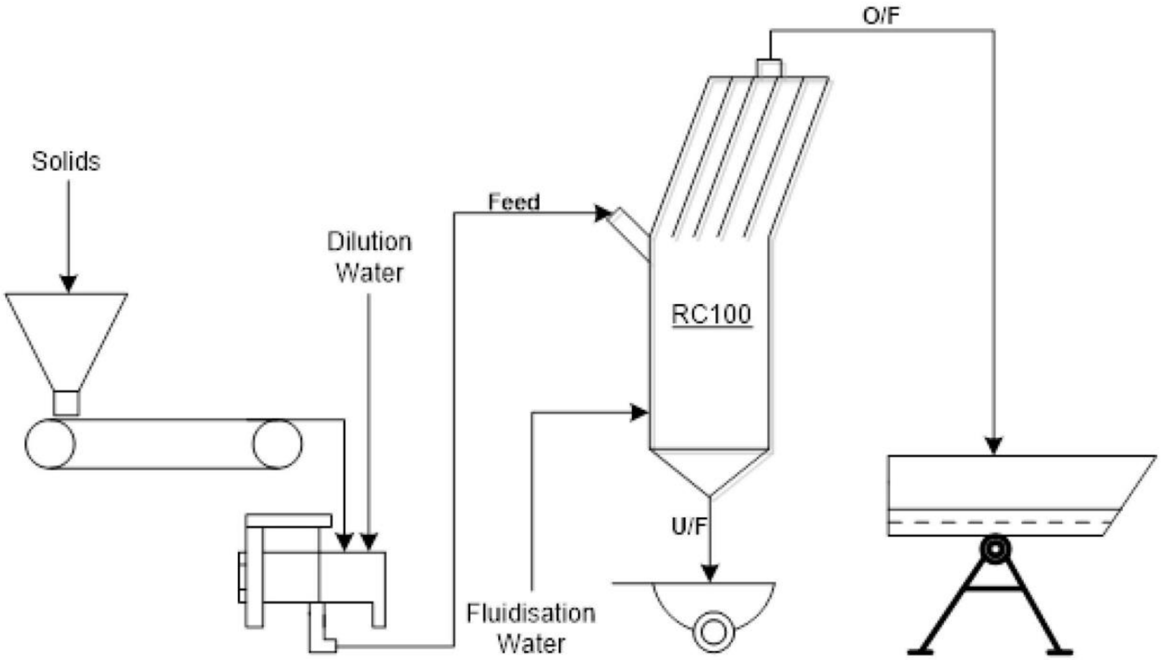


Figure 13-13: Setup for the Phase 1 Reflux® Classifier Testwork

A total of six tests were performed with Phase 1 spiral concentrate. The first three tests were performed at very low loading to evaluate if the technology could be of any interest. Higher loadings were performed for the last three tests but were limited by the samples availability.

The first five tests were performed in automatic mode, the underflow valve was regulated by a proportional–integral–derivative ("PID") controller, thus allowing to control the actual relative density to the defined set point. For unknown and unresolved reasons, the controller was not able to maintain a fixed relative density; oscillations of the density and on the underflow valve opening were observed all along the tests. In order to minimize the effect of the oscillation, Corem did not sample the first three cycles to allow steady-state and sampled consistently the following three cycles.

After discussion with COREM, for the last test, test 6, it was decided to perform manual operation of the Reflux® Classifier by conducting manual control of the underflow valve opening. Operation was smoother, there were no cycles during the operation of the equipment. The relative density values in manual and automatic cannot be compared as the value in automatic was a visual average of the density during the cycle.

At this stage, it should be noted that the operation of the RC100 in manual was an improvement, however:

- The relative density reading was not precise and did not allow a good control over it;
- Solving the automatic operation issue would allow a better operation and potentially better results.

The operational conditions of each test are presented in Table 13-14.

Table 13-14: Phase 1 Reflux® Classifier Testwork Operational Conditions

Test ID	Operating Conditions			Teetered Bed Conditions		
	Operation	Solids Surfacic Throughput	Solids Dry Feed Rate	Solids Percentage	Relative Density	Fluidization Water
	(Auto/Manual)	(t/m^2*h)	(kg/h)	(%)	(kg/m^3)	(m^3/h)
1	Auto	9	90	40	1,700	0.240
2	Auto	9	90	40	1,900	0.240
3	Auto	9	90	40	2,100	0.240
4	Auto	32	320	40	1,900	0.225
5	Auto	21	210	40	1,900	0.225
6	Manual	20	200	40	1,950	0.225

Data reconciliation was done using Bilmat™.

The reconciled Reflux® Classifier testwork results are presented in Table 13-15. The main observations are:

- The first three tests proved that a concentrate grade around 5% SiO_2 grade with a Fe recovery above 85% could be achieved with the RC100 and provided guidelines to define the operating teeter water flowrate and pressure required to reach it. Test 2 showed the better results, allowing the production of a 2.5% SiO_2 grade concentrate with a Fe recovery of 94.1%;
- Tests 4 and 5 confirmed the previous performances could be achieved at a loading that would result in a reasonable amount of full-size units;
- Test 6 showed a significantly better operation in manual compared tests 4 and 5 as steady state was reached. However, operating parameters needed to be optimized to maximize iron recovery.

Table 13-15: Phase 1 Reconciled Reflux® Classifier Testwork Concentrate Results

Test	Weight (%)	Fe_T		Magnetite		SiO_2		MgO		CaO		MnO	
		Gr. (%)	Rec. (%)	Gr. (%)	Rec. (%)	Gr. (%)	Rec. (%)	Gr. (%)	Rec. (%)	Gr. (%)	Rec. (%)	Gr. (%)	Rec. (%)
1	82.1	62.3	93.1	48.7	94.3	6.2	35.6	0.8	54.8	0.79	46.1	1.5	74.4
2	78.6	67.4	94.1	49.4	95.3	2.5	13.5	0.4	29.9	0.27	17.1	1.1	62.6
3	54.5	67.8	67.1	49.8	63.6	2.0	7.6	0.3	12.0	0.16	6.2	0.8	26.4
4	81.6	63.9	91.7	47.8	92.2	5.4	33.7	0.7	49.5	0.61	40.0	1.3	69.3
5	81.0	63.9	92.5	50.4	93.7	5.3	31.1	0.7	47.0	0.61	37.0	1.4	68.3
6	68.7	67.6	84.3	54.0	84.8	2.7	12.9	0.4	22.3	0.27	13.3	1.0	45.2

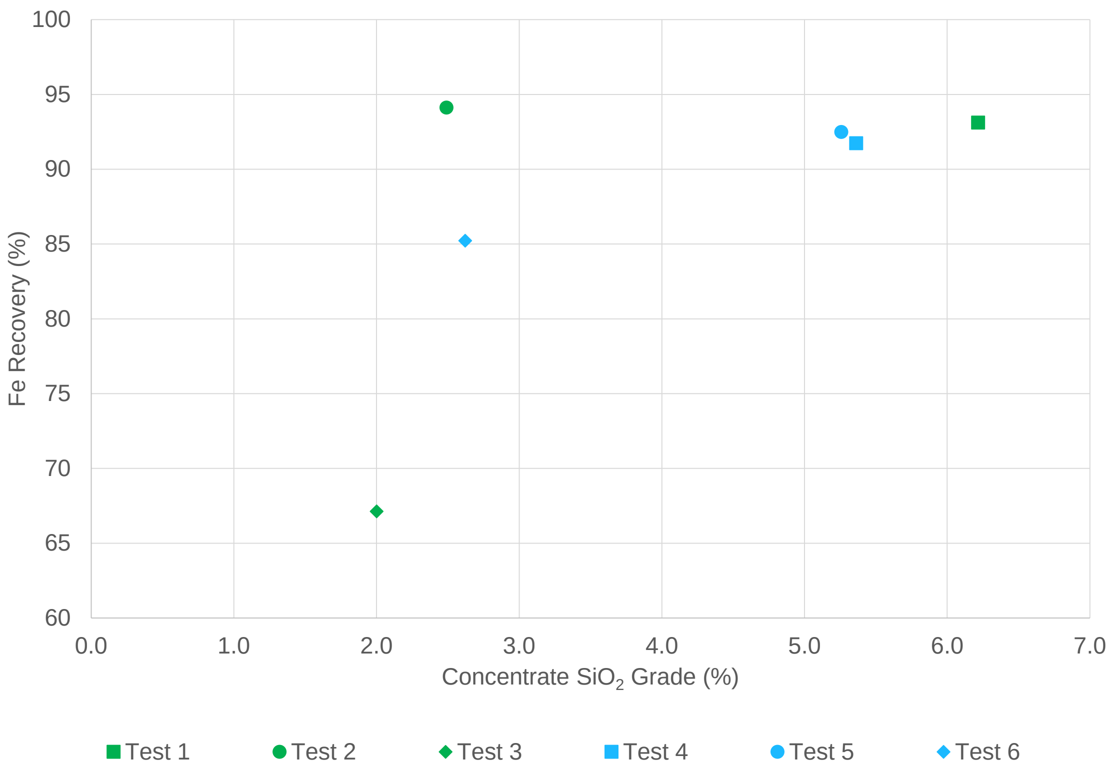


Figure 13-14: Phase 1 Reflux® Classifier Testwork Results

These preliminary Phase 1 Reflux® Classifier tests demonstrated equal to better results than the combined cleaner and recleaner WW6 spirals performances tested by Mineral Technologies. Based on these positive results, the sample availability and the Project calendar, it was decided not to proceed with the hindered settler testwork as a cleaner stage.

13.3.3.4.2 Phase 2

Phase 2 Reflux® Classifier testwork was supposed to consist in the production of material for the next stage (flotation). However, with the limited amount of sample left, the little experience in the manual operation of the Reflux® Classifier and the potential of improvements of the Phase 1 tests, it was decided to use the Phase 2 production to test new conditions and optimize the results. The operating conditions of the Phase 2 tests were defined based on:

- Reflux® fluidized bed ascending velocity;
- Reflux® lamella section ascending velocity.

Those two parameters were optimized using the feed solid density and fluidization water while maintaining the bed fluidized at the desired relative density range.

The operational conditions of each test are presented in Table 13-16. Sampling campaigns A and B were performed when the circuit reached stability. The RC100 overflow and underflow were recovered during the overall production and analyzed.

Table 13-16: Phase 2 Reflux® Classifier Testwork Operational Conditions

Sample	Condition	Operating Conditions		Teetered Bed Conditions					
		Solids Surfacic Throughput (t/m².h)	Solids Dry Feed Rate (kg/h)	Solids percentage (%)	Relative Density (kg/m³)	Fluidization Water (m³/h)	Nozzle Diameter (mm)	Lamella Velocity (m/h)	Fluidized Bed Velocity (m/h)
Year 01-05	A	32	320	50	1,800	0.300	1.25	54.9	15.2
	B	32	320	50	1,700	0.300	1.25	54.9	15.2
High RC	A	32	320	45	1,800	0.240	0.75	56.0	9.2
	B	32	320	50	1,800	0.240	0.75	49.4	9.6
High RN	A	32	320	50	1,800	0.300	1.25	56.5	16.5
	B	32	320	55	1,700	0.360	1.25	56.6	22.5

Data reconciliation was done using Bilmat™.

The reconciled Reflux® Classifier testwork results are presented in Table 13-17 and Figure 13-15. The main observations are:

- High Reflux® Classifier (first production performed):
  - Both tests showed good performances;
  - An increase in the feed density (B) allowed a reduction in the lamella ascending velocity, while maintaining low fluidized bed ascending velocity.

- Year 01-05 (second production performed):
  - The increase in the fluidized bed ascending speed through teeter water adjustment was too aggressive and lead to high Fe rejection for test A;
  - The reduction in the bed density (RD) (B) allowed an improvement in the performance.
- High RN (third production performed):
  - Test A used the same conditions as test Year 01-05A and also showed high Fe rejection;
  - However, unlike test Year 01-05B, the reduction in bed density (RD) in test B was counterbalanced by the increase in teeter water, which increased the fluidized bed ascending velocity and did not result in a significant increase in Fe recovery.

Table 13-17: Phase 2 Reconciled Reflux® Classifier Testwork Concentrate Results

Composite Sample	Condition	Weight Yield (%)	Fe_T		Magnetite		Main Impurities			
			Grade (%)	Rec. (%)	Grade (%)	Rec. (%)	SiO_2 (%)	MgO (%)	CaO (%)	MnO (%)
Year 01-05	A	62.4	64.7	75.9	40	72.9	4.8	0.4	0.4	1.1
	B	73.7	66.1	91.8	44	92.7	3.5	0.3	0.3	1.1
High RC	A	72.7	63.3	90.5	52	90.6	5.8	0.7	0.9	1.6
	B	71.5	65.4	91.5	52	91.7	4	0.5	0.6	1.4
High RN	A	66.4	65.7	85.2	41	85.8	4.1	0.3	0.2	1.0
	B	68.8	65.0	87.2	40	87	4.7	0.4	0.3	1.0

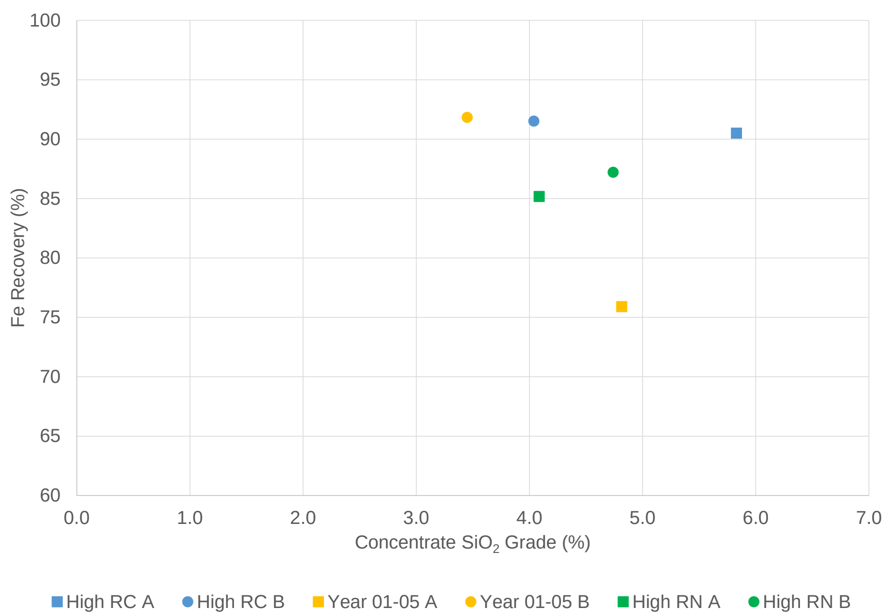


Figure 13-15: Phase 2 Reflux® Classifier Testwork Results

For each production run, size-by-size analyses were performed on the total recovered underflow and overflow products. Results are presented in Table 13-18, while Figure 13-16 presents the size-by-size Fe and SiO_2 recoveries of the global productions. The following observations are made:

- Fe particles coarser than 106 µm is highly recovered;
- Fe recovery drops below 106 µm, but significant amount of each class is recovered;
- SiO_2 is well removed for particle finer than 212 µm,
- SiO_2 coarser than 212 µm is partially recovered.

Table 13-18: Phase 2 Reflux® Classifier Testwork Concentrate Production Results

Composite Sample	Weight Yield (%)	Fe_T		Magnetite		Main impurities			
		Grade (%)	Rec. (%)	Grade (%)	Rec. (%)	SiO2 (%)	MgO (%)	CaO (%)	MnO (%)
Year 01-05	73.2	63.6	87.1	42	87.3	5.9	0.5	0.5	1.2
High RC	73.4	61.4	92.4	47	93	7.6	0.9	1.0	1.7
High RN	64.6	65.2	83.8	41	85.3	4.5	0.4	0.2	0.9

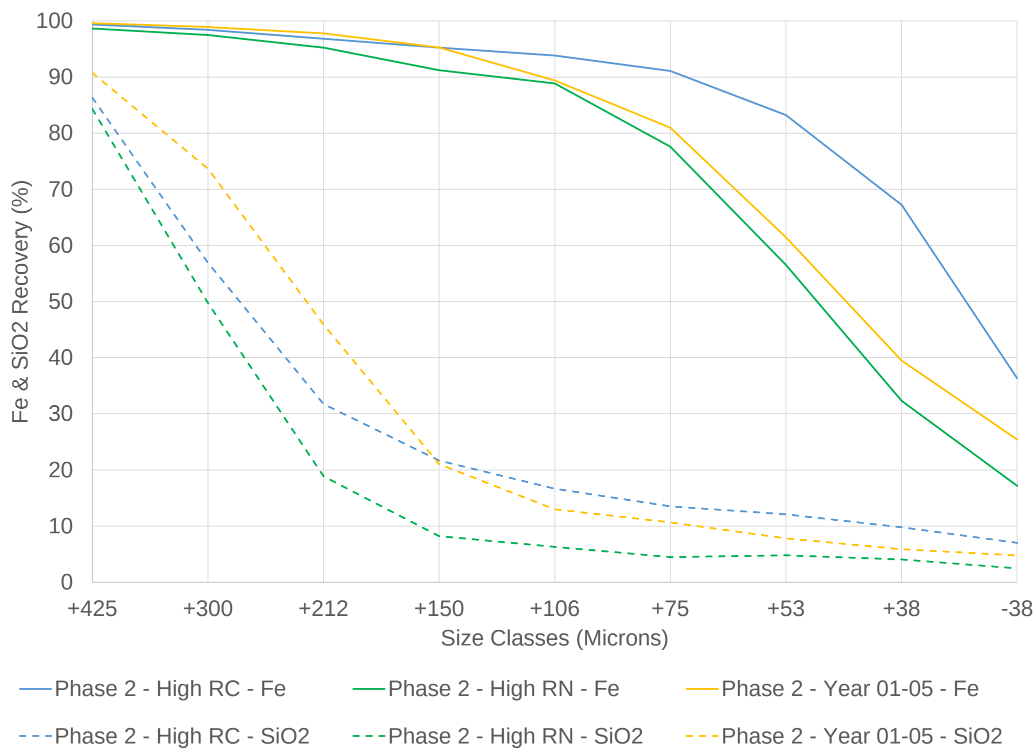


Figure 13-16: Phase 2 Reflux® Classifier Testwork Size-by-Size Results

13.3.3.4.3 Other Testwork

Exploratory testwork was conducted with the Reflux® Classifier on Phase 2 rougher spirals concentrate productions reground at 100% -212 µm. The goal of these tests was to produce a gravity concentrate at a SiO_2 grade around 2% with the highest Fe recovery.

The testwork showed interesting results as concentrate below 2% SiO_2 was generated. However, the recoveries obtained were below what was achieved with the flotation of a reground Reflux® underflow. Also, to process this finer material, solid feed rate had to be decreased and the capacity of the Reflux® was greatly reduced compared to the processing of unaltered rougher concentrate.

Tests were stopped due to the results, the calendar and the lack of samples.

13.3.3.4.4 Conclusion

The following conclusions are made:

- The Reflux® Classifier tests demonstrated better results than the combined cleaner and recleaner WW6 spirals performances tested by Mineral Technologies (Section 13.3.4.1);
- Due to the pilot scale of the RC100 device, the number of tests performed was limited but allowed sufficient performances to include the Reflux® Classifier in the process flowsheet to clean the rougher spiral concentrate in one stage;
- The cleaner testwork showed a spiral rougher concentrate could be upgraded to a concentrate with less than 4.5% SiO_2 achieving Fe recoveries above 90%.

13.3.3.5 Magnetic Separation Circuit Testwork

The magnetic separation circuit was tested through a pilot plant on the spiral tails only. The Reflux® Classifier overflow was not included in the pilot as the gravity circuit cleaning tests were not completed at the beginning of the magnetic separation circuit testwork. The rougher spiral tails is the most important part of the circuit feed and was assumed to be the hardest part of the ore to be processed by the magnetic circuit, due to the expected higher SiO_2 level in this stream. The performance of the magnetic separation circuit was to be extrapolated with a comparative analysis of the Davis Tube tests on the spiral tails and on the gravity circuit cleaning tails (refer to Section 13.3.3.5.4).

13.3.3.5.1 Phase 1

Davis tube tests were first performed on the phase 1 production spiral tails (magnetic separation circuit feed) reground samples to determine their magnetic content. The results are shown in Table 13-19.

Table 13-19: Spiral Tails (Magnetic Separation Circuit Feed) Reground Samples Davis Tube Tests Results

80% Passing Size (µm)	Magnetic Concentrate								
	Weight Yield (%)	Fe_T		Magnetite		Main Impurities			
		Grade (%)	Rec. (%)	Grade (%)	Rec. (%)	SiO_2 (%)	MgO (%)	CaO (%)	MnO (%)
300	22.5	26.8	84.8	25.0	48.4	56.3	2.1	1.8	0.9
212	16.8	38.7	83.1	33.1	46.3	46.1	1.7	1.3	0.9
150	10.0	64.1	76.4	50.6	41.2	23.9	1.2	0.8	0.8
106	8.4	78.1	78.2	61.2	42.0	10.9	0.7	0.4	0.7
75	7.6	94.5	96.3	66.1	42.1	5.4	0.4	0.2	0.7
53	8.0	97.2	97.7	67.8	44.4	3.1	0.3	0.1	0.7
38	7.0	99.9	81.5	68.5	38.2	2.7	0.2	0.1	0.7

The main observations were the following:

- The Davis tube tests showed that at a P_{80} of 53 µm would lead to a silica grade of 3.1% SiO_2, which was in line with the performances observed during the performances of the semi-pilot productions carried out during detailed engineering (Davies and Imeson, 2013) and (Davies and Imeson, 2014), which produced respectively a 4.76/3.82 SiO_2 grade magnetic concentrate of similar P_{80} (49/56 µm);
- The Davis tube tests showed that at a P_{80} of 75 µm would lead to a silica grade of 5.4% SiO_2, which would be around 6-7% SiO_2 with magnetic separation based on the semi-pilot results. This was acceptable considering the next stage of the process was planned to be flotation to reach the final SiO_2 grade. Operating at a coarser size can be beneficial for the flotation by reducing the fine Fe losses and is also a way to improve the filtration efficiency of the concentrate.

Phase 1 magnetic separation production was then performed in a pilot plant for two and a half days, as shown in Figure 13-17. The pilot plant included a screen with 106 µm apertures to generate a P_{80} of 75 µm and a cleaner LIMS stage within the ball mill circulating load. All three LIMS (cobber, cleaner and finisher) were single-drum units with a magnetic field set at 1000 Gauss.

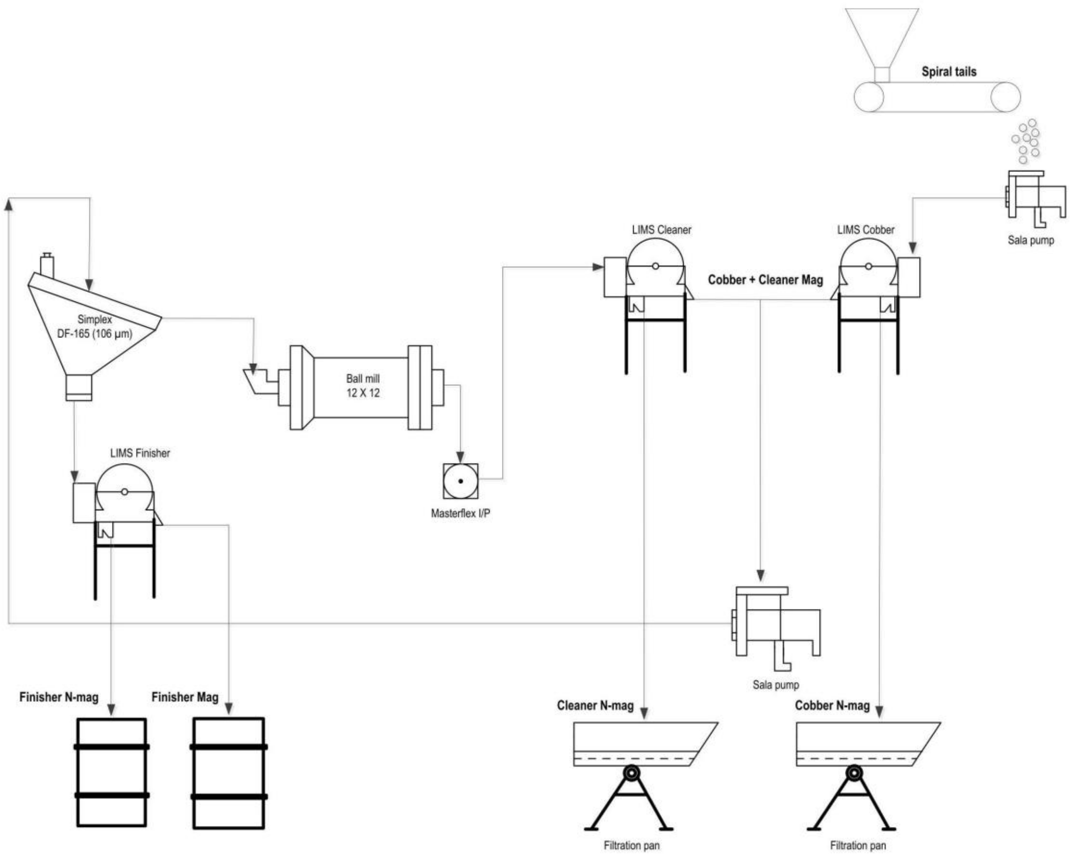


Figure 13-17: Phase 1 Magnetic Separation Circuit Pilot Plant Flowsheet

Composite samples were taken over each day of production and analyzed. Final pilot plant products were also recovered and analyzed. Data reconciliation was done using Bilmat™. Results of the pilot plant based on the daily composite samples are presented in Table 13-20. The daily composite results were used for the analysis as they represent the average daily performances of the circuit without the start-up and shut down periods.

Based on the daily sampling campaigns, the main observations were the following:

- The finisher LIMS silica grade obtained was around 9.7% SiO_2 with a magnetite circuit recovery between 68% and 76%;
- The finisher LIMS silica grade was higher than what was expected from the Davis Tube preliminary tests; insufficient cleaning stages at the finisher stage and too coarse grind size were explanations raised for this too high silica grade;

- The cobber LIMS concentrate magnetite recovery was significantly lower than what was experienced in previous study, which impacted the global circuit recovery. Comparison with previous results shows the magnetite content of the spiral tails was significantly lower than before due to higher magnetite recovery at the current PFS rougher spiral and higher magnetite grade tested in the past;
- More than 80% of the weight was rejected at the cobber tails;
- The cleaner LIMS located in the circulating load allowed the removal of 11% of the weight, but at the cost of 4.0% of the magnetite units.

Table 13-20: Phase 1 Magnetic Separation Sampling Campaign Results

Stream	Grade				Recovery				
	Fe_T (%)	Mag. (%)	SiO_2 (%)	MnO (%)	Weight (%)	Fe (%)	Mag. (%)	SiO_2 (%)	MnO (%)
August 30th Sampling Campaign									
Cobber Feed	12.6	6.0	68.0	1.7	100.0	100.0	100.0	100.0	100.0
Cobber Concentrate	25.0	26.4	56.1	0.9	16.3	32.3	72.2	13.4	9.0
Cobber Tails	10.2	2.0	70.3	1.8	83.7	67.7	27.8	86.6	91.0
Screen Oversize	16.4	14.8	67.3	0.9	13.6	17.7	33.6	13.4	7.7
Ball Mill Discharge	16.4	14.8	67.3	0.9	13.6	17.7	33.6	13.4	7.7
Cleaner Concentrate	47.3	59.2	28.7	0.7	3.0	11.2	29.5	1.3	1.3
Cleaner Tails	7.7	2.3	78.1	1.0	10.5	6.5	4.1	12.2	6.4
Screen Undersize	57.1	71.4	15.0	0.8	5.7	25.8	68.1	1.3	2.6
Finisher Concentrate	61.2	78.1	9.7	0.7	5.2	25.1	67.7	0.7	2.2
Finisher Tails	15.9	4.9	68.1	1.3	0.5	0.6	0.4	0.5	0.4
August 31st Sampling Campaign									
Cobber Feed	11.8	6.0	69.6	1.6	100.0	100.0	100.0	100.0	100.0
Cobber Concentrate	24.5	26.0	56.5	0.9	18.8	39.0	82.1	15.3	10.6
Cobber Tails	8.9	1.3	72.6	1.8	81.2	61.0	17.9	84.7	89.4
Screen Oversize	16.5	14.3	66.9	0.9	16.3	22.7	39.2	15.7	9.3
Ball Mill Discharge	16.5	14.3	66.9	0.9	16.3	22.7	39.2	15.7	9.3
Cleaner Concentrate	40.2	46.9	38.1	0.8	4.4	15.2	35.1	2.4	2.2
Cleaner Tails	7.5	2.0	77.8	1.0	11.5	7.5	4.0	13.2	7.2
Screen Undersize	53.2	66.4	20.6	0.8	7.0	31.5	78.1	2.1	3.5
Finisher Concentrate	62.1	80.0	9.6	0.7	5.7	29.7	76.0	0.8	2.4
Finisher Tails	15.9	9.2	66.2	1.3	1.4	1.8	2.1	1.3	1.0

The cobber tails were processed through a LIMS at a higher magnetic field of 2600 Gauss. The test results are presented in Table 13-21.

Table 13-21: Cobber Tails Scavenger Test Results

Product	Weight Yield (%)	Fe		Magnetite		Main Impurities			
		Grade (%)	Rec. (%)	Grade (%)	Rec. (%)	SiO_2 (%)	MgO (%)	CaO (%)	MnO (%)
Concentrate	3.9	10.6	5.1	5.0	13.2	75.6	2.2	2.4	1.1
Tails	96.1	7.9	94.9	1.0	86.8	74	2.6	3.5	1.8
Calculated Feed	100.0	8.0	100	1.0	100.0	74	2.5	3.5	1.8

The use of a higher LIMS intensity could increase the cobber magnetite recovery by approximately 2% while increasing the mass recovery of around 3%. This was included in the Phase 2 testwork.

13.3.3.5.2 Phase 2: Magnetic Pilot Plant Production

Phase 2 magnetic separation production was performed in a pilot plant, as shown in Figure 13-18, for three days for each composite sample for a total of nine days of operation.

Three major changes were conducted for the Phase 2 magnetic separation production to maximize the magnetic recovery and reduce the final silica grade:

- A higher magnetic field (2500 Gauss) was used for the cobber LIMS to maximize the magnetite recovery;
- The cleaner LIMS located in the ball mill circulating load was removed as the mass rejection was not high enough and the magnetite losses significant;
- The screen size was reduced from 106 µm to 75 µm to increase particle liberation (P_{80} = 53 µm) to generate a grade around 6-7% SiO_2;
- A double-drum finisher LIMS was included.

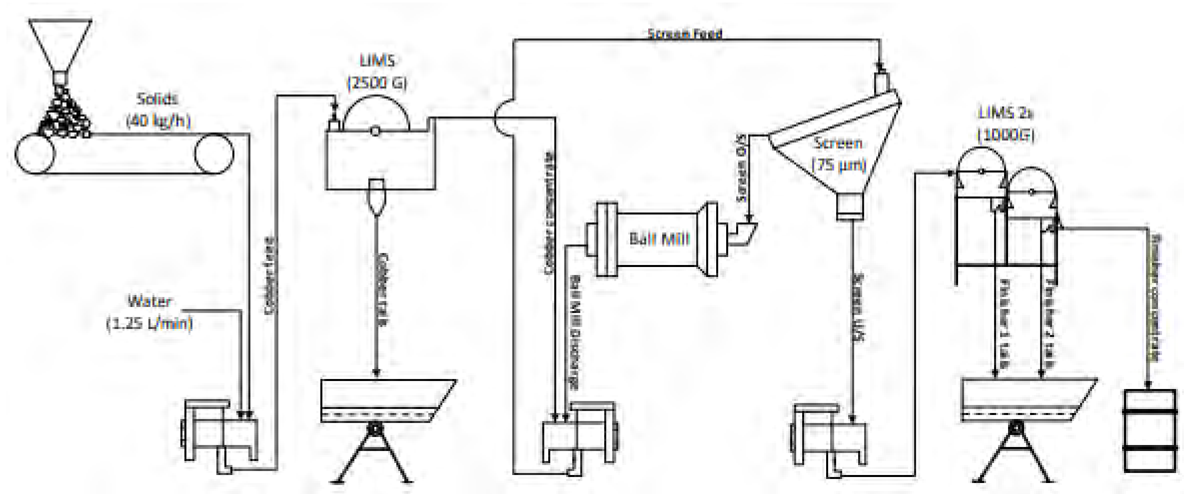


Figure 13-18: Phase 2 Magnetic Separation Circuit Pilot Plant Flowsheet

Composite samples were taken over each day of production and analyzed. Final pilot plant products were also recovered and analyzed. Data reconciliation was done using Bilmat™. Table 13-22 presents the daily composites magnetic separation results for the three samples. The daily composite results were used for the analysis as they represent the average daily performances of the circuit without the start-up and shut down periods. Sampling campaign showing non-steady state (High RN Day 2) or incoherent (Year 01-05 Day 2) data were not included in the analysis.

Based on the average daily sampling campaign, the following observations are made:

- The final products silica grade varied between 9.4% SiO_2 to 14.4% SiO_2;
- The final products lowest Fe recovery achieved was 86% for the Year 01-05 sample, which has the lowest magnetite feed content;
- The final products highest Fe recovery achieved was 95.7% for the High RC sample, which has the highest magnetite feed content, and which provided the highest concentrate SiO_2 grade;
- Cobber magnetite recovery increased significantly compared to Phase 1 lowest magnetic field (Figure 13-19), but lower weight rejection is also achieved.

The particle size distribution was not in line with the expectations, the screen was only efficient at 80-85% with up to 16% of +75 µm reporting to the undersize and up to 5% of -75 µm reporting to the oversize. The target 80% passing of 53 µm was not achieved as final concentrate P_{80} ranged between 65 µm to 70 µm.

Table 13-22: Phase 2 Magnetic Separation Sampling Campaign Average Results

Stream	Grade				Recovery				
	Fe_T (%)	Mag. (%)	SiO_2 (%)	MnO (%)	Weight (%)	Fe_T (%)	Mag. (%)	SiO_2 (%)	MnO (%)
High RC - Average									
Cobber Feed	11.2	7.1	67.9	2.2	100.0	100.0	100.0	100.0	100.0
Cobber Concentrate	18.0	18.4	65.7	1.2	37.6	60.5	97.8	36.4	21.0
Cobber Tails	7.1	0.2	69.2	2.8	62.4	39.5	2.2	63.6	79.0
Screen Oversize	10.3	8.4	78.3	0.9	170.2	155.5	199.3	196.2	73.9
Ball Mill Discharge	10.3	8.4	78.3	0.9	170.2	155.5	199.3	196.2	73.9
Screen Undersize	18.0	18.4	65.7	1.2	37.6	60.5	97.8	36.4	21.0
Finisher Concentrate	59.6	79.6	14.4	0.9	8.5	45.4	95.7	1.8	3.3
Finisher Tails #1	5.7	0.4	80.8	1.3	28.4	14.5	1.5	33.8	17.3
Finisher Tails #2	10.0	5.8	77.1	1.3	0.7	0.7	0.6	0.8	0.4
High RN - Day 1									
Cobber Feed	12.5	7.2	75.0	0.8	100.0	100.0	100.0	100.0	100.0
Cobber Concentrate	22.0	23.1	63.2	0.6	29.2	51.2	93.4	24.6	22.4
Cobber Tails	8.6	0.7	79.9	0.8	70.8	48.8	6.6	75.4	77.6
Screen Oversize	13.7	12.4	74.9	0.5	44.5	48.9	76.8	44.5	29.6
Ball Mill Discharge	13.7	12.4	74.9	0.5	44.5	48.9	76.8	44.5	29.6
Screen Undersize	22.0	23.1	63.2	0.6	29.2	51.2	93.4	24.6	22.4
Finisher Concentrate	63.4	82.1	9.4	0.5	7.8	39.7	89.3	1.0	4.6
Finisher Tails #1	6.8	1.5	82.7	0.7	13.9	7.5	2.8	15.3	11.9
Finisher Tails #2	6.7	1.2	83.5	0.6	7.5	4.0	1.3	8.3	5.9
Year 01-05 - Average Days 1 & 3									
Cobber Feed	12.0	6.2	72.8	1.3	100.0	100.0	100.0	100.0	100.0
Cobber Concentrate	19.9	20.2	64.9	0.9	28.2	46.7	91.3	25.1	19.3
Cobber Tails	8.9	0.8	75.8	1.5	71.8	53.3	8.7	74.9	80.7
Screen Oversize	12.5	10.7	76.2	0.8	69.1	70.9	116.9	72.6	39.6
Ball Mill Discharge	12.5	10.7	76.2	0.8	69.1	70.9	116.9	72.6	39.6
Screen Undersize	19.9	20.2	64.9	0.9	28.2	46.7	91.3	25.1	19.3
Finisher Concentrate	59.8	80.2	14.2	0.7	6.7	33.2	86.0	1.3	3.4
Finisher Tails #1	7.2	1.2	81.0	1.0	20.7	12.4	4.1	23.1	15.4
Finisher Tails #2	16.0	9.5	70.4	1.0	0.8	1.0	1.2	0.7	0.6

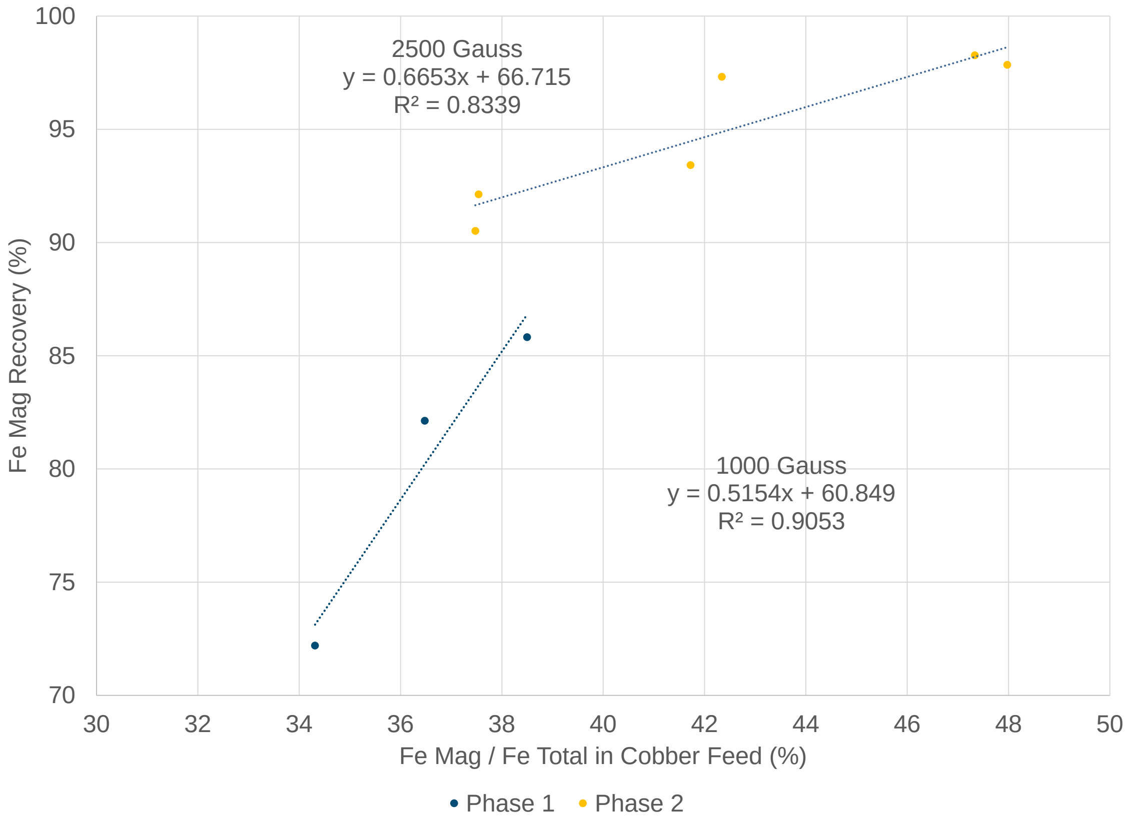


Figure 13-19: Cobber Magnetic Fe Recovery at Two Magnetic Field Intensity

13.3.3.5.3 Phase 2: Regrind Pilot Plant Production

To improve the magnetic circuit SiO_2 grade, it was decided to resume the Phase 2 pilot. Due to previous grinding, the spiral tails (magnetic separation circuit feed) could not be regenerated and were thus eliminated from the flowsheet. The finisher products were recombined and further processed in a "regrind magnetic separation" pilot, as shown in Figure 13-20.

Phase 2 regrind magnetic separation production was performed in a pilot plant for two days for each composite sample for a total of six days of operation.

One major change was done for the Phase 2 regrind magnetic separation production:

- The screen size was reduced from 75 µm to 53 µm to increase particle liberation (P_{80} = 45 µm) to generate a grade around 4.5% SiO_2 (2.7-3.1% SiO_2 with DT, Table 13-19).

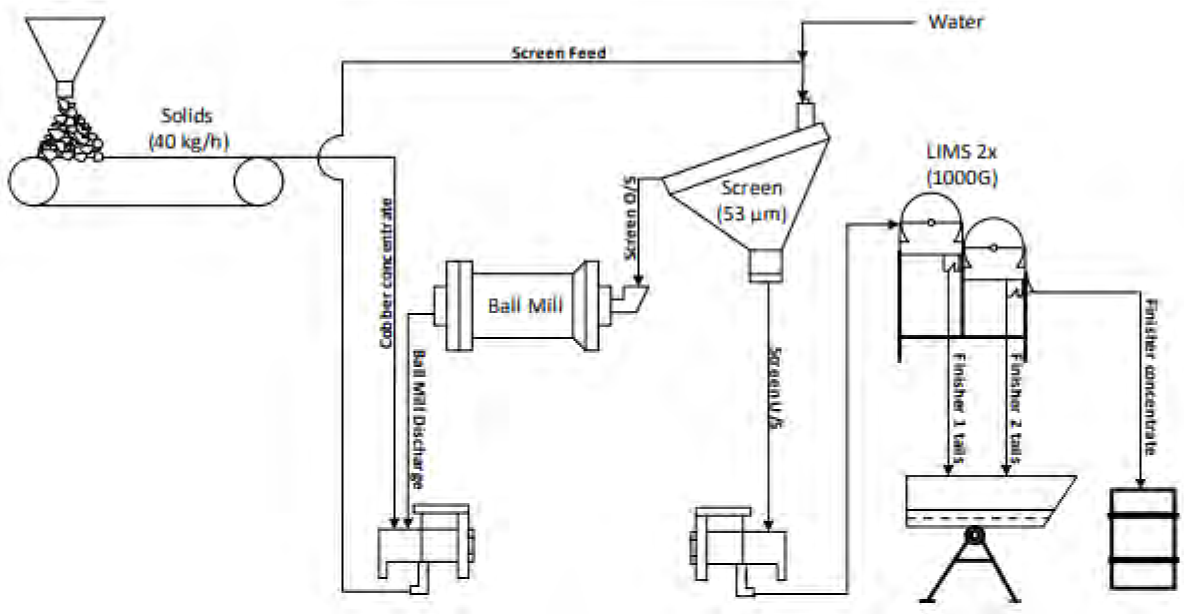


Figure 13-20: Phase 2 Second Magnetic Separation Circuit Testwork Pilot Plant Flowsheet

Composite samples were taken over each day of production and analyzed. Final pilot plant products were also gathered and analyzed. Data reconciliation was done using Bilmat™.

Table 13-23 presents the daily composites regrind magnetic separation results. The daily composite results were used for the analysis as they represent the average daily performances of the circuit without the start-up and shut down periods.

As can be observed based on the average sampling campaign results:

- The final products silica grade varied between 4.0% SiO_2 to 6.2% SiO_2, close to the targeted 4.5% SiO_2;
- Magnetic recoveries are above 98%, higher than for a coarser grind.

The particle size distribution was not in line with the expectations, the screen was only efficient at 55-85% with up to 26% of -53 µm reporting to the oversize. Still, the target of 80% passing of 45 µm was achieved ranging between 44 µm to 47 µm.

LIMS cleaning tests were performed to assess the possibility to reduce the final SiO_2 grade with lower magnetic fields. Magnetic field as low as 400 Gauss was tested and presented a low SiO_2 grade reduction associated with a low magnetite recovery reduction. This option was not retained.

Table 13-23: Phase 2 Magnetic Separation Regrind Sampling Campaign Average Results

Stream	Grade				Recovery				
	Fe_T (%)	Mag. (%)	SiO_2 (%)	MnO (%)	Weight (%)	Fe_T (%)	Mag. (%)	SiO_2 (%)	MnO (%)
High RC Regrind - Average									
Cobber Concentrate	20.2	21.4	62.2	1.3	100.0	100.0	100.0	100.0	100.0
Screen Oversize	15.8	15.5	70.7	1.0	288.3	225.0	209.7	328.0	222.9
Screen Undersize	20.2	21.4	62.2	1.3	100.0	100.0	100.0	100.0	100.0
Ball Mill Discharge	15.8	15.5	70.7	1.0	288.3	225.0	209.7	328.0	222.9
Finisher Concentrate	66.4	90.8	6.2	0.8	23.3	76.5	98.9	2.3	14.1
High RN Regrind - Average									
Cobber Concentrate	22.0	21.9	62.8	0.6	100.0	100.0	100.0	100.0	100.0
Screen Oversize	17.9	17.7	70.0	0.5	564.0	458.4	454.4	628.6	451.8
Screen Undersize	22.0	21.9	62.8	0.6	100.0	100.0	100.0	100.0	100.0
Ball Mill Discharge	17.9	17.7	70.0	0.5	564.0	458.4	454.4	628.6	451.8
Finisher Concentrate	68.3	87.4	4.0	0.4	24.7	76.8	98.7	1.6	15.9
Year 01-05 Regrind - Average									
Cobber Concentrate	23.0	23.0	60.2	0.9	100.0	100.0	100.0	100.0	100.0
Screen Oversize	15.6	14.7	72.2	0.7	219.8	148.2	139.9	265.2	155.6
Screen Undersize	23.0	23.0	60.2	0.9	100.0	100.0	100.0	100.0	100.0
Ball Mill Discharge	15.6	14.7	72.2	0.7	219.8	148.2	139.9	265.2	155.6
Finisher Concentrate	66.6	85.9	5.5	0.6	26.2	76.1	98.2	2.4	16.5

13.3.3.5.4 Other Testwork

Davis Tube ("DT") tests were performed on Reflux® Classifier overflow to infer the behavior of this stream in the magnetic separation circuit. The Davis Tube results are compared to the Davis Tube performed of the Phase 1 Spiral Feed and Spiral Tails on Figure 13-21 and Table 13-24.

The Davis Tube magnetic concentrate SiO_2 grade of the Reflux® Classifier overflow is dependant on the Reflux® magnetite recovery:

- High RN and Year 01-05 Reflux® production recovered less magnetite and provided an overflow with more magnetite leading to DT SiO_2 grades significantly lower than what was observed for the Davis Tube concentrate on spiral tails;
- High RC Reflux® production recovered significantly more magnetite and provided an overflow leading to a slightly higher DT SiO_2 grade than was observed on the Davis Tube concentrate on spiral tails.

The magnetic recovery at the Reflux® Classifier obtained during the testwork and used for the design generates a Davis Tube interpolated SiO_2 grade similar to the spiral tails. Thus, the behaviour of the overflow material is expected to be similar to the spiral tails.

The magnetite recovery of the Reflux® Classifier overflow is slightly better than for the spiral tails, but this was not considered in the design.

Table 13-24: Davis Tube Test Results on Reflux® Classifier Overflow and Other Streams

Size P_{80} (µm)	Spiral Feed		Spiral Tails		Year 01-05		High RC		High RN	
	Rec. Mag. (%)	Grade SiO_2 (%)	Rec. Mag. (%)	Grade SiO_2 (%)	Rec. Mag. (%)	Grade SiO_2 (%)	Rec. Mag. (%)	Grade SiO_2 (%)	Rec. Mag. (%)	Grade SiO_2 (%)
300	94.9	19.6	84.8	56.3	-	-	-	-	-	-
212	95.0	8.7	83.1	46.1	-	-	-	-	-	-
150	97.7	4.9	76.4	23.9	98.6	18.2	97.9	37.1	98.8	16.4
106	97.7	1.9	78.2	10.9	99.0	6.4	98.5	15.6	97.4	5.4
75	99.0	1.5	96.3	5.4	97.5	2.8	98.6	6.7	97.7	2.1
53	98.7	0.9	97.7	3.1	99.1	1.6	98.5	4.0	98.8	1.5
38	98.6	0.9	81.5	2.7	99.1	1.4	98.6	2.6	95.9	1.2

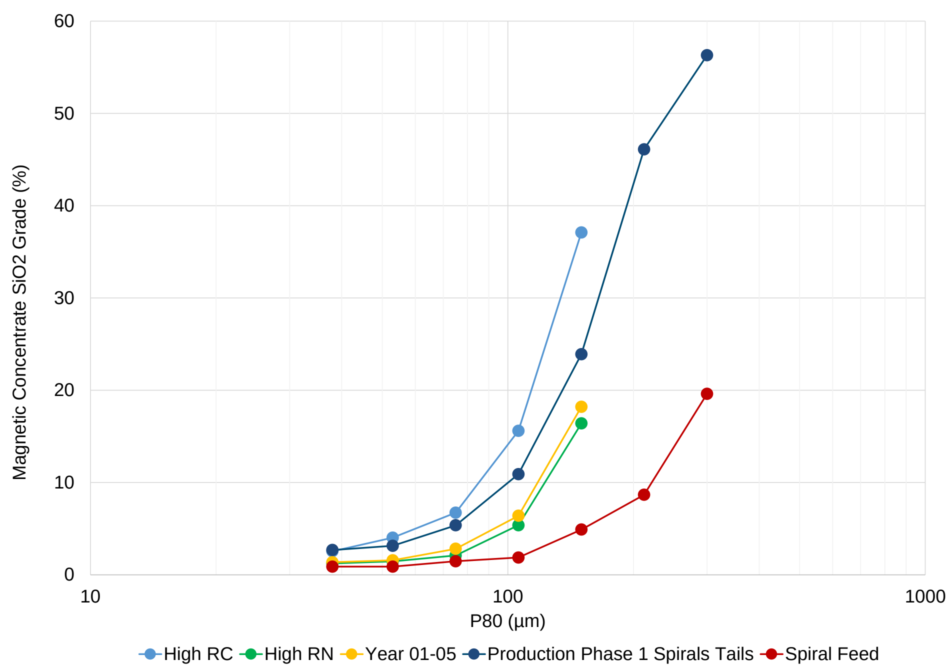


Figure 13-21: Davis Tube Test Results on Reflux® Classifier Overflow

13.3.3.5.5 Conclusion

Figure 13-22 presents the sampling campaign results taken during the three magnetic separation pilot plant. The following conclusions are drawn:

- The increase in the cobber magnetic field and the removal of the cleaner LIMS allowed an increase in the magnetite recovery;
- Grinding at a P_{80} of 45 µm is required to achieve the target SiO_2 grade around 5% SiO_2;
- Magnetic recoveries between 86% and 95.7% was achieved at a P_{80} of 53 µm producing a final concentrate grading between 9.4% SiO_2 to 14.4% SiO_2;
- Magnetic recoveries above 98% was achieved on the cobber concentrate regrind at a P_{80} of 45 µm to produce a final concentrate grading between 4.0% SiO_2 to 6.2% SiO_2;
- Based on the Davis Tube results, the Reflux® Classifier overflow is expected to perform similarly than the spiral tails in similar conditions.

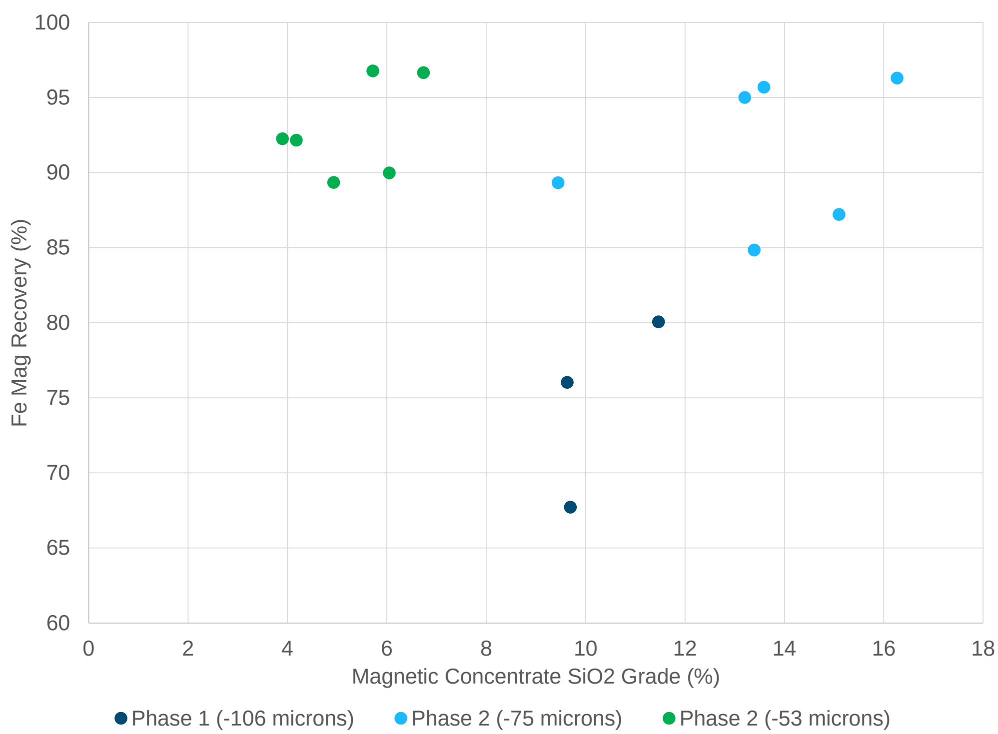


Figure 13-22: Magnetic Separation Testwork Sampling Campaign Results

13.3.3.6 Fine Hematite Scavenger Testwork

The potential recovery of hematite from the tailings streams of the magnetic separation circuit was assessed. Size-by-size analysis of the cobber and finisher tails streams was performed, and mineralogical characterization of the cobber tails was conducted. Based on these, it was determined that the recovery potential of fine hematite from those streams was low:

- The iron not recovered in the gravity and magnetic separation circuit is mostly composed of hydroxide, carbonate and Mn oxides;
- The iron in the tailings streams is generally distributed in all the size classes, which makes the processing of only the fine particle less attractive as an important amount of iron would be lost;
- The proportion of liberated hematite is very low for particle coarser than 106 microns, which means a significant portion of the tails would require regrinding to allow their recovery in a final concentrate.

No further testwork was performed.

13.3.3.7 Flotation Testwork

Batch flotation tests were performed on gravity concentrate (cleaner Reflux® Classifier underflow) and magnetite separation circuit concentrate to produce a final concentrate suitable for the production of Direct Reduction pellets.

Phase 1 testwork was exploratory and was used to narrow the SiO_2 flotation conditions for the Kami ore.

Phase 2 testwork was performed on various gravity circuit material:

- Reflux® Classifier underflow fine portion screened at various sizes (-300 µm and -223 µm);
- Reflux® Classifier underflow coarse portion screened at +223 µm.

The final flotation tests conditions used for the PFS design are presented first, while the other conditions are presented in Section 13.3.3.7.5.

13.3.3.7.1 Phase 1: Gravity Concentrate

Flotation was explored on the rougher spiral concentrate. Batch cell flotation tests were carried out on rougher spiral concentrate from Phase 1 production (Section 13.3.3.3.1) ground at a P_{80} of 45 µm and 150 µm. The target of 0.8% SiO_2 was not reached. The best result was obtained at a P_{80} of 45 µm with 2.2% SiO_2 and an iron recovery of 88.7%. The flotation of carbonates was also investigated, but no significant results were obtained.

Batch flotation tests were performed on the -300 µm and -212 µm fractions of the cleaner Reflux® Classifier underflow. The testwork conditions are presented in Table 13-25.

Kinetic flotation tests and staged flotation tests were performed on the screened Reflux® underflow. In staged flotation, reagents are added at regular time intervals, while in kinetic flotation, reagents are added all at once for the determination of the flotation kinetics. Kinetic flotation test did not lead to significant SiO_2 reduction and resulted in significant Fe losses. Staged flotation tests achieved good selectivity and limited Fe losses. Table 13-26 presents the results of these tests.

Table 13-25: Phase 1 Screened Gravity Concentrate -300 µm/-212 µm
Staged Flotation Conditions

Test ID	P_{100} (µm)	Flotation Time (min)	Reagent addition (g/t)		
			Tomamine	F_{100}	NaOH
10	300	31	660	0	525
11	300	24.5	540	10	390
16	300	37	700	10	515
19	212	18.5	630	10	728

Table 13-26: Phase 1 Screened Gravity Concentrate -300 µm/-212 µm
Staged Flotation Results

Test ID	Weight Recovery (%)	Fe_T		SiO_2		Magnetite		Main Impurities		
		Grade (%)	Rec. (%)	Grade (%)	Rec. (%)	Grade (%)	Rec. (%)	MgO (%)	CaO (%)	MnO (%)
10	85.1	66.9	87.5	2.0	40.7	58.1	90.8	0.5	0.5	1.4
11	72.4	67.0	74.4	2.2	38.3	61.0	80.2	0.5	0.5	1.3
16	54.1	66.1	55.2	2.4	30.4	69.1	66.1	0.7	0.6	1.5
19	80.3	66.5	82.1	2.6	49.3	59.8	84.2	0.5	0.5	1.4

The best result shows that a concentrate grading 2% SiO_2 can be reached but with significant Fe losses.

Due to a lack of Phase 1 material, gravity flotation testwork was stopped. It was pursued with Phase 2 material.

13.3.3.7.2 Phase 1: Magnetic Concentrate

Batch flotation tests were performed on the magnetic concentrate. The testwork conditions are presented in Table 13-27.

Kinetic flotation tests (tests 3 and 4) and staged flotation tests were performed (tests 1 and 2). Table 13-28 presents the results of these tests. MFQ4 is a collector (diamine) provided by NordChem.

Table 13-27: Phase 1 Magnetic Concentrate Flotation Conditions

Test ID	Stage	Reagents consumption (g/t)				
		Depressant WW82	Collectors		pH Regulator NaOH	Froth Stabilizer F_{100}
			MFQ4	Tomamine		
1	Rougher	1,125	-	360	145	10
2	Rougher	1,125	-	960	350	10
3	Rougher	500	-	700	300	10
4	Rougher	500	400	-	70	10

Table 13-28: Phase 1 Magnetic Concentrate Flotation Results

Test ID	Weight Yield (%)	Fe_T		Magnetite		Main Impurities			
		Grade (%)	Rec. (%)	Grade (%)	Rec. (%)	SiO_2 (%)	MgO (%)	CaO (%)	MnO (%)
1	81.3	66.0	88.2	88.0	88.9	4.0	0.7	0.5	0.8
2	48.2	68.5	54.3	85.0	54.0	1.2	0.5	0.5	0.7
3	55.7	68.8	62.9	91.0	63.5	1.5	0.4	0.3	0.7
4	68.4	68.1	76.3	89.0	76.7	2.5	0.5	0.3	0.7

The preliminary flotation tests on magnetic separation circuit concentrate allowed a significant reduction in the SiO_2 grade as the feed sample was grading 11.5% SiO_2 (Table 13-20). No further tests were performed as the feed content was considered not representative of the targeted finisher concentrate grade.

13.3.3.7.3 Phase 2: Reground Cleaner Reflux® Underflow

Flotation tests were done using the Reflux® Classifier concentrate ground at -212 µm (second Reflux® production). The principal objective of these tests was to reproduce the results obtained with the best flotation tests on the Reflux® Classifier concentrate of the first productions screened at -223 µm (Section 13.3.3.7.5.1). Table 13-29 presents the operational parameters used for each test. The pH in the cell was maintained at 10 using a PID controller. The injection of reagents was done in several injections (staged flotation).

Table 13-30 presents the test results, which shows SiO_2 grades below 2% were achieved with Fe recoveries above 90%, except for the High RC sample for which a SiO_2 grade of 2.2% was achieved. This result confirmed that flotation provided similar performance on Reflux® concentrate ground at -212 µm, and on Reflux® Concentrate screened at -223 µm.

Table 13-29: Phase 2 Reground Gravity Concentrate Flotation Conditions

Test ID	Stage	Composite Sample	Reagents Consumption (g/t)		
			Depressant WW82	Collector	
				Tomamine	NaOH
30	Rougher	Year 01-05	75	500	190
31	Rougher	Year 01-05	75	450	100
32	Rougher	Year 01-05	75	450	270
33	Rougher	High RC	75	450	325
34	Rougher	High RN	75	450	70

Table 13-30: Phase 2 Reground Gravity Concentrate Flotation Results

Test ID	Flotation Time (min)	Weight Yield (%)	Fe_T		Magnetite		Main Impurities			
			Grade (%)	Rec. (%)	Grade (%)	Rec. (%)	SiO_2 (%)	MgO (%)	CaO (%)	MnO (%)
30	5.5	88.3	66.7	91.4	48.0	92.8	1.7	0.5	0.5	1.3
31	4.0	89.1	67.9	90.9	50.0	93.2	1.5	0.4	0.3	1.2
32	6.0	92.6	67.9	94.3	48.0	95.3	1.5	0.3	0.3	1.2
33	12.0	92.2	67.4	93.6	56.0	93.0	2.2	0.5	0.5	1.4
34	4.0	93.8	67.5	96.1	46.0	96.5	1.6	0.4	0.3	1.1

13.3.3.7.4 Phase 2: Magnetic Concentrate

Confirmatory flotation tests were done using the reground magnetic plant finisher concentrate. Table 13-31 presents the operational parameters while Table 13-32 the tests results. The pH in the cell was maintained at 10 using a PID controller.

Table 13-31: Phase 2 Magnetic Concentrate Flotation Tests Conditions

Test ID	Stage	Composite Sample	Reagents Consumption (g/t)		
			Depressant WW82	Collector	
				Tomamine	NaOH
7	Rougher	Year 01-05	500	300	N/A
8	Rougher	High RC	500	300	N/A
9	Rougher	High RN	500	300	N/A

Table 13-32: Phase 2 Magnetic Concentrate Flotation Tests Results

Test ID	Flotation Time (min)	Weight Yield (%)	Fe_T		Magnetite		Main Impurities			
			Grade (%)	Rec. (%)	Grade (%)	Rec. (%)	SiO_2 (%)	MgO (%)	CaO (%)	MnO (%)
7	7.0	93.3	68.7	97.7	90.0	97.9	2.3	0.3	0.2	0.6
8	7.0	94.9	68.2	98.3	94.0	98.4	3.1	0.3	0.2	0.8
9	7.0	95.4	69.2	98.3	90.0	98.4	2.0	0.2	0.1	0.5

Tests showed that Fe recovery around 98% could be achieved for the production of a concentrate grading between 2%-3% SiO_2.

13.3.3.7.5 Other Testwork

13.3.3.7.5.1 Phase 2: Flotation Tests on Cleaner Reflux® Underflow Screened (-223 µm)

Exploratory flotation tests were conducted on the Reflux® Classifier underflow generated during the first production, which was screened at -223 µm. Table 13-33 presents the operational parameters. Tests 23 to 26 were staged flotation tests, while tests 27 to 29 were kinetic flotation tests.

Table 13-33: Phase 2 Screened Gravity Concentrate -223 µm Flotation Conditions

Test ID	Stage	Composite sample	Reagents consumption (g/t)		
			Depressant WW82	Collectors	
				Tomamine	NaOH
23	Rougher	High RN	-	780	420
24	Rougher	High RN	75	500	425
25	Rougher	High RC	75	500	225
26	Rougher	Year 01-05	75	500	190
27	Rougher	High RC	75	500	135
28	Rougher	High RN	75	500	125
29	Rougher	Year 01-05	75	500	115

Table 13-34 presents a summary of the batch cell flotation test results on the Reflux® Classifier concentrate screened at -223 µm for the staged flotation tests only, as the kinetic tests did not provide interesting results.

The addition of depressant after test 23 allowed to reduce the flotation time needed while maintaining a silica content below 2% (1.0% to 1.6% SiO_2). High RC (test 25) showed high SiO_2 grade and high Fe and magnetite recoveries although the same conditions were applied. At the exception of the test performed on High RC sample, all other tests showed better performance than Phase 1 tests performed on -300 µm material, and lead to Fe recoveries above 90% and SiO_2 grades below 2%. This was in line with the mineralogical analysis that showed that the liberation of iron oxides drops below 80% for the +212 µm fraction (Figure 13-5).

Table 13-34: Phase 2 Screened Gravity Concentrate -223 µm Flotation Results

Test ID	Flotation Time (min)	Weight Yield (%)	Fe_T		Magnetite		Main Impurities			
			Grade (%)	Rec. (%)	Grade (%)	Rec. (%)	SiO_2 (%)	MgO (%)	CaO (%)	MnO (%)
23	25.5	89.1	68.6	92.3	58.0	95.9	1.0	0.3	0.3	0.8
24	18.0	94.5	68.1	96.9	57.0	98.1	1.6	0.4	0.2	0.8
25	16.0	99.6	65.7	99.7	63.0	99.7	4.2	0.6	0.7	1.5
26	9.5	89.4	67.4	92.4	58.0	95.5	1.9	0.5	0.5	1.1

13.3.3.7.5.2 Phase 2: Flotation Production on Reground Cleaner Reflux® Underflow

A flotation production was completed on the second Reflux® production underflow in order to generate material of each composite sample for testwork on final products. The production was completed in batches of approximately 50 kg to 60 kg in a 170-liters Westpro mechanical tank cell (model FL6TC). A summary of the operational conditions is presented in Table 13-35 and Table 13-36 presents the production flotation results. Production using Year 01-05 and High RN samples produced results similar to those obtained in smaller cells. However, for High RC, the production did not reach the expected results. In order to achieve the desired grade, the production conditions were pushed, and, with that, the weight and iron recoveries dropped.

Table 13-35: Phase 2 Reground Gravity Concentrate Flotation Production Conditions

Test ID (Tank Cell #)	Composite Sample	Addition Type	Cell Volume (L)	Rotor Rotation Speed (rpm)	Airflow (L/min)	Avg. Solids Fraction (%)
1 - 2 - 3	Year 01-05	Staged	170	662	100+	25.4
4 - 8	High RC	Staged	170	662	100+	24.5
5 - 6 - 7	High RN	Staged	170	662	100+	21.2

Table 13-36: Phase 2 Reground Gravity Concentrate Flotation Production Results

Test ID	Flotation Time (min)	Weight Yield (%)	Fe_T		Magnetite		Main Impurities			
			Grade (%)	Rec. (%)	Grade (%)	Rec. (%)	SiO_2 (%)	MgO (%)	CaO (%)	MnO (%)
Year 01-05	6.0	92.0	67.6	93.4	48.0	93.6	1.9	0.3	0.3	1.1
High RC	12.0	68.5	67.6	70.0	57.0	70.5	2.2	0.4	0.4	1.2
High RN	4.0	91.7	67.2	94.0	46.0	94.5	2.0	0.4	0.3	1.1

13.3.3.7.5.3 Phase 2: Additional Testwork on High RC Flotation Production

To improve the performances of the High RC sample, additional batch cell flotation tests were performed on the concentrate of a High RC production (tank cell #4 - test 36) and on a recombined feed from a High RC production (tank cell #8 recombined products - tests 37 to 39). Table 13-37 presents a summary of the tests conditions and Table 13-38 of the results.

The test 36 revealed that a grade below 2.0% SiO_2 can be achieved with this sample by adding flotation time. The iron recovery obtained of 92% allows the complete process (tank cell production + batch cell test) to reach a total recovery of 65% Fe. The other tests on recombined material showed similar final performances.

Due to schedule, and the lack of fresh flotation feed material, the optimization of the High RC performance was stopped.

Table 13-37: Phase 2 Reground Gravity Concentrate Flotation High RC Additional Tests Conditions

Test ID	Stage	Composite Sample	Reagents consumption (g/t)		
			Depressant WW82	Collector	
				Tomamine	NaOH
36	Rougher	High RC	75	900	0
37	Rougher	High RC	75	550	268
38	Rougher	High RC	75	550	111
39	Rougher	High RC	75	400	201

Table 13-38: Phase 2 Reground Gravity Concentrate Flotation High RC Additional Tests Results

Test ID	Flotation Time (min)	Weight Yield (%)	Fe_T		Magnetite		Main Impurities			
			Grade (%)	Rec. (%)	Grade (%)	Rec. (%)	SiO_2 (%)	MgO (%)	CaO (%)	MnO (%)
36	2.0	91.5	68.0	91.9	54.0	93.6	1.7	0.4	0.4	1.2
37	4.0	62.1	66.9	63.0	56.0	68.3	2.2	0.5	0.5	1.3
38	6.0	67.0	67.2	68.3	55.0	73.4	2.0	0.4	0.4	1.3
39	16.0	65.4	67.3	66.9	50.0	68.5	2.0	0.4	0.4	1.3

13.3.3.7.5.4 Phase 2: Flotation Production on Finisher Concentrate

A flotation production was completed in order to generate material of each composite sample for testwork on final products. However, there was not enough High RN sample to perform a production as material was sent to Metso to conduct flotation tests using Concorde cells. The production was completed in batches of approximately 50 kg to 60 kg in a 170-L Westpro mechanical tank cell model FL6TC. A summary of the operational conditions is presented in Table 13-39 and results are presented in Table 13-40.

Results were in line with the batch tests.

Table 13-39: Phase 2 Magnetic Concentrate Flotation Tests Conditions

Test ID	Stage	Composite Sample	Reagents Consumption (g/t)		
			Depressant WW82	Collector	
				Tomamine	NaOH
Tank Cell 9	Rougher	High RC	500	400	N/A
Tank Cell 10	Rougher	Year 01-05	500	400	N/A

Table 13-40: Phase 2 Magnetic Concentrate Flotation Tests Results

Test ID	Flotation Time (min)	Weight Yield (%)	Fe_T		Magnetite		Main Impurities			
			Grade (%)	Rec. (%)	Grade (%)	Rec. (%)	SiO_2 (%)	MgO (%)	CaO (%)	MnO (%)
Year 01-05	3.0	94.5	68.2	97.9	83.0	98.5	3.1	0.3	0.2	0.6
High RC	3.0	94.3	68.2	97.7	96.0	97.2	3.1	0.3	0.3	0.8

13.3.3.7.5.5 Flotation Tests on Cleaner Reflux® Underflow Screened (+223 µm)

Coarse flotation tests were performed on +223 µm from Phase 2 first production. For these tests, the HydroFloat separator (6-inches laboratory model) from Eriez was used. The HydroFloat is a fluidized-bed coarse particle flotation machine that combines gravity concentration and froth flotation. The main feature is a circular vessel comprised of an upper freeboard region, a central separation region, and a lower dewatering cone.

A report from Kohmuench et al. (2018) explains the mechanisms in place as follows: The upward flow of water and air create a fluidized bed of suspended particles in the separation region with high interstitial liquid velocities that resist the penetration of slow settling particles. As air bubbles rise through the fluidized bed and into the freeboard region, they selectively attach to hydrophobic particle surfaces and produce bubble-particle agglomerates with a reduced effective density and increased buoyancy. Hydrophilic particles that do not attach to the air bubbles continue to move down through the fluidized bed, settle into the dewatering cone, and are discharged at high percent solids through the use of an underflow control valve.

A summary of the operational conditions of the tests performed on High RC sample is presented in Table 13-41 and results are presented in Table 13-42. Tests 4 to 7 were conducted according to the results of tests 1 to 3. The testwork did not provide any interesting results and was therefore stopped.

Table 13-41: Phase 2 Coarse Gravity Concentrate Flotation Tests Conditions – High RC

Test ID	Operating Conditions					Conditioning Conditions		
	Solids Feed Rate (kg/h)	Bed Height (in)	Teeter Water (L/min)	Air (L/min)	Frother (F-100) (ml/min)	Collector (Tomamine M100-7) (g/t)	Solids Percentage (%)	Time (min)
1	48.0	37.0	14.0	0.5	50.0	100.0	60.0	5.0
2	48.0	37.0	14.0	0.5	50.0	150.0	60.0	5.0
3	48.0	37.0	14.0	0.5	50.0	200.0	60.0	5.0
4	30.0	37.0	14.0	0.5	50.0	100.0	60.0	5.0
5	30.0	37.0	15.5	0.5	50.0	100.0	60.0	5.0
6	30.0	37.0	14.0	0.8	50.0	100.0	60.0	5.0
7	30.0	37.0	15.5	0.8	50.0	100.0	60.0	5.0

Table 13-42: Phase 2 Coarse Gravity Concentrate Flotation Tests Results

Test ID	Weight Yield (%)	Fe_T		Magnetite		Main impurities			
		Grade (%)	Rec. (%)	Grade (%)	Rec. (%)	SiO_2 (%)	MgO (%)	CaO (%)	MnO (%)
1	95.0	63.4	98.1	43.0	98.6	5.8	0.7	0.7	1.4
2	40.7	64.5	43.0	51.0	50.9	5.5	0.7	0.6	1.2
3	53.1	64.7	54.9	46.0	60.4	4.6	0.6	0.5	1.2
4	76.3	65.7	79.0	48.0	87.5	4.4	0.5	0.4	1.1
5	78.7	65.0	81.4	46.0	88.2	4.7	0.6	0.5	1.2
6	64.5	64.9	66.9	50.0	79.0	4.9	0.6	0.5	1.3
7	67.0	65.5	70.2	48.0	80.2	4.5	0.5	0.5	1.2

13.3.3.7.5.6 Dilution Flotation Tests on Finisher Concentrate

A dilution test following Metso protocol was performed (Metso:Outotec, 2022). It consisted in three cleaner tests of a same iron concentrate. The first two cleaner tests were performed in batch and the third one was performed with specific flotation times in order to determine the kinetics of this process.

Table 13-43 presents the grade, recovery and recovery by stage (S. Rec.) of the dilution test on the finisher concentrate of Year 01-05 composite sample. The results show that a concentrate at 0.8% SiO_2 can be obtained with 95% Fe and magnetite recoveries by retreating the froth in order to increase the iron recovery. These results were in line with the batch tests.

Table 13-43: Phase 2 Magnetic Concentrate Dilution Flotation Tests Results

Stage	Flotation Time (min)	Weight Yield (%)	Fe_T			Magnetite			Main Impurities			
			Grade (%)	Rec. (%)	S. Rec (%)	Grade (%)	Rec. (%)	S. Rec (%)	SiO_2 (%)	MgO (%)	CaO (%)	MnO (%)
Cleaner 1	12.0	73.1	70.4	78.1	78.1	92.0	78.7	78.7	0.5	0.1	0.1	0.5
Cleaner 2	4.0	12.8	69.4	13.5	61.8	89.3	13.4	63.0	1.6	0.3	0.2	0.7
Cleaner 3	10.5	3.1	67.2	3.2	38.1	84.6	3.1	39.3	3.4	0.6	0.3	0.8
Total Concentrate	26.5	89.1	70.1	94.8	-	91.3	95.2	-	0.8	0.2	0.1	0.6

13.3.3.7.6 Conclusion

Figure 13-23 presents the batch flotation testwork results considered for the Pre-feasibility Study flowsheet, i.e., tests performed on:

- Gravity concentrate reground to -212 µm;
- Magnetic concentrate reground at P_{80} = 45 µm.

The following conclusions are drawn:

- Flotation of the gravity concentrate achieved an average SiO_2 grade of 1.8% at an average Fe recovery of 94%;
- Flotation of the magnetic concentrate achieved an average SiO_2 grade of 2.7% at an average Fe recovery of 98%;
- The High RC provided higher SiO_2 grade.

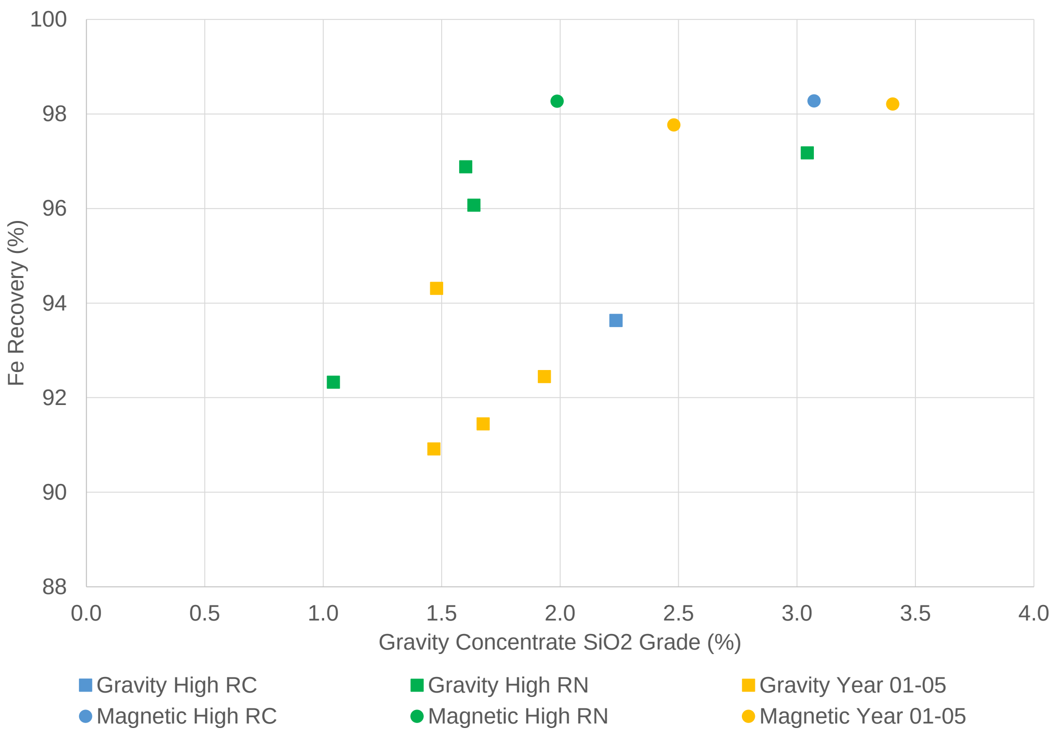


Figure 13-23: Phase 2 Flotation Tests Results

13.3.4 Grindability Testwork

Very limited grindability testwork was undertaken in this PFS considering the numerous testwork performed for the previous studies:

- The SPI tests complemented by IGS simulations results were used to determine the specific grinding energy and operating work index required to handle the increased production capacity projected for the Kami Project;
- As part of the testwork plan, it was decided to perform additional grindability tests to better understand the grinding energy required for the regrind stages:
  - The Bond work index ("BWI") measurement was performed on the spiral tails and cobber concentrate to estimate the magnetic separation circuit regrind ball mill size and power;
  - Jarr Mill grindability tests were performed to estimate the grinding energy required to regrind the gravity concentrate to a P_{100} of 212 µm.

13.3.4.1 AG Mill Sizing

SPI tests (Davies and Imeson, 2012a) and IGS simulation results (Bulled, 2014) were reviewed at the beginning of the pre-feasibility stage to evaluate the potential for higher plant throughput with a larger unit than the 2018 FS selected mill of 36 ft in diameter by 23 ft flange-to-flange.

The plant capacity with a 38 ft diameter AG mill (larger installed AG mill with no wrap around) was estimated with the ore specific grinding energy, determined by IGS simulations, for various maximum downstream capacities. The final nominal capacity was then defined to maximize the usage of the AG mill capacity while limiting the downstream process oversizing.

With this larger AG mill, the downstream limit was finally increased to 3,850 t/h of fresh feed, and the power of the mill was estimated at 15,690 kW using Morrell C-model at the 35% load level. This resulted in a nominal throughput of 3,200 t/h, which was identified as the basis for the revised throughput.

Table 13-44: Calculated Throughput by Mineralization Limited at 3,850 t/h

Calculated Throughput (t/h)	RC Avg	RN Avg	RC1	RC2	RC3	RN1	RN2	RN3	Weighted to Mine Plan
Average	3,207	3,192	3,424	3,305	2,893	3,427	3,417	2,732	3,206

13.3.4.2 Bond Ball Mill Work Index

The 2018 FS Detailed engineering ball mill sizing was based on a nominal BWI of 12.4 kWh/t and a design value of 14.2 kWh/t, values obtained during pilot plant testwork on cobber concentrate. However, no data was found in SGS reports (Davies and Imeson, 2013) and (Davis and Imeson, 2014) to sustain these BWI values.

Also, previous testwork generated BWI data on head samples but no BWI measurement were made on the magnetic separation circuit actual feed material.

For these reasons, additional BWI tests were included in the 2023 testwork plan for validation purposes of the previous data used for ball mill sizing. Two bond ball mill work index tests were conducted:

- On the spiral tails of the Phase 1 spiral production run with a screen reference of 106 µm:
  - The BWI for the spiral tails was 28.3 kWh/t, which could be classified as being very hard (> 20 kWh/t) on the JKMRC hardness classification.

- On the cobber concentrate of the Phase 2 Year 01-05 composite sample magnetic separation production with a screen reference of 75 µm:
  - The BWI for the cobber concentrate was 27.9 kWh/t, which could also be classified as being very hard (> 20 kWh/t) on the JKMRC hardness classification.

The Bond work indexes measured are significantly higher than what was measured and used for previous studies. The fact that the Bond work indexes were previously all performed on run of mine samples having a lower silica grade may be an explanation.

For the ball mill sizing, relations between the silica grade, the grind size and the available Bond Work Index values were used to extrapolate the design BWI value.

For the design cobber concentrate grade, a BWI of 22.7 kWh/t was defined for the regrind of the cobber concentrate at a P_{80} of 75 microns.

13.3.4.3 Jar Mill Grindability Test

A Jar Mill test is a grindability test to determine the specific energy required to grind to a target particle size using a Tower Mill. A Jar Mill test was performed at Corem on each of the three Phase 2 recombined spiral concentrates composite samples, aiming a P_{80} of 180 µm, and results were analyzed by Metso to evaluate a resulting Jarr Mill specific energy.

Table 13-45 presents the result of the Jar Mill tests on the rougher spiral concentrates.

For the design, an average specific energy of 5.3 kWh/t was used. No efficiency factor was applied to the Jar Mill Specific Energy given the fact that the application is outside the typical bounds of regrind tower mill duty. Further pilot testing would be required in the next phase to predict a more accurate specific energy.

Table 13-45: Jar Mill Grindability Test Results

Jarr Mill Test	Description	F_{80} (micron)	P_{80} (micron)	Jarr Mill Specific Energy (kWh/t)
1	High RC	421.8	180	5.06
1	High RN	422.8	180	5.32
3	Year 01-05	414.2	180	5.28

13.3.5 Solid-Liquid Separation

13.3.5.1 Concentrate Thickening and Filtration

For the current PFS, the concentrate dewatering flowsheet has been modified when compared to the flowsheet developed for the previous phases of the Project.

Based on expected particle size distribution for the gravity flotation concentrate, a fractionated dewatering circuit was defined to filter the fine and coarse particles separately. The circuit would include a cyclone stage after gravity flotation, with cyclone underflow reporting directly to filtration via pan filter with utilization of steam-drying. Cyclone overflow would report to a thickener, where it would be combined with the magnetic separation circuit concentrate to be thickened before being filtered via pressure filtration. The cycloning stage ahead of the pan filters removes the fine particles detrimental to pan filtration and generates a coarser concentrate at a high density suitable for filtration with horizontal pan filters.

Representative samples were sent to vendors for filtering tests to validate the final design and performance of the filters.

Pan filtration testing plan on gravity flotation concentrate includes tests without and with pre-classification to assess the gain on pan filtration efficiency. Tests were also conducted with and without steam addition.

According to the results provided by the vendor (Bokela, 2023), the pre-classification sample was necessary to reach the target moisture for the final concentrate. The tests results are presented in Table 13-46. Note that the nominal and maximum solid throughput tested correspond to the throughputs expected from the mass balance simulations (refer to Chapter 17).

Table 13-46: Gravity Flotation Concentrate filtering Tests Results – Pre-classified Sample

Solids Throughput	Steam Demand (kg/t)	Cake Thickness (mm)	Filter Speed (rpm)	Moisture (wt%)
Nominal	0	70-95	0.3-0.5	4.5
Nominal	10-20	70-95	0.3-0.5	< 3
Maximum	0	70-95	0.4-0.7	4.9
Maximum	12-30	70-95	0.4-0.7	< 3

The magnetic separation circuit flotation concentrate filtration test plan includes pressure filtration tests. According to the results (Diemme, 2023), moistures below 10% are achievable with membrane squeeze and blowing, and 8% moisture can be achieved at high-pressure squeeze and blowing.

13.3.5.2 Tailings Thickening

The current PFS tailings flowsheet is also based on separate pumping of the coarse and fine tailings. Magnetite separation circuit tailings are fed to cyclones. The tailings cyclones produce a dense and coarse underflow reporting to the coarse tailings and a fine and dilute overflow that reports to a high-rate thickener. Current design uses previous testwork results and is based on having a thickener overflow water quality having <200 ppm of suspended solids and a thickener underflow solids density of 60% for tailings final disposition to the TMF.

Representative samples of the thickener feed will be sent to vendors for final design validation.

13.3.6 Process Flowsheet and Recovery Model

13.3.6.1 Process Flowsheet

The testwork performed during the PFS permitted to design a revised processing flowsheet that will enable the production of a low silica grade concentrate suitable for direct reduction. The proposed major processing stages are depicted in Figure 13-24.

The testwork has provided confirmations and improvements in the following areas:

- The gravity circuit design and performance are supported by testwork based on a finer feed particle size distribution (100% -600 µm instead of 100% -1,000 µm in the previous studies), which was supported by the mineralogical analysis of the six mineralization types;
- Additional open and closed loop pilot tests on WW6 spirals confirmed the better Fe recovery and SiO_2 rejection performance than previous tests performed on the HC33 spirals;
- The testwork conducted on the Reflux® Classifier lead to iron recoveries above 90% for the production of 3.5-4.5% SiO_2 concentrate, which outperformed the previous cleaner/recleaner spiral results. These results were the basis for the replacement of the two stages of cleaner/recleaner spirals by one stage of Reflux® Classifier cleaning;
- The magnetic separation circuit design is supported by two pilots that permitted to confirm the LIMS recoveries and the required regrind liberation size;
- Both in the gravity and magnetic separation circuits the production of a low silica grade concentrate was tested with success:
  - Reflux® Classifier concentrate reground at -212 µm followed by reverse iron flotation showed that it was feasible to produce a <2% SiO_2 concentrate while maintaining the Fe recovery above 90%;
  - Regrinding of the magnetic separation circuit concentrate at -45 µm followed by reverse iron flotation showed that it was feasible to produce a <3% SiO_2 concentrate while maintaining the Fe recovery above 98%;

- Those positive results were the basis for the addition of regrind and flotation circuits in both the gravity and magnetic separation circuits.

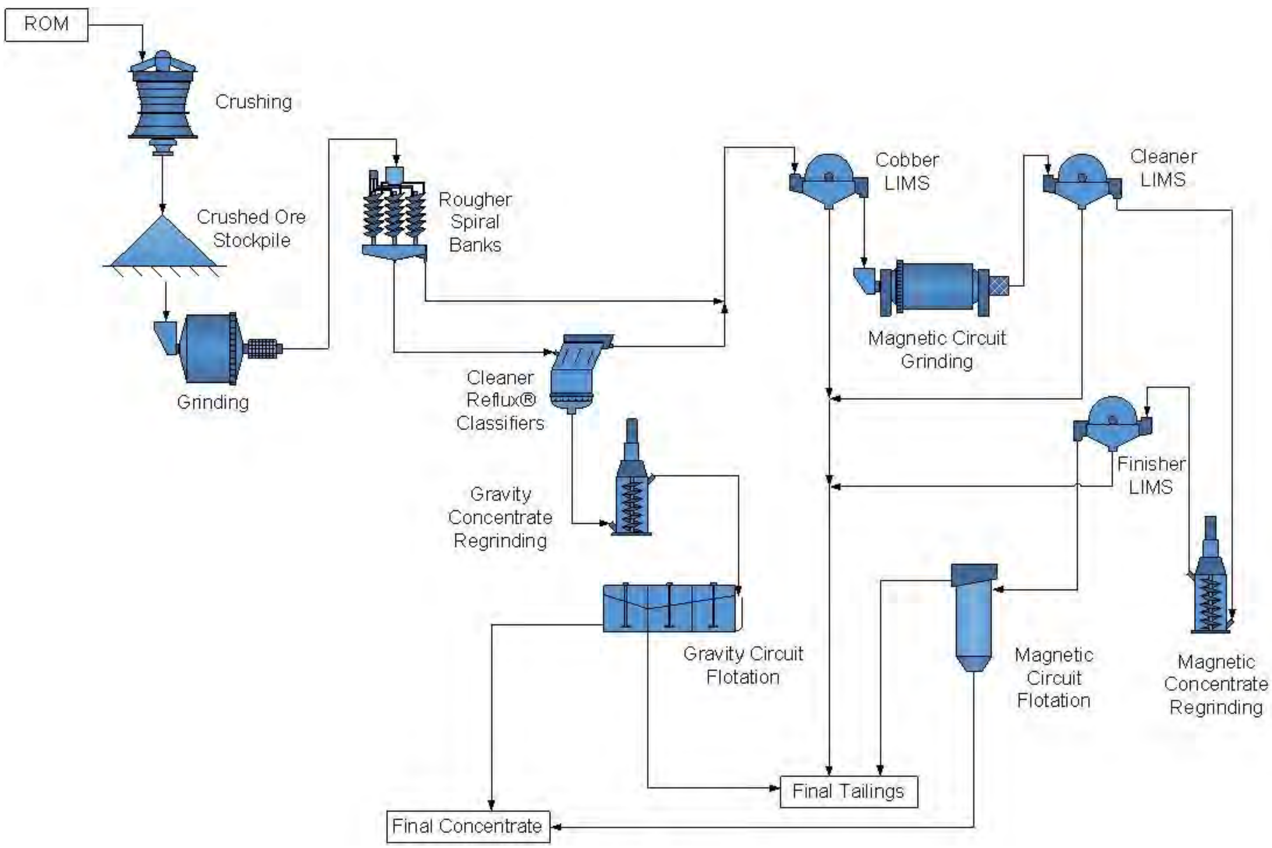


Figure 13-24: Simplified Process Block Diagram

13.3.7 Recovery Models

Following the development of the processing flowsheet, recovery models have been developed for the Fe and MnO. These models have been developed using the following methodology:

- For each process stage, a recovery model was determined based on the testwork data;
- These models were then implemented in the process mass balance that is used to calculate the estimated concentrate recoveries as presented in Chapter 17 of this Report;
- Stochastic simulations were performed with this mass balance considering the developed recovery models and other variables to generate the stream characteristics used for the design as presented in Chapter 17 of this Report;

- Stochastic simulations outputs were used to develop the Fe and MnO recovery models. Considering the complexity of the process flowsheet and of the resulting Fe and MnO recovery equations of this system, a simplified empirical model was identified based on the mass balance stochastic simulations outputs for both the Fe and MnO recovery models.

The following subsections describe specifically each of the models.

13.3.7.1 Fe Recovery Model

The model developed for the Fe recovery of the PFS flowsheet is the following:

$$1.493\ Fe + 71.556\%Fe\ Mag - 1.591Fe \times \%Fe\ Mag + 20.265$$

Where:

- Fe: Plant feed Fe grade;
- %Fe Mag: Plant feed magnetic Fe proportion.

Figure 13-25 presents a comparison between the modelled Fe recovery using the equation above and the simulated Fe recovery provided by the stochastic simulations using the mass balance.

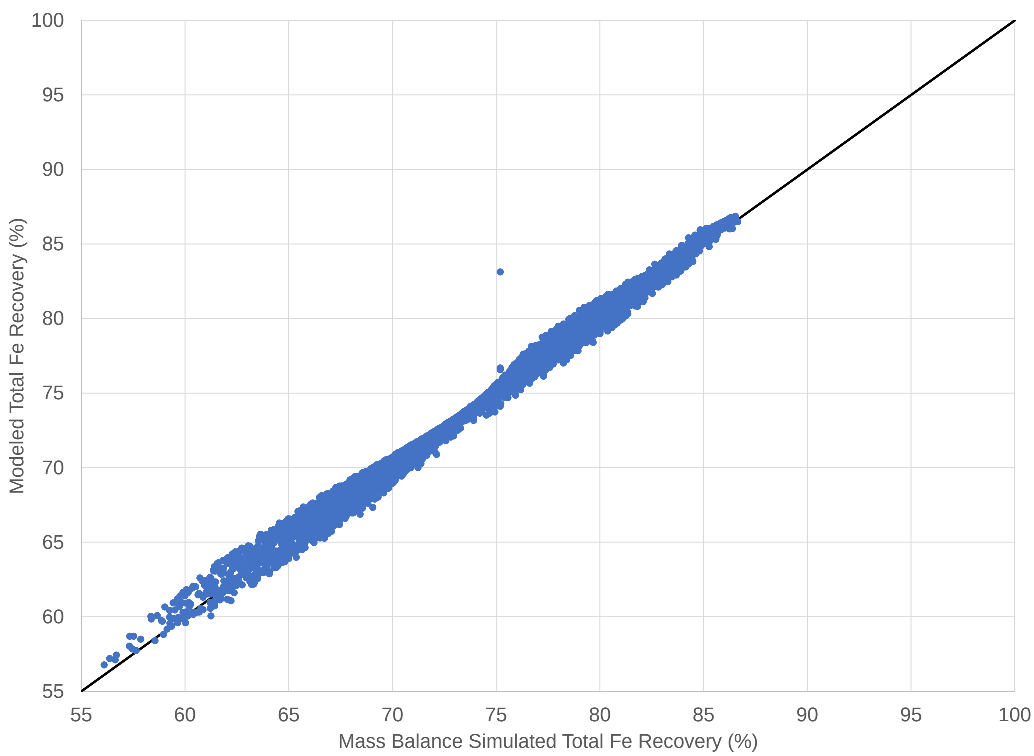


Figure 13-25: Total Fe Recovery Modelled vs. Simulated

13.3.7.2 MnO Recovery Model

The model developed for the MnO recovery of the developed flowsheet is the following:

$$-13.827\ MnO + 1.815\ Fe + 4.422\%\ Fe\ Mag + 9.15\ MnO^2 - 0.467\ (MnO \times Fe) - 5.145$$

Where:

- Fe: Plant feed Fe grade;
- MnO: Plant feed MnO grade;
- %Fe Mag: Plant feed magnetic Fe proportion.

Figure 13-26 presents a comparison between the modelled MnO recovery using the equation above and the simulated Fe recovery provided by the stochastic simulations using the mass balance.

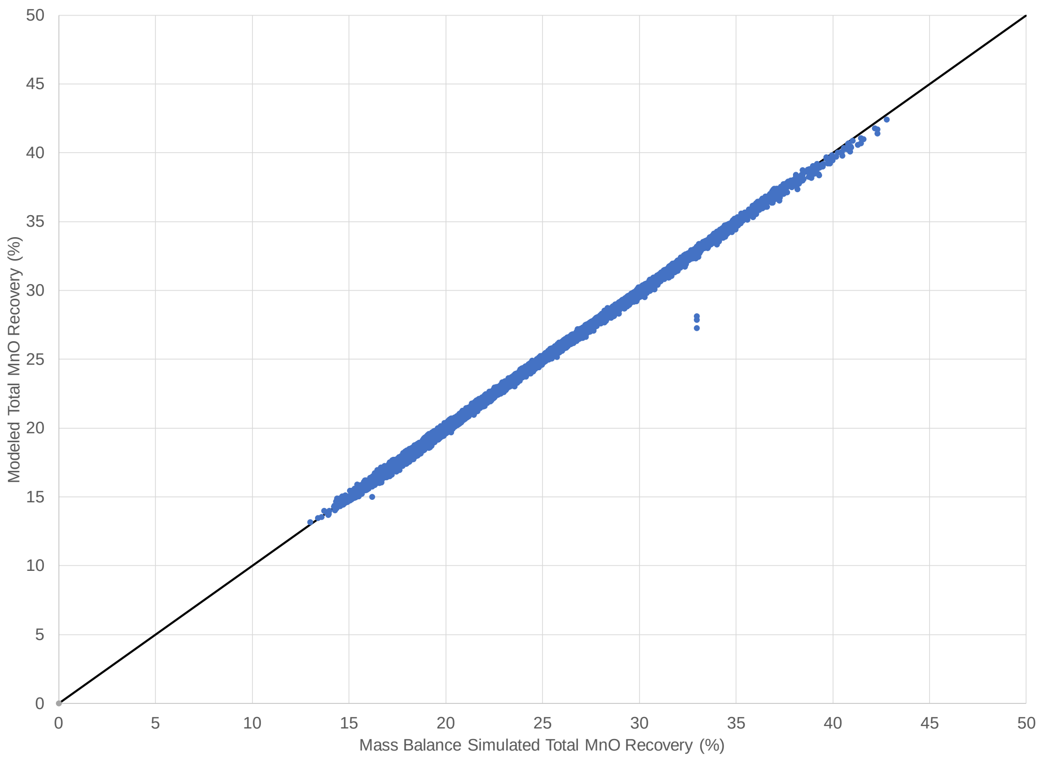


Figure 13-26: Total Mn Recovery Modelled vs. Simulated

13.3.8 Concentrate Specifications

The testwork performed in support of the Kami Project development provides the basis for estimating the final product specification. The estimation is based on the gravity and magnetic separation circuits concentrate characteristics observed during testwork, the projected gravity and magnetic separation circuit concentrate proportions as defined in the mass balance as well as the above-described recovery models. The moisture content represents an annual average, which includes steam injection during the winter months for the gravity concentrate. This is presented in Table 13-47.

Table 13-47: Projected Kami Concentrate Analysis (%)

Parameter	Unit	Value
Mineral Composition - Typical		
Fe	%	67.6
Fe_3O_4	%	55.5
SiO_2	%	2.1
Al_2O_3	%	0.25
MgO	%	0.35
CaO	%	0.30
Na_2O	%	0.10
K_2O	%	0.01
TiO_2	%	0.03
MnO	%	1.10
P_2O_5	%	0.02
Cr_2O_3	%	0.09
V_2O_5	%	0.01
ZrO_2	%	0.02
ZnO	%	0.01
LOI	%	-0.75
Moisture	%	4.5
Specific Gravity	-	5
Particle Size (percent cumulative passing)		
212 µm	%	100.0
150 µm	%	81.9
106 µm	%	54.9
75 µm	%	35.7
53 µm	%	23.2
38 µm	%	13.0
D80	µm	147
D50	µm	98

14. Mineral Resource Estimates

The Mineral Resource Estimate ("MRE") of Champion's Kami deposits presented herein represents an update from the previous Updated Feasibility Study ("FS") of the Kamistiatusset Iron Property ("Kami"), completed by BBA in 2018 (Grandillo et al., 2018). Previous Mineral Resources Estimate was done by Watts, Griffis and McOuat Ltd. ("WGM").

14.1 Estimation Methodology

The Mineral Resources reported herein have been interpolated into a sub-block model using the modelled lithological zones for each deposit, Rose Central ("RC"), Rose North ("RN") and Mills Lake, separately.

The procedures summarized below represent the resource estimate methodology used by GMS:

- Drillhole database validations and selection of the drillholes to be included in the Mineral Resource estimation;
- 3D modelling of geological wireframes based on lithology types and magnetite vs. hematite content as described in Chapter 7;
- Geostatistical analysis for data conditioning: capping, compositing and variography;
- Block modelling and grade estimation;
- Resource classification and grade interpolation validations;
- Grade and tonnage sensitivities to cut-off grade scenarios;
- Gains and losses analysis with previous resource estimate (Grandillo et al., 2018).

14.2 Resource Database

To complete an updated MRE for the Kami Project, a database in acQuire format was retrieved by Champion in Alderon's installations. An incomplete MS Access database was also extracted, which permitted cross-validation of data between the two datasets. The database in acQuire format was provided to GMS on December 6, 2021. All drillhole collar information is recorded in the NAD83/UTM Zone 19 North coordinate system. When data was originally recorded in NAD27, transformations were applied to the coordinates. The database used for the MRE included the following information:

- Collar information;
- Downhole surveys;
- Assay table, including Satmagan, Titration and Davis Tube results;

- Lithology table;
- Weathering table;
- Downhole probe density measurements and other geophysical properties.

No new drilling has been completed since the latest Updated Feasibility Study (2018). The drilling database comprises 237 diamond drillholes ("DDH"), targeting four areas: Rose (Central and North), Mills Lake, Mart Lake and Rose SW. Several holes are abandoned holes due to lost core and bad recovery, resulting in a total 194 holes out 220 targeting the Rose and Mills Lake areas, host of the iron ore deposits.

A summary of the drillhole database used for the Rose and Mills Lake MRE is presented in Table 14-1, with total assays. To evaluate magnetite and hematite content, an array of tests was performed on samples (see Chapter 11). A summary of assays for magnetite content (Satmagan) and for hematite content (Davis Tube and/or titration assays) is presented in Table 14-2. Nearly all intervals assayed by XRF were also assayed for mineralogy relevant to the project.

Table 14-1: Summary of DHs and Assay used for the MRE

Deposit	Number of Drillholes	Total Drilled (m)	Total of Assays - XRF	Total Assayed (m)
Rose	157	53,320.0	10,650	31,847.6
Mills Lake	37	7,647.5	1,342	4,077.4
Total	194	60,968	11,992	35,925

Table 14-2: Summary of Mineralogical Assays

Deposit	Total of Satmagan Assays	Total Satmagan (m)	% Satmagan of Total XRF Assays	Total Fe^{2+} Assays (Titration or DT)	Total Fe^{2+} (m) (Titration or DT)	% Fe^{2+} of Total XRF Assays
Rose	10,643	31,788.6	99.8%	10,255	30,711.1	96%
Mills Lake	1,328	4,008.1	98.3%	1,328	4,008.1	98%
Total	11,971	35,797	99.6%	11,583	34,719	97%

Only one drillhole (K-10-27) was ignored during the process of geological modelling and block modelling because of its near-vertical plunge and uncertainty regarding the geological interpretation. This hole is in a densely drilled area.

14.3 Mineral Phases

Total iron ("TFe") alone does not represent potentially recoverable iron since it includes all iron-rich mineral phases, such as magnetite and hematite, but also iron silicates and carbonates. To properly segregate the different units as magnetite- and/or hematite-rich ones, the total iron content was divided into three main components: iron associated to magnetite ("Magn_Fe"), to hematite ("Hem_Fe") and to other iron minerals ("Other_Fe"). Data from Satmagan, titration and Davis Tube were used to determine the content of each mineral phases. It must be noted that it is impossible to decipher hematite from the limonite/goethite mineral phases.

Table 14-3: Element to Oxide Multipliers used in Calculations

Element	To oxide	Multiplier
Fe	Fe_3O_4	1.3820
Fe	FeO	1.2865
Fe	Fe_2O_3	1.4297
Fe^{2+} in magnetite		0.3333

Satmagan measures the amount of magnetite in a sample, expressed as Fe_3O_4. Iron contained in magnetite is calculated with the following formula, where *Magn_Fe* is the iron ("Fe") associated to magnetite:

$$Magn\_Fe = \frac{Fe3O4\ (from\ Satmagan)}{1.3820}$$

Before evaluating the hematite content, the proportion of other iron minerals (iron carbonates and silicates) have to be calculated first. Since titration assays are not available for all intervals, the other iron minerals must be calculated in three steps:

1. Calculate iron from other iron minerals using the titration assays.
2. Where titration assays are unavailable, calculate iron from other iron minerals using the Davis Tube tests.
3. Merge the two calculations, with higher precedence to titration tests.

Iron by titration measures the Fe^{2+} available in a sample and reports it as FeO. This step calculates the Fe^{2+} in the sample that is associated with iron silicates and carbonates (compensating for the Fe^{2+} in magnetite, assuming a 1/2 ratio of Fe^{2+}/Fe^{3+} in magnetite). When titration is unavailable, Davis Tube ("DT") tests are used to determine the Fe^{2+} associated with other iron minerals. This manipulation is possible because FeO analysis was generally made on the Davis Tube Tails. This is done by calculating the recovery of Davis Tube Tails and multiplying it by the Fe^{2+} available in a sample (*FeO_NonMag_pct* below). The formulas used are presented below:

$$1 - Other\_Fe\ (Titration) = \frac{FeO\ (by\ titration)}{1.2865} - (Magn\_Fe \times 0.333)$$

$$2 - Other\_Fe\ (DT) = \frac{NonMag\ weigth\ (from\ DT)}{NonMag\ weigth\ (From\ DT) + Mag\ weigth\ (from\ DT)} \times \frac{FeO\ (from\ DT\ Tails)}{1.2865}$$

The last step is to derive the iron associated with hematite (and also limonite and goethite) using the following equation:

$$Hem\_Fe = Total\ Fe\ (from\ XRF) - Magn\_Fe - Other\_Fe$$

14.4 Modelling of Geological Units

The MRE of Kami relies heavily on the geological model. A similar approach to WGM was used to model the different geological units. GMS reviewed the previous geological model with the data available (drillhole data, geophysical inversion, and drill core observations). The model was found to be a reasonable interpretation of the data it is based on, except for the south-eastern fold limb of the southmost fault block of Rose Central where drilling is insufficient. Nevertheless, a new model was created to revise or improve some key aspects of the model: re-interpretation of contacts between units, remodelling of locally expanding units at depth where not supported, adding of new units (SIF), re-interpretation of internal waste units and removal of the south-eastern fold limb of the southmost fault block of Rose Central. A new limonite-goethite model was also generated in the Rose North area mostly from the weathering log table.

Based on the global geometry of the previous model, the new model has new contacts that rely on, depending on the area, and generally in that order:

- Hematite content;
- Magnetite content;
- Magnetite/Hematite ratio;
- Lithology (as logged);
- MnO content;
- Specularite occurrences;
- Grain size.

The Kami deposit was subdivided into three different geological models, namely Rose Central, Rose North and Mills Lake. Description of each unit can be found in Section 7.3. Geological modelling was done in Leapfrog Geo (v.2021.1) using the interval selection tool, based on the assay and lithological tables. Whenever possible, each interval was assigned to a specific unit, listed below. Contacts between units were created based on the pre-selected intervals with the available Leapfrog tools, such as *Deposit*, *Erosion* or *Structural Surface*. All contact surfaces snap to the analysis interval contact, except in very rare occasions where the drillhole orientation did not permit snapping. Several manual editing polylines, points or structural data were added to refine the model.

The previous model by Alderon was subdivided by three NW-trending faults interpreted as normal faults with movements of 40 m to 180 m (Grandillo et al., 2018). GMS could not validate the presence of these structural features based on field observations, but the distribution of lithological units on each side of the faults gave weight to this interpretation. GMS used the same faults, as in the previous geological model, to separate each Rose model into three fault blocks. Mills lake is not affected by this faulting.

All drillhole collars were assigned a new elevation based on the topography surface. All geological surfaces were cut by the overburden surface.

14.4.1 Rose Central

Rose Central geological model (Figure 14-1 and Figure 14-2) includes the following units, in chronological order:

1. Basement rocks;
2. SIF_RC1 (waste unit);
3. RC1;
4. RC2;
5. RC23_W (waste unit);
6. RC3;
7. Overlying rocks;
8. Overburden.

14.4.2 Rose North

Rose North geological model (Figure 14-1 and Figure 14-2) includes the following units, in chronological order:

1. Basement rocks;
2. SIF_RN1 (limonite-goethite rich unit);
3. RN1;
4. RN2;
5. RN23A_W (waste unit);
6. RN3A;
7. RN3AB_W (waste unit);
8. RN3B;
9. Overlying rocks;
10. Overburden.

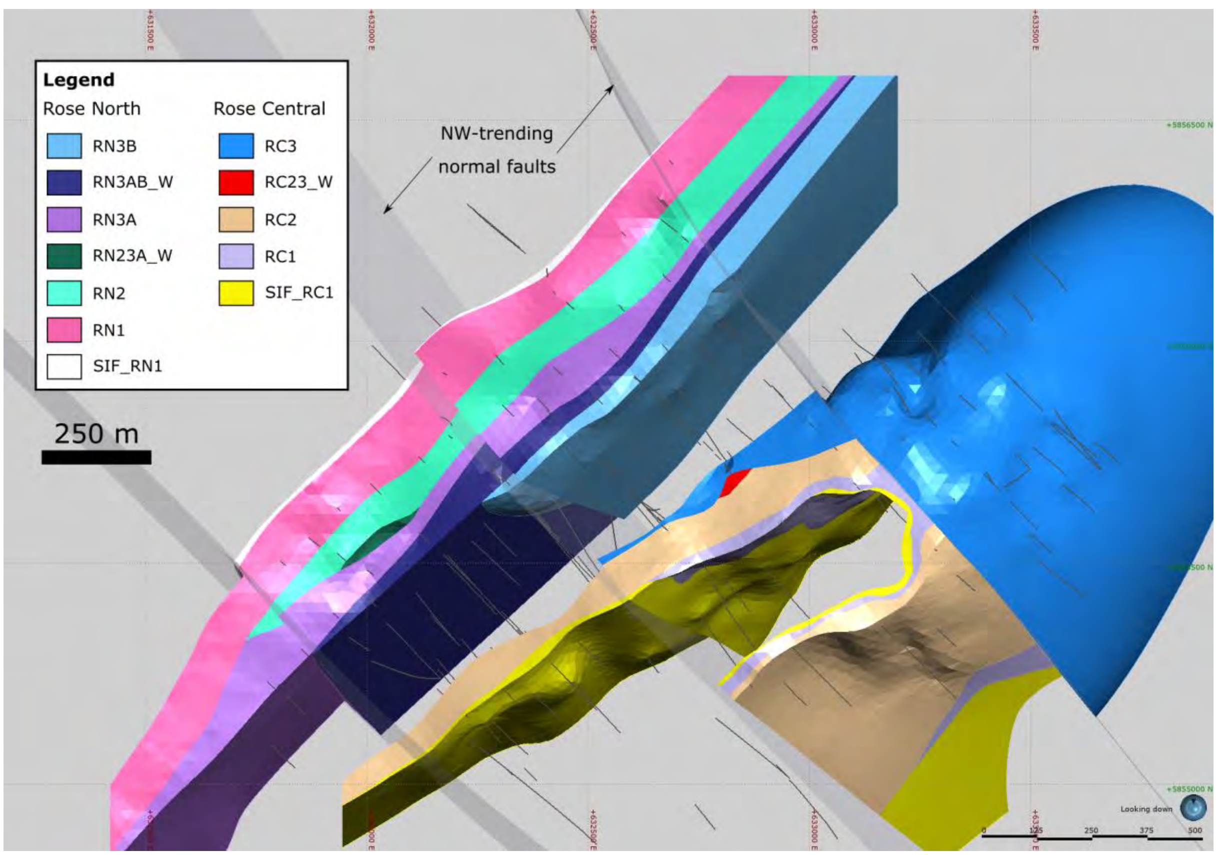


Figure 14-1: Rose North and Rose Central Geological Models – Plan View

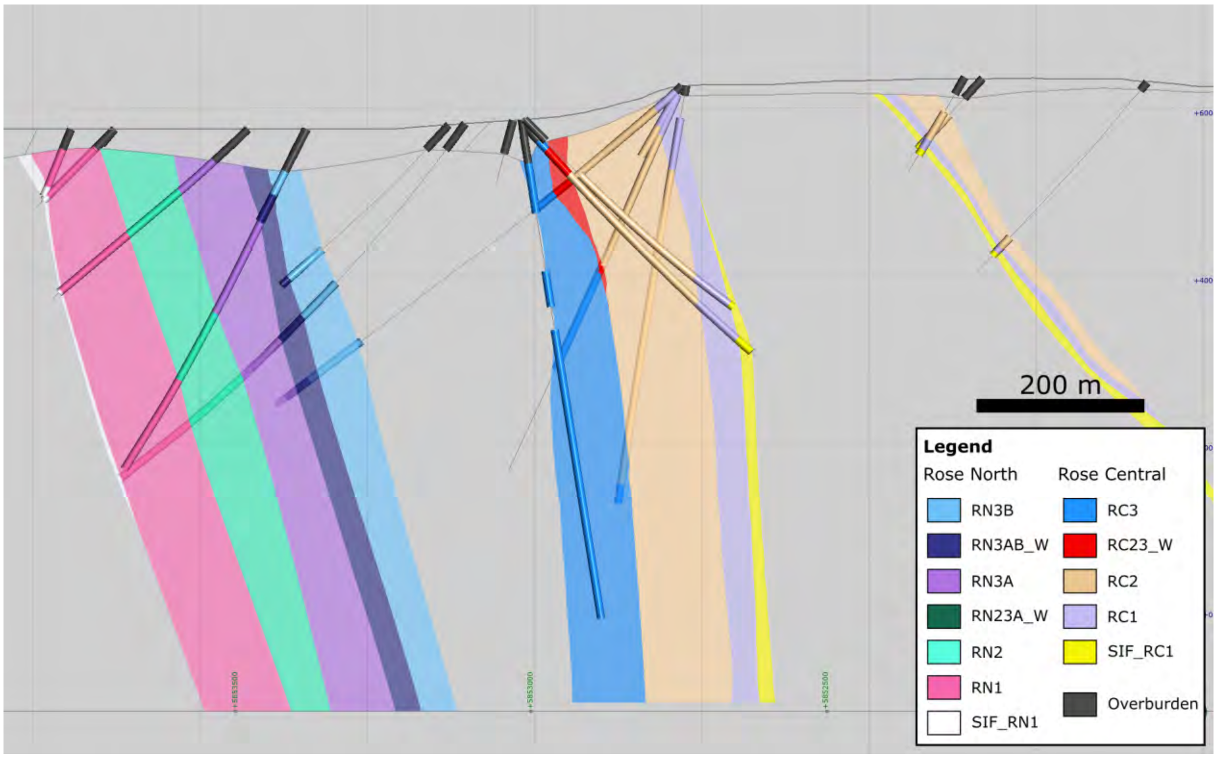


Figure 14-2: Rose North and Rose Central Geological Models – Cross Section Looking NE

14.4.3 Mills Lake

Mills Lake geological model (Figure 14-3 and Figure 14-4) includes the following units, in chronological order:

1. Basement rocks (waste unit);
2. M_MM;
3. M_HZ (enclosed within M_MM);
4. M_W_MID (intermediate waste unit);
5. M_UM;
6. Overlying rocks (waste unit);
7. Overburden.

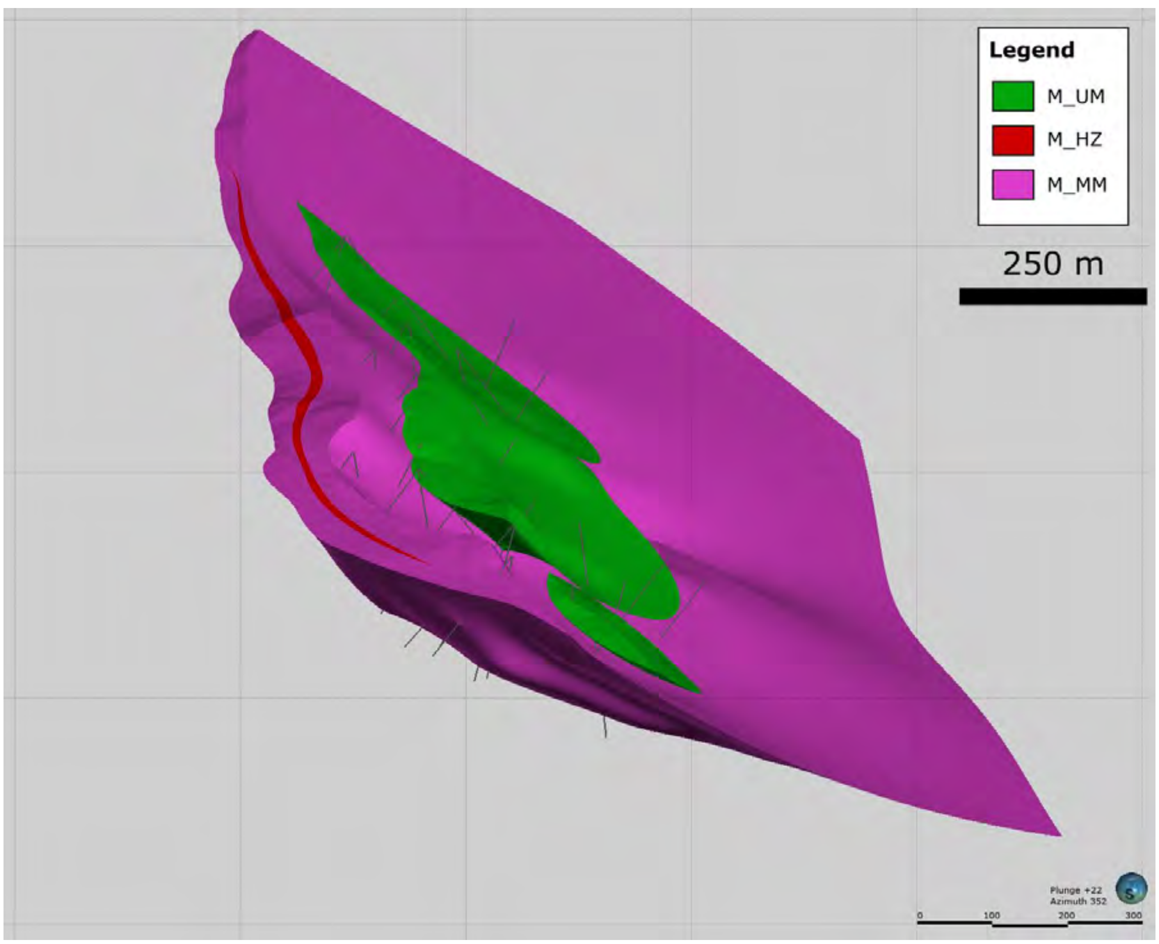


Figure 14-3: Mills Lake Geological Model – 3D Plunging View Looking NNW

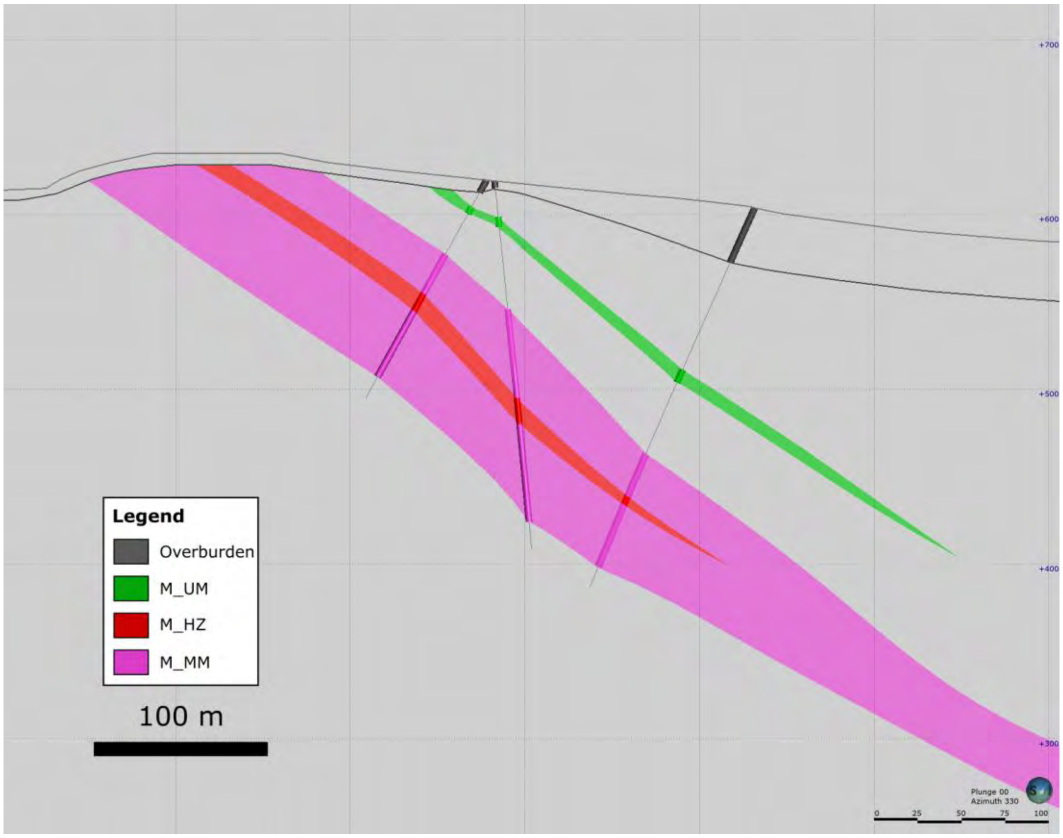


Figure 14-4: Mills Lake Geological Model – Cross Section Looking NW

14.4.4 Dilution Skin Model

A dilution skin of 6 m around all combined domains was created. This is to ensure that density and background grades are better defined when reblocking will occur for the Mineral Reserve estimation and assuming the appropriate dilution grades.

14.4.5 Topographic and Overburden Models

The topographic surface has been provided by Champion and is a Lidar survey from September 2011. All drillhole collars were pressed on this topographic surface. For Rose deposits, collars were displaced vertically by an average of 0.9 m, ranging from -2.45 m to 3.88 m. For Mills Lake deposit, collars were displaced vertically by an average of 1.14 m, ranging from -2.96 m to 1.21 m.

The overburden surface was created as an offset from the topographic surface using the "overburden'" lithological codes. This method ensures that the overburden surface does not overlap on the topography. Some manual contact points were added locally to ensure that overburden depth was not exaggerated on top of hills.

14.5 Assays, Capping and Compositing

For the current MRE, several chemical elements were investigated for potential grade capping: Al_2O_3, CaO, Fe, Fe associated with magnetite, Fe associated with iron silicates/carbonates, MgO, MnO and SiO_2. Capping of any of the elements was not judged mandatory, based on statistical analysis, histogram distribution and probability plot curves. The very few outliers found in the database were generally from short length assays (<3 m) or could be explained by the geological context (e.g., aluminum-rich sub-layer of a specific sedimentary unit). Statistics, histograms, and probability plots were generated for all listed elements, and all sub-domains of each three deposits. Table 14-4 presents a summary of total iron (TFe) assays basic statistics for all domains and Table 14-5 presents the assay means of all elements divided by sub-domains. As observed from these tables, the difference between sub-domains generally resides in hematite content (RC1 versus RC2 versus RC3, RN1 versus RN2, M_MM versus M_HZ), or in contaminant content (RN2 versus RN3A/B). Locally iron in magnetite also served as a proxy for isolating units (RN2 vs RN3A). Figure 14-5, Figure 14-6 and Figure 14-7 show Fe grade distribution by deposit.

Iron in hematite is shown for reference only. Only total iron, iron in magnetite and iron in other iron minerals were interpolated in the block model; iron in hematite was calculated from those two attributes after interpolation.

Table 14-4: Total Iron (TFe) Assay Summary Statistics for all Sub-Domains

Domain	Count	Length	Mean	SD	CoV	Minimum	Median	Maximum
RC1	687	2,114	31.19	4.65	0.15	7.41	31.41	50.43
RC2	2,765	8,383	29.03	7.48	0.26	1.82	30.50	56.94
RC3	1,316	4,090	27.63	5.77	0.21	1.42	27.28	62.67
SIF_RN1	67	195	35.34	6.77	0.19	10.84	35.11	54.28
RN1	1,620	4,734	33.06	7.28	0.22	4.08	34.27	57.84
RN2	1,032	3,020	29.96	4.69	0.16	16.23	29.52	45.32
RN3A	721	2,157	26.22	3.74	0.14	0.38	26.23	46.30
RN3B	319	934	27.70	5.04	0.18	7.20	27.84	42.46
M_MM	849	2,597	30.00	3.44	0.11	6.24	30.15	46.58
M_HZ	109	305	33.72	3.70	0.11	6.36	34.27	41.90
M_UM	120	344	29.38	3.57	0.12	6.38	29.52	38.12

Table 14-5: Mean Assay Grades of Various Elements Included in the MRE

Domain	Fe (%)	Fe in Magn. (%)	Fe in Hem. (%)	Fe in Other Min. (%)	Al_2O_3 (%)	CaO (%)	MgO (%)	MnO (%)	SiO_2 (%)
RC1	31.19	6.25	23.47	1.51	0.23	2.52	2.47	4.02	42.08
RC2	29.03	18.31	6.94	3.85	0.39	3.40	2.16	2.00	45.50
RC3	27.63	20.20	2.27	5.30	0.66	3.84	2.71	0.86	47.28
SIF_RN1	35.34	1.49	31.10	2.74	1.58	0.24	0.43	1.55	36.68
RN1	33.06	4.88	27.85	0.23	0.14	0.13	0.20	1.59	49.42
RN2	29.96	18.79	8.46	2.73	0.23	1.22	1.58	0.95	50.15
RN3A	26.22	14.33	7.49	4.46	0.27	1.96	1.87	0.59	53.18
RN3B	27.70	17.51	6.98	3.25	0.85	2.00	1.80	0.69	51.25
M_MM	30.00	23.96	3.68	2.47	0.40	2.15	3.14	0.69	47.77
M_HZ	33.72	2.27	30.65	0.81	0.31	2.07	2.10	6.11	35.79
M_UM	29.38	22.03	0.70	6.80	0.38	3.94	3.04	0.81	44.04

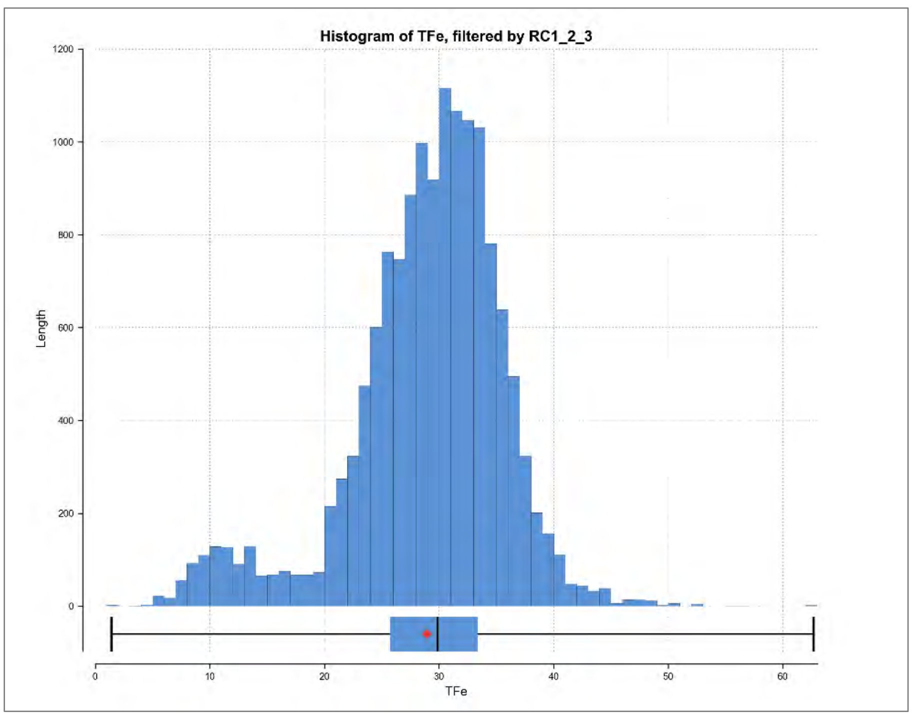


Figure 14-5: Total Iron Histogram of Rose Central (RC1, RC2 and RC3 combined)

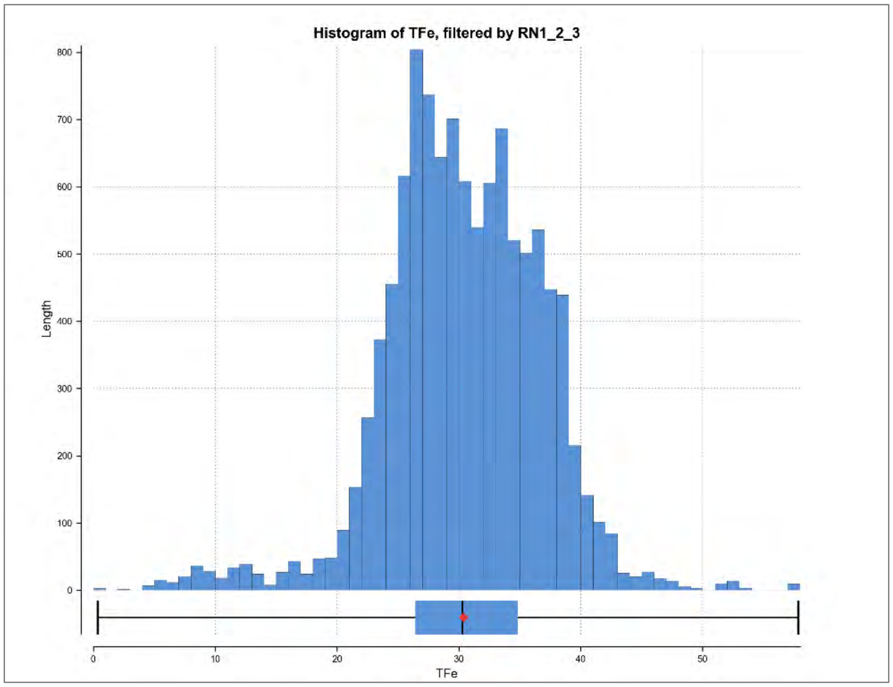


Figure 14-6: Total Iron Histogram of Rose North (RN1, RN2, RN3A and RN3B combined)

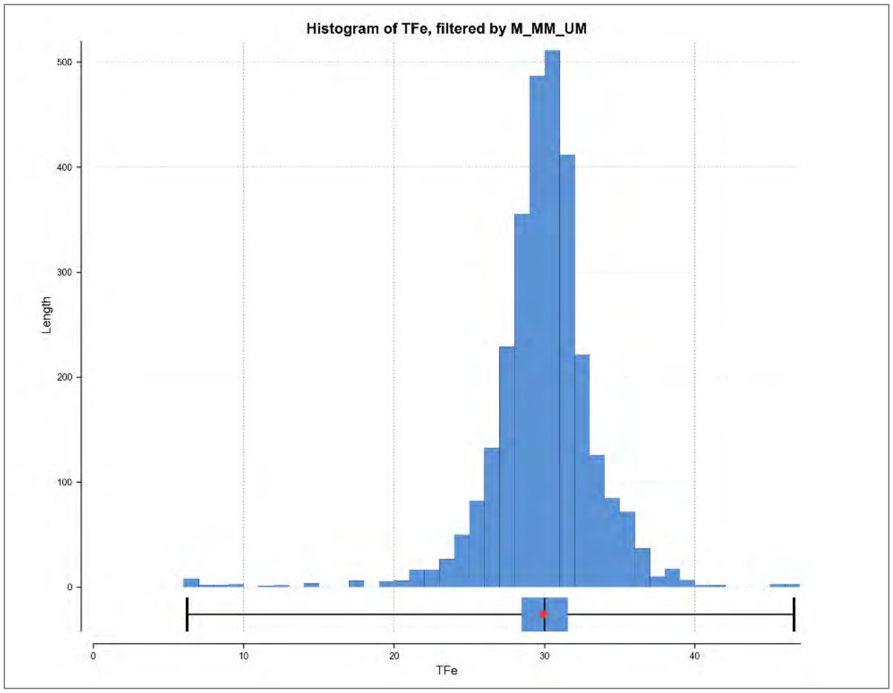


Figure 14-7: Total Iron Histogram of Mills Lake (M_MM and M_UM combined)

To standardize the sample lengths used during block model interpolation, drillhole assay intervals of all elements listed above for all deposits were composited. Composite of 3.0 m (downhole, within boundaries) were generated for all geological domains, with composite residuals less than 1.0 m retained and included in the previous composite interval. A sample coverage of 50% of the composite length was also necessary to create the composite. A visual validation of composite creation was completed to with an emphasis on areas with missing intervals.

The choice of composite length was based on the most sampled interval length (see Figure 14-8), block size and also to better honour locally thinner domains (SIF_RC1, RC1 and SIF_RN1). Approximately 81% of all assays of the database have a sample length equal or lower than 3.0 m.

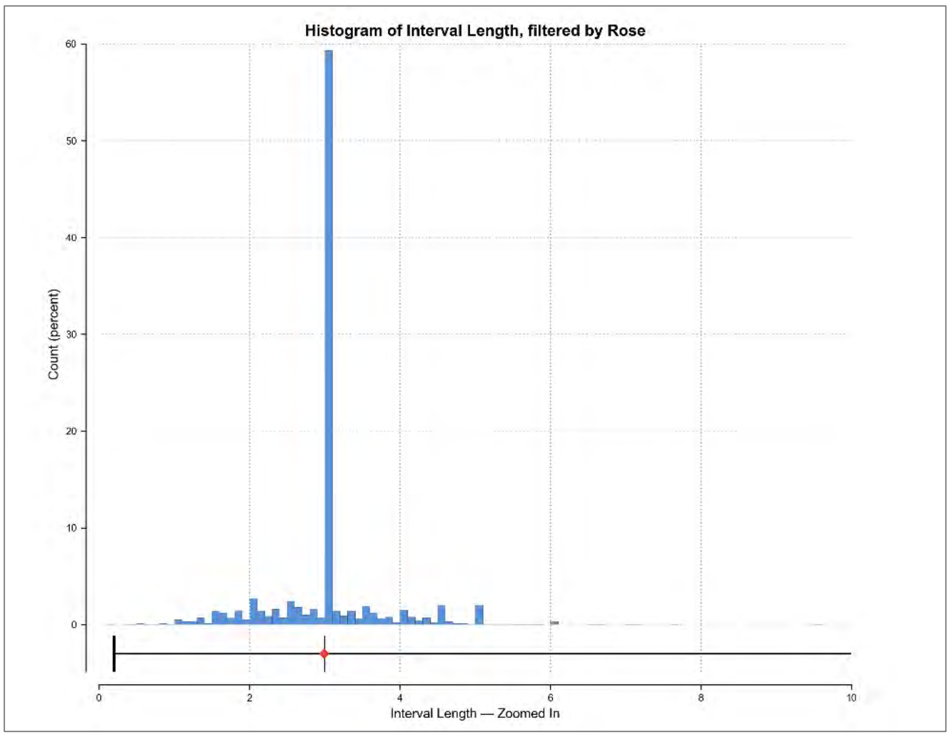


Figure 14-8: Sample Lengths for Rose Central and Rose North Combined

Table 14-6 presents a summary of total iron (TFe) composite basic statistics for all domains and Table 14-7 presents the composite means of all elements divided by sub-domains. When compared to assays statistics, very little variance is observed between the two datasets.

Iron in hematite is shown for reference only. Only total iron, iron in magnetite and iron in other iron minerals were interpolated in the block model; iron in hematite was calculated from those two attributes after interpolation.

Table 14-6: Total Iron (TFe) Composites Summary Statistics for all Sub-Domains

Domain	Count	Length	Mean	SD	CoV	Variance	Minimum	Median	Maximum
RC1	711	2,113	31.19	3.96	0.13	15.72	15.81	31.48	44.97
RC2	2,804	8,384	29.04	6.96	0.24	48.38	4.69	30.43	50.36
RC3	1,372	4,092	27.63	5.44	0.20	29.54	5.42	27.21	48.88
SIF_RN1	67	192	35.37	5.81	0.16	33.79	22.17	35.17	51.06
RN1	1,584	4,733	33.05	6.59	0.20	43.41	5.32	34.13	57.84
RN2	1,014	3,022	29.96	4.47	0.15	19.94	18.23	29.47	42.11
RN3A	728	2,157	26.22	3.33	0.13	11.09	11.12	26.31	42.33
RN3B	315	936	27.70	4.52	0.16	20.44	9.35	27.77	39.94
M_MM	880	2,598	30.00	3.01	0.10	9.08	10.26	30.11	46.58
M_HZ	107	305	33.72	3.01	0.09	9.06	20.49	34.09	41.48
M_UM	118	344	29.38	3.05	0.10	9.30	17.34	29.32	36.97

Table 14-7: Mean Composite Grades of Various Elements Included in the MRE

Domain	Fe (%)	Fe in Magn. (%)	Fe in Hem. (%)	Fe in Other Min. (%)	Al_2O_3 (%)	CaO (%)	MgO (%)	MnO (%)	SiO_2 (%)
RC1	31.19	6.25	23.46	1.51	0.23	2.52	2.47	4.01	42.08
RC2	29.04	18.31	6.94	3.85	0.39	3.40	2.16	2.00	45.50
RC3	27.63	20.20	2.27	5.30	0.66	3.84	2.71	0.86	47.28
SIF_RN1	35.37	1.51	31.16	2.71	1.59	0.24	0.43	1.56	36.61
RN1	33.05	4.87	27.85	0.23	0.14	0.13	0.20	1.59	49.43
RN2	29.96	18.79	8.46	2.74	0.23	1.22	1.58	0.95	50.15
RN3A	26.22	14.33	7.49	4.46	0.27	1.96	1.87	0.59	53.18
RN3B	27.70	17.53	6.98	3.25	0.85	2.00	1.79	0.69	51.25
M_MM	30.00	23.96	3.69	2.47	0.40	2.15	3.13	0.69	47.77
M_HZ	33.72	2.27	30.65	0.81	0.31	2.07	2.10	6.11	35.79
M_UM	29.38	22.03	0.70	6.80	0.38	3.94	3.04	0.81	44.04

14.6 Bulk Density Calculation

To assign density to most mineralized blocks of the block models, a similar but adjusted methodology to WGM was used as data was investigated per domain and with multiple inputs (SiO_2, MnO). Down hole probe data measurements (see Section 11.6) were used to derive a regression formula using total iron, given its strong correlation with bulk density. Multivariate tests with deleterious elements were found inconclusive. For all rock types, except limonite rich domains, near density probe measurements were used to generate a predictive formula based on iron content. For limonite rich domains, the predictive formula based on far density probe measurements had better correlation. Table 14-8 summarizes how the density was calculated and integrated in the block model.

Table 14-8: Density Designation in the Block Model

Domain	Density used	Source
RC	2.778 + 0.0236 x TFe	3-m composited near density probe measurements
RN	2.781 + 0.0225 x TFe	3-m composited near density probe measurements
Mills (Magn)	2.795 + 0.0250 x TFe	3-m composited near density probe measurements
Mills (Hem)	2.897 + 0.0299 x TFe	3-m composited near density probe measurements
Limonite	2.530 + 0.0219 x TFe	3-m composited far density probe measurements
Overburden	2.35 g/cm3	Alderon 2018 report
Waste	Interpolated	3-m composited far density probe measurements
Waste (no TFe)	2.83 g/cm3	Average

14.7 Variography

Experimental variograms were produced by GMS for each domain based on the 3 m composites and were aligned with the clearest angle of continuity. Given the folded nature of the deposit, one variogram per domain was modelled by filtering data for a single limb of the fold and was later applied to the whole unit. Pitches were manually fixed at 0° for the same reason for Rose Central. Variograms were produced for the following elements: TFe, CaO, MgO and SiO_2. For Total iron, variogram parameters were applied to iron associated to magnetite and iron associated to "other iron minerals". Parameters are shown in Table 14-9 for reference and an example for RC2 is displayed in Figure 14-9. Ranges of the sill generally go above 150 m, as expected for a sedimentary iron deposit. Clear variograms were not always achievable given the locally erratic drill spacing. Grade distribution of Al_2O_3 and MnO did not yield satisfactory variogram models.

Table 14-9: Variogram Parameters for Total Iron

Domain	Direction			Nugget	Structure 1				Structure 2			
	Dip	Dip Azimuth	Pitch		Sill 1	Major	Semi-major	Minor	Sill 2	Major	Semi-major	Minor
RC1	85	148	0	0.30	0.45	85	70	7	0.25	160	130	25
RC2	79	145	0	0.10	0.57	80	15	13	0.33	135	85	35
RC3	85	140	0	0.10	0.34	95	20	13	0.56	170	100	35
RN1	65	134	170	0.10	0.44	50	53	9	0.46	162	100	35
RN2	68	136	170	0.10	0.61	80	55	15	0.29	190	110	35
RN3A	68	136	0	0.10	0.62	96	60	15	0.28	190	105	35
RN3B	71	134	170	0.10	0.53	121	82	14	0.37	190	130	35
M_MM	30	80	5	0.18	0.44	125	60	12	0.38	185	105	40
M_UM	30	80	5	0.18	0.44	125	60	12	0.38	185	105	40

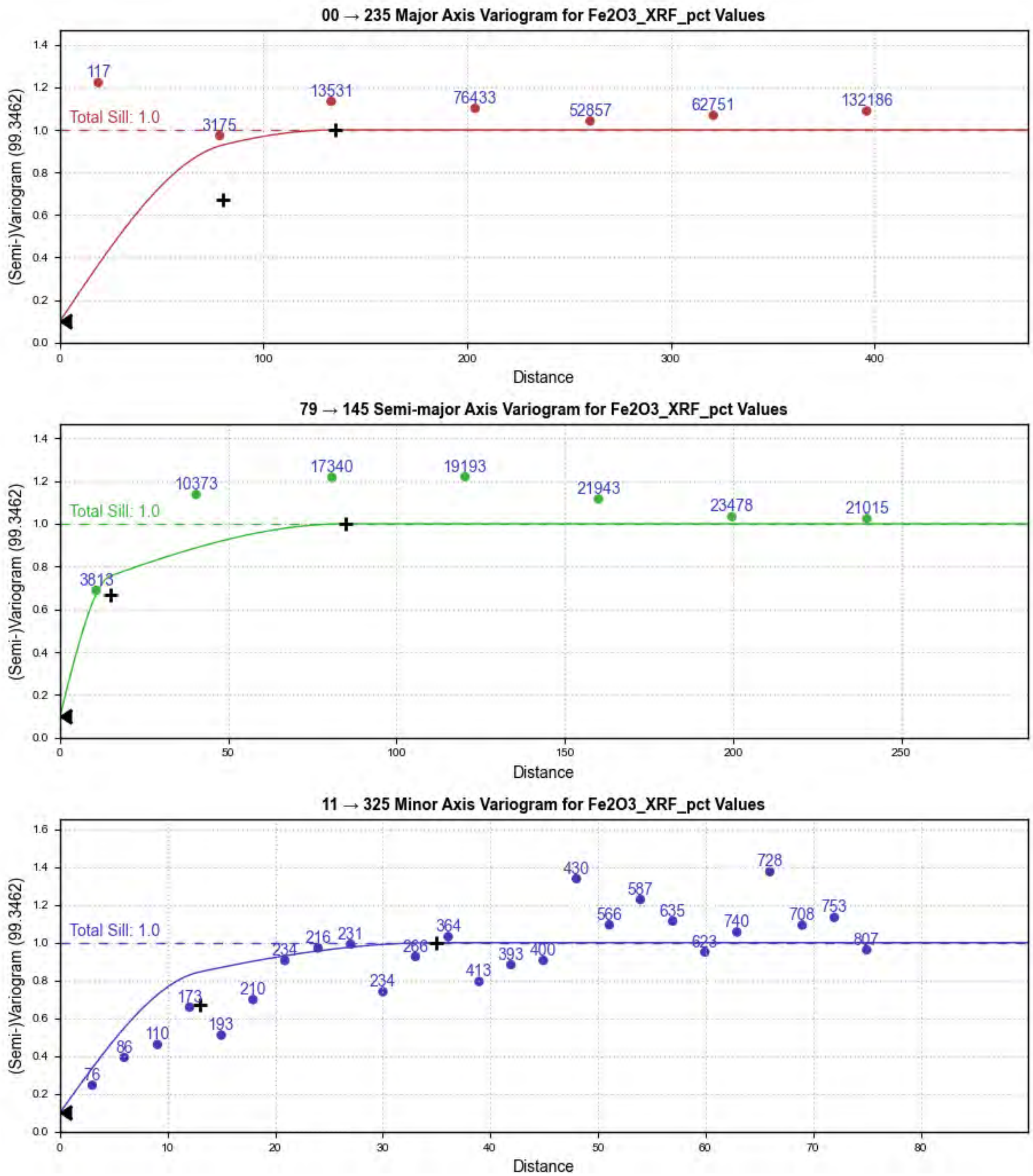


Figure 14-9: Example of Experimental Variogram for Fe_2O_3 – RC2 Domain

14.8 Block Modelling

Separated rotated sub-blocked models were created for Rose (North and Central combined) and Mills Lake. Dimensions and parameters are presented in Table 14-10 and their general display is shown in Figure 14-10.

Each block models were created with a parent block size of 10 m x 20 m x 10 m and a sub-block of 5 m x 10 m x 5 m. The sub-block triggers are the topography, the overburden surface, the geological models, and the 6 m dilution skin surrounding all domains. GMS validated the volume of each geological unit wireframes against the block model volumes. Results show that volumes are very well represented by the block model parent and sub-block sizes.

Table 14-10: Block Models Parameters and Dimensions

Deposit	Description	Easting (m)	Northing (m)	Elevation (m)
Rose	Origin coordinates	630,700	5,855,500	735
	Parent / Sub-block size	10/5	20/10	10/5
	Number of blocks	248	191	83
	Rotation	45°		
	Sub-block triggers	Topography, overburden, geological model, dilution skin		
Mills	Origin coordinates	634,120	5,850,625	700
	Parent / Sub-block size	10/5	20/10	10/5
	Number of blocks	158	95	56
	Rotation	345°		
	Sub-block triggers	Topography, overburden, geological model, dilution skin		

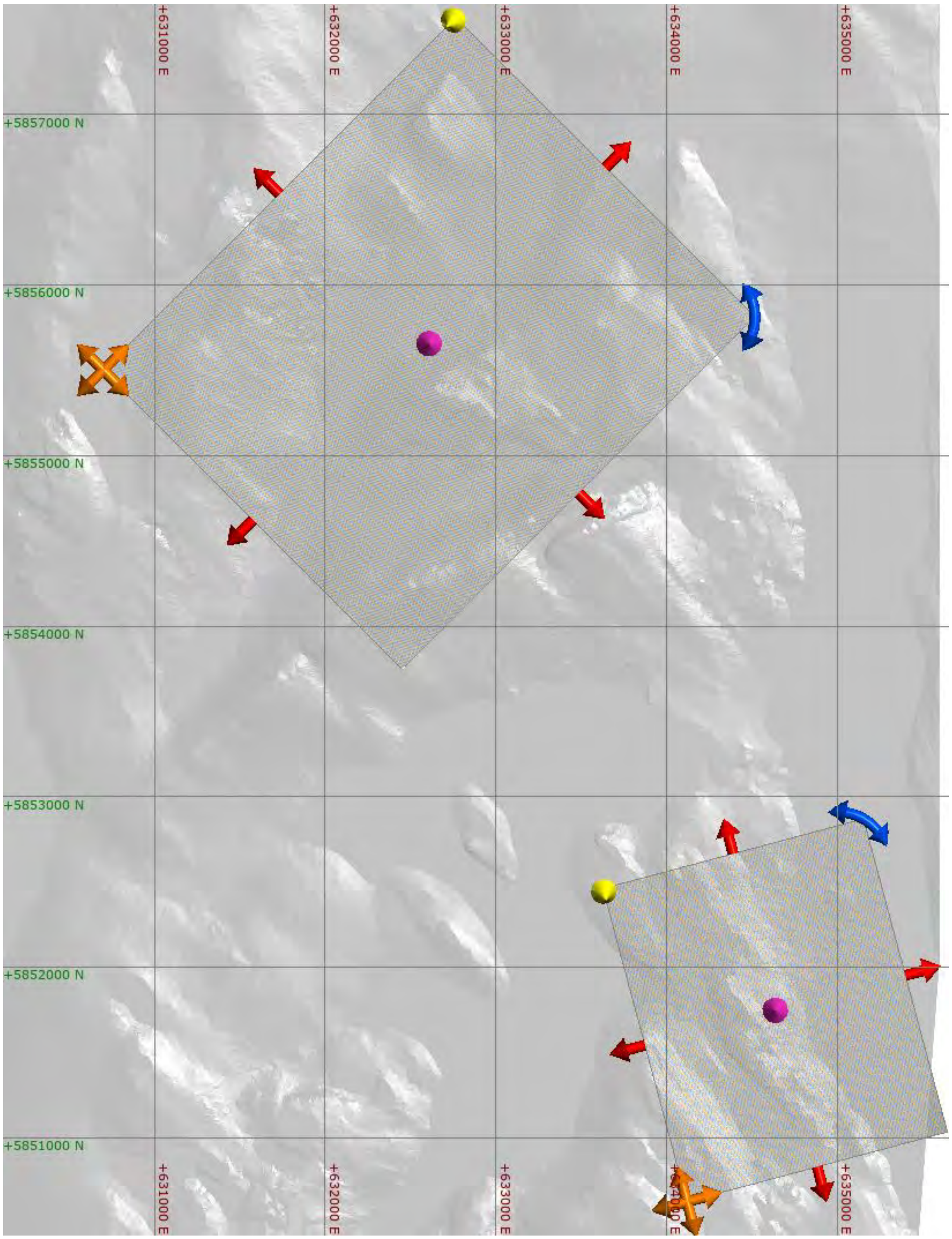


Figure 14-10: Rose and Mills Block Models

14.9 Block Model Interpolation

Interpolations were completed based on the variograms models presented in the previous sub-section using the Ordinary Kriging method ("OK"). For the domains (SIF-RN1 and M_HZ) and the elements (Al_2O_3 and MnO) lacking robust variogram models, grade was interpolated using the Inverse Distance square method ("ID^2"). Grades were estimated using a four-pass approach, with increasing ellipsoid size. The approach used by domain and by passes is shown in Table 14-11. The same sample search criteria were used for all domains and all elements (Table 14-12). The fourth pass is essentially to ensure proper block population throughout the wireframes. All interpolation used variable ellipsoid orientation ("dynamic anisotropy") based on the geometry of each domain. A visual validation was undertaken to ensure that ellipsoid orientation matches the orientation of the folds.

Table 14-11: Search Ellipsoid Ranges

Domain	Ellipsoid ranges (m)											
	Pass 1			Pass 2			Pass 3			Pass 4		
RC1	105	90	15	160	130	20	300	250	25	350	350	75
RC2	100	60	15	140	85	20	300	250	30	350	350	75
RC3	110	70	15	170	100	20	300	250	25	350	350	75
SIF_RN1	100	80	20	160	100	30	300	250	50	350	350	75
RN1	100	80	15	160	100	20	300	250	25	375	375	80
RN2	120	80	15	190	110	20	300	250	25	350	350	75
RN3A	120	80	15	190	110	20	300	250	25	375	375	80
RN3B	120	80	15	190	110	20	300	250	25	350	350	75
M_MM	120	75	25	185	105	30	300	250	60	350-400	350-400	85
M_HZ	120	75	25	185	105	30	300	250	60	350-400	350-400	85
M_UM	120	75	25	185	105	30	300	250	60	350-400	350-400	85

Table 14-12: Sample Search Criteria

Pass	Composites			Minimum DDH
	Min.	Max	Max/DDH	
Pass 1	9	12	3	3
Pass 2	7	12	3	3
Pass 3	5	12	3	2
Pass 4	4	12	3	2

14.10 Grade Estimation Validation

Various validation steps were taken to ensure that the block model is a robust representation of the composites. The following validations were undertaken:

- Visual checks on-section comparing composite grades against block grades and validation of the dynamic anisotropy;
- Global statistical checks comparing the various grades of the block model against a Nearest Neighbor ("NN") estimate and against the composite data;
- Local statistical validation to identify any over-smoothing are areas of grade over- or under-extrapolation (Swath Plots).

14.10.1 Visual Validation

GMS performed a visual validation comparing the composite grades against the block grades in cross section. This validation also allowed to confirm that the search ellipsoids followed the attitude of the geological model, especially for the folded Rose Central model. As seen from Figure 14-11 and Figure 14-12 for Rose and Mills deposits respectively, blocks grades are good representation of composite grades. Grades adequately follow the fold of Rose Central. At Mills Lake, the inner hematite-rich domain (M_HZ) is also well represented within the magnetite-rich main domain (M_MM) where a hard boundary was used.

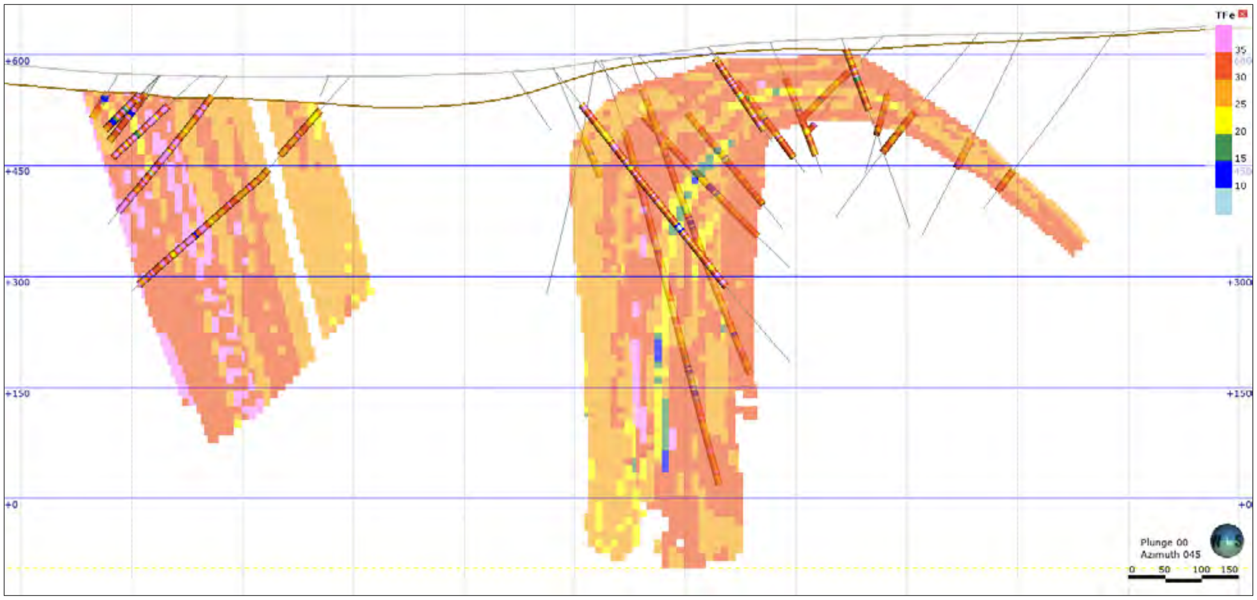


Figure 14-11: Total Iron Block Grades against Composite Grades
Rose North and Rose Central

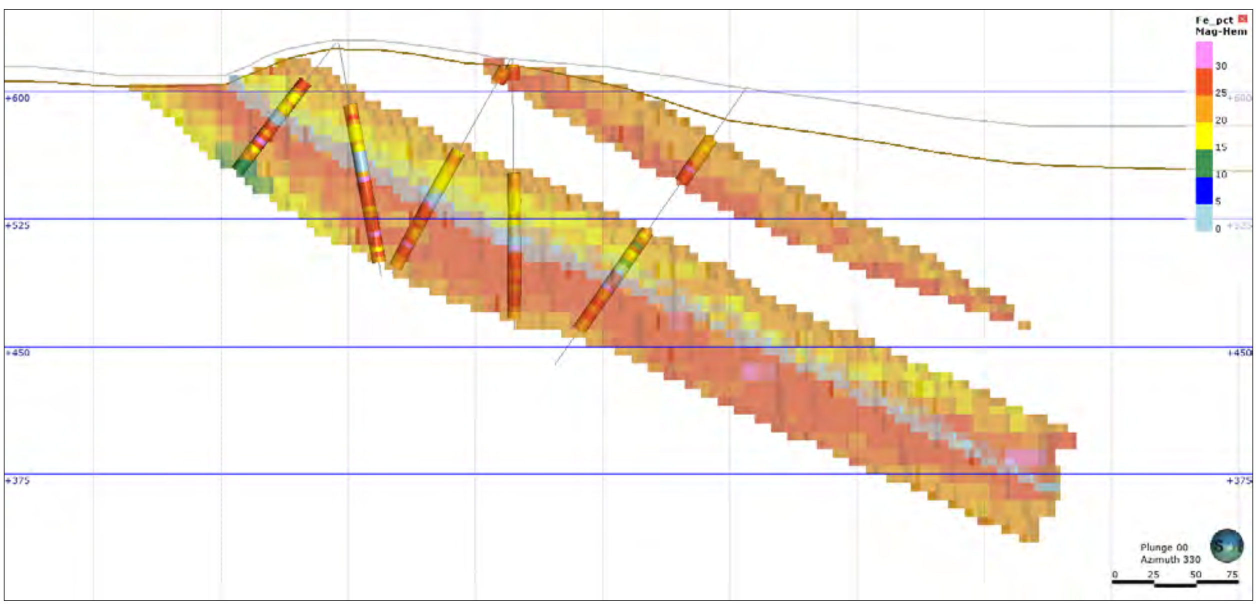


Figure 14-12: Iron Associated to Magnetite Block Grades against Composite Grades
Mills Lake

14.10.2 Global Statistical Validation

To ensure proper composite representation in each domain, a statistical comparison was made between various attributes: final grades used for the resource model (mix of OK and ID^2), grades interpolated using NN and composite grades. Various tests were made using declustered mean composite grades, but only minimal differences were found; declustering having close to no impact on mean grades. Table 14-13 shows the comparison between the various data and it is found that in most cases, differences in average grades are less than 1% when compared to composites.

Table 14-13: Comparison of Total Iron Grades

Domain	Total Iron (TFe%)			Difference OK vs Comp (%)	Volume ('000 m³)
	Composite Mean	BM (MII) OK	BM (MII) NN		
RC1	31.19	31.38	32.33	0.6%	24,630
RC2	29.04	28.96	28.98	-0.3%	110,966
RC3	27.63	27.33	27.03	-1.1%	54,956
SIF_RN1	35.37	34.89	34.37	-1.4%	5,218
RN1	33.05	33.07	33.04	0.0%	78,279
RN2	29.96	29.94	29.93	-0.1%	52,280
RN3A	26.22	26.39	26.32	0.6%	42,429
RN3B	27.70	27.55	27.40	-0.6%	15,955
M_MM	30.00	30.01	29.91	0.0%	39,086
M_HZ	33.72	33.90	33.98	0.5%	3,739
M_UM	29.38	29.36	29.06	-0.1%	4,812

14.10.3 Local Statistical Validation – Swath Plots

Swath plots were generated for all domains for total iron grades in Eastings, Northings and Elevation. They were investigated for potential over-smoothing of grades, especially for kriged iron grades. It was found that peaks and trough in composite grades generally follow peaks and trough in block grades; no important bias and composite grades are well represented in blocks. Figure 14-13 and Figure 14-14 show examples of specific domains for Rose North and Mills Lake respectively.

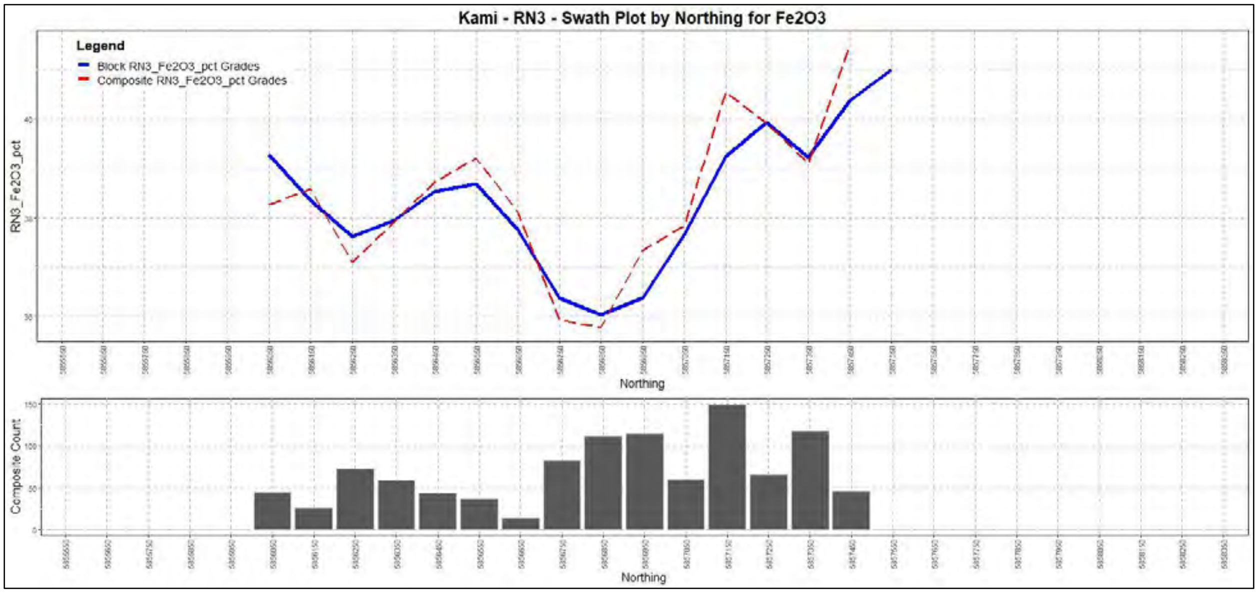


Figure 14-13: Total Iron Swath Plot for Rose North (RN3)

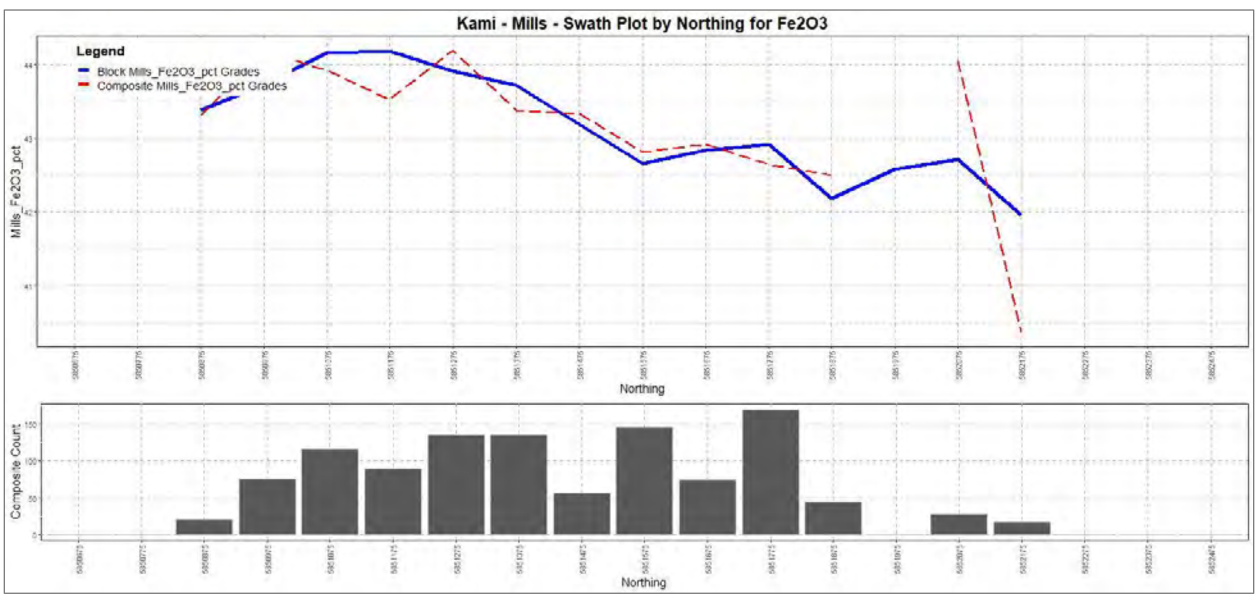


Figure 14-14: Total Iron Swath Plot for Mills Lake (M_MM, M_HZ and M_UM combined)

14.11 Mineral Resources

14.11.1 Mineral Resource Classification

Block model grades estimated for the Kami project were classified according to the CIM's "Definition Standards for Mineral Resources and Mineral Reserves" (2014) and adhere to the CIM's "Estimation of Mineral Resources and Mineral Reserves Best Practices Guidelines" (2019). As defined by the CIM, all classified material must be within a potentially mineralized wireframe and within the "reasonable prospects of eventual economic extraction" shapes. The Mineral Resources at the Project were classified as Measured, Indicated and Inferred Mineral Resources.

As stated in the CIM's "Definition Standards for Mineral Resources and Mineral Reserves":

> *"A Measured Mineral Resource is that part of a Mineral Resource for which quantity, grade or quality, densities, shape, and physical characteristics are estimated with confidence sufficient to allow the application of Modifying Factors to support detailed mine planning and final evaluation of the economic viability of the deposit."*

> *"An Indicated Mineral Resource is that part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics are estimated with sufficient confidence to allow the application of Modifying Factors in sufficient detail to support mine planning and evaluation of the economic viability of the deposit."*

> *"An Inferred Mineral Resource is that part of a Mineral Resource for which quantity and grade or quality are estimated on the basis of limited geological evidence and sampling. Geological evidence is sufficient to imply but not verify geological and grade or quality continuity."*

The Mineral Resource classification considers various factors, such as variogram ranges, but is mostly based on average drillhole spacing, the number of samples used in the interpolation, confidence in the geological interpretation and recovery methods. Manual editing was performed to avoid isolated blocks. The principal assumptions undertaken by GMS to classify the Mineral Resources as Measured, Indicated and Inferred categories is summarized below (more detailed assumptions are presented in Table 14-14):

- Measured Mineral Resources are defined where blocks have an average distance to the nearest three drillholes less than 70 m and interpolated in passes 1, 2 or 3. No Measured Mineral Resources are classified in the SIF_RN1 and the limonite rich domains of the Rose North Deposit. No Measured Mineral Resources are classified in the M_UM domain of the Mills Lake Deposit.

- Indicated Mineral Resources are defined where blocks have an average distance to the nearest three drillholes less than 150 m. No Indicated Mineral Resources are classified in the SIF_RN1 and the limonite rich domains.
- Inferred Mineral Resources are defined where blocks have an average distance to the nearest three drillholes less than 200 m. SIF_RN1 and limonite rich domains were included in that selection if they respect the 200 m drill spacing.

Final categories of all domains were manually edited to avoid isolated clusters of blocks.

The final classification of Mineral Resources is displayed in Figure 14-15 for Rose (Rose Central and Rose North combined) and in Figure 14-16 Mills Lake.

Table 14-14: Global Parameters used for Mineral Resource Classification

Category	Deposit	Three Nearest DDH	Total Iron Interpolation				Excluded Domains
		Maximum Average Distance (m)	Minimum Number of Samples	Maximum Average Distance (m)	Maximum Distance of Closest Sample (m)	Interpolation Pass	
Measured	Rose Central	70	7	125	100	1,2,3	None
	Rose North	70	7	120	100	1,2,3	SIF_RN1, Limonite-rich
	Mills Lake	70	9	N/A	N/A	1,2,3	M_UM
Indicated	Rose Central	150	5	200	N/A	1,2,3,4	None
	Rose North	150	5	200	N/A	1,2,3,4	SIF_RN1, Limonite-rich
	Mills Lake	150	5	N/A	N/A	1,2,3,4	None
Inferred	Rose Central	200	4	250	N/A	1,2,3,4	None
	Rose North	200	4	250	N/A	1,2,3,4	None
	Mills Lake	200	4	250	N/A	1,2,3,4	None

14.11.2 Cut-off Grade and Open Pit Optimization

The cut-off grade used to report Mineral Resources was calculated by GMS Open Pit personnel. The parameters used for the calculation are presented in Table 14-15. The cut-off was calculated at 7.35% TFe and raised at 15% TFe for an open pit resource, considering the very low iron content between 7.35% and 15% TFe and to better compare with similar projects.

To report a Mineral Resource that responds to a Reasonable Prospect of Eventual Economic Extraction ("RPEEE"), open pit optimizations were generated, using the parameters tabulated in Table 14-15. Only Hem_Fe and Magn_Fe were used as payable metals for each block. Figure 14-15 and Figure 14-16 display the constraining shells used to report the Mineral Resources presented in this Report for Rose (Rose Central and Rose North) and Mills Lake respectively.

Table 14-15: Optimization Parameters

Pit Optimization Parameters		
Mineral Resources	Unit	Value
Crude Ore	Mt/year	26
Mining Recovery	%	97.50%
Process Recovery	%	85%
Fe Grade	% Fe	28.60%
Final Weight Recovery	%	36.40%
Fe Recovery	%	83.55%
Revenues	Unit	Value
Concentration Ratio	t con./t ore	0.364
Fe Metal Mined	t metal/t ore	0.239
Concentrate Production	Mt con.	9.452
Concentrate Production Less Concentrate Losses (1%)	Mt con.	9.357
Concentrate Fe Grade	% Fe	65.20%
Concentrate Moisture Content	%	0.00%
CAN$ to US$	CAN$/US$	1.3
Reference Price (China sales Price) 65% Fe	$/dmt con.	150
DR Quality Premium	$/dmt con.	0
Si + Al + P Adjustment	$/dmt con.	0
Royalties & Ocean Freight	$/dmt con.	-37.00
Net Revenue (FOB Sept-Iles)	$/dmt con.	113.00
Railing and Ship Loading	$/dmt con.	-21
Net Revenue (FOB Kami)	$/dmt con.	92.00
Ore Value	$/dmt ore	33.44

Pit Optimization Parameters		
Ore Based Costs	Unit	Value
Processing, Maintenance	$/dmt ore	3.85
G&A Costs	$/dmt ore	2.72
Tailings Sustaining Capital	$/dmt ore	0
Rehabilitation and Closure Cost	$/dmt ore	0.37
Total Ore-based Cost	$/dmt ore	6.93
Operating Margin	$/dmt ore	26.52
Operating Margin Rate (before mining)	%	79%
Mining Costs & Parameters	Unit	Value
Incremental Bench Cost	$/t/10m	0.032
Reference Elevation	RL	655
Mining Costs	$/t mined	2.74

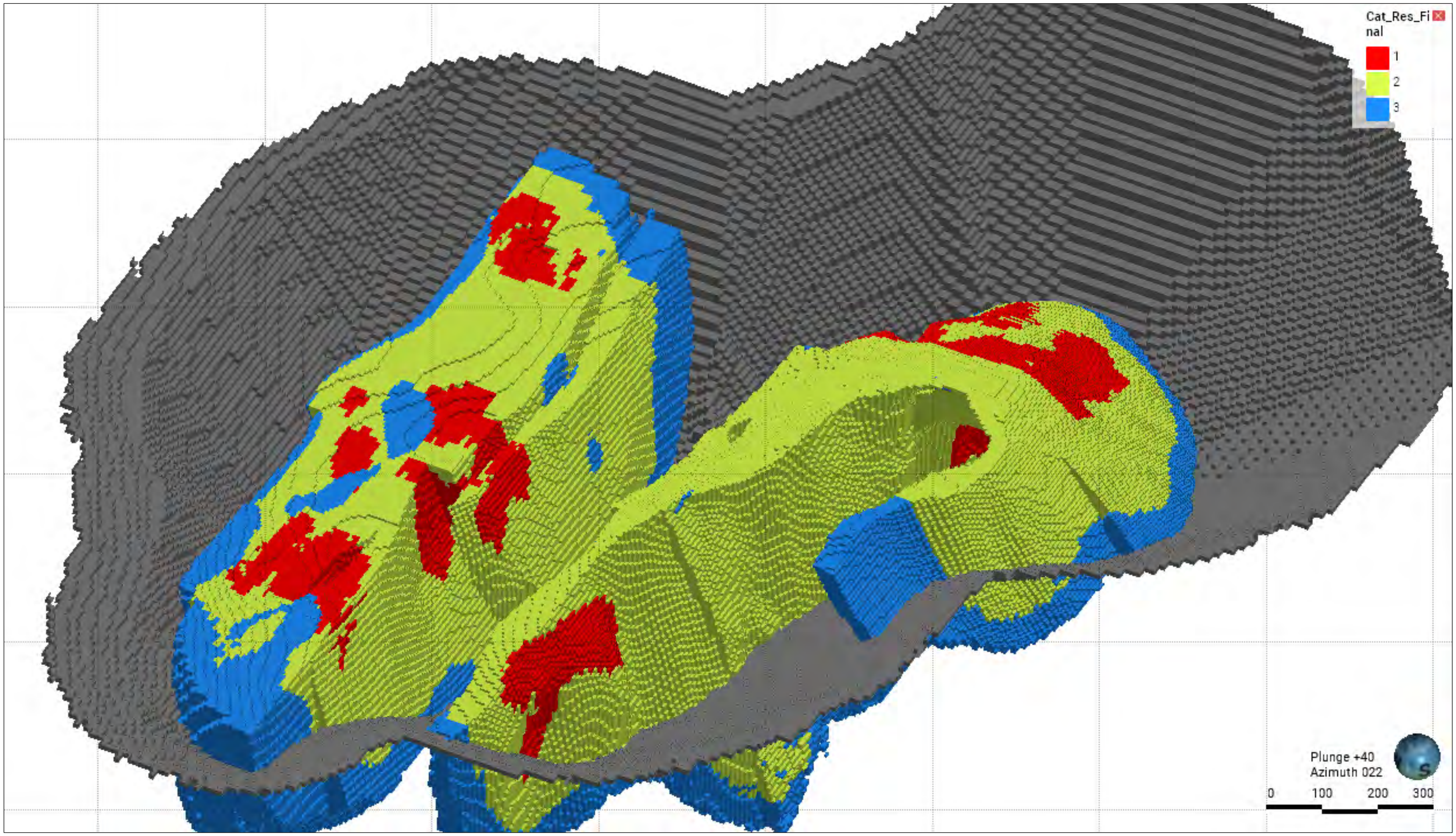


Figure 14-15: Isometric View of Rose Central and Rose North Pit Optimization
View Looking Northwest

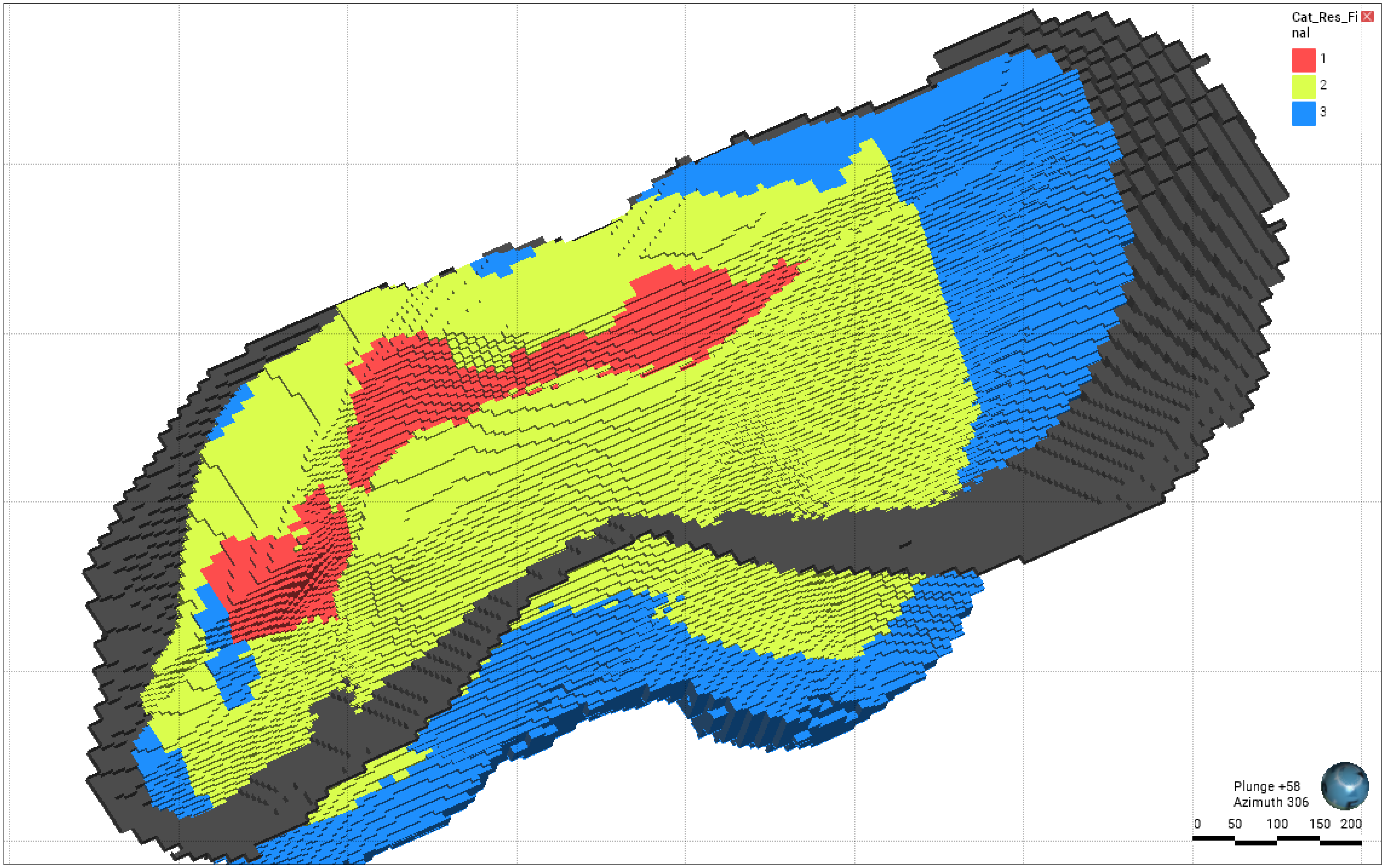


Figure 14-16: Isometric View of Mills Lake Pit Optimization – View Looking Northwest

14.11.3 Cut-off Grade Sensitivities

The sensitivities to variations in cut-off grades are presented in Table 14-16, Table 14-17 and Table 14-18 for Rose Central, Rose North and Mills Lake respectively. Figure 14-17 and Figure 14-18 show the Measured & Indicated grade-tonnage curves for varying total iron cut-off grades for Rose (Central and Rose North combined) and Mills Lake respectively. As seen from the various tables and graphs, Rose Central, Rose North and Mills Lake deposits are all showing a varying level of sensitivity: starting from an absence to a very high level of sensitivity. The change, or rapid decrease in tonnage, occurs between 25% and 30% TFe. Most of the tonnage for all deposits are located within 25% and 35% TFe (85% for Rose and 97% for Mills).

Iron grades from magnetite and hematite are generally constant within most domains, with higher variability for interlayers such as RC2, RN2 and RN3A.

Table 14-16: Rose Central Total Iron Cut-off Grade Sensitivity

Category	Cut-off %TFe	Mass (Mt)	TFe (%)	Fe in Mag (%)	Fe in Hem (%)	Fe in Mag+Hem (%)	MnO (%)	SiO_2 (%)
Measured & Indicated	5.0	458.2	29.0	17.3	7.8	25.1	1.9	45.5
	10.0	458.2	29.0	17.3	7.8	25.1	1.9	45.5
	15.0	457.5	29.0	17.3	7.8	25.1	1.9	45.5
	20.0	450.5	29.2	17.5	7.9	25.3	1.9	45.3
	25.0	402.1	29.9	17.8	8.4	26.2	2.0	44.7
	30.0	200.0	31.9	17.6	11.4	29.0	2.4	42.4
	35.0	6.9	35.9	22.5	10.3	32.8	1.7	39.5
Category	Cut-off %TFe	Mass (Mt)	TFe (%)	Fe in Mag (%)	Fe in Hem (%)	Fe in Mag+Hem (%)	MnO (%)	SiO_2 (%)
Inferred	5.0	60.1	27.9	16.7	7.4	24.1	1.6	46.2
	10.0	60.1	27.9	16.7	7.4	24.1	1.6	46.2
	15.0	59.8	28.0	16.7	7.5	24.2	1.6	46.1
	20.0	58.5	28.2	16.9	7.6	24.5	1.6	46.1
	25.0	45.9	29.5	17.3	8.8	26.1	1.8	45.2
	30.0	21.5	31.8	15.7	13.7	29.4	2.5	42.7
	35.0	0.7	36.2	19.1	14.5	33.6	1.7	39.2

Note: Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability. The tonnages and grade at differing cut-offs shown above are for comparison purposes only and do not constitute an official Mineral Resource.

Table 14-17: Rose North Total Iron Cut-off Grade Sensitivity

Category	Cut-off %TFe	Mass (Mt)	TFe (%)	Fe in Mag (%)	Fe in Hem (%)	Fe in Mag+Hem (%)	MnO (%)	SiO_2 (%)
Measured & Indicated	5.0	420.2	30.1	13.0	14.8	27.8	1.2	50.2
	10.0	420.2	30.1	13.0	14.8	27.8	1.2	50.2
	15.0	420.2	30.1	13.0	14.8	27.8	1.2	50.2
	20.0	419.8	30.1	13.0	14.8	27.8	1.2	50.1
	25.0	392.5	30.6	13.0	15.5	28.5	1.2	49.9
	30.0	202.6	33.5	10.0	22.8	32.8	1.6	47.7
	35.0	47.3	36.6	6.0	30.1	36.2	1.7	44.3
Category	Cut-off %TFe	Mass (Mt)	TFe (%)	Fe in Mag (%)	Fe in Hem (%)	Fe in Mag+Hem (%)	MnO (%)	SiO_2 (%)
Inferred	5.0	89.8	29.9	11.7	16.1	27.8	0.9	49.5
	10.0	89.8	29.9	11.7	16.1	27.8	0.9	49.5
	15.0	89.8	29.9	11.7	16.1	27.8	0.9	49.5
	20.0	89.8	29.9	11.7	16.1	27.8	0.9	49.5
	25.0	82.5	30.4	11.7	16.7	28.4	0.9	48.9
	30.0	37.3	34.0	7.5	25.6	33.2	1.2	45.4
	35.0	12.3	36.9	1.8	34.9	36.7	1.2	40.2

Note: Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability. The tonnages and grade at differing cut-offs shown above are for comparison purposes only and do not constitute an official Mineral Resource.

Table 14-18: Mills Lake Total Iron Cut-off Grade Sensitivity

Category	Cut-off %TFe	Mass (Mt)	TFe (%)	Fe in Mag (%)	Fe in Hem (%)	Fe in Mag+Hem (%)	MnO (%)	SiO_2 (%)
Measured & Indicated	5.0	97.8	30.4	21.5	6.4	27.8	1.3	46.2
	10.0	97.8	30.4	21.5	6.4	27.8	1.3	46.2
	15.0	97.8	30.4	21.5	6.4	27.8	1.3	46.2
	20.0	97.8	30.4	21.5	6.4	27.8	1.3	46.2
	25.0	96.9	30.4	21.5	6.4	27.9	1.3	46.2
	30.0	56.8	31.7	21.0	8.8	29.8	1.7	45.2
	35.0	2.1	35.8	5.2	30.0	35.2	5.2	35.6
Category	Cut-off %TFe	Mass (Mt)	TFe (%)	Fe in Mag (%)	Fe in Hem (%)	Fe in Mag+Hem (%)	MnO (%)	SiO_2 (%)
Inferred	5.0	13.4	29.6	23.1	3.3	26.5	1.2	46.1
	10.0	13.4	29.6	23.1	3.3	26.5	1.2	46.1
	15.0	13.4	29.6	23.1	3.3	26.5	1.2	46.1
	20.0	13.4	29.6	23.1	3.3	26.5	1.2	46.1
	25.0	13.4	29.6	23.1	3.3	26.5	1.2	46.0
	30.0	3.7	31.9	19.9	8.3	28.3	2.7	42.1
	35.0	0.03	35.2	6.7	27.7	34.5	6.8	32.4

Note: Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability. The tonnages and grade at differing cut-offs shown above are for comparison purposes only and do not constitute an official Mineral Resource.

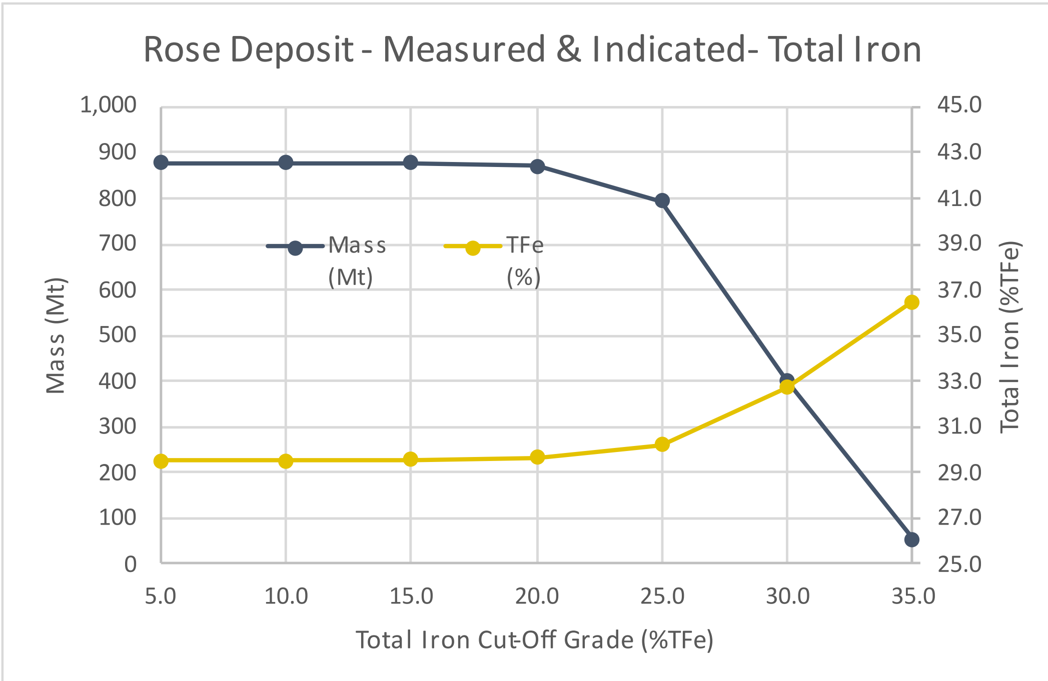


Figure 14-17: Grade-Tonnage Curves for Rose (Central and North Combined) Measured and Indicated

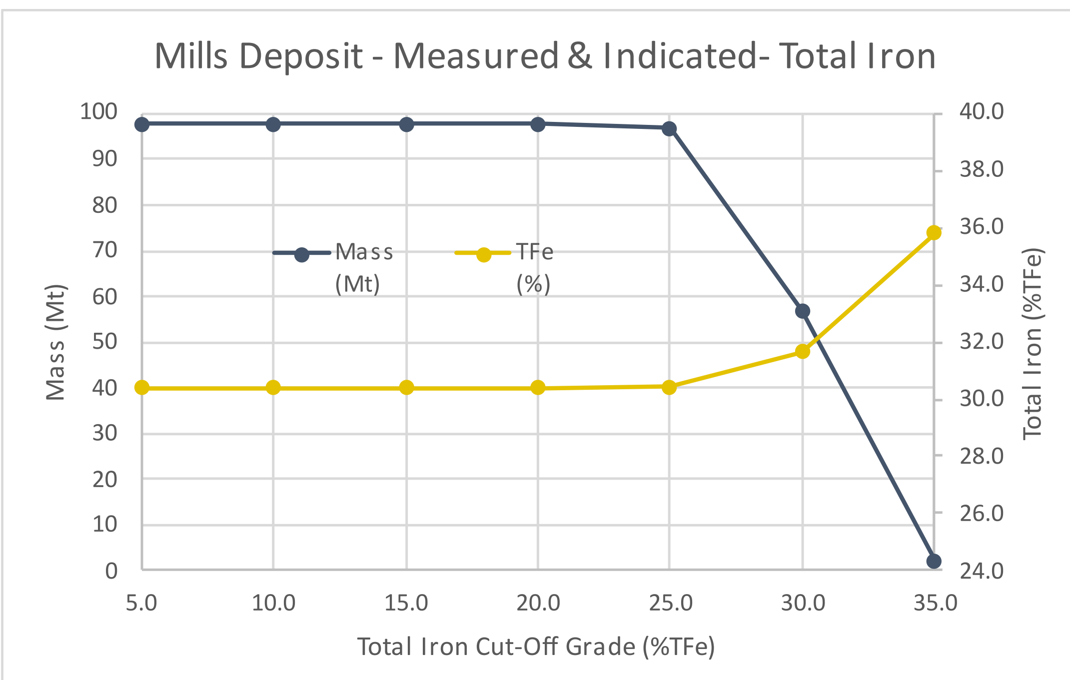


Figure 14-18: Grade-Tonnage Curves for Mills Lake – Measured & Indicated

14.11.4 Mineral Resource Statement

The open pit Mineral Resource are stated using a lower cut-off grade of 15% TFe, constrained within an optimized shell based on the parameters listed in Table 14-15. Results, by deposit, are presented in Table 14-19.

- Total open pit Measured Mineral Resources are estimated at 212.4 Mt @ 14.8% MagnFe and 13.0% HemFe.
- Total open pit Indicated Mineral Resources are estimated at 763.0 Mt @ 16.2% MagnFe and 10.0% HemFe.
- Total open pit Inferred Mineral Resources are estimated at 163.0 Mt @ 14.5% MagnFe and 11.9% HemFe.

These Mineral Resources are not mineral reserves as they have not demonstrated economic viability. The quantity and grade of reported inferred Mineral Resources in this Report are uncertain in nature and there has been insufficient exploration to define these resources as Indicated or Measured; however, it is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration.

Mr. Christian Beaulieu, P.Geo., is not aware of any factors or issues that materially affect the Mineral Resource Estimate other than normal risks faced by mining projects in the province in terms of environmental, permitting, taxation, socio-economic, marketing, and political factors and additional risk factors regarding Indicated and Inferred resources.

Table 14-20, Table 14-21 and Table 14-22 detail the resource by domain for Rose Central, Rose North and Mills Lake respectively.

Table 14-19: Open Pit Mineral Resources for the Kami Project – 15% Total Iron Cut-off Grade

Category	Density (t/m^3)	Mass (Mt)	TFe (%)	Fe in Mag (%)	Fe in Hem (%)	Fe in Mag+Hem (%)	MnO (%)	SiO_2 (%)
Rose Central								
Measured	3.47	93.8	29.3	16.9	9.4	26.3	2.2	45.1
Indicated	3.46	363.7	28.9	17.4	7.4	24.8	1.9	45.6
M&I	3.46	457.5	29.0	17.3	7.8	25.1	1.9	45.5
Inferred	3.44	59.8	28.0	16.7	7.5	24.2	1.6	46.1
Rose North								
Measured	3.48	81.7	31.0	9.2	19.8	29.1	1.2	50.7
Indicated	3.45	338.5	29.9	13.9	13.6	27.5	1.2	50.0
M&I	3.46	420.2	30.1	13.0	14.8	27.8	1.2	50.2
Inferred	3.30	89.8	29.9	11.7	16.1	27.8	0.9	49.5
Mills Lake								
Measured	3.59	37.0	30.5	21.4	7.1	28.5	1.3	46.5
Indicated	3.57	60.8	30.3	21.5	5.9	27.4	1.2	46.0
M&I	3.58	97.8	30.4	21.5	6.4	27.8	1.3	46.2
Inferred	3.55	13.4	29.6	23.1	3.3	26.5	1.2	46.1
Total								
Measured	3.49	212.4	30.2	14.8	13.0	27.8	1.6	47.5
Indicated	3.46	763.0	29.5	16.2	10.0	26.2	1.5	47.6
M&I	3.47	975.5	29.6	15.9	10.7	26.6	1.5	47.6
Inferred	3.37	163.0	29.2	14.5	11.9	26.4	1.2	48.0

Notes on Mineral Resources:

1. The Mineral Resources described above have been prepared in accordance with the CIM Standards (Canadian Institute of Mining, Metallurgy and Petroleum, 2014) and follow the Best Practices outlined by CIM (2019).
2. The QP for this Mineral Resource Estimate is Christian Beaulieu, P.Geo., consultant for G Mining Services Inc. Mr. Beaulieu is a member of the Professional Engineers and Geoscientists of Newfoundland & Labrador (#10653) and of l'Ordre des géologues du Québec (#1072).
3. The effective date of the Mineral Resource Estimate is November 15, 2022.
4. The cut-off used to report Open Pit Mineral Resources is 15.0% total iron (TFe).
5. Density is applied by rock type and is related to the amount of iron in each block.

6. Pit optimization parameters are described as follows:
    i. Iron price of $150/dmt: $124/dmt of long-term reference price, and $26/dmt added as an iron concentrate premium (P65 index);
    ii. Concentrate grade of 65.2% Fe;
    iii. Exchange rate of 1.30 CAN$:US$;
    iv. Metallurgical recoveries of 83.55%;
    v. Mining costs of $2.74/t mined;
    vi. Total ore-based costs of $6.93/dmt;
    vii. Overall slope angle varies from 48.4° to 51.6° for the footwall and hanging wall domains respectively.
7. Measured, Indicated and Inferred Mineral Resources have been defined mainly based on drillhole spacing.
8. Mineral Resources (Rose Central, Rose North and Mills Lake combined) have a stripping ratio of 2.0:1 (W:O).
9. The tonnages and grades outlined above are reported inside a block model with parent block size of 10 m x 20 m x 10 m, and subblocks of 5 m x 10 m x 5 m.
10. Tonnages have been expressed in the metric system and metal content as percentages. Totals may not add up due to rounding.
11. Mineral Resources are not Mineral Reserves as they have not demonstrated economic viability. The quantity and grade of reported Inferred Mineral Resources are uncertain in nature.
12. The qualified person is not aware of any factors or issues that materially affect the Mineral Resource Estimate, other than normal risks faced by mining projects in the province in terms of environmental, permitting, taxation, socio-economic, marketing, political factors, and additional risk factors regarding Indicated and Inferred resources.

These Mineral Resources are not Mineral Reserves as they have not demonstrated economic viability. The quantity and grade of reported Inferred Mineral Resources in this Report are uncertain in nature and there has been insufficient exploration to define these resources as Indicated or Measured; however, it is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration.

Mr. Christian Beaulieu, P.Geo., is not aware of any factors or issues that materially affect the Mineral Resource Estimate, other than normal risks faced by mining projects in the province in terms of environmental, permitting, taxation, socio-economic, marketing, and political factors, and additional risk factors regarding Indicated and Inferred resources.

Table 14-20: Open Pit Mineral Resources for Rose Central – 15% Total Iron Cut-off Grade

Category	Density (t/m^3)	Mass (Mt)	TFe (%)	Fe in Mag (%)	Fe in Hem (%)	Fe in Mag+Hem (%)	MnO (%)	SiO_2 (%)
Measured								
RC1	3.50	14.1	30.8	6.2	22.8	29.1	4.6	41.6
RC2	3.46	60.3	29.1	17.3	8.7	26.1	2.0	45.4
RC3	3.46	19.3	28.9	23.5	1.6	25.0	1.0	46.7
Total	3.47	93.8	29.3	16.9	9.4	26.3	2.2	45.1
Indicated								
RC1	3.52	44.9	31.4	6.9	22.9	29.8	4.3	41.5
RC2	3.46	205.2	29.2	18.4	6.9	25.3	1.9	45.4
RC3	3.42	113.6	27.5	19.9	2.2	22.1	0.8	47.5
Total	3.46	363.7	28.9	17.4	7.4	24.8	1.9	45.6
Inferred								
RC1	3.52	8.6	31.4	9.0	19.8	28.8	3.6	42.5
RC2	3.46	28.9	28.8	17.1	8.7	25.8	1.7	45.4
RC3	3.38	22.4	25.7	19.3	1.1	20.4	0.5	48.5
Total	3.44	59.8	28.0	16.7	7.5	24.2	1.6	46.1

Notes on Mineral Resources: see notes to Table 14-19.

These Mineral Resources are not Mineral Reserves as they have not demonstrated economic viability. The quantity and grade of reported Inferred Mineral Resources in this Report are uncertain in nature and there has been insufficient exploration to define these resources as Indicated or Measured; however, it is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration.

Mr. Christian Beaulieu, P.Geo., is not aware of any factors or issues that materially affect the Mineral Resource Estimate, other than normal risks faced by mining projects in the province in terms of environmental, permitting, taxation, socio-economic, marketing, and political factors, and additional risk factors regarding Indicated and Inferred resources.

Table 14-21: Open Pit Mineral Resources for the Rose North – 15% Total Iron Cut-off Grade

Category	Density (t/m^3)	Mass (Mt)	TFe (%)	Fe in Mag (%)	Fe in Hem (%)	Fe in Mag+Hem (%)	MnO (%)	SiO_2 (%)
Measured								
SIF_RN1	-	0.0	-	-	-	-	-	-
RN1	3.53	43.0	33.3	3.4	29.8	33.1	1.6	49.3
RN2	3.45	25.2	30.0	17.6	9.7	27.3	0.8	51.7
RN3A	3.35	11.9	25.3	11.2	8.0	19.2	0.4	54.1
RN3B	3.39	1.6	27.3	20.3	1.1	21.4	0.8	48.9
Total	3.48	81.7	31.0	9.2	19.8	29.1	1.2	50.7
Indicated								
SIF_RN1	-	0.0	-	-	-	-	-	-
RN1	3.52	119.4	33.1	5.6	27.2	32.8	1.7	49.2
RN2	3.45	106.4	29.7	19.5	7.0	26.5	1.0	49.1
RN3A	3.38	81.4	26.4	16.9	5.1	22.0	0.7	52.2
RN3B	3.40	31.4	27.5	18.6	5.9	24.5	0.7	50.7
Total	3.45	338.5	29.9	13.9	13.6	27.5	1.2	50.0
Inferred								
SIF_RN1	2.85	8.1	36.4	1.1	34.4	35.5	1.2	36.5
RN1	3.39	21.0	33.1	2.9	30.0	32.9	1.0	49.9
RN2	3.42	16.5	30.3	19.6	8.0	27.6	1.1	48.2
RN3A	3.26	23.1	26.4	13.4	10.1	23.5	0.7	53.0
RN3B	3.39	21.1	27.7	16.3	8.3	24.7	0.6	51.4
Total	3.30	89.8	29.9	11.7	16.1	27.8	0.9	49.5

Notes on Mineral Resources: see notes to Table 14-19.

These Mineral Resources are not Mineral Reserves as they have not demonstrated economic viability. The quantity and grade of reported Inferred Mineral Resources in this Report are uncertain in nature and there has been insufficient exploration to define these resources as Indicated or Measured; however, it is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration.

Mr. Christian Beaulieu, P.Geo., is not aware of any factors or issues that materially affect the Mineral Resource Estimate, other than normal risks faced by mining projects in the province in terms of environmental, permitting, taxation, socio-economic, marketing, and political factors, and additional risk factors regarding Indicated and Inferred resources.

Table 14-22: Open Pit Mineral Resources for the Mills Lake – 15% Total Iron Cut-off Grade

Category	Density (t/m^3)	Mass (Mt)	TFe (%)	Fe in Mag (%)	Fe in Hem (%)	Fe in Mag+Hem (%)	MnO (%)	SiO2 (%)
Measured								
M_MM	3.55	32.6	30.1	24.1	3.9	27.9	0.6	48.0
M_HZ	3.91	4.4	33.8	1.9	31.1	33.0	6.2	36.0
M_UM	-	0.0	-	-	-	-	-	-
Total	3.59	37.0	30.5	21.4	7.1	28.5	1.3	46.5
Indicated								
M_MM	3.55	43.9	30.2	23.8	4.3	28.1	0.7	47.9
M_HZ	3.90	5.4	33.5	2.6	30.2	32.8	6.3	35.3
M_UM	3.53	11.4	29.3	21.6	0.5	22.1	0.8	43.9
Total	3.57	60.8	30.3	21.5	5.9	27.4	1.2	46.0
Inferred								
M_MM	3.52	11.1	29.1	24.8	1.5	26.4	0.8	47.3
M_HZ	3.92	0.9	34.4	6.3	27.2	33.5	6.9	32.4
M_UM	3.56	1.3	30.5	20.6	1.6	22.3	0.8	45.2
Total	3.55	13.4	29.6	23.1	3.3	26.5	1.2	46.1

Notes on Mineral Resources: see notes to Table 14-19.

These Mineral Resources are not mineral reserves as they have not demonstrated economic viability. The quantity and grade of reported Inferred Mineral Resources in this Report are uncertain in nature and there has been insufficient exploration to define these resources as Indicated or Measured; however, it is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration.

Mr. Christian Beaulieu, P.Geo., is not aware of any factors or issues that materially affect the Mineral Resource Estimate, other than normal risks faced by mining projects in the province in terms of environmental, permitting, taxation, socio-economic, marketing, and political factors, and additional risk factors regarding Indicated and Inferred resources.

14.11.5 Comparison with Previous Mineral Resource Estimate

Since the previous MRE does not appear to be constrained by an optimized pit shell, comparisons presented below are between the updated block model and Alderon one within the same optimized pit shell as presented in this Report. Comparisons are also limited to the Rose deposits, as Mills previous block model was not recovered by Champion. Rose Central and Rose North Inferred Mineral Resources were combined into a single rock code.

The main changes in the Mineral Resource are in the classification, where the current model has significantly less Measured material. Globally, Measured & Indicated Mineral Resources ("M&I") from GMS have 4% less tonnage compared to the Alderon block model within the same optimized pit. Conversely, Inferred Mineral Resources tonnage from GMS are 10% higher than Alderon's. Mean total iron grades are similar, but some differences are observed in magnetite iron versus hematite iron grades, caused by differences in classification. Hematite and magnetite iron grades in M&I are similar in both models. Table 14-23 shows the comparison between the two models, inside the same optimized pit shell as presented in this Report.

Table 14-23: Comparison Between the Current MRE (GMS 2022)
and the Previous Block Model Inside GMS Pit Optimization (Alderon 2018 Block Model) – 15% Total Iron Cut-off Grade

Category	GMS 2022				Alderon Block Model Inside GMS Pit Optm.				Difference (relative % unless specified)				
	Mass (Mt)	TFe (%)	Fe in Mag (%)	Fe in Hem (%)	Mass (Mt)	TFe (%)	Fe in Mag (%)	Fe in Hem (%)	Mass (Mt)	Mass	TFe	Fe in Mag	Fe in Hem
Rose Central													
Measured	93.8	29.3	16.9	9.4	250.8	29.5	17.5	8.3	-157.0	-63%	1%	-3%	12%
Indicated	363.7	28.9	17.4	7.4	222.9	28.2	17.6	6.1	140.8	63%	3%	-1%	21%
M&I	457.5	29.0	17.3	7.8	473.7	28.9	17.6	7.3	-16.3	-3%	0%	-1%	7%
Inferred	59.8	28.0	16.7	7.5	N/A[1]				N/A[1]				
Rose North													
Measured	81.7	31.0	9.2	19.8	228.1	30.1	13.2	14.2	-146.4	-64%	3%	-30%	40%
Indicated	338.5	29.9	13.9	13.6	209.8	30.0	13.0	14.8	128.7	61%	0%	7%	-8%
M&I	420.2	30.1	13.0	14.8	437.9	30.1	13.1	14.5	-17.7	-4%	0%	-1%	2%
Inferred	89.8	29.9	11.7	16.1	N/A[1]				N/A[1]				
Total Rose													
Measured	175.5	30.08	13.4	14.2	478.9	29.8	15.5	11.1	-303.4	-63%	1%	-14%	28%
Indicated	702.2	29.40	15.7	10.4	432.8	29.1	15.4	10.3	269.5	62%	1%	2%	0%
M&I	877.7	29.53	15.3	11.2	911.7	29.4	15.4	10.8	-34.0	-4%	0%	-1%	4%
Inferred	149.6	29.14	13.7	12.7	148.4	28.3	13.9	11.3	1.2	1%	3%	-1%	138%

(1) Alderon Block Model combines Rose Central and Rose North in the Inferred category. Mills Lake Block Model was not recovered by Champion.

15. Mineral Reserve Estimates

15.1 Summary

The Proven and Probable Ore Reserve for the Kami Project is estimated at 643.2 Mt resulting in a produced concentrate tonnage of 212.4 Mt as summarized in Table 15-1. Most of the ore mined is in the Probable category, representing 74% of the Project's ore.

Table 15-1: Kami Project Ore Reserve Estimate (November 11, 2022)

Mineral Reserves by Category	Unit	Proven	Probable	Proven & Probable
Diluted Ore Tonnage	Mt	167	476	643
Diluted Iron Grade in Hematite	%Fe in Hem	13.8	10.6	11.4
Diluted Iron Grade in Magnetite	%Fe in Mag	13.2	15.1	14.6
Diluted Total Iron Grade	% TFe	29.7	29.0	29.2
Concentrate Tonnage	Mt	54.8	157.6	212.4
Concentrate Iron Grade	% Fe	67.6	67.6	67.6

Notes on Mineral Reserves:

1. The Mineral Reserve described above has been prepared in accordance with NI 43-101 Standards of Disclosure for Mineral Projects and the CIM definition of Standards for Mineral Resources and Mineral Reserves.
2. The QP for this Mineral Reserve Estimate is Alexandre Dorval, mining engineer at G Mining Services Inc. Mr. Dorval is a member of the Professional Engineers and Geoscientists of Newfoundland & Labrador (#11042), of Professional Engineers Ontario (#100214598) and of l'Ordre des Ingénieurs du Québec (#5027189).
3. Mineral Reserves based on an updated Lidar dated September 2011.
4. Mineral Reserves are estimated using a long-term iron price reference price (Platt's 62%) of US$ 80/dmt and an exchange rate of 1.3 C$/US$. An Fe concentrate price adjustment of US$ 20/dmt was added as an iron grade premium.
5. Bulk density of ore is variable but averages 3.1 t/m^3.
6. Cut-off grade of 15% TFe used to calculate reserves.
7. The average strip ratio is 1.6:1 W:O.
8. The Mineral Reserve includes a 1.4% mining dilution calculated using a dilution script.
9. The number of metric tonnes was rounded to the nearest thousand. Any discrepancies in the totals are due to rounding; with rounding following the recommendations detailed in National Instrument 43-101 – Standards of Disclosure for Mineral Projects ("NI 43-101").
10. See the appendix in the Company's quarterly activities report filed on January 31, 2024, on the ASX at www.asx.com.au *on January 31, 2024, for additional information regarding Joint Ore Reserves Committee ("JORC").*

The open pit mine design and ore reserve estimate have been prepared by GMS to a level appropriate for a feasibility study. The mineral reserve stated herein is consistent with the CIM definitions and is suitable for public reporting. As such, the mineral reserves are based solely on Measured and Indicated mineral resources with applicable modifying factors and therefore exclude any Inferred mineral resources. The Inferred mineral resources contained within the mine design are classified as waste for reporting purposes.

15.2 Resource Block Model

The resource block model was completed by GMS. It was imported to the Deswik.CAD™ software as a singular, regularized block model. The block model consists of 3,005,264 blocks each 10 m x 20 m x 10 m.

15.3 Open Pit Optimization

Open pit optimization was conducted in GEOVIA Whittle™ to determine the optimal economic shape of the open pit to guide the pit design process. This task was undertaken using the Whittle software which utilizes the pseudoflow algorithm. The method works on a block model of the ore body, and progressively constructs lists of related blocks that should, or should not, be mined. The method uses the values of the blocks to define a pit outline that has the highest possible total economic value, subject to the required pit slopes defined as structure arcs as well as physical constraints under the form of heavy blocks in the software. This section describes all the parameters used to calculate block values in Whittle™.

The pit optimizations performed to generate optimal pit limits to guide the ultimate pit design were based only on Measured and Indicated resource category blocks and excluded Inferred blocks.

15.3.1 Slope Recommendations

The geotechnical study was done by Stantec in 2012 (Stantec, 2012h). Table 15-2 summarizes the slope design recommendations. Figure 15-1 presents the physical zones used for the Project. Both the table and the figure were provided in the Stantec study. Since the benches were modified from 14 m to 10 m, the overall slope angle ("OSA") was respected along with the bench face angle ("BFA"), but the berm width was adjusted. Overburden slope was changed from the recommended to the second scenario presented in the study, proposing BFA of 27° compared to the recommended 22°. Both proposed BFA have an equivalent Factor of Safety of above 1.3.

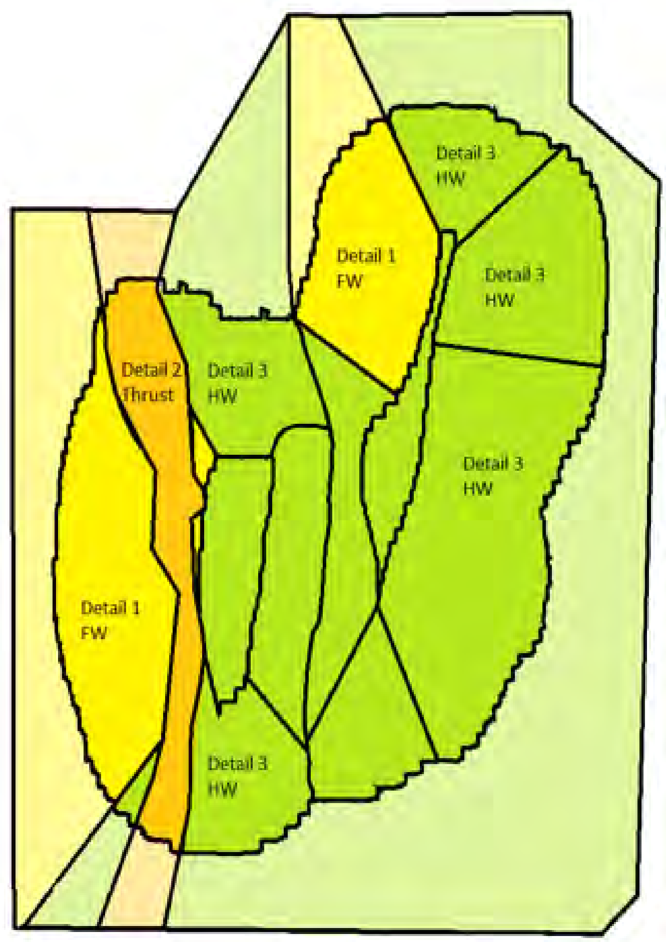


Figure 15-1: Slope Design Sectors

Table 15-2: Detailed Slope Design Parameters

Design Sector	Footwall	Thrust Zone	Hanging Wall	Overburden
Slope Codes	2	3	4	1
Vertical Bench Height	20	20	20	10
Bench Face Angle	70	40	75	27
Avg. Catch Berm Width	10.5	10.5	10.5	8
OSA (Crest-to-Crest)	48.4	30.2	51.6	19.9

15.4 Mining Dilution and Ore Loss

A mining dilution assessment was made by evaluating the number of contacts for blocks above an economic cut-off grade ("COG"). The block contacts are then used to estimate a dilution skin around ore blocks to estimate an expected dilution during mining. The dilution skin consists of 1.0 m of material in a north-south direction and 1.0 m in an east-west direction.

For each mineralized block in the resource model diluted grades and a new density are calculated by considering the in-situ grades and in situ density of the surrounding blocks.

Although dilution skin thickness is conservative, the average external mining dilution result is low at 1.4%. This is explained by the fact that the ore body is generally massive in nature and continuous in the middle of the pit resulting in minimal ore-waste contacts (Figure 15-2).

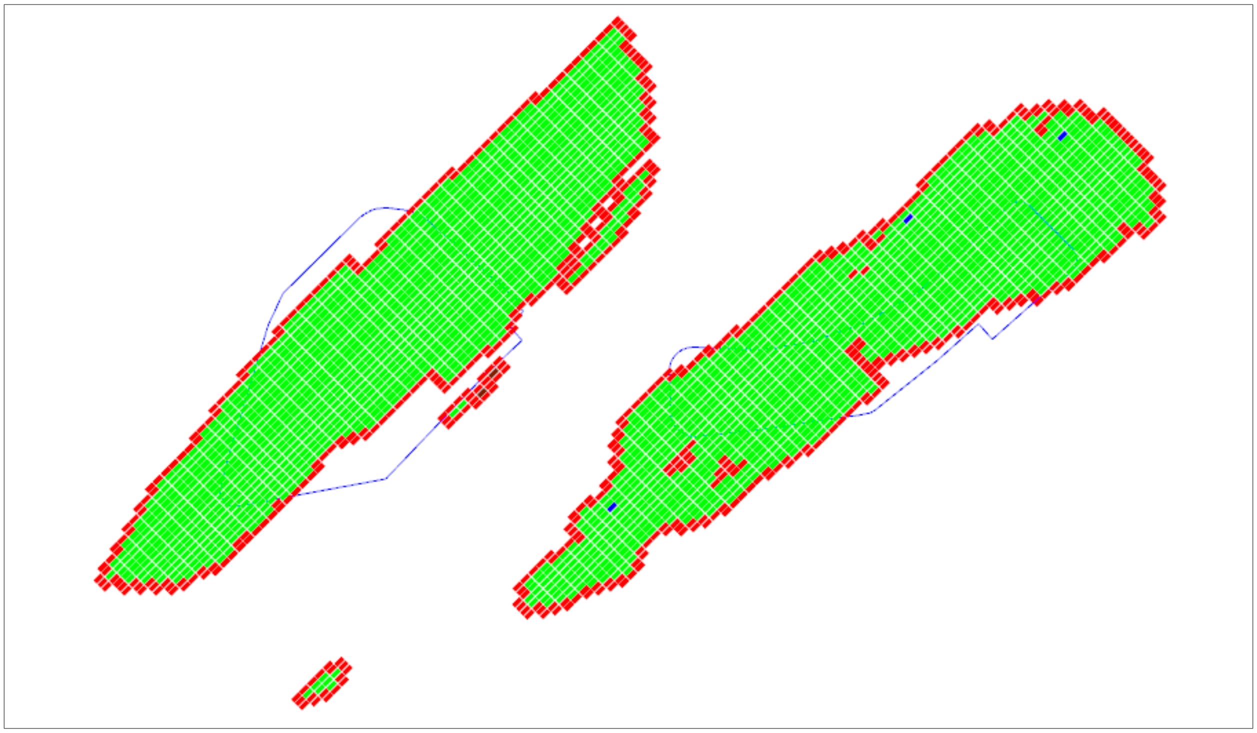


Figure 15-2: Ore Body (RL 205)

15.5 Pit Optimization Parameters and Cut-off Grade

A summary of the open pit optimization parameters is presented in Table 15-3. The parameters used for optimization were updated from previous work done on the Kami Project as well as benchmarking on similar projects. All prices for the optimization are in Canadian Dollars. The resulting concentrate will consist of 65.2% iron and will sell for $130/dmt prior to royalties, transport, and shipping costs. The mining reference cost (i.e., for a block near surface) is $2.74/t with an incremental cost of $0.032/t per 10 m bench added to account for the additional haulage cycle time. Total ore-based $6.93 at a nominal throughput of 26 Mt/y. The concentrate grade is different in the optimization than it is in the economic model. No premium was attributed at this stage for the higher concentrate grade.

Table 15-3: Economic Optimization Parameters by Rock Type

Pit Optimization Parameters - Mineral Reserves	Unit	Value
Crude Ore	Mt/year	26.0
Mining Dilution (included in Block Model)	%	3.4%
Mining Recovery	%	97.5%
Process Recovery	%	85%
Fe Grade	% Fe	28.60%
Final Weight Recovery	%	36.4%
Fe Recovery	%	83.55%
Revenues		
Concentration Ratio	t con./t ore	0.364
Fe Metal Mined	t metal/t ore	0.239
Concentrate Production	Mt con.	9.452
Concentrate Production Less Concentrate Losses (1%)	Mt con.	9.357
Concentrate Fe Grade	% Fe	65.20%
Concentrate Moisture Content	%	0.00%
CAN$ to US$	CAN$/US$	1.30
Reference Price (China Sales Price) 65% Fe	$/dmt con.	130.00
DR Quality Premium	$/dmt con.	0.00
Si + Al + P Adjustment	$/dmt con.	0.00
Royalties & Ocean Freight	$/dmt con.	-36.40
Net Revenue (FOB Sept-Îles)	$/dmt con.	93.60
Railing and Ship Loading	$/dmt con.	-21.00
Net Revenue (FOB Kami)	$/dmt con.	72.60
Ore Value	$/dmt ore	26.39

Pit Optimization Parameters - Mineral Reserves	Unit	Value
Ore Based Costs		
Processing, Maintenance	$/dmt ore	3.85
G&A Costs	$/dmt ore	2.72
Tailings Sustaining Capital	$/dmt ore	0.00
Rehabilitation and Closure Cost	$/dmt ore	0.37
Total Ore-based Cost	$/dmt ore	6.93
Operating Margin	$/dmt ore	19.46
Operating Margin Rate (before mining)	%	74%
Mining Costs & Parameters		
Incremental Bench Cost	$/t/10 m	0.032
Reference Elevation	RL	655
Mining Costs	$/t mined	2.74

15.6 Pit Optimization Results

The Whittle™ nested shell results are presented in Table 15-4 using only the Measured and Indicated mineral resource, applying a 3.4% dilution within Whittle™. The nested shells are generated using revenue factors to scale up and down from the base case the selling price.

Table 15-4: M&I Whittle™ Shell Results

Pit Shell	Best Case Disc. @ 8%	Specified Case Disc. @ 8%	Worst Case Disc. @ 8%	Total Tonnage	Ore Tonnage	Strip Ratio	TFe	Conc
	(M$)	(M$)	(M$)	(kt)	(kt)	(W:O)	%	(kt)
1	1,480	1,480	1,480	254,657	134,804	0.89	29.93	49,069
2	2,313	2,258	2,135	554,619	278,390	0.99	29.26	101,334
3	2,689	2,602	2,314	833,055	385,832	1.16	29.00	140,443
4	2,928	2,825	2,327	1,185,877	502,167	1.36	28.75	182,789
5	3,019	2,925	2,228	1,428,522	571,634	1.50	28.60	208,075
6	3,040	2,924	2,184	1,502,105	590,618	1.54	28.54	214,985
7	3,058	2,926	2,133	1,580,843	610,015	1.59	28.49	222,045
8	3,073	2,902	2,077	1,659,467	626,756	1.65	28.46	228,139
9	3,081	2,900	2,040	1,711,025	638,560	1.68	28.43	232,436
10	3,087	2,888	2,002	1,757,524	648,071	1.71	28.41	235,898

Pit Shell	Best Case Disc. @ 8%	Specified Case Disc. @ 8%	Worst Case Disc. @ 8%	Total Tonnage	Ore Tonnage	Strip Ratio	TFe	Conc
	(M$)	(M$)	(M$)	(kt)	(kt)	(W:O)	%	(kt)
11	3,093	2,872	1,959	1,808,833	656,774	1.75	28.39	239,066
12	3,096	2,852	1,935	1,837,431	661,932	1.78	28.37	240,943
13	3,098	2,866	1,911	1,867,322	667,787	1.80	28.36	243,074
14	3,100	2,863	1,885	1,892,539	671,500	1.82	28.35	244,426
15	3,102	2,868	1,852	1,930,030	677,242	1.85	28.34	246,516
16	3,103	2,859	1,837	1,947,539	680,061	1.86	28.33	247,542
17	3,105	2,849	1,800	1,991,981	686,537	1.90	28.31	249,900
18	3,106	2,841	1,771	2,024,941	690,205	1.93	28.30	251,235
19	3,106	2,835	1,752	2,044,904	692,688	1.95	28.30	252,138
20	3,106	2,824	1,732	2,067,863	695,147	1.97	28.29	253,034
21	3,106	2,822	1,719	2,081,809	696,547	1.99	28.29	253,543
22	3,106	2,810	1,692	2,107,129	699,060	2.01	28.28	254,458
23	3,106	2,810	1,688	2,114,389	699,657	2.02	28.28	254,675
24	3,106	2,804	1,676	2,125,374	700,556	2.03	28.28	255,002
25	3,106	2,800	1,665	2,138,576	701,741	2.05	28.28	255,434

The shell selection is presented in Table 15-5 and Figure 15-3. Pit shell 10 was selected as the final pit shell, which corresponds to a revenue factor of 0.83. This shell has a total tonnage of 1,757 Mt including 648 Mt of ore. The pit shell was selected as having a good combination of best case and specified case scenario in Whittle™ as well as providing a lower strip ratio for an In-pit Crushing System ("IPCS"). The IPCS requires a larger ramp due to the conveyors and a life of mine ("LOM") of around 25 years at minimum. An IPCS for waste and conventional truck and shovel for ore were selected for the Pre-feasibility Study ("PFS").

Table 15-5: M&I Pit Shell Selection

Shell Selection	Best	Spec.	Worst	Selection
Shell Number	21	7	4	10
Shell RF	1	0.8	0.76	0.83
Shell Price (CAN$)	130	104	98.8	107.9
Total Tonnage (kt)	2,081,809	1,580,843	1,185,877	1,757,524
Waste Tonnage (kt)	1,385,262	977,469	694,496	1,113,970
Strip Ratio (W:O)	1.99	1.62	1.41	1.73
Ore Tonnage (kt)	696,547	603,374	491,381	643,554
TFe Grade (%)	28.29	28.49	28.75	28.41
Conc. Tonnage (kt)	253,543	219,628	179	234,254
DCF @ 8% (M$)	3,106	2,925	2,326	2,888
LOM (year)	33.76	24.19	22.19	26.11

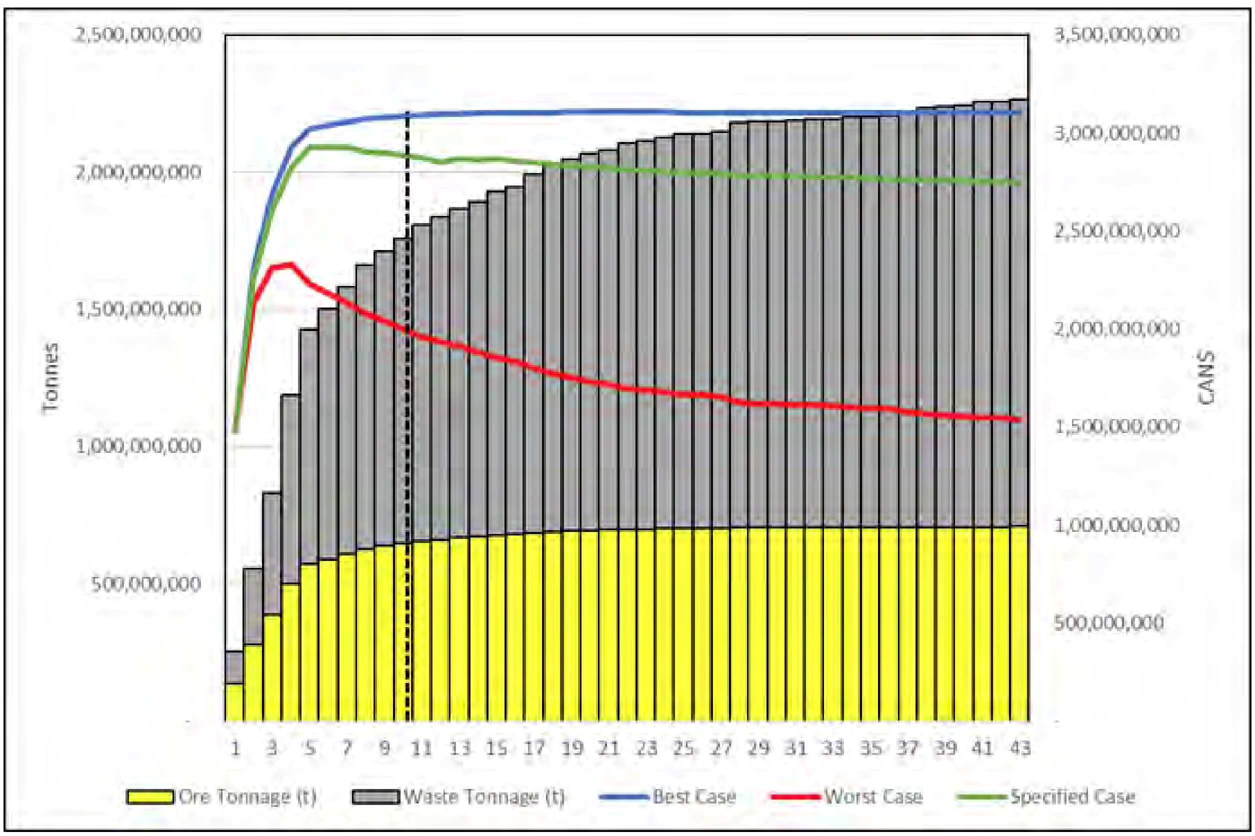


Figure 15-3: M&I Pit by Pit Graph @ $130/dmt con

15.7 Mine Design

15.7.1 Ramp Design Criteria

The ramps and haul roads are designed for the largest equipment being a 300 t haul truck with a canopy width of 8.7 m. For double-lane traffic, industry best-practice recommends designing a travelling surface of at least three and a half times the width of the largest vehicle. Ramp gradients are established at 10%.

A shoulder barrier or safety berm on the outside edge will be constructed of crushed rock to a height equal to the rolling radius of the largest tire using the ramp. The rolling radius of the truck tire is 1.35 m. These shoulder barriers are required wherever a drop-off greater than 3 m exists and will be designed at 1.1H:1V. A ditch planned on the highwall will capture run-off from the pit wall surface and assure proper drainage of the running surface. The ditch will be 2.0 m wide. To facilitate drainage of the roadway, a 2% cross slope on the ramp is planned.

The double-lane ramp width is 37 m wide, the double-lane ramp with a conveyor line is 53 m wide, and the single-lane ramp is 23 m wide. Single-lane ramps are introduced in the pit bottom when the benches start narrowing and when the mining rates will be significantly reduced. Double and single-lane ramp configurations are shown in Figure 15-4 and Figure 15-5.

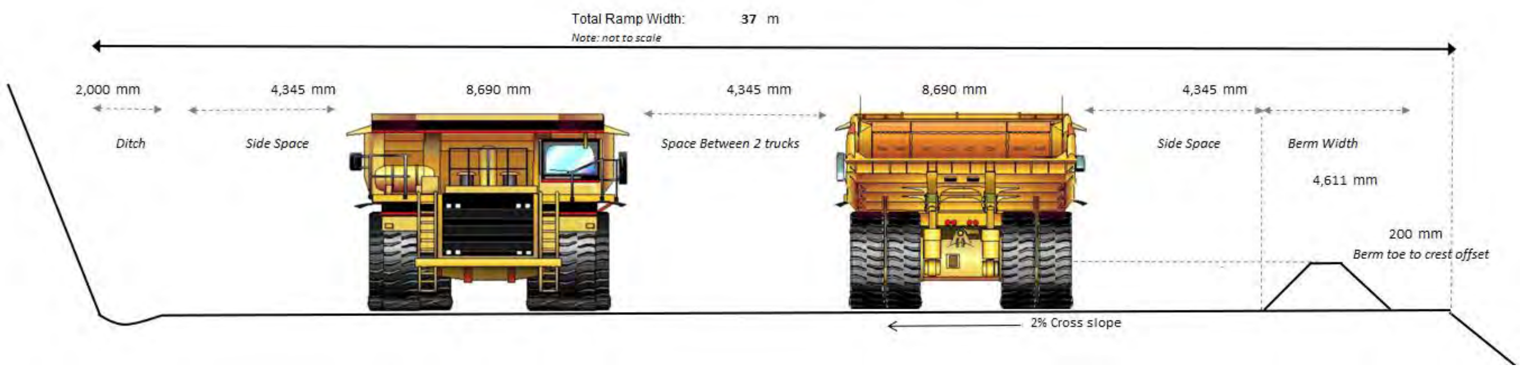


Figure 15-4: Double-Lane Ramp Design Criteria

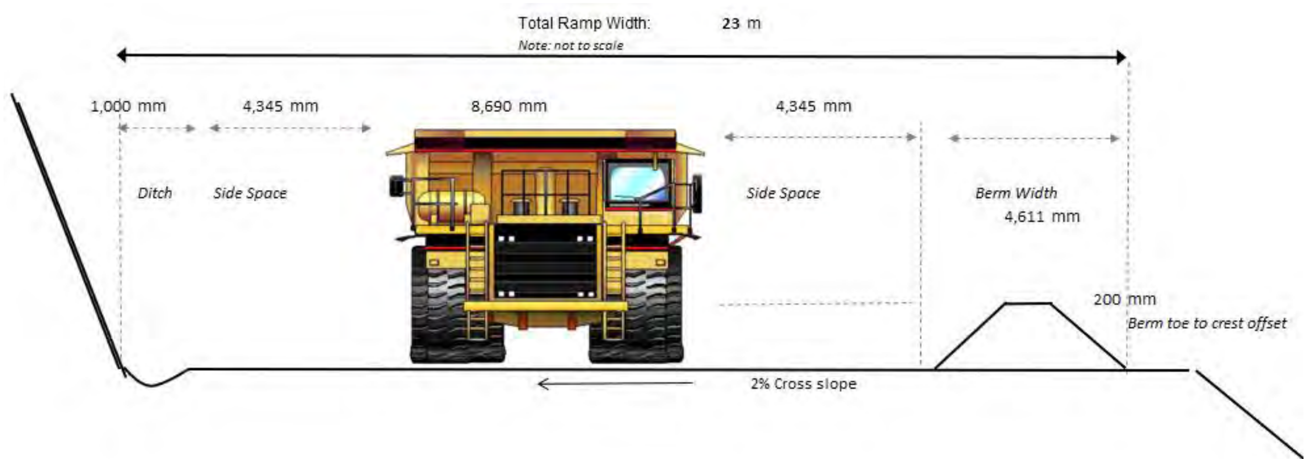


Figure 15-5: Single-Lane Ramp Design Criteria

15.7.2 Open Pit Mine Design Results

The Kami deposit is mined as a single pit as presented in Figure 15-6. The pit has a roughly ellipsoidal shape with a west-east orientation. It is approximately 2.6 km long by 1.5 km wide and reaches an average depth of 550 m. The final pit design has one exit to the east to facilitate the access to the crusher and the primary waste dump. There are two internal pits within the final pit. These pits join at 275 m depth. The ore will be mined using conventional truck and shovel method, while the waste will be transported using an IPCS. The crusher and conveyor system is planned to move once from its initial position to its final location at 275 m depth, where it will become a fixed crusher to allow mining from either internal pits. The main ramp to the final crusher location has a width of 53 m to allow space for the waste conveyor, while the ramps to the bottom of the pit are 37 m for double-lane and 23 m for single-lane. The ramps are designed as long and straight as possible to minimize transfer stations and maximize straight conveyors as their turning radius is limited.

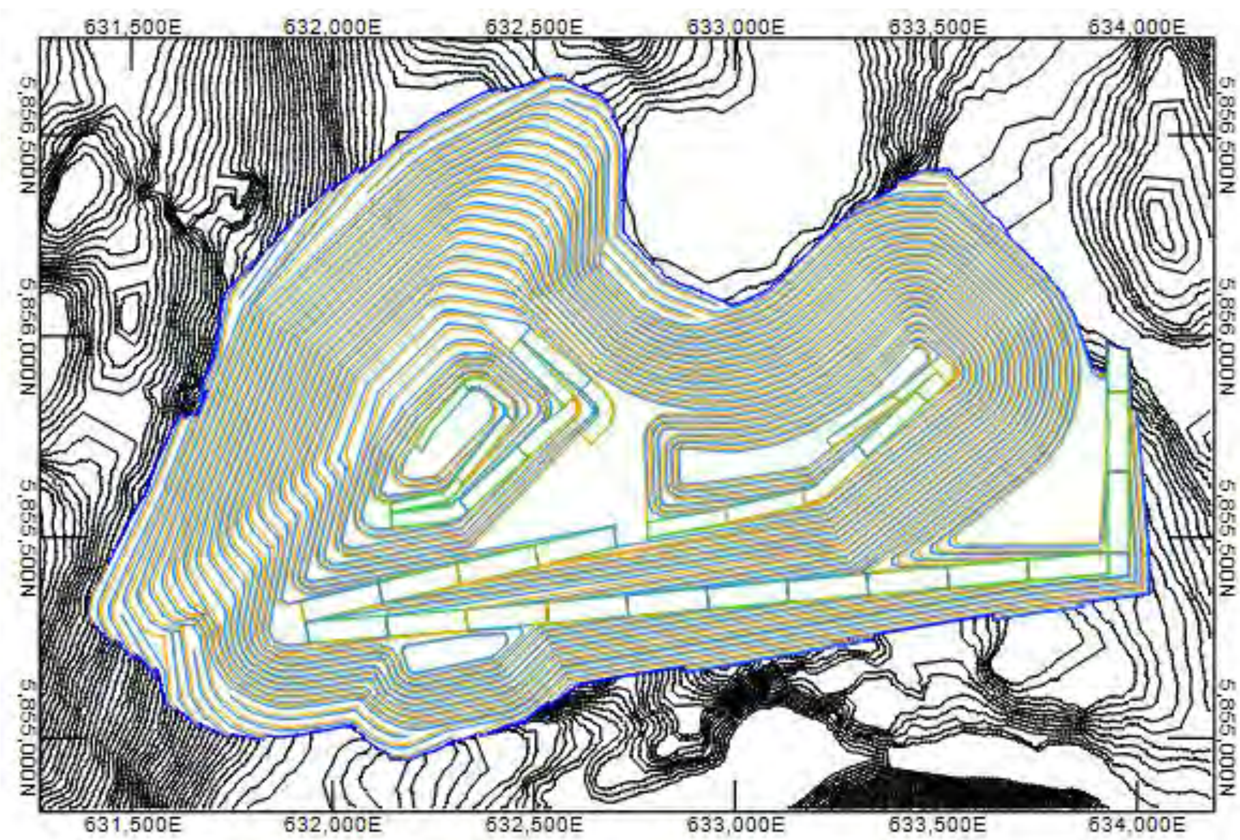


Figure 15-6: Final Pit Design Plan View

15.8 Mineral Reserve Statement

Ore reserve and stripping estimates are based on the final pit design presented in Section 15.7. Proven and Probable ore reserves are inclusive of mining dilution and ore loss. Total ore tonnage before external mining dilution and ore loss is estimated at 634.3 Mt at an average grade of 29.3% TFe

External mining dilution around the ore blocks results in a dilution tonnage of 8.9 Mt at 27.8% TFe (recoverable Fe of 14.8% comprised of 10.1% Fe in Hem and 4.7% Fe in Mag). Dilution tonnage represents 1.4% of the ore tonnage before dilution and the dilution grade is estimated from the block model and corresponds to the average grade of the dilution skin. Table 15-6 presents a mineral resource to ore reserve reconciliation.

Table 15-6 Mineral Resource to Ore Reserve Reconciliation

Resource to Reserve Reconciliation	Tonnage	Grade	Grade	Grade
	(Mt)	%Fe in Hem	%Fe in Mag	% TFe
In-Situ Ore	634	11.4	14.7	29.3
Less: Ore Loss (Isolated Blocks)	0.01	20.8	1.8	25.3
Ore Before Mining Dilution	634	11.4	14.7	29.3
Add: Mining Dilution	8.9	10.1	4.7	27.8
Proven & Probable Mineral Reserve	643	11.4	14.6	29.2

16. Mining Methods

16.1 Summary

The Kami Project is planned as a mix of conventional open pit mine for the ore combined with an In-pit Crushing System ("IPCS") for the waste. Mining will be done with the use of drills, haul trucks coupled with hydraulic shovels, and a semi-mobile waste IPCS while the ore crusher will be at the pit exit on the east side. The Project consists of the Rose pit, which is split into three phases. The peak mining rate is 81.0 million tonnes per year ("Mt/y") over a mine of life of 26 years. A total of 643 Mt of ore will be mined at an average total iron grade of 29.2% with a total of 1,019.5 Mt of combined waste and overburden, resulting in a strip ratio of 1.6 t of waste per tonne of ore mined. The primary production equipment includes 29 m³ electric-hydraulic production shovels and 300 t off-highway mining trucks combined with a semi-mobile gyratory in-pit crusher and conveyor system for the waste. An owner mining operation is planned with overburden stripping and topographic drilling activities outsourced to contractors.

Pre-production mining will take place for about 1 year to provide material for construction and remove overburden to allow access to the pits. A total of 110.6 Mt of waste and overburden as well as 19.1 Mt of ore will be mined in the pre-production and ramping up period.

The milling rate is planned at 26.0 Mt/y with a ramp up period of 1 year at 17.0 Mt/y. The mill will run for 25 years and produce 212.4 Mt of iron ore concentrate having an iron content above 67.5%Fe. The ore stockpile will reach a maximum of 5.9 Mt and will be gradually built-up to allow for blending of the material ahead of crushing. The maximum stockpile is reached at Year 6.

16.2 Open Pit Designs

16.2.1 Mine Design Parameters

The open pit mine designs were guided using optimal Whittle™ shells, pit slope, ramp design criteria, and dilution parameters are outlined in Chapter 15. Mining of the Kami Open Pit Project is planned with three phases in one pit. The mining physical characteristics of each mining phase are summarized in Table 16-1 and final configuration of the pit is presented in Figure 16-1.

Table 16-1: Mining Reserve by Phase

Description	Unit	Phase I	Phase II	Phase III	Total
Total Tonnage	Mt	225	438	999	1,663
Waste	Mt	105	240	674	1,020
Stripping Ratio	W:O	0.9	1.2	2.1	1.6
Ore	Mt	120	199	325	643
Iron Grade	% TFe	28.9	29.6	29.1	29.2
Diluted Iron Grade in Magnetite	%Fe in Mag	14.6	13.1	15.5	14.6

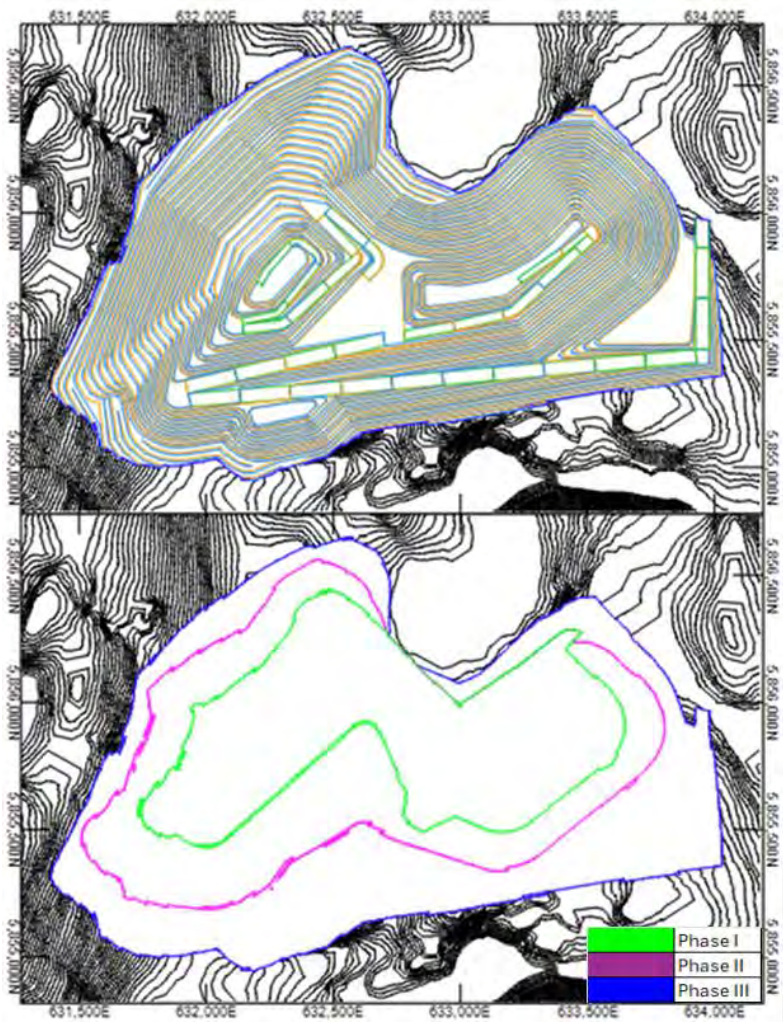


Figure 16-1: End of LOM Pit Layout and Phase Limits

16.2.2 Pit Phases

16.2.2.1 Rose

Rose is located southwest of Pike Lake and west of the planned crusher, mill, and concentrator location. It is limited to the west by the Quebec-Labrador provincial border. The pit is located about at 10 km southwest from the town of Wabush at approximately 52.84°N latitude and 66.95°W longitude. Rose pit is composed of three nested phases, each using the northeast wall as a base and expanding via 60 m to 100 m pushbacks. Special considerations of pit designs are made to allow ramping to be as straight as possible for the conveying system, thus limiting the number of transfer points needed. In all phases the haulage ramp transitions to a single lane from double lane along the last three benches to better capture ore pockets at the bottom of the phase. Pit exits are planned to exit to the east to allow the shortest haul to the ore crusher and the waste dump.

The borrow pit is not a separate phase and is included in Rose Phase I during the construction and pre-production period.

Rose Phase I is the smallest nested pit. The final wall closest to Pike Lake will be achieved during this phase. The ramp for the "IPCS" for Rose Phase I and Rose Phase II is located between Rose North and Rose Central. It will be ready at the start of Rose Phase I during the construction and pre-production period. Rose Phase I is 1.6 km long, 1.2 km wide, and has a maximum depth of 265 m.

Rose Phase II shares the ramp created in Rose Phase I. Rose Phase II is 2.3 km long, 1.5 km wide, and has a maximum depth of 405 m.

Rose Phase III is the final phase of the Rose pit. Rose Phase III drives a ramp along the east and south wall. The east ramp will only be used until the depth of Rose Phase III exceeds that of Rose Phase II, then the east and south primary ramp will be driven to the bottom of the pit. Rose Phase III is 2.6 km long, 1.5 m wide and has a maximum depth of 550 m.

The different Rose phases are presented in Figure 16-2, Figure 16-3, and Figure 16-4.

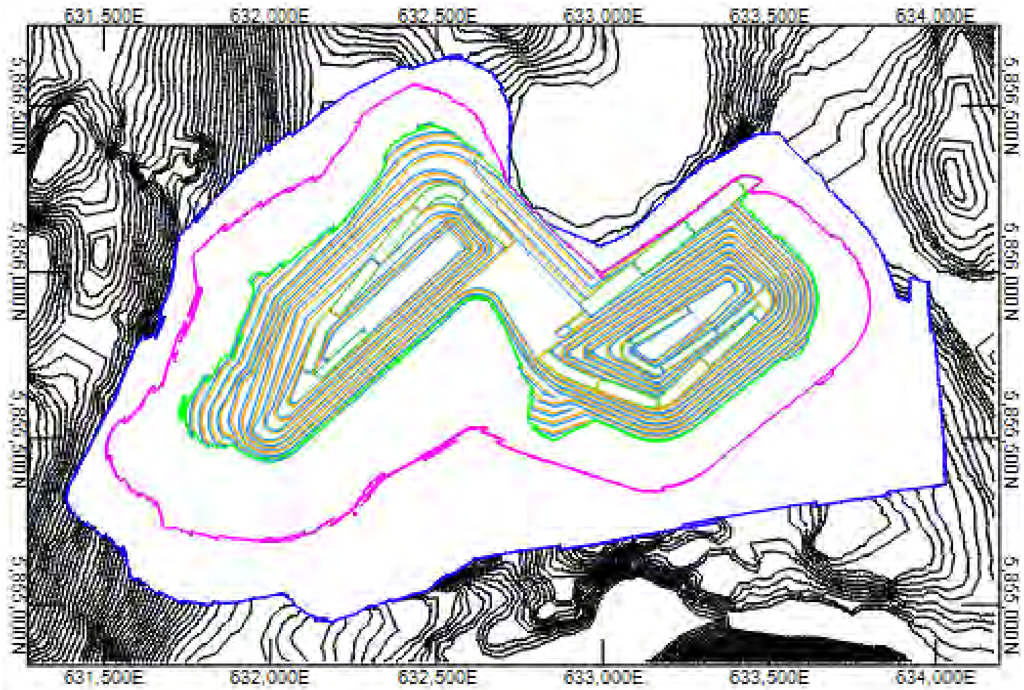


Figure 16-2: Kami Phase I

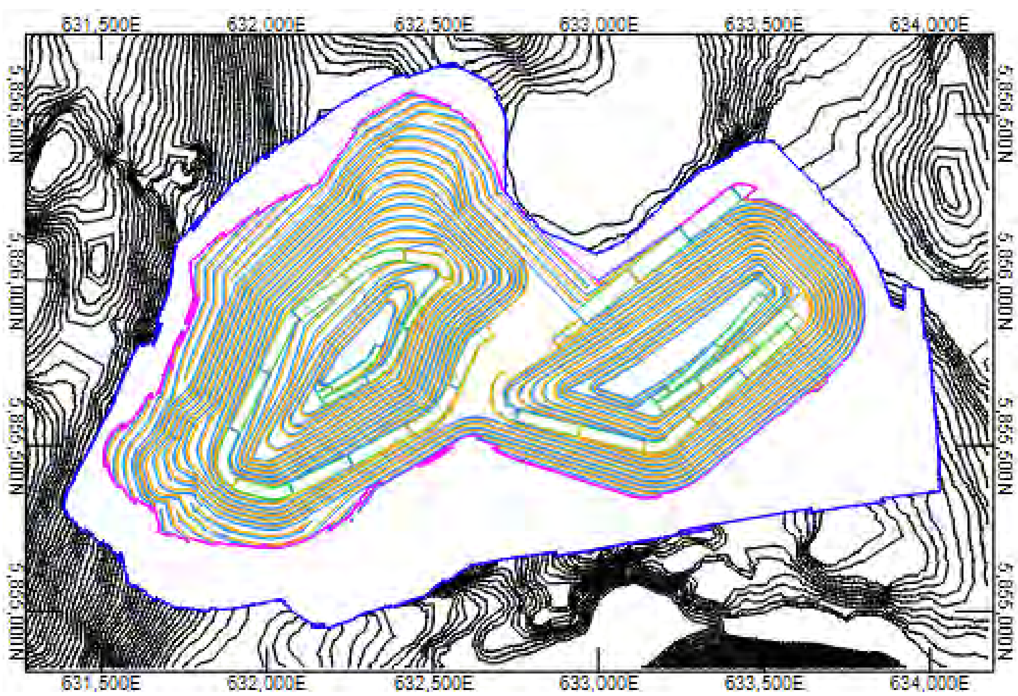


Figure 16-3: Kami Phase II

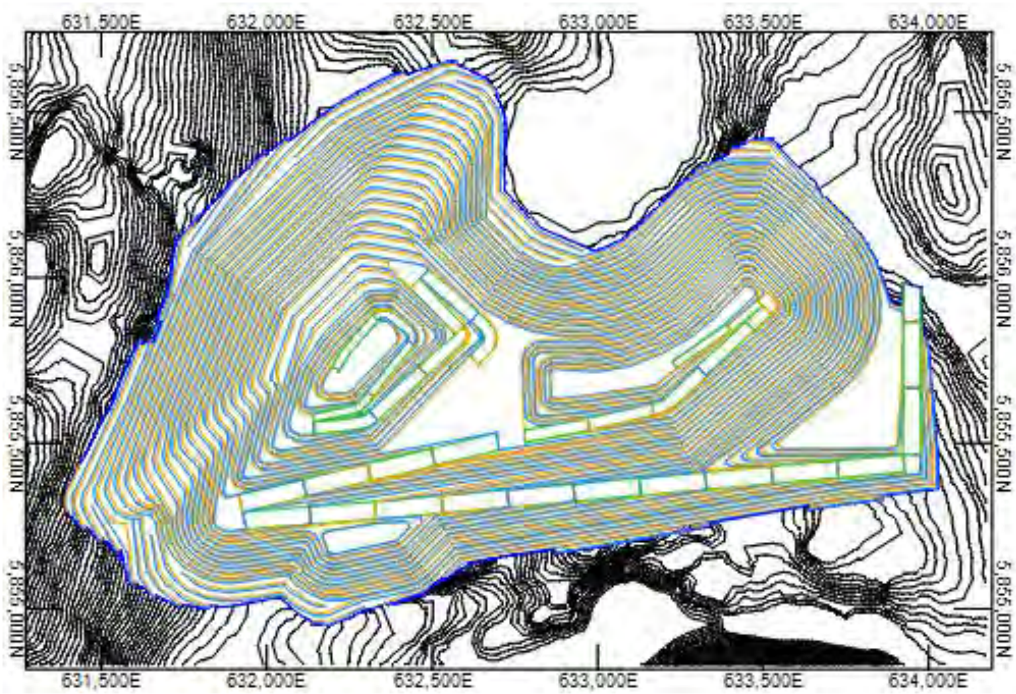


Figure 16-4: Kami Phase III

16.3 Waste Rock Storage Facilities

A total of 913.9 Mt of waste rock and 105.6 Mt of overburden will be produced over the mine's life. Rock material will be conveyed to the rock storage facility and stacked using a mix of a stacker with a track dozer. The material pile will be built in layers in the north-south and west-east axis. Overburden will be hauled to the overburden storage facility by a contractor. Figure 16-5 depicts the facilities locations. Table 16-2 presents the capacities and general design considerations of the facilities.

A total of 7.4 Mm³ of waste rock is planned for construction. An additional 1.3 Mm³ of other materials (sand, gravel and till) will be taken from borrow pits located on site. These values include the building of the initial tailings dam, site laydowns, processing plant, and haulage roads.

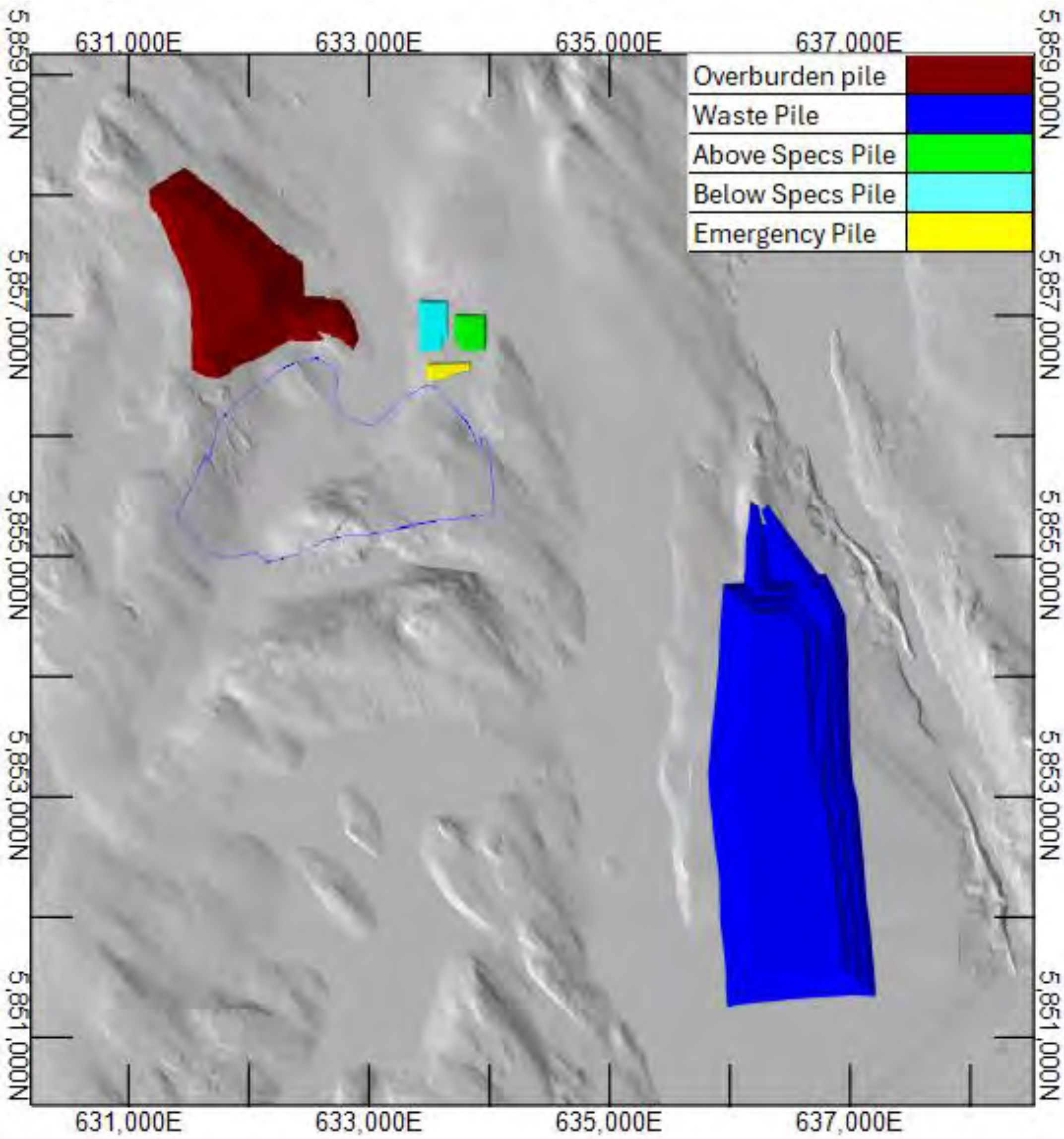


Figure 16-5: Waste Storage Facilities

Table 16-2: Dump Capacities and Design Parameters

Facility	Capacity (Mm³)	Capacity Used (Mm³)	Filled %	OSA Degree
Waste Storage Facility	518.4	404.4	78	27.5°
Overburden Storage Facility	59.7	59.7	100	18.5°

OSA: Overall slope angle

16.4 Ore Stockpile

The specifications for the blend are based on the Magnetite to Total Iron ratio for this study. Three different stockpiles will be built close to the crusher to allow material blending. Stockpiles and their capacities are defined as below specifications (1.3 Mm³), emergency (0.4 Mm³), and above specifications (0.9 Mm³), allowing to adjust the feed to keep it constant. Figure 16-6 depicts the ore stockpiles and their locations.

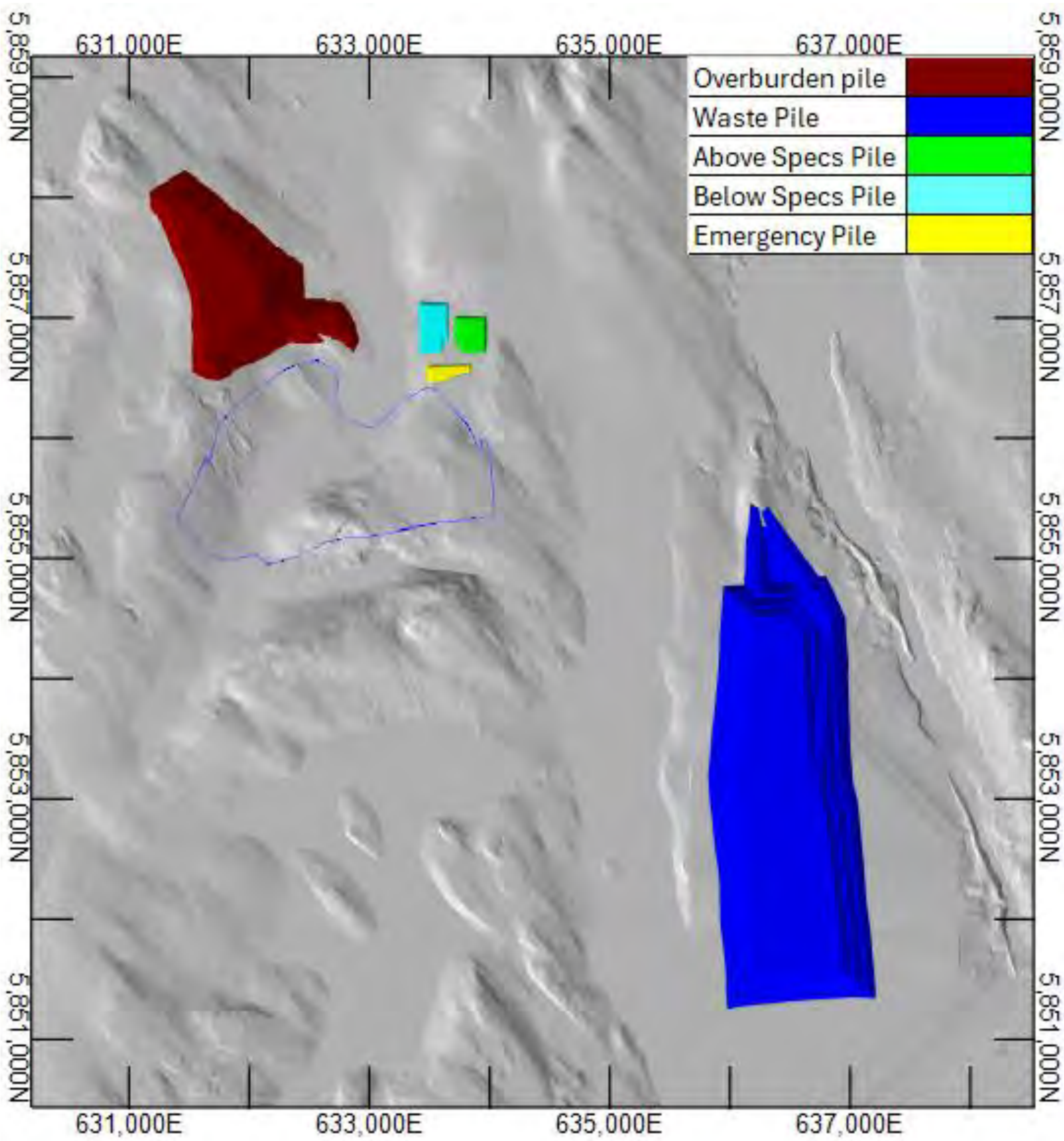


Figure 16-6: Ore Stockpile

16.5 Mine Haul Roads

The structure of the mining roads was established using the recommendations in the geotechnical report (Stantec 2012e). Berms were designed wherever there was a difference in elevation over 2.5 m between the roadway and the existing ground as per the Newfoundland and Labrador regulation 5/12. The geometry of the roads was determined based on a 300-t class mining truck. Figure 16-7 shows the typical cross section of the mining haul road.

The alignment of the roads uses the alignment established in the previous studies while optimizing its position to minimize the amount of work required to construct the road while maintaining the required access to the conveyors and minimize the trip time of the haul trucks. The profile of the road follows the natural topography of the ground to minimize the construction where possible, but also attempts to minimize the number of slope changes to ensure speeds can be consistent on the mining roads.

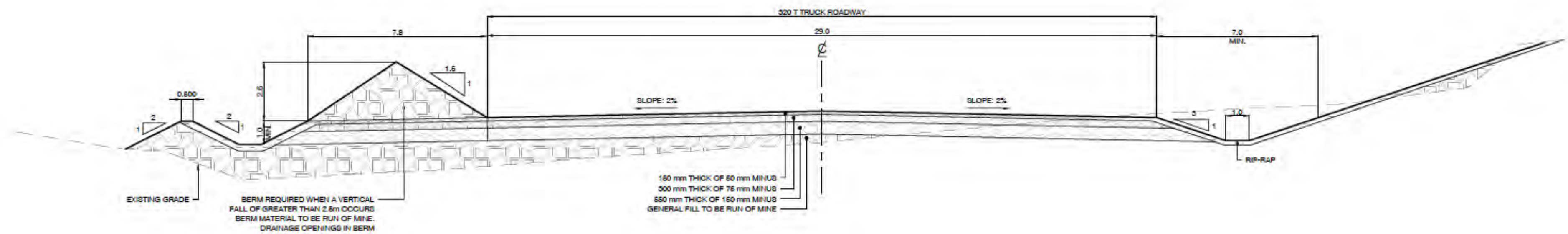


Figure 16-7: Haul Road Layout

Figure 16-8: Ex-pit Haul Road Design Criteria

Road type	Design Speed	Maximum Speed Posted	Max. Vertical Slope	Curve Radius (5)	Width (1) (3) (4)	Shoulder Width (2)	Berm Height/ Width (4)
	(km/h)	(km/h)	(%)	(m)	(m)	(m)	(m)
Mine Hauling Road	60	50	10	135	29.1	Included in Width	2.6 / 7.8
Plant Area	30	15	10	100	29.1	Included in Width	2.6 / 7.8
Crusher Area	30	15	10	100	29.1	Included in Width	2.6 / 7.8
Ore Stockpile Area	30	15	10	100	29.1	Included in Width	2.6 / 7.8
Mine Garage Area	30	15	10	100	29.1	Included in Width	2.6 / 7.8

Notes:

(1) Minimum truck lane width is in accordance with Client standards.

(2) Refer to TAC, Table C5.2 for shoulder width (function of design speed).

(3) Refer to TAC, Table 11.4.4 for lane widths.

(4) Refer to NFLD Regulation 5/12 (3 times the width of the widest vehicle (8.65 m), plus 3 m).

(5) Curve radii are function of design vehicle turning radius.

16.6 Production Schedule

The life of mine production schedule was optimized using Minemax™ Scheduler, which is an industry leading schedule optimizer using best in class CPLEX technology. Minemax™ Scheduler is an automated mine scheduling tool which leverages multi-period optimization to determine maximum net present value ("NPV") while imposing various physical constraints and targets. The optimization includes mine sequencing and mining rate, stockpile usage and rehandling, and fleet usage. The strategic optimal plan from Minemax™ on an annual basis was then further detailed by month using Deswik™ to track material movements, stockpile inventory, mill blending, waste movements and equipment usage / movements.

16.6.1 Mining Schedule

Mining activities are planned over a duration of 26 years, which includes 1 year of pre-production. The last year of production will include approximately 2.8 Mt of stockpile rehandling to feed the mill. The mining rate will remain between 75 Mt to 79 Mt for 11 years, peaking at approximately 81 Mt on Year 15, and then start ramping down until the end of the life of the mine. Figure 16-9 presents the mining schedule by material type.

Figure 16-10 presents the tonnage mined by phase for the Rose pit. In any given year, there are up to three simultaneous phases, one of which is usually the main source of ore and the other being stripped. The mine plan kept a maximum sinking rate of 80 m per year.

Mine production details showing mined grades and material movement are presented in Table 16-3.

Figure 16-11 through Figure 16-14 depict the mine progression for the selected years as well as the end of the mine at Year 25.

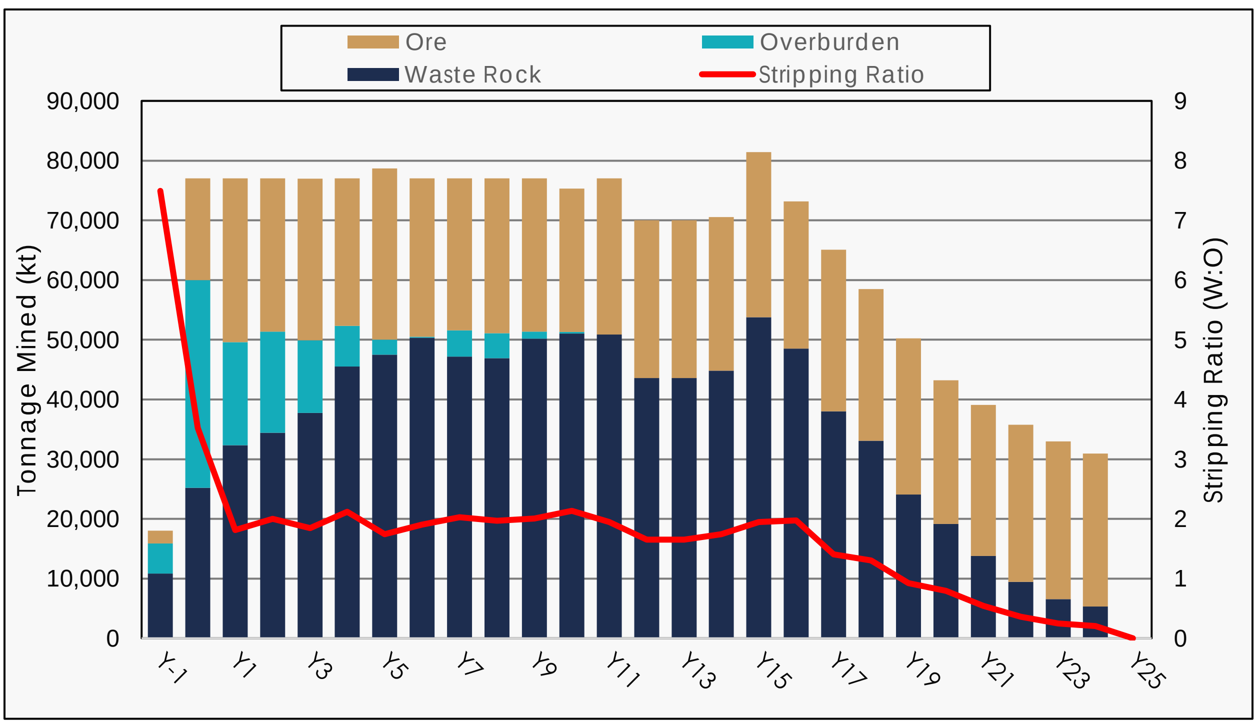


Figure 16-9: Mine Production by Material Type

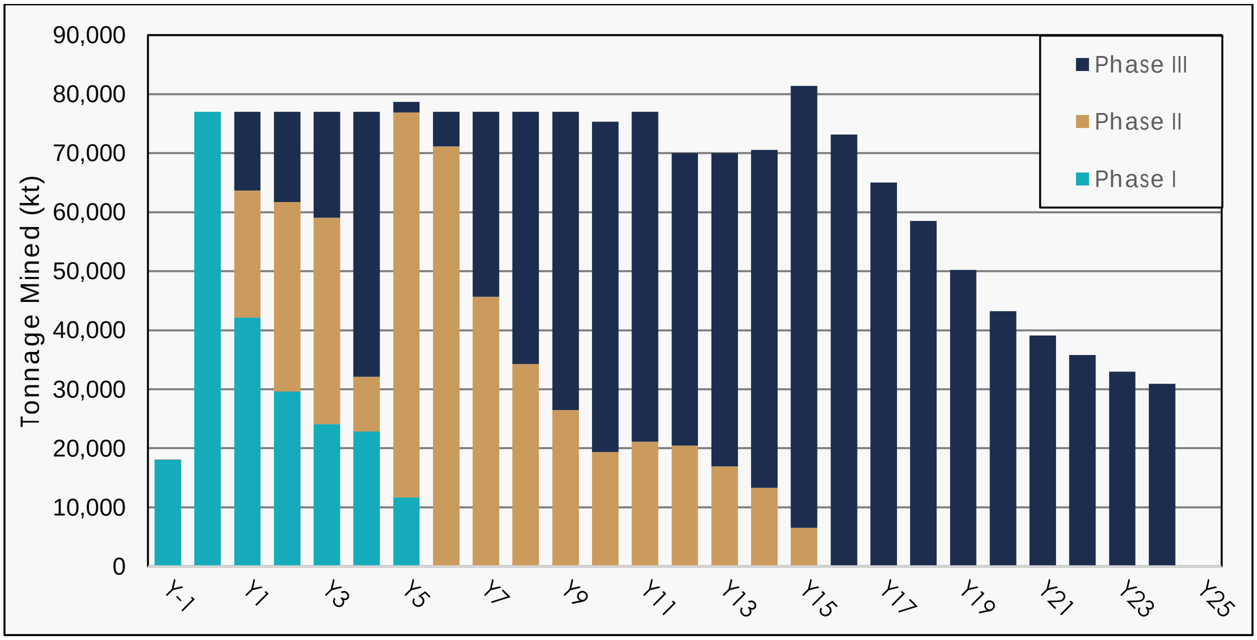


Figure 16-10: Mine Production by Phase

Table 16-3: Mining Production Schedule Summary

	Unit	Total	Y-1	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11
Total Tonnage	Mt	1,663	18	77	77	77	77	77	79	77	77	77	77	75	77
Tonnage Moved	Mt	1,705	18	77	77	77	77	78	81	82	78	77	77	77	80
Waste Tonnage	Mt	1,020	16	60	50	51	50	52	50	50	52	51	51	51	51
Overburden	Mt	106	5	35	17	17	12	7	2	0	4	4	1	0	-
Rock	Mt	914	11	25	32	34	38	46	48	50	47	47	50	51	51
Strip Ratio (W:O)	W:O	1.6	7.5	3.5	1.8	2.0	1.8	2.1	1.7	1.9	2.0	2.0	2.0	2.1	1.9
Ore Tonnage	Mt	643	2	17	27	26	27	25	29	27	25	26	26	24	26
TFe	%	29	27	27	29	29	29	29	30	30	30	29	29	29	29
Fe in Mag	%	15	16	16	12	14	14	17	13	12	12	13	14	14	14
	Unit	Y12	Y13	Y14	Y15	Y16	Y17	Y18	Y19	Y20	Y21	Y22	Y23	Y24	Y25
Total Tonnage	Mt	70	70	71	81	73	65	59	50	43	39	36	33	31	-
Tonnage Moved	Mt	73	70	71	85	75	69	59	54	45	40	38	35	31	2
Waste Tonnage	Mt	44	44	45	54	49	38	33	24	19	14	9	7	5	-
Overburden	Mt	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rock	Mt	44	44	45	54	49	38	33	24	19	14	9	7	5	-
Strip Ratio (W:O)	W:O	1.7	1.7	1.7	1.9	2.0	1.4	1.3	0.9	0.8	0.5	0.4	0.2	0.2	-
Ore Tonnage	Mt	26	26	26	28	25	27	25	26	24	25	26	26	26	-
TFe	%	29	29	29	29	29	29	29	29	29	29	29	29	30	-
Fe in Mag	%	14	14	15	15	16	16	16	15	16	16	16	16	16	-

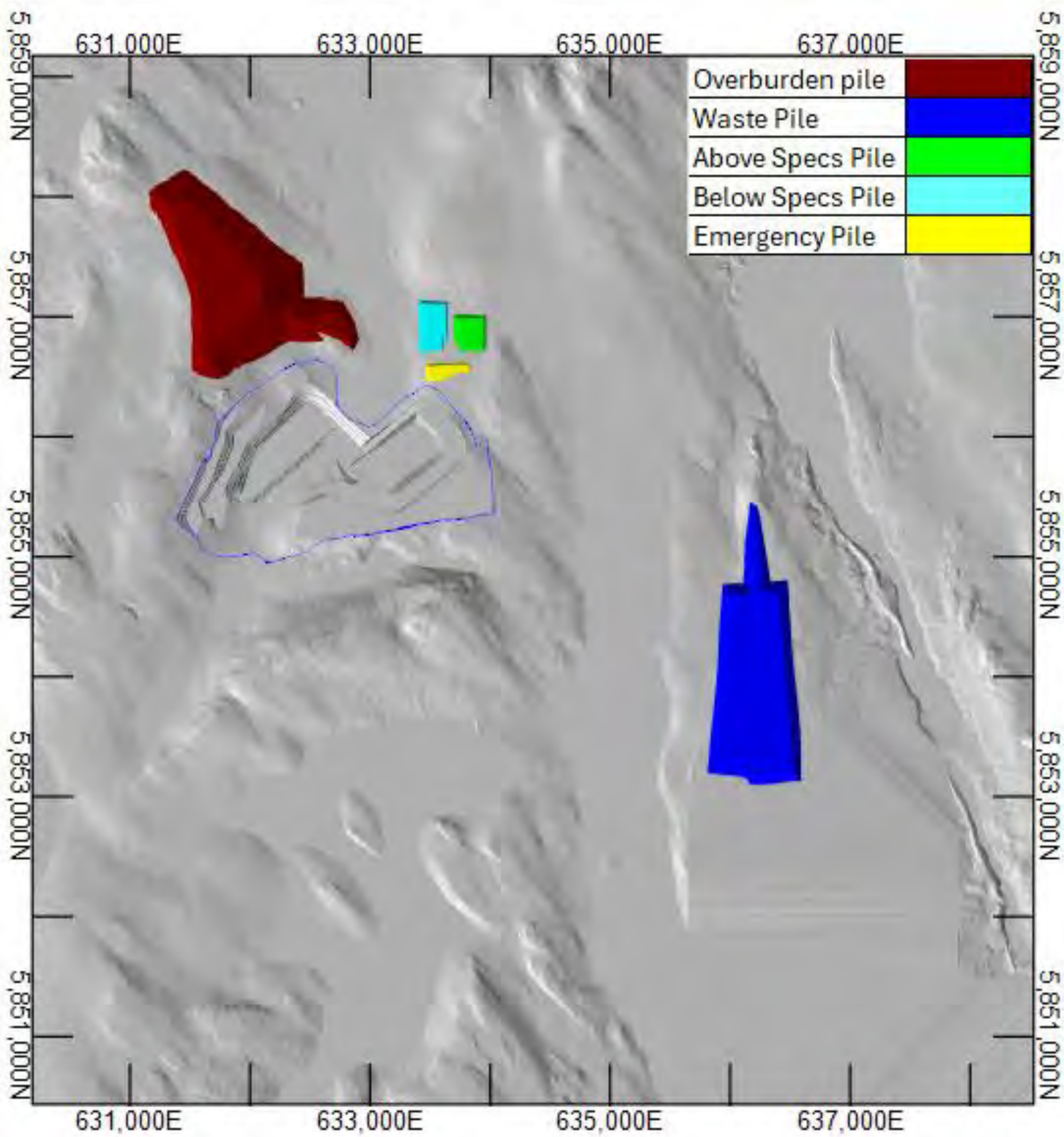


Figure 16-11: Mine Development – Year 1

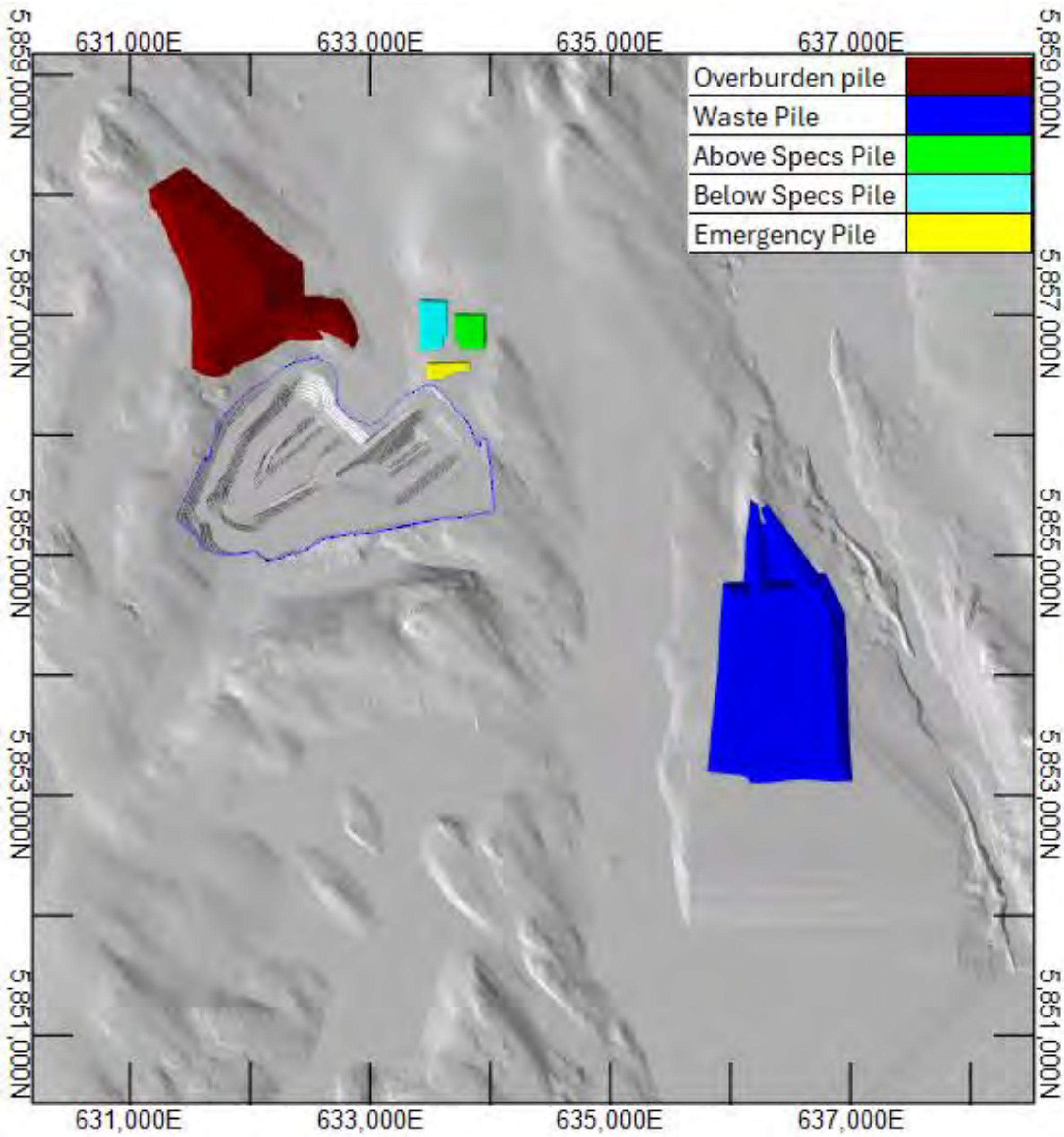


Figure 16-12: Mine Development – Year 6

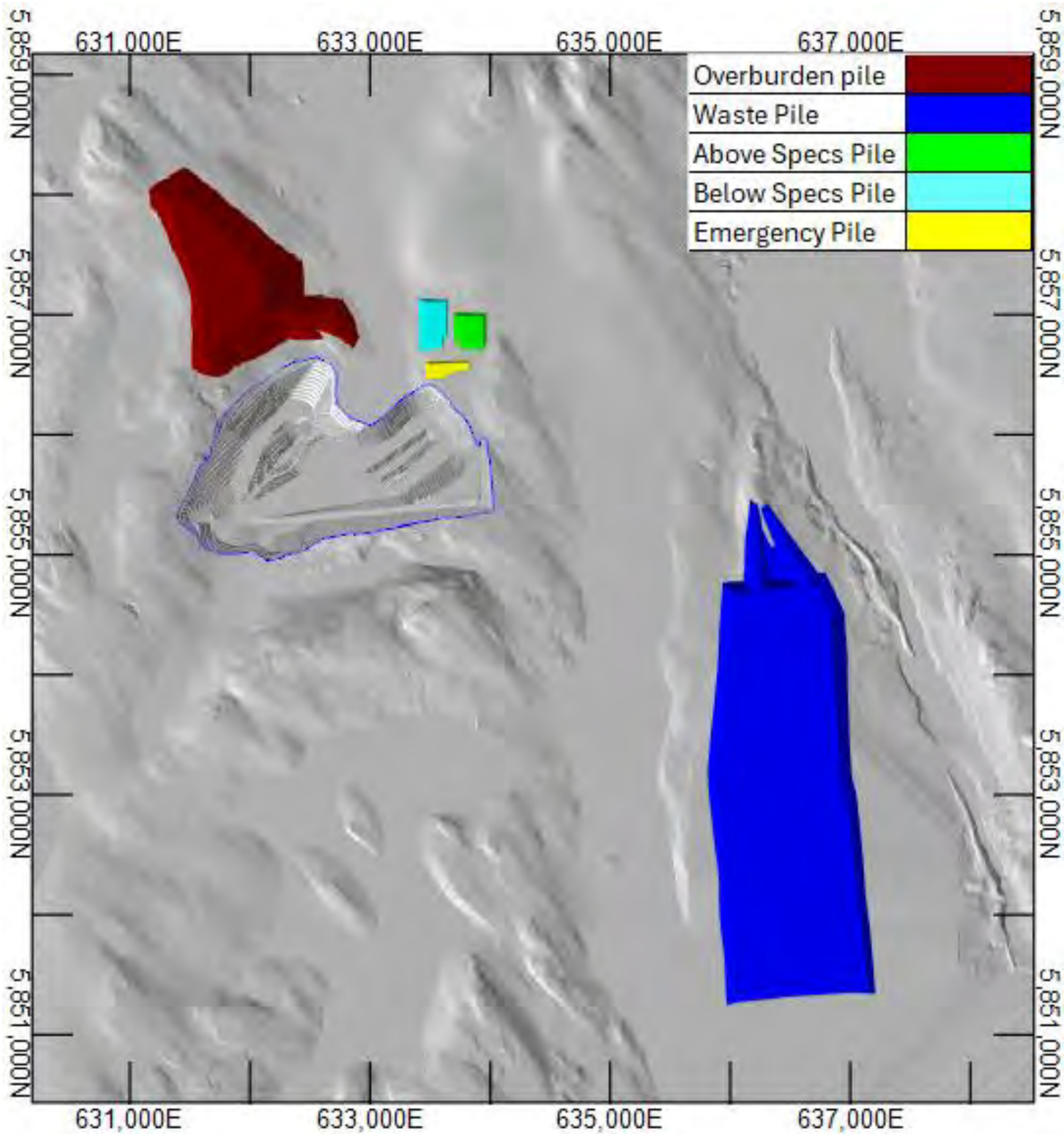


Figure 16-13: Mine Development – Year 16

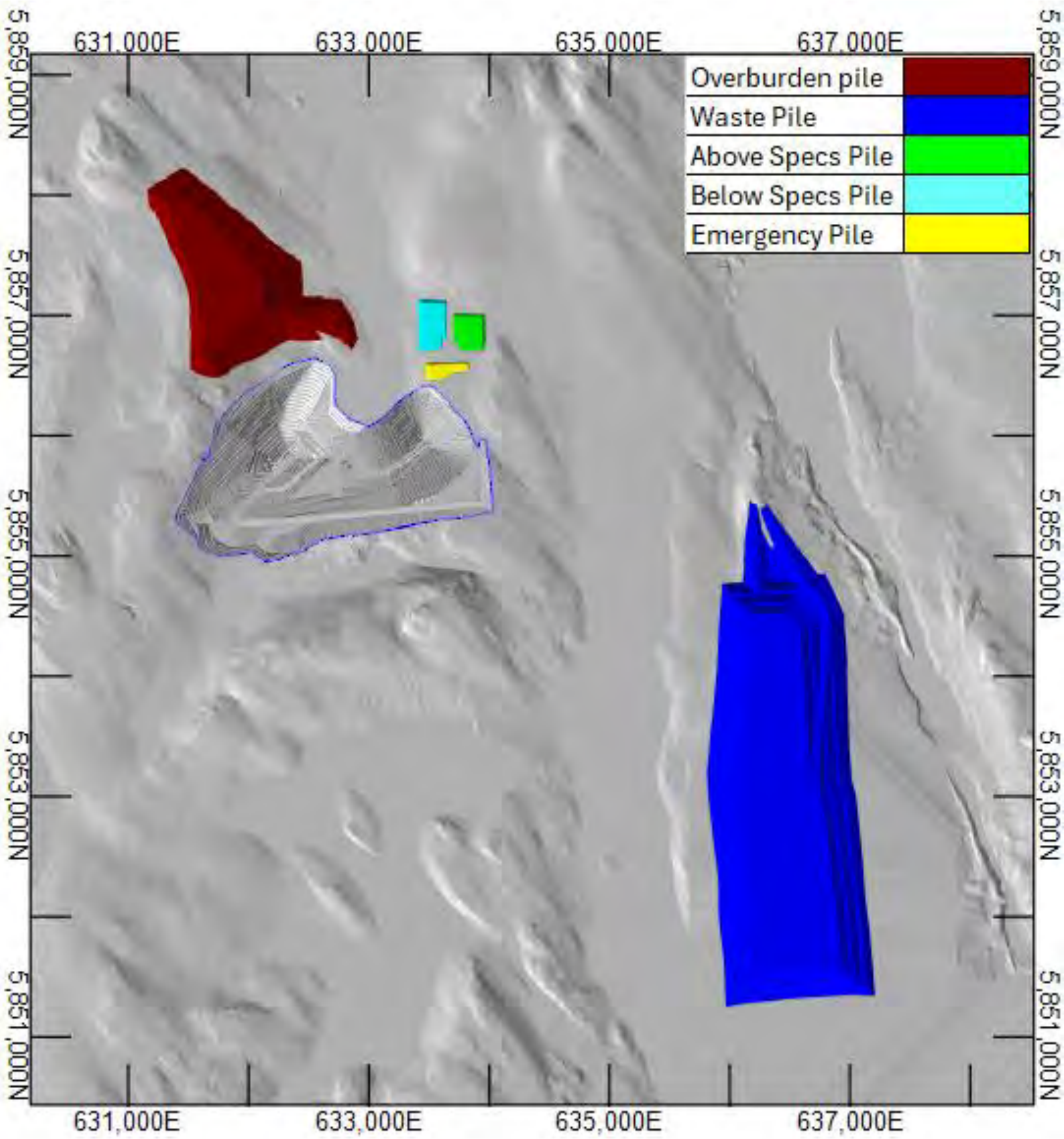


Figure 16-14: Mine Development – Year 25 (end of LOM)

16.6.2 Processing Schedule

The mill schedule includes a ramp-up in the pre-production year of approximately 66% nameplate throughput after which nameplate throughput of 26 Mt/y is achieved for 24 years, followed by a ramp-down at the end of the life of the mine. Mill feed is maximized with direct feed from the pit and rehandled stockpiled material. Figure 16-15 depicts the milled tonnage and the average total iron head grade per period.

Figure 16-16 depicts the produced iron ore concentrate by period and the average final weight recovery, which varies between 31.4% to 34.7% over the life of the mine. Concentrate production averages 8.6 Mt/y with an expected total of approximately 212.4 Mt of concentrate produced over 26 years. Table 16-4 depicts the mill schedule from the mine and stockpiles.

Figure 16-17 depicts the end of year ("EOY") stockpile inventories. On specification material is prioritized at the mill with a blend of above and under specs. Stockpile inventory peaks at Year 6 for a total of 5.9 Mt.

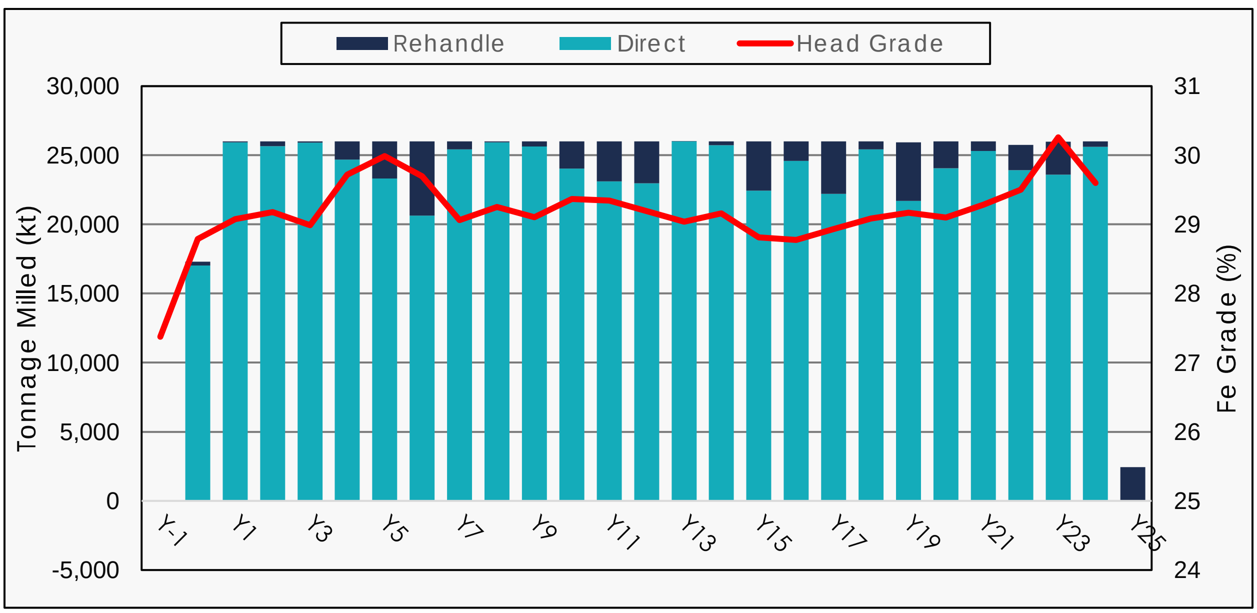


Figure 16-15: Mill Feed

Table 16-4: Milling Production Schedule Summary

	Unit	Total	Y-1	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11
Ore Milled	Mt	643	-	17	26	26	26	26	26	26	26	26	26	26	26
TFe Grade	%	29	-	27	29	29	29	29	30	30	30	29	29	29	29
Fe Grade in Mag	%	15	-	15	13	14	14	17	13	11	12	13	14	15	14
MnO Grade	%	1.5	-	1.6	1.6	1.6	1.5	1.6	1.6	1.4	1.4	1.4	1.5	1.6	1.5
Conc. Produced	Mt	212	-	5.4	8.2	8.5	8.5	8.7	8.6	8.5	8.5	8.4	8.5	8.6	8.6
Avg. Weight Rec.	%	33.0	-	31.2	31.7	32.6	32.8	33.6	33.2	32.7	32.6	32.4	32.8	32.9	33.2
Stockpile Inv.	Mt		2.1	1.8	3.2	2.9	4.0	2.7	5.4	5.9	5.3	5.2	4.9	2.9	3.0
To Stockpile	Mt		2.1	-	1.5	-	1.2	-	5.4	5.9	-	-	-	-	3.0
From Stockpile	Mt		-	0.3	0.1	0.3	0.1	1.3	2.7	5.4	0.6	0.1	0.4	2.0	2.9
	Unit	Y12	Y13	Y14	Y15	Y16	Y17	Y18	Y19	Y20	Y21	Y22	Y23	Y24	Y25
Ore Milled	Mt	26	26	26	26	26	26	26	26	26	26	26	26	26	2
TFe Grade	%	29	29	29	29	29	29	29	29	29	29	29	30	30	30
Fe Grade in Mag	%	14	15	15	15	16	16	16	16	16	15	16	16	16	15
MnO Grade	%	1.6	1.6	1.4	1.4	1.3	1.4	1.5	1.5	1.7	1.7	1.7	1.7	1.5	2.5
Conc. Produced	Mt	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.7	8.6	8.6	8.8	9.0	0.8
Avg. Weight Rec.	%	32.9	33.0	32.9	33.1	33.0	33.1	33.2	33.2	33.4	33.2	33.5	33.8	34.7	33.6
Stockpile Inv.	Mt	3.4	3.8	3.6	5.2	3.8	4.8	4.2	4.4	2.5	1.8	2.4	2.8	2.4	-
To Stockpile	Mt	3.4	0.4	-	5.2	-	4.8	-	4.4	-	-	2.4	2.8	-	-
From Stockpile	Mt	3.0	0.0	0.3	3.6	1.4	3.8	0.6	4.2	1.9	0.7	1.8	2.4	0.4	2.4

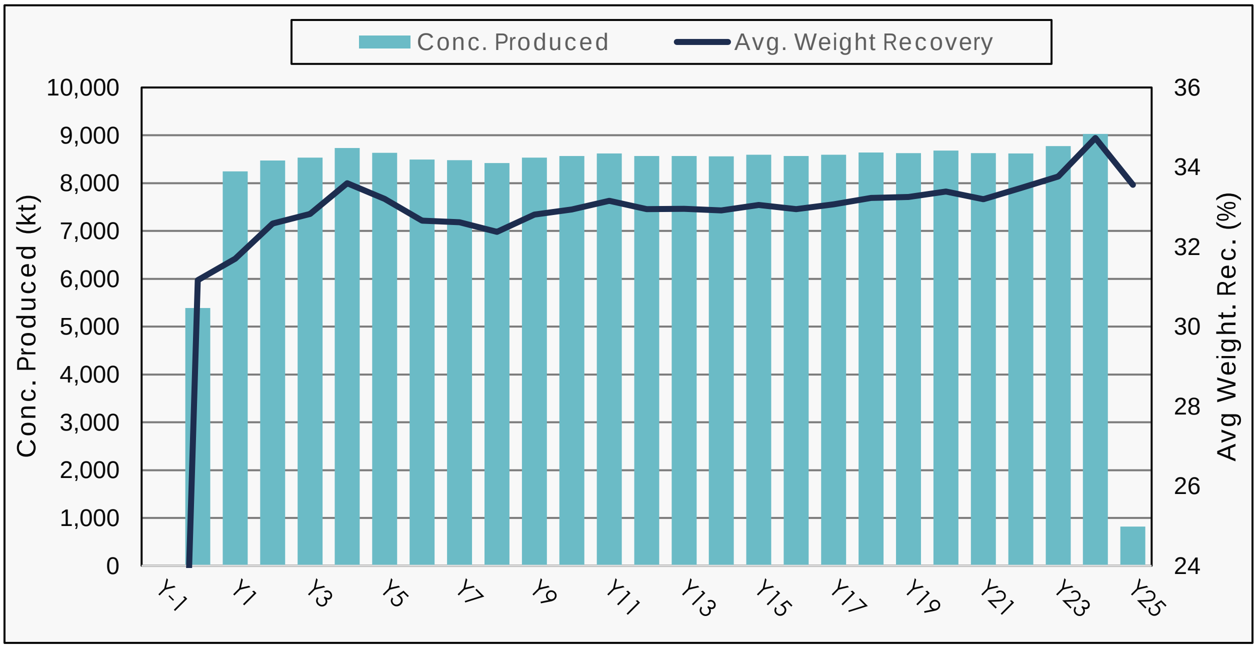


Figure 16-16: Iron Ore Concentrate

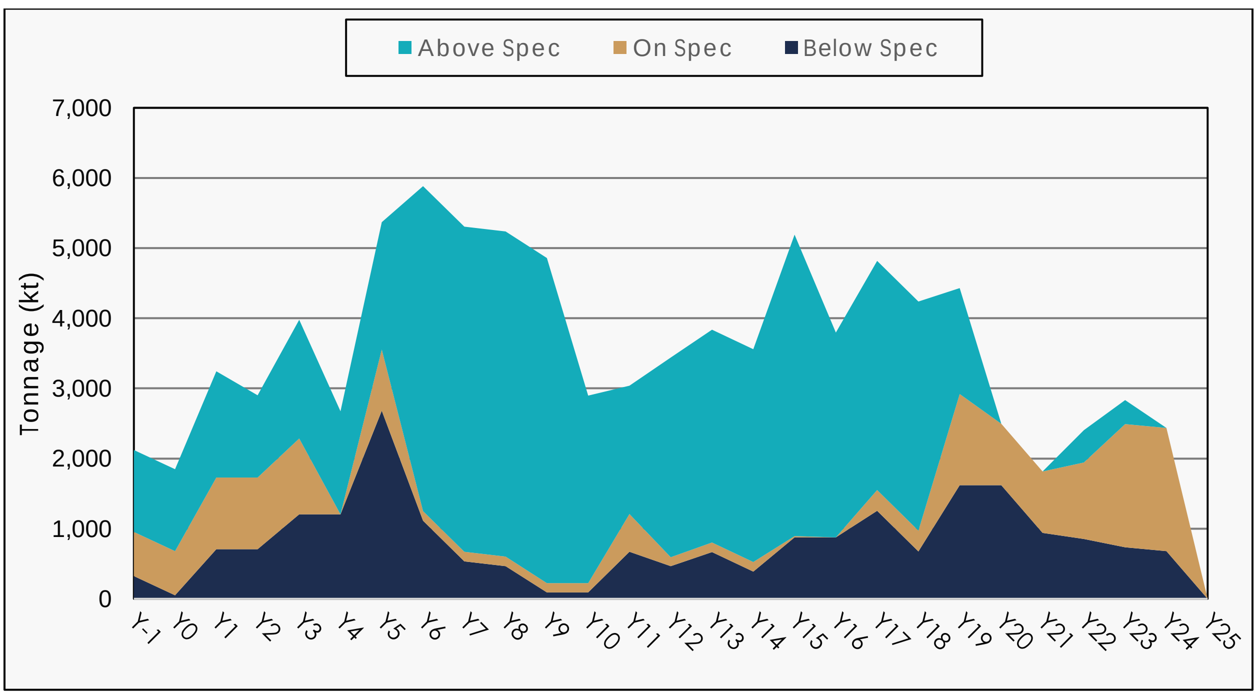


Figure 16-17: End of Period Stockpile

16.7 Mine Operations and Equipment Selection

16.7.1 Drilling and Blasting

Production drilling is planned on 10 m benches using 9.875" (251 mm) diameter holes. Electric production drills capable of single-pass drilling, specifically designed for 10 m benches with a hole range from 215.9 mm to 300 mm are selected and are capable of either rotary drilling or down-the-hole ("DTH") drilling.

Drill and blast specifications are established according to material type and whether the rock is ore or waste. The ore drill pattern is proposed with a 5.5 m burden and 6.25 m spacing with 1.5 m of subdrill. The waste drill pattern is proposed with a 6.5 m burden and 7.5 m spacing with 1.5 m of subdrill. These drill parameters combined with a high energy bulk emulsion with a density of 1.25 kg/m^3 result in a powder factor of 0.4 kg/t for ore and 0.34 kg/t for waste. Blast holes are planned to be initiated with electronic detonators and primed with boosters.

Table 16-5 depicts the drill patterns and the production drill parameters.

Table 16-5: Drill and Blast Parameters

Drill & Blast Parameters	Unit	Ore	Waste
Drill Pattern			
Diameter (D)	m	0.251	0.251
Burden (B)	m	5.50	6.50
Spacing (S)	m	6.25	7.50
Subdrill (J)	m	1.50	1.50
Stemming (T)	m	4.00	4.00
Pattern Yield			
Rock Density	t/bcm	3.40	2.83
BCM/Hole	bcm/hole	344	488
Yield per Hole	t/hole	1,169	1,380
Yield per Metre Drilled	t/m drilled	102	120
Powder Factor	kg/t	0.40	0.34
Drill Productivity			
Re-drills	%	5.0%	5.0%
Pure Penetration Rate	m/h	38.0	38.0
Overall Drilling Factor (%)	%	0.63	0.63
Overall Penetration Rate	m/h	23.9	23.9
Drilling Efficiency	t/h	2,433	2,872
Drilling Efficiency	holes/h	2.08	2.08

Controlled blasting techniques will be used including buffer blasts and pre-splits. The pre-split consists of closely spaced holes along the design excavation limit. The holes are loaded with a light charge and detonated simultaneously or in groups separated by short delays. Firing the pre-split row creates a crack that forms the excavation limit and helps to prevent wall rock damage by venting explosive gases and reflecting shock waves. A pre-split drill rig (4.5"-8") was selected for this application.

Topographic drilling will be executed by a contractor.

Explosives furniture will be outsourced to an explosive provider who will be responsible for supplying and delivering explosives to the hole. An owner operated blasting team will oversee the loading and blasting activities. The mine engineering department will be responsible for designing blast patterns, relaying hole information to the drilling team, and supervising all blasting activities.

16.7.2 Loading

The primary loading fleet consists of four (29 m³) electric hydraulic shovels and one (21.3 m³) diesel front end loader. The shovel will be used in ore and waste while the loader will supplement the waste loading and some of the stockpile rehandling when needed. Both unit types can load 300 t class mining trucks. Table 16-6 presents the loading fleet productivity assumption. The number of units is in whole numbers for productivity assumption numbers, but some equipment will be shared between ore and waste, such as one shovel and the wheel loader

The overburden removal will be contracted and is not accounted for the fleet requirement. Overburden removal will last for approximately 12 years.

Table 16-6: Loading Fleet Productivity Assumptions

Description	Unit	Ore		Waste	
Loading Unit		29 m³ Shovel	21 m³ Loader	29 m³ Shovel	21 m³ Loader
Haulage Unit		300 t	300 t	300 t	300 t
Rated Truck Payload	t	290	290	290	290
Heaped Tray Volume	m³	211	211	211	211
Bucket Capacity	m³	29	21.3	29	21.3
Bucket Fill Factor	%	90	90	90	90
Passes (whole)	#	5	6.75	5	7.5
Production / Productivity					
Productivity Dry Tonnes	t/h	3,076	2,288	2,766	2,065
Dry annual Production Capacity	kt/y/unit	16,826	11,927	15,132	10,765
Number of Units	#	2	1	3	1
Productivity	t/y	33,652	11,927	45,398	10,765

16.7.3 Hauling and Conveying

Haulage will be performed by 300 t class off-highway mining trucks. The ore material will be hauled to the ore crusher located outside of the pit, while the waste will be hauled to the in-pit semi-mobile gyratory crusher. It will then be conveyed to the waste storage facility, where it will be spread into a pile using a spreader system.

The truck requirements haven been calculated in Deswik.LHS™ (Landform and Haulage) software. This software links the mining schedule to the waste movements and determine optimal haulage routes and simulates them using Rimpull data from the fleet. The following assumptions were used when running the simulations:

- Max site speed limit of 50 km/h;
- Max speed loaded and downhill of 30 km/h;
- Average rolling resistance of 3%;
- A fixed loading and spotting time varies depending on the loader, truck, and material. This value ranges from 4-7 mins;
- Waste material to be crushed and conveyed using an in-pit semi mobile crushing and conveying system.

There is one overburden storage facility and one waste storage facility planned. The material sent to the overburden pile will be hauled by contractors and were not accounted for in the time cycle study, while the waste will be conveyed through the in-pit crushing and conveying system. Ore is hauled to the ore crusher using 300 t class mining trucks. Figure 16-18 depicts the average cycle time for ore and waste divided by phase. Note that cycle time increases as pits get deeper due to increased uphill haulage required. Plateaus or dips in the cycle time represent transitions to new pushbacks starting from the surface, temporarily reducing cycle time. Cycle times shown exclude fixed times.

Figure 16-19 depicts the mass balance of the Project. Ore material is any material going to the plant or the stockpiles. A total of 8.7 Mm^3 of waste rock is planned for construction use in pre-production and Year 0. This includes the tailings dam, site laydowns, pads, and road construction.

Figure 16-20 depicts the total truck fleet requirements. A total of eight 300-t trucks are required to maintain production at peak mining rate, this is held through Years 7 to 24. Trucks will need to be repurchased throughout the life of the mine based on the replacement schedule.

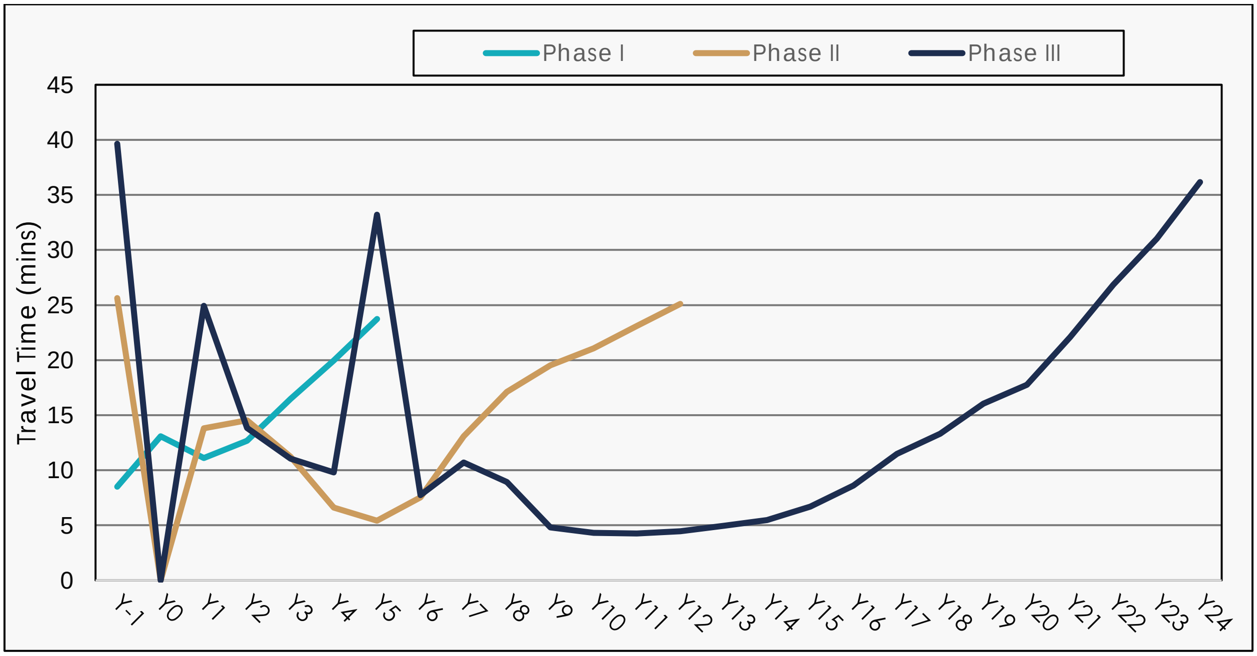


Figure 16-18: Truck Cycle Times for Rock by Phase

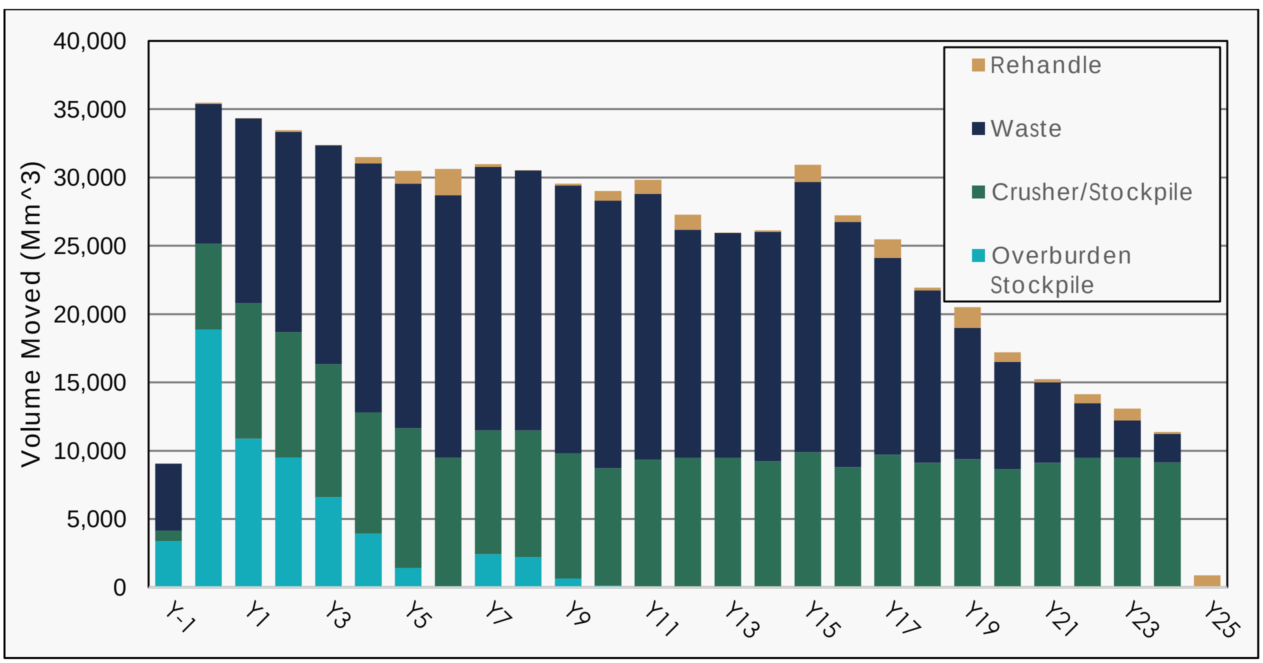


Figure 16-19: Material Movement

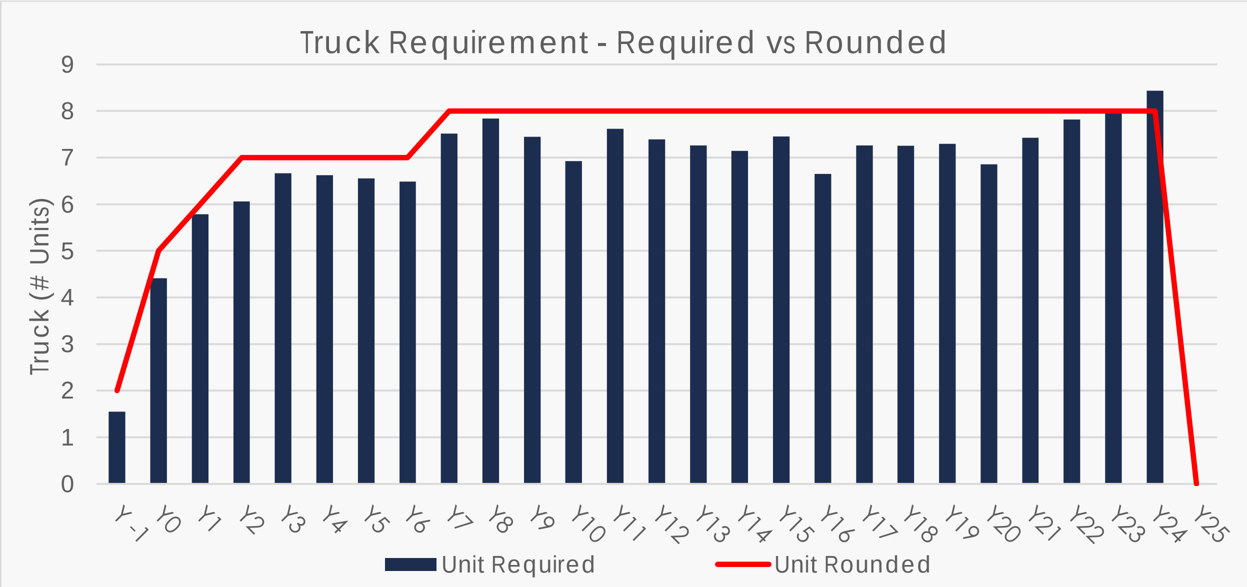


Figure 16-20: Truck Requirements

16.7.4 Support Operations

Support equipment requirements are based on typical open pit mine operation and maintenance requirements to safely support the loading, hauling, and drilling fleets.

Support equipment is planned for maintaining dump areas, stockpiles, pit floors, and mine roads. The fleet of support equipment consists of the following items:

- Two 850 hp dozers for dump maintenance;
- Three 18 ft blade motor graders for road upkeep;
- Two water/sand trucks for dust suppression and winter road sanding;
- Two 752 hp Wheel Dozers.

16.7.5 Mine Dewatering

16.7.5.1 Initial Dewatering

A pumping system (vertical turbine pump placed on a barge) with a nominal capacity of 495 m^3/h will be used for the dewatering of Rose Lake prior to the beginning of the operations. One line of HDPE 500 mm DR17 will be used to discharge the water in Pike Lake. The dewatering of Rose Lake should take between one and three months, depending on weather conditions.

16.7.5.2 Dewatering During Operations

Dewatering during the operations in the first 5 years of the Project will reach 8.0 Mm^3/y considering expected infiltration and average hydrological year. The maximum dewatering rate considering the full development of the pit will reach 15.8 Mm^3/y, considering expected infiltration and average hydrological year.

16.7.5.3 Pumping System

Two permanent sumps equipped with two electric pumps each are planned to manage the water in the pit (two pumps in parallel in sump 1 and two pumps in parallel in sump 2). The pumping system nominal capacity will be 4,680 m^3/h. Diesel pumps will be used to bring water to the permanent sumps.

A set of HDPE and carbon steel pipelines will be used to discharge water to the Rose Pit Collection Pond. Between sump 1 and sump 2, two parallel lines of 600 mm HDPE DR 9 pipelines will be used and between sump 2 and the Rose pit collection pond, two parallel lines of 600 mm carbon steel Sch40 pipelines will be used. HDPE and carbon steel pipelines will be above ground, insulated and heat-traced to allow for winter operations.

16.7.6 Mining Fleet Requirements

Table 16-7 summarizes the gross operating hours used for subsequent equipment fleet requirement calculations. The mine is expected to operate 22 hours per day, 355 days per year. This accounts for shift changes and weather delays from heavy rain events. Additional delays and applied factors are described in productivity calculations for each fleet. Assumptions relating to ancillary and support equipment are specific to each equipment and are not summarized in the table.

Table 16-8 and Table 16-9 presents the equipment purchase schedule for the life of the mine.

Table 16-7: Equipment Usage Assumption

Description	Unit	Shovels	Loaders	Trucks	Drills	Pumps	IPCS - Waste
Days in Period	day	365	365	365	365	365	365
Weather, Schedule Outages	day	10.0	10.0	10.0	10.0	10.0	10.0
Shifts per Day	shift/day	2.0	2.0	2.0	2.0	2.0	2.0
Hours per Shift	h/shift	12.0	12.0	12.0	12.0	12.0	12.0
Availability	%	80.0	80.0	85.0	85.0	90.0	80.0
Use of Availability	%	90.0	90.0	90.0	85.0	95.0	90.0
Utilization	%	72.0	72.0	76.5	72.25	85.5	72.0
Effectiveness	%	80.0	85.0	87.0	85.0	90.0	90.0
Overall Equipment Effectiveness ("OEE")	%	57.6	61.2	66.6	61.4	77.0	64.8
Total Hours	h	8,760	8,760	8,760	8,760	8,760	8,760
Scheduled Hours	h	8,520	8,520	8,520	8,520	8,520	8,520
Down Hours	h	1,704	1,704	1,278	1,278	852	1,704
Delay Hours	h	1,227	920	847	923	728	613
Standby Hours	h	682	682	724	1,086	383	682
Operating Hours	h	6,134	6,134	6,518	6,156	7,285	6,134
Ready Hours	h	4,908	5,214	5,670	5,232	6,556	5,521

Table 16-8: Major Equipment Purchase Schedule

Major Equipment	Total	Y-1	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14	Y15	Y16	Y17	Y18	Y19	Y20	Y21	Y22	Y23	Y24	Y25
Production Drill (8.5-12")	11	2	3	0	0	1	0	0	0	0	0	0	0	0	0	0	2	3	0	0	0	0	0	0	0	0	0	0
Auxiliary Pre-split Drill (4.5-8")	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Electric Hydraulic Shovel (29 m³)	8	2	1	0	0	1	0	0	0	0	0	2	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Wheel Loader (30 m³)	2	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheel Loader (30 m³)	3	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Mining Haul Truck (320 t)	16	5	1	1	0	0	0	0	1	0	0	2	3	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0
Track Dozer (850 hp)	6	2	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
Motor Grader (18 ft)	9	3	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0
Water/Sand Truck (76 kL tank)	6	1	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0
Wheel Dozer (752 hp)	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
Waste Primary Crusher (In-Pit)	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Waste Spreader System	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Waste Tripper Cars (Spreader)	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Waste Conveyor Line 1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Waste Conveyor Line 2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Waste Conveyor Line 3	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Waste Conveyor Line 4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Waste Conveyor Line 5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Waste Conveyor Line 6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Waste Transfer Tower 1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Waste Transfer Tower 2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Waste Transfer Tower 3	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spreader System Conveyor Line 1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spreader System Conveyor Line 2	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spreader System Conveyor Line 3	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 16-9: Support Equipment Purchase Schedule

Support Equipment	Total	Y-1	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14	Y15	Y16	Y17	Y18	Y19	Y20	Y21	Y22	Y23	Y24	Y25
Cable Handling Wheel Loader 271HP	6	2	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Stemming Loader	12	1	1	0	1	0	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	0	1	1	0	0	0	0
Excavator (49 t)	8	2	0	0	0	0	0	0	2	0	0	0	0	0	0	2	0	0	0	0	0	0	2	0	0	0	0	0
Excavator (90 t)	2	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Hammers for Excavator 49t	5	1	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0
Wheel Loader 271 hp	4	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0
Boom Truck 28 t	2	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Mechanic Service Truck	12	3	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3	0	0	0	0	0	0	3	0	0	0	0
Mechanic Service Truck Attachment	12	3	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3	0	0	0	0	0	0	3	0	0	0	0
Tire Handler Loader	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fuel & Lube Truck 10-Wheel	5	1	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0
Tow Haul Truck 150 t	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trailer Lowboy 150 t	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pickup Truck	85	17	0	0	0	0	0	0	17	0	0	0	0	17	0	0	0	0	17	0	0	0	0	17	0	0	0	0
Pit Bus	4	1	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0
Mobile Air Compressor 185CFM	5	1	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0
Welding Machine Electric	8	2	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	0	0	0	0	0	0	2	0	0	0	0
Welding Machine Diesel 400A	8	2	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	0	0	0	0	0	0	2	0	0	0	0
Light Plant	50	10	0	0	0	0	0	10	0	0	0	0	10	0	0	0	0	10	0	0	0	0	10	0	0	0	0	0
Genset 6 kW	9	3	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0
Genset 60 kW	10	2	0	0	0	0	2	0	0	0	0	2	0	0	0	0	2	0	0	0	0	2	0	0	0	0	0	0
Water pump 3" - Gasoline	32	4	0	0	0	4	0	0	4	0	0	4	0	0	4	0	0	4	0	0	4	0	0	4	0	0	0	0

Support Equipment	Total	Y-1	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14	Y15	Y16	Y17	Y18	Y19	Y20	Y21	Y22	Y23	Y24	Y25
Diesel Powered Air Heaters	16	4	0	0	0	0	0	4	0	0	0	0	0	4	0	0	0	0	0	4	0	0	0	0	0	4	0	0
Snow Blower	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Pipelayer Dozer	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Water Pump 6 in - Diesel	8	1	0	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0
6" Pipe – 280 psi	1,500	0	1,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

16.7.7 Mine Workforce Requirements

Mine personnel were divided into hourly and staff positions and were divided between mine operations, mine maintenance, mine engineering and geology. Hourly positions were all associated with a shift roster of 14 days on and 14 days off and as such each unit of equipment requires four operators hired in hourly positions.

Staff positions in management, supervision or technical services roles will also be on roster schedule. In some cases where 24-hour support in the staff role was necessary, the staff position was planned to be on the same 14 days on / 14 days off schedule as hourly staff. A few positions are considered local and are on a 5/2 schedule.

16.7.8 Mine Management & Technical Services

The operations team is responsible for achieving production targets in a safe manner. The engineering and geology team will provide support to the operations team by providing short-term and long-term planning, grade control, surveying, mining reserves estimation and all other technical functions.

16.8 Crushing Plant

The production of crushed material will be necessary, for blasthole stemming purposes, for road maintenance or spreading of road abrasive on the ramps during winter. It is assumed that the required aggregate material production will occur during summertime, with the mobilization of a contracted mobile crusher to site. Waste rock to feed the small crushing plant will come from the waste storage facility, and the material produced will be stockpiled for use throughout the year. Cost of such contract services have been accounted for in the cost/tonne of aggregate used in the model.

16.9 Pit Slope Monitoring

Pit slope monitoring systems are used to gather any information on micro and macro movements of the pit walls. It usually consists of strategically placed prisms that are surveyed under a controlled environment (windless, rainless, and stationary). No monitoring system has been developed during this phase of the Pre-feasibility Study and should be an element of focus in the later engineering stages.

16.10 Mine Maintenance

The Project has not included a maintenance and repair contract ("MARC") for its mobile equipment fleet. The maintenance department and personnel requirement has been structured to fully manage this function, performing maintenance planning and training of employees. However, reliance on dealer and manufacturer support will be key for the initial years of the Project, and major component rebuilds will be supported by the OEM's dealer throughout LOM. An evaluation of a MARC will be considered during the feasibility study process. Tire monitoring, rotation and / or replacement will be carried out by a specialized contractor.

Some other equipment will also be purchased to facilitate the maintenance activities and support the operation, such as fuel and lube trucks, forklift, telehandler, low-boy trailer and tractor for moving the tracked equipment. Other small equipment such as mechanical service trucks, generators, compressors, light towers, welding machines, water pumps, and air heaters are also included.

17. Recovery Methods

17.1 Introduction

Following the issuance of the 2018 NI 43-101 Updated Feasibility Study Technical Report for the Kami Project by Alderon (Grandillo et al., 2018), Champion has reviewed the scope of the Kami Project to prepare a Pre-feasibility Study. Additional testwork has been conducted to design a process allowing the production of a low silica grade concentrate suitable for Direct Reduction usage.

The various metallurgical test programs presented in Chapter 13 of this Report are the basis for the processing flowsheet, design criteria, material and water balance, equipment selection and sizing proposed in this chapter.

The flowsheet presented in this report is based on the flowsheet developed during the previous phases of the Project, with the following major changes:

- The gravity separation circuit was initially a rougher-cleaner-recleaner spirals circuit, while the proposed flowsheet is composed of rougher spirals generating a concentrate cleaned by Reflux® Classifiers. As shown in Chapter 13, this modification allows to increase the iron recovery of the gravity circuit. A gravity concentrate regrinding stage is also added for further liberation of the material;
- The magnetic separation circuit was slightly changed to exclude the cleaning LIMS from the ball mill circulating load due to low mass rejection, and a regrinding stage was added as the finisher LIMS is performed at a finer grind size;
- In both gravity and magnetic circuits, a flotation circuit was added following the regrinding of the concentrate to reduce the final concentrate silica grade.

In the following sections, the design basis and criteria of the processing plant are presented together with the description of each of the processing sections. This information provides the basis for the processing plant and related capital and operating cost estimates for the Kami Project presented in Chapter 21.

17.2 Process Basis of Design and Design Criteria

The process plant described in the following sections is designed to process ore grading 29.2% Fe in average at a nominal rate 3,200 t/h over a 25-year mine life. The projected concentrate production is 8.6 Mt/y at a grade of 67.6% Fe.

The overall process and plant design criteria for the Kami concentration plant are established on the following bases:

- The life of mine ("LOM") nominal iron feed grade is 29.2% Fe with an average proportion of magnetic iron of 50%;
- The iron recoveries are based on the recovery models developed from the testwork and presented in Chapter 13;
- The Fe, SiO_2 and Fe_3O_4 product grades are based on the testwork results presented in Chapter 13;
- Stochastic simulations have been conducted to generate realistic maximum and minimum flow rates for each stream and results from simulations have been used for equipment sizing:
  - The stochastic simulations conducted with the mass balance has variables that can change randomly following defined individual probabilities based on data, experience and assumptions. Realizations of these random variables are generated and inserted into the mass balance. Outputs of the mass balance are recorded, and then the process is repeated with a new set of random values. These steps are repeated 10,000 times. In the end, the distribution of the mass balance outputs shows the most probable estimates for each stream flow rates and other characteristics;
  - The simulation variables are:
    - Mill Feed Fe Grade;
    - Magnetic Fe Proportion;
    - AG Mill Feed Throughput;
    - AG Mill Discharge % Solids;
    - AG Mill Circulating Load;
    - Rougher Spirals Wash Water;
    - Cleaner Reflux® Classifiers Teeter Water;
    - Magnetic Circuit Ball Mill Cyclones Underflow Weight Recovery;
    - Magnetic Circuit Ball Mill Cyclones Underflow % Solids;
    - Gravity Circuit Fine Screen Undersize Weight Recovery;
    - Gravity Circuit Tower Mill Cyclones Underflow Weight Recovery;
    - Gravity Circuit Tower Mill Cyclones Underflow % Solids;
    - Magnetic Circuit Fine Screens Undersize Weight Recovery;
    - Magnetic Circuit Tower Mill Cyclones Underflow Weight Recovery;
    - Magnetic Circuit Tower Mill Cyclones Underflow % Solids;
    - Concentrate Cyclones Underflow Weight Recovery;
    - Concentrate Cyclones Underflow % Solids;

  - Concentrate Thickener Underflow % Solids;
  - Tailings Cyclones Underflow Weight Recovery;
  - Tailings Cyclones Underflow % Solids;
  - Tailings Thickener Underflow % Solids.
- The concentration plant will process different ore blends coming from the Rose North and Rose Central mineralization zones during the LOM. Variability of the iron feed grade and magnetic iron proportion occurring from these blends have been taken into account in the stochastic simulations used for the design;
- Only proven and modern technology for processing iron ore has been considered in the process design and equipment selection. The only relatively new technology is the Reflux® Classifier initially developed for coal and heavy minerals industries and recently used for iron ore processing, notably in Bloom Lake concentrator;
- Fresh water usage has been minimized by designing a water distribution system that maximizes water recovery and recirculation;
- Recirculation of water that could contain flotation reagents has been limited to the flotation areas to limit their potential presence in other sectors.

Table 17-1 summarizes the general parameters upon which the concentration plant design has been based.

Table 17-1: Process Design Basis for Kami Concentrator

Parameter	Unit	Nominal Value	Design Value
Operating Schedule			
Annual Operating Time	d/y	365	-
Equipment Utilization - Crusher	%	65.0	-
Equipment Utilization - Concentrator	%	92.8	-
Mill Feed			
Mill Feed Annual Capacity	t/y	26,000,000	-
Mill Feed Rate	t/h	3,200	3,850
Mill Feed Fe Grade	%	29.2	-
Mill Feed Magnetic Fe Proportion	%	50.0	85.0
Concentrate			
Concentrate Annual Production	t/y	8,577,231	
Concentrate Production Rate	t/h	1,056	-
Concentrate Weight Recovery	%	33.0	-
Concentrate Fe Recovery	%	76.4	-
Concentrate Fe Grade	%	67.6	-
Concentrate SiO_2 Grade	%	2.1	-
Gravity Separation and Concentrate Flotation Circuit			
Gravity Circuit Feed	t/h	3,200	3,850
Gravity Circuit Concentrate Production	t/h	917	1,239
Magnetic Separation and Concentrate Flotation Circuit			
Cobber Concentrate	t/h	498	836
Magnetic Circuit Concentrate Production	t/h	139	237
Tailings Circuit			
Tailings generated	t/h	2,144	2,653

17.3 General Process Description

The process flow diagram for the processing plant was derived from metallurgical testwork (bench-scale and pilot-scale), engineering's team and manufacturers' experience to meet the general design criteria presented in Table 17-1. Figure 17-1 presents the general process flow diagram for the Project while Table 17-2 presents the overall mass and water balance. The main processing stages are the following:

- The run of mine ("ROM") material crushing takes place in a single gyratory crusher located in the vicinity of the Rose deposit;
- Crushed material is conveyed using an overland conveyor that discharges onto a covered stockpile located ahead of the Kami concentrator;
- Crushed material from the stockpile is reclaimed onto a belt conveyor feeding the Autogenous Grinding ("AG") mill;
- AG mill discharge is screened using a two-stage screening circuit. Oversize from the scalping and classification screens is recirculated back to the AG mill;
- Slurry from the grinding and screening circuit is first subjected to gravity concentration using rougher spirals and cleaner Reflux® Classifiers that produce a tailings stream and a gravity concentrate;
- The gravity concentrate is further reground in a tower mill closed-circuit and processed through an iron ore reverse flotation circuit that permits to produce a low-silica grade final gravity concentrate;
- Tailings from the gravity separation circuit are subjected to a magnetic separation process. The concentrate of the first magnetic separation stage, the cobber stage, is reground in two stages and magnetite is recovered gradually through two additional stages of low intensity magnetic separation ("LIMS");
- The magnetic concentrate is processed through flotation columns that permit to remove liberated silica through iron ore reverse flotation and produce a low-silica grade final magnetic concentrate;
- Concentrate from the gravity circuit is processed through cyclones to remove fine particles and the coarse underflow is dewatered using pan filters with steam injection. The fine overflow from the cyclones is combined with the fine concentrate from the magnetic separation circuit to be dewatered by thickening and press-filtration;
- Filtered concentrates are combined on a belt conveyor, which directs the product to the train load-out silo system;
- Tailings from the magnetic separation circuit (cobber, cleaner and finisher) are combined and treated through cyclones where they are dewatered, and coarse and fine fractions are separated. The coarse tailings (cyclones underflow) are pumped to the Tailings Management Facility ("TMF") and used for progressive dam construction as described in Chapter 18. The fine tailings (cyclones overflow) are directed to a thickener where they are dewatered and subsequently pumped to the TMF and deposited based on the tailings deposition plan;
- The general location of the crusher, stockpile, concentrator, load-out, tailings disposal area and other infrastructure are shown on the general site plans in Chapter 18 of this report.

The following sections provide a more in-depth description of the recovery circuit selected.

Table 17-2: Overall Process Mass Balance

Stream	Solids	Slurry	Slurry	Fe	Global Recovery (%)		
	(t/h)	(t/h)	(m³/h)	%	Weight	Fe	Fe_3O_4
Primary Crushing							
Crusher Discharge	4,480	4,548	0	29	-	-	-
Grinding and Screening							
AG Mill Fresh Feed	3,200	3,249	0	29	100	100	100
AG Mill Dilution Water	37	1,871	1,845	21	1	1	1
Scalping Screens Pump Box Dilution Water	3	168	166	21	0	0	0
Classification Screens Pump Box Dilution Water	21	1,059	1,044	21	1	0	0
Classification Screens Pump Box Discharge	3,262	9,320	7,042	29	102	101	101
Gravity Separation							
Rougher Spirals Tails	1,867	8,762	7,545	11	58	22	18
Cleaner Reflux® Classifiers Overflow	361	2,043	1,802	17	11	7	7
Cleaner Reflux® Classifiers Underflow	1,034	1,379	559	65	32	72	76
Gravity Circuit Tails Cyclones Clusters Overflow	111	5,569	5,494	21	3	2	2
Gravity Circuit Tails Cyclones Clusters Underflow	2,116	5,236	3,853	12	66	27	23
Magnetic Separation							
Cobber LIMS Feed	2,116	6,047	4,664	12	66	27	23
Cobber LIMS Tails	1,618	5,313	4,275	7	51	12	2
Cleaner LIMS Concentrate	165	275	147	60	5	11	21
Cleaner LIMS Tails	333	1,358	1,142	10	10	4	1
Gravity Concentrate Regrinding							
Gravity Circuit Fine Screens Undersize	1,034	2,269	1,449	65	32	72	76
Gravity Concentrate Flotation							
Gravity Flotation Cells Froth	117	235	147	49	4	6	6
Gravity Flotation Cells Concentrate	917	2,354	1,623	68	29	66	70
Magnetic Concentrate Regrinding							
Finisher LIMS Concentrate	145	242	126	67	5	10	20
Finisher LIMS Tails	20	278	265	10	1	0	0
Magnetic Concentrate Flotation							
Magnetic Flotation Columns Froth	6	12	8	31	0	0	0
Magnetic Flotation Columns Concentrate	139	434	322	69	4	10	20
Concentrate Dewatering							
Filter Press Cake	203	225	0	68	6	15	25
Pan Filter Cake	853	898	0	68	27	62	65
Final Concentrate	1,056	1,123	0	68	33	76	89
Tailings Thickening							
Tailings Cyclone Clusters Feed	1,971	6,961	5,695	8	62	16	3
Tailings Cyclone Cluster Underflow	1,419	2,028	1,116	8	44	12	2
Tailings Thickener Underflow	601	1,002	614	9	19	6	2
Tailings Pumping							
Coarse Tailings Pumps Discharge	1,419	2,617	1,705	8	44	12	2
Fine Tailings Pumps Discharge	725	1,268	788	15	23	12	9

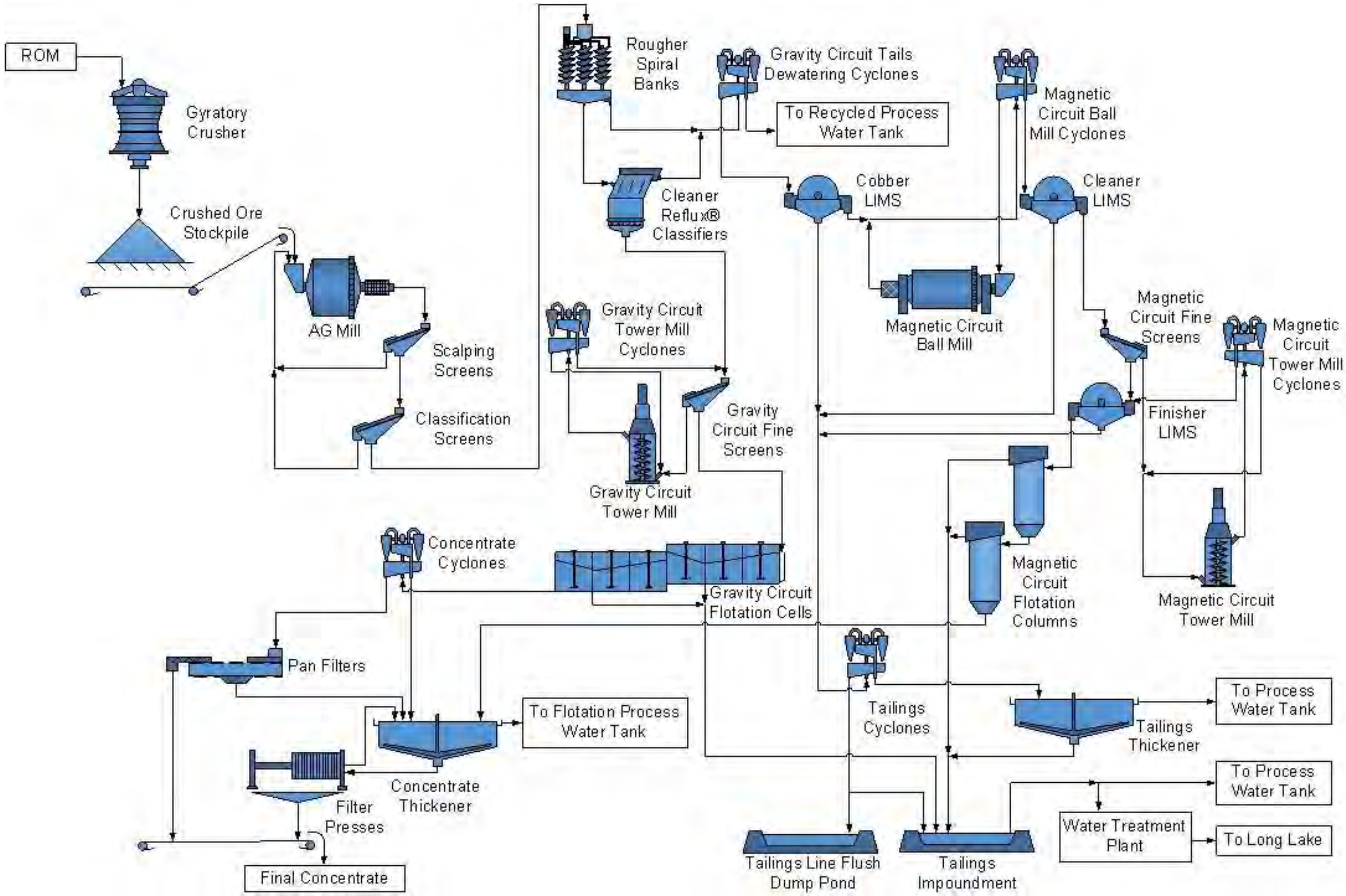


Figure 17-1: General Process Flow Diagram

17.3.1 Primary Crushing Circuit

A basic flowsheet of the crushing circuit is represented in Figure 17-2. The subsections below describe the crushing circuit flowsheet.

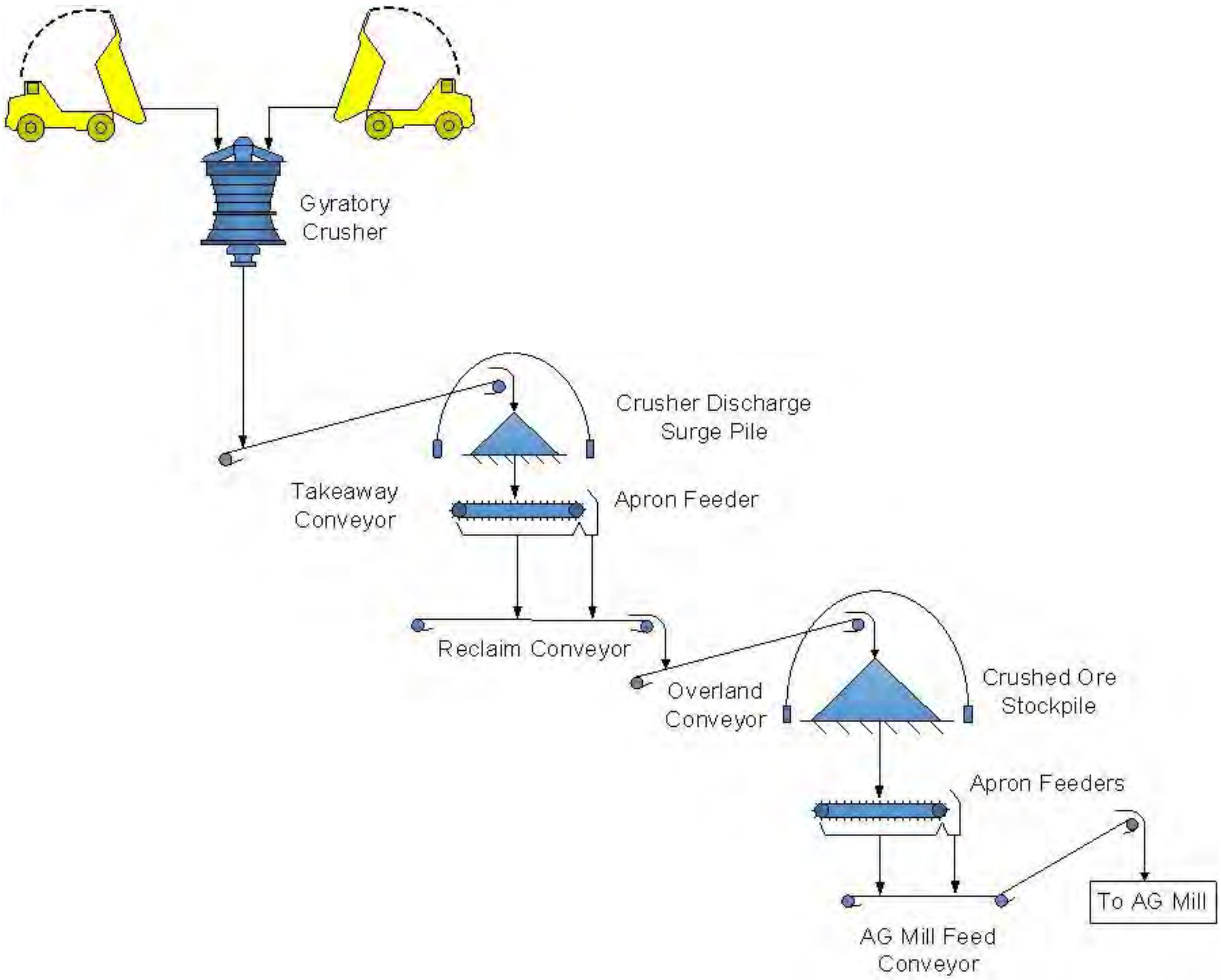


Figure 17-2: Simplified Block Flow Diagram – Primary Crushing Circuit

Material from the mine is delivered by haul truck to a dump pocket directly feeding one 1,525 mm x 2,800 mm (60" x 110"), 1,175 kW gyratory crusher. Crusher power was determined based on a design crusher work index of 12.6 kWh/t, F_{100} of 1,200 mm, F_{80} of 800 mm, P_{100} of 255 mm and P_{80} of 150 mm. During periods when the crusher is not available, ROM material is stockpiled in designated area ahead of the crusher. A hydraulic rock breaker operated from the crusher control room is provided adjacent to the crusher to break up and manipulate oversized or improperly positioned rocks. Crushed ore is collected on a takeaway conveyor below the crusher and sent to a covered surge pile having a live capacity of 1,640 t. Crushed ore from the surge pile is collected on an apron feeder below the pile and fed onto a reclaim conveyor. This reclaim conveyor discharges onto an overland conveyor.

The overland conveyor discharges onto a covered stockpile of 54,000 t live capacity. This live capacity is sufficient to sustain about 17 hours of processing plant operation at nominal throughput to the mill. When required, reclaim from the dead area of the stockpile can be done using dozers and/or loaders.

Crushed material is reclaimed from the stockpile by three variable-speed apron feeders located inside a tunnel. The feeders discharge onto a stockpile reclaim conveyor at the rate required to feed the AG mill. The apron feeders' configuration makes it easier to withdraw material from the centre or the extremities of the crushed ore stockpile, improving the consistency of the particle size distribution of the AG mill feed. Each apron feeder is equipped with a dust collector to minimize dust emission. The mill feed tonnage is controlled by varying the apron feeder speed with a signal from the belt scale. A metal detector is installed on the mill feed conveyor to stop the conveyor when metal pieces are detected in order to protect the conveyor and mill liners.

17.3.2 Grinding and Screening Circuit

A basic flowsheet of the grinding and screening circuit is represented in Figure 17-3. The subsections below describe the circuit flowsheet.

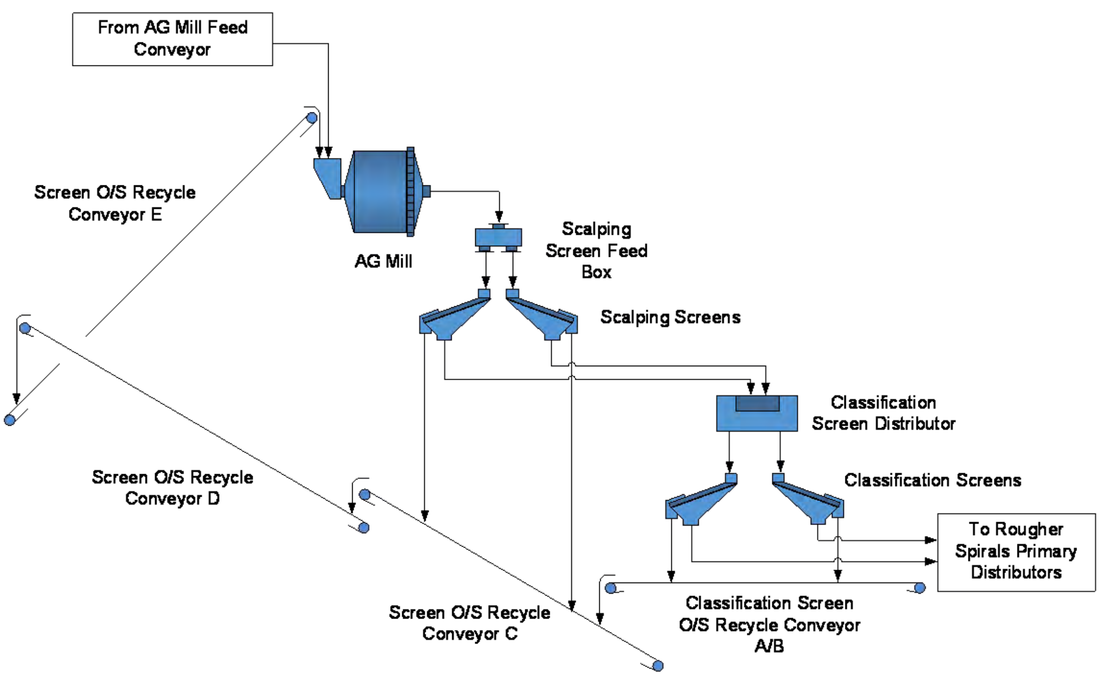


Figure 17-3: Simplified Block Flow Diagram – Grinding and Screening Circuit

17.3.2.1 Grinding

Crushed material at a nominal rate of 3,200 t/h is fed to a single 11.58 m dia. X 7.00 m EGL (38' x 23'), 2 x 8,500 kW dual-pinion AG mill. Recycled process water is added in the feed chute to control the mill slurry density. The material is ground to a particle size P_{80} of 300 microns, which is the size required to achieve sufficient liberation for effective gravity concentration.

17.3.2.2 Screening

The slurry from the AG mill is discharged into a splitting chute distributing the slurry to two horizontal single deck scalping screens of 3.6 m x 8.2 m (12' x 27') with a screen opening of 4.0 mm. The oversize fraction from the scalping screens is returned to the AG mill by belt conveyor.

The passing fraction from the scalping screens is collected within two pump boxes each equipped with a single-stage pump feeding, by the means of one six-way distributor, six horizontal single deck classification screens of 3.6 m x 8.2 m (12' x 27') with a screen opening of 0.65 mm. Oversize material from the classification screens is returned to the AG mill by belt conveyors while the classification screen passing fraction is collected into two pump boxes.

Each of the two classification screens undersize pump boxes collects undersize from three classification screens and handles half of the total AG mill product. Each pump box is equipped with a two-stage pumping system, each feeding two primary rougher spirals distributors. Recycled water is added to the pump boxes ensuring stable rougher spirals feed density.

17.3.3 Gravity Separation Circuit

A basic flowsheet of the gravity separation circuit is represented in Figure 17-4. The subsections below describe the gravity separation circuit flowsheet.

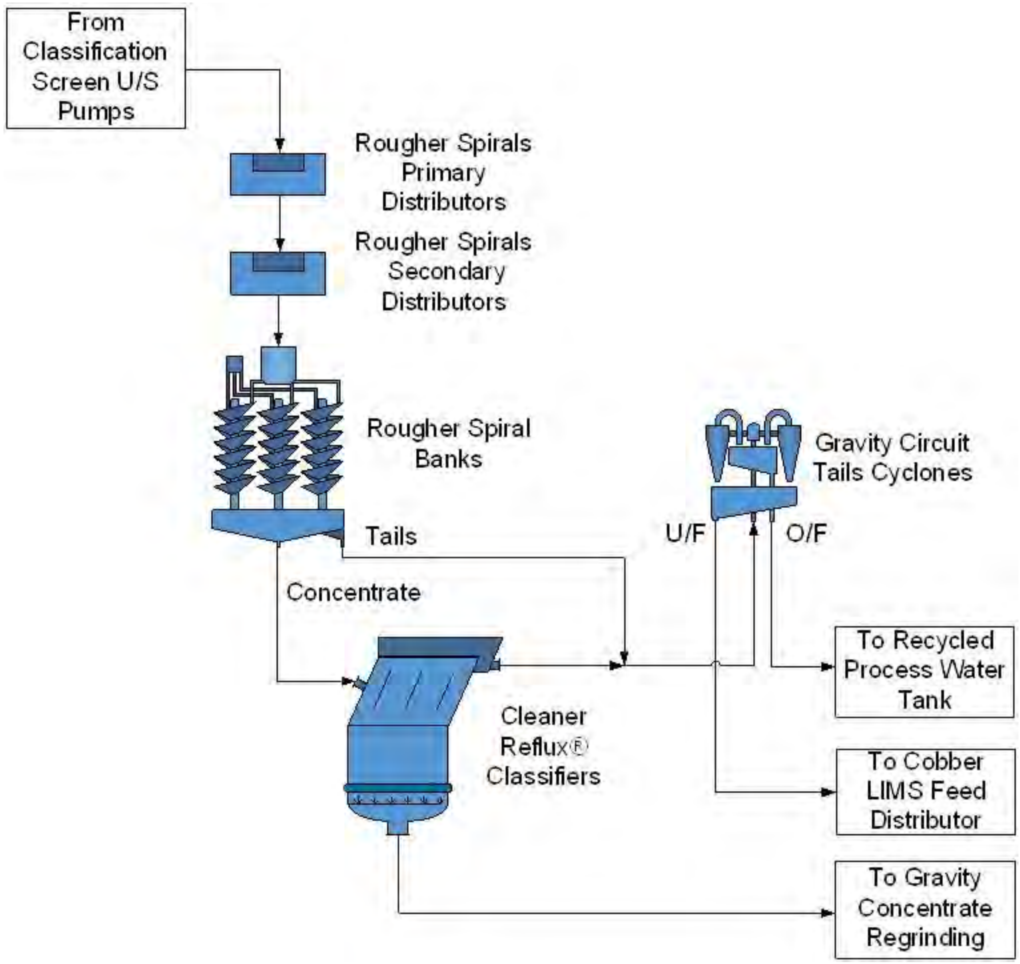


Figure 17-4: Simplified Block Flow Diagram – Gravity Separation Circuit

The gravity separation circuit layout consists of rougher spirals and cleaner Reflux® Classifiers, divided in two production lines. There are two primary distributors per line, each feeding eight banks of roughers (32 in total). Each rougher spiral bank has a distributor that feeds 24 double-start spirals (48 spiral starts per bank) arranged in a back-to-back configuration of 12 spirals. There is a total of 768 double-start spirals (1,536 spiral starts in total).

The rougher spirals produce a concentrate and a tailings stream. The concentrate is collected in a network of launders and directed to cleaner Reflux® Classifiers. The tailings are directed to dewatering cyclones. The rougher spirals have wash water added to promote a better selectivity and separation efficiency of the iron rich particles from the lighter silica rich particles. Dilution water is added to the rougher concentrate to allow for density control at the Reflux® Classifier feed.

There are four cleaner Reflux® Classifiers on each line (eight in total), one Reflux® Classifier for four rougher spirals banks. Fluidization water is added to each Reflux® Classifier to carry the tailings to the overflow. The iron ore concentrate is recovered at the Reflux® Classifier underflow and the tails exit via the classifier overflow.

The concentrate from the cleaner Reflux® Classifiers is collected in collection boxes (one per classifier) where dilution water is added and is then gravity fed to the gravity concentrate regrinding circuit.

The overflow from the cleaner Reflux® Classifiers is combined with the rougher spirals tails and sent to a cluster of dewatering cyclones. There is one cyclone cluster per line. Each cluster has six (five operating + one standby) 800 mm cyclones. The underflow of each cluster is collected into a pump box and directed to the magnetic separation circuit. The overflow from these cyclones is sent to the recycled water tank. This water, having a higher concentration of suspended solids than process water, is kept within a separate circuit intended for use at the AG mill as well as in the scalping screens and classification screens underflow pump boxes. This strategy allows for a smaller thickener and a better overall water management system.

17.3.4 Magnetic Separation Circuit

A basic flowsheet of the magnetic separation circuit is represented in Figure 17-5. The subsections below describe the magnetic separation circuit flowsheet.

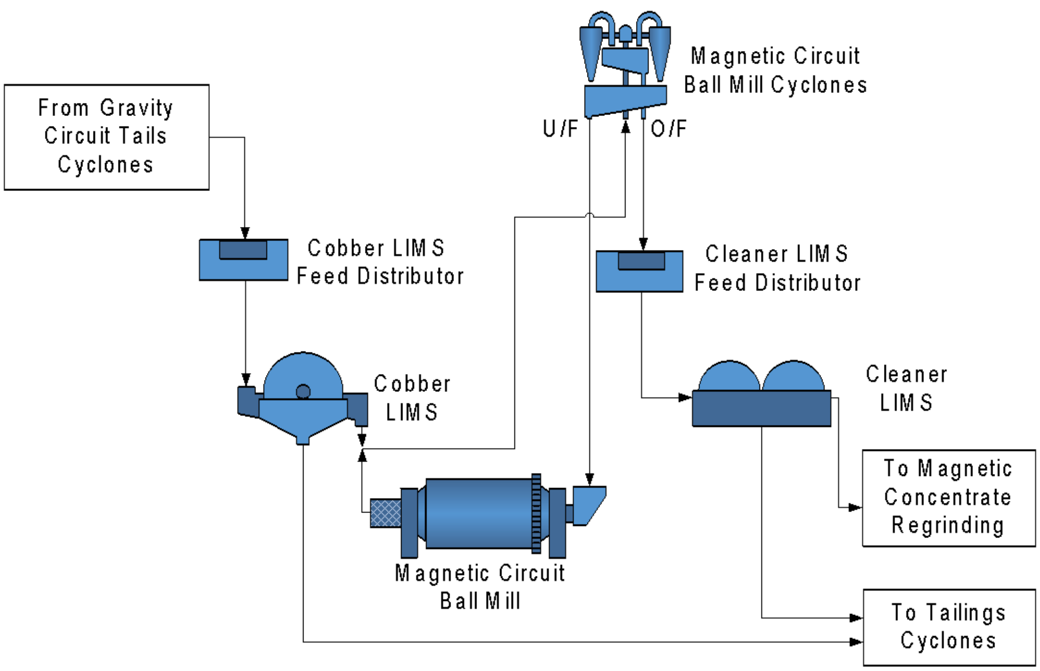


Figure 17-5: Simplified Block Flow Diagram – Magnetic Separation Circuit

The dewatered rougher spirals and cleaner Reflux® Classifier tailings are pumped to the magnetic separation circuit cobbing low intensity magnetic separators ("LIMS"). There is a total of eight 1.2 m x 3.66 m cobber LIMS units configured in two banks of four, each fed by its own distributor. The concentrate from the cobbing drums consists mainly of non-liberated magnetite, requiring regrinding, and fine liberated magnetite that was not recovered in the spirals. This concentrate is directed to magnetic circuit ball mill cyclone cluster while the cobber LIMS tailings are directed to the tailings cyclone clusters.

The magnetic circuit ball mill cyclone system consists of one cluster having seven (six operating + one standby) 650 mm diameter cyclones. The cyclone underflow is sent to a 7.92 m x 13.56 m (26' x 44.6'') 17 MW ball mill while the overflow, having a P_{80} of 75 microns is directed to cleaner LIMS.

The cleaner LIMS consist of six 1.2 m x 3.66 m, double-drum units. The objective of these units is to recover liberated and partly liberated magnetite. The concentrate is pumped to the magnetic concentrate regrinding circuit and the tailings are directed to the tailings cyclone clusters.

17.3.5 Gravity Concentrate Regrinding

A basic flowsheet of the gravity concentrate regrinding circuit is represented in Figure 17-6. The subsections below describe the gravity regrinding circuit flowsheet.

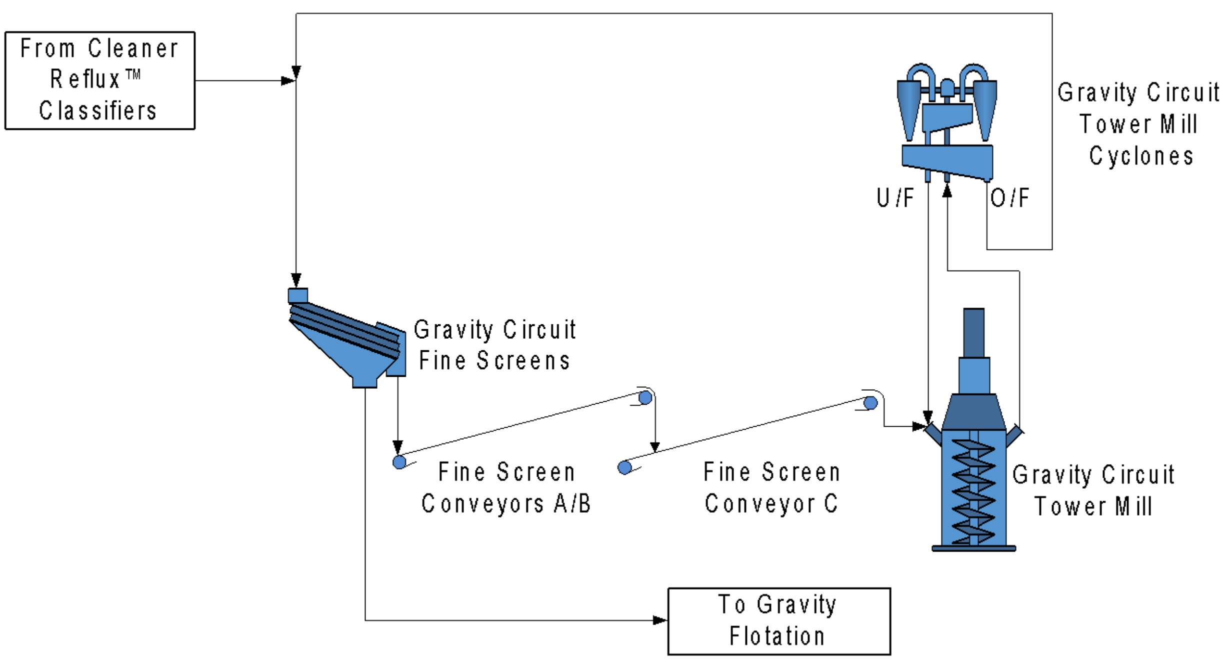


Figure 17-6: Simplified Block Flow Diagram – Gravity Concentrate Regrinding

Each cleaner Reflux® Classifier concentrate is gravity fed to an 8-Deck Super Stack Sizer® with a screen opening of 212 microns. The oversize fraction from the screens is conveyed to the gravity circuit tower mill while the undersize is collected in two pump boxes each equipped with one single-stage pump feeding the gravity flotation circuit.

The VTM® 4500 gravity circuit tower mill operates in closed loop with cyclones to regrind the gravity fine screen oversize at a P_{80} of 150 microns.

The tower mill cyclone cluster system consists of one cluster having five (four operating + one standby), 800 mm diameter cyclones. The cyclone underflow is recycled back to the gravity circuit tower mill, while the overflow is redirected to the screens water 8-way distributor. Recycling the cyclone overflow to the screens help to minimize screens dilution and wash water addition. Also, it allows to catch coarse silica particles that would have been poorly classified by the cyclones due to their low density and send them back to the tower mill.

17.3.6 Gravity Concentrate Flotation

A basic flowsheet of the gravity concentrate flotation circuit is represented in Figure 17-7 and is described in the subsection below.

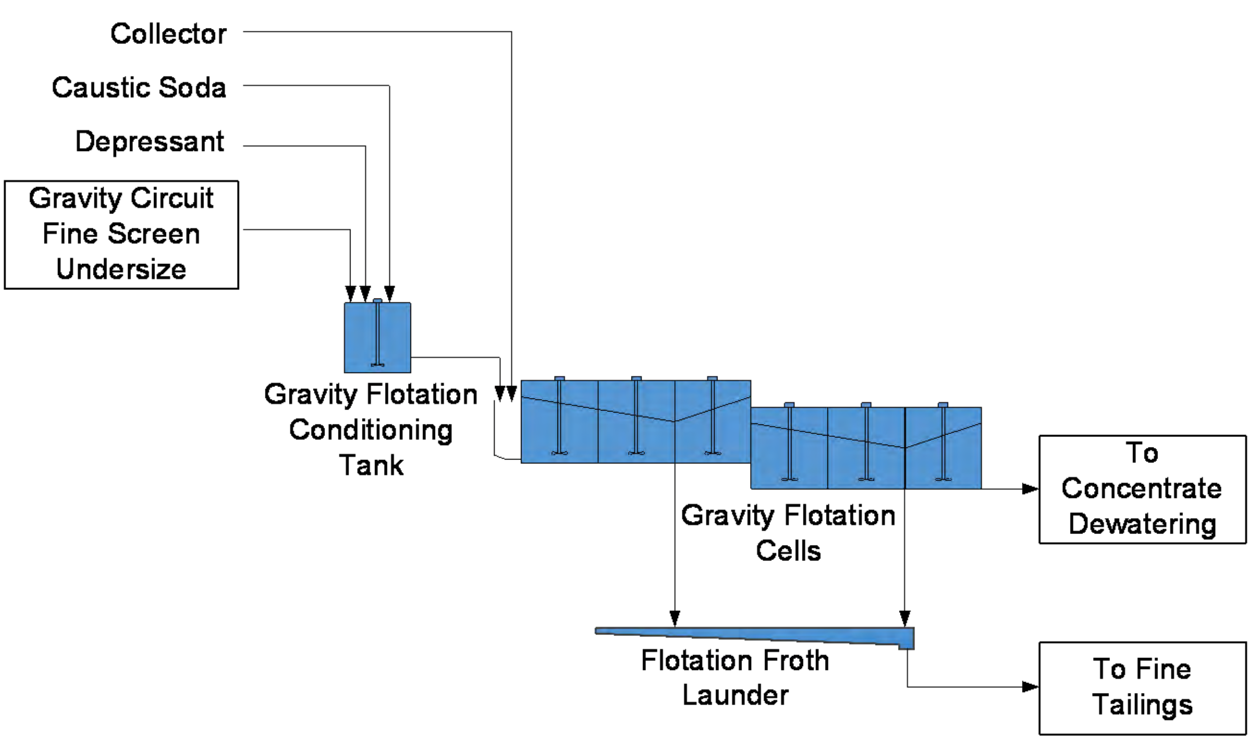


Figure 17-7: Simplified Block Flow diagram – Gravity Concentrate Flotation

The gravity circuit fine screen undersize is pumped to the gravity flotation conditioning tank where the iron ore depressant is added to the slurry and the pH is adjusted with the addition of caustic soda. Slurry from the conditioning tank is added with flotation collector and gravity feeds the first flotation cell. The reverse-flotation of the iron ore is performed in six flotation tank cells providing a nominal flotation time of 16 minutes.

Silica tails are collected in the froth launder and flow by gravity to the froth pump box discharging in the fine tailings pump box.

Iron ore concentrate is collected in the gravity flotation concentrate pump box to be pumped to the concentrate dewatering circuit.

17.3.7 Magnetic Concentrate Regrinding

A basic flowsheet of the magnetic concentrate regrinding circuit is represented in Figure 17-8 and is described in the subsection below.

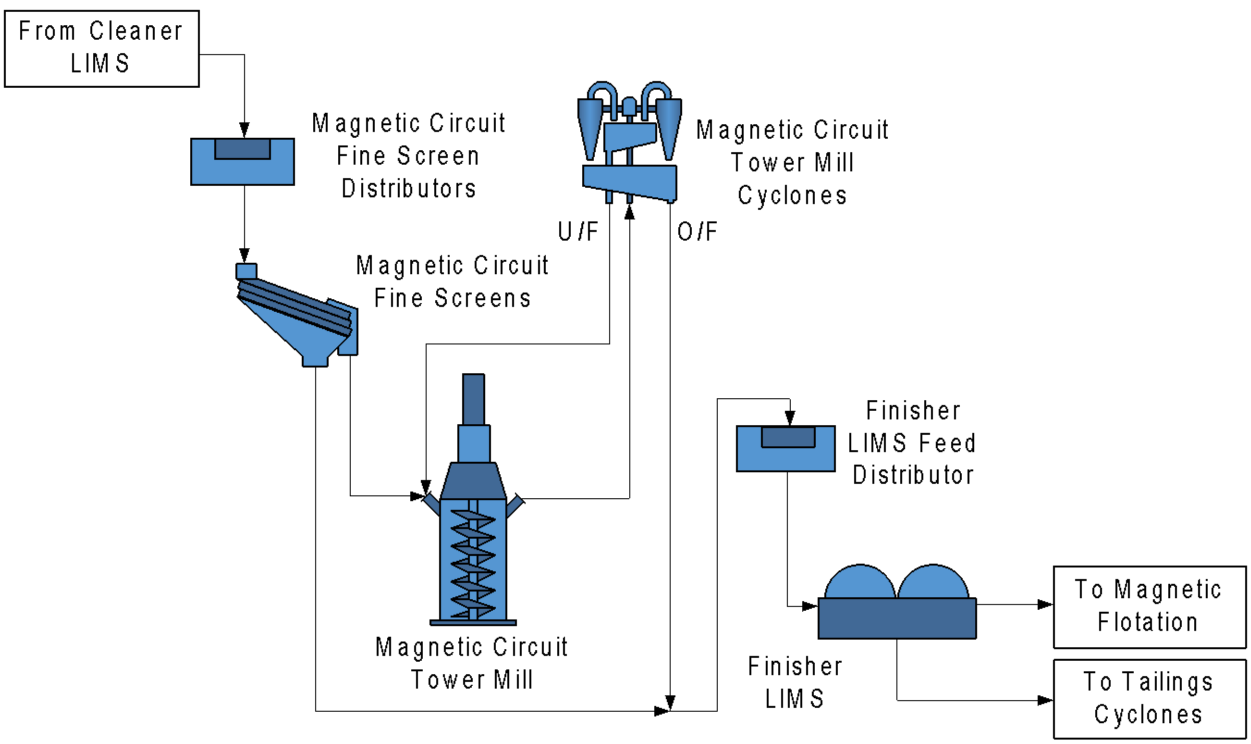


Figure 17-8: Simplified Block Flow Diagram – Magnetic Concentrate Regrinding

The cleaner LIMS concentrate is pumped to the magnetic concentrate regrinding circuit. The concentrate is distributed to two 8-Deck Super Stack Sizers® having a screen opening of 53 microns. The oversize fraction from the fine screens is gravity fed to the magnetic circuit tower mill.

The VTM® 1500 tower mill operates in closed loop with cyclones to regrind the cleaner magnetic concentrate at a P_{80} of 45 microns. The magnetic circuit tower mill cyclone cluster has six cyclones (five operating + one standby) of 250 mm diameter. The cyclone underflow is sent to the magnetic circuit tower mill, while the overflow is combined with the fine screen undersize and sent to the finisher LIMS.

The finisher LIMS consist of four, 1.2 m x 3.66 m, double-drum units. The concentrate is directed to the magnetic flotation circuit and the tailings are pumped to the tailings cyclone cluster.

17.3.8 Magnetic Concentrate Flotation

A basic flowsheet of the magnetic concentrate flotation circuit is represented in Figure 17-9 and is described in the subsection below.

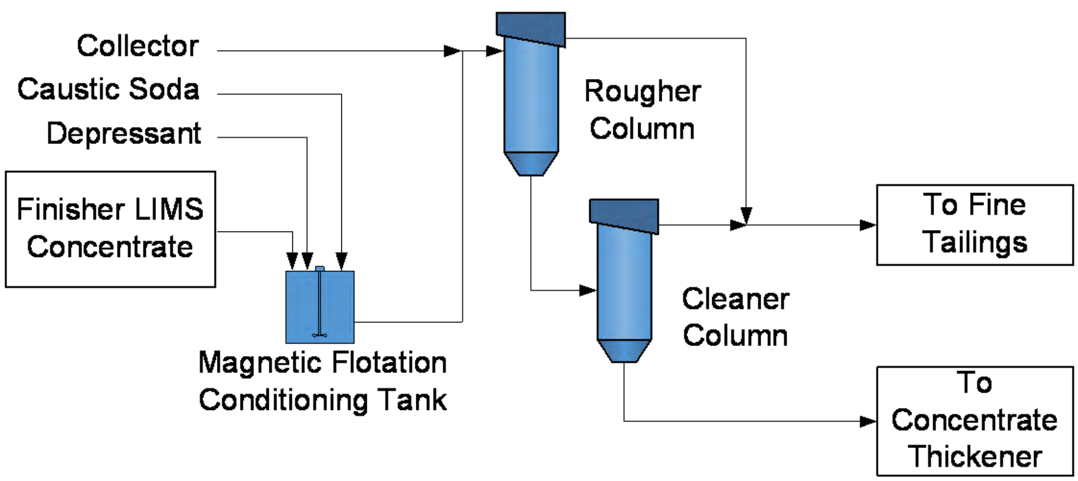


Figure 17-9: Simplified Block Blow Diagram – Magnetic Concentrate Flotation

The finisher LIMS concentrate is gravity fed to the magnetic flotation conditioning tank where the iron ore depressant is added to the slurry and the pH is adjusted with the addition of caustic soda. Slurry from the conditioning tank added with flotation collector is pumped to two 2.5 m x 11 m flotation columns arranged in series for the iron ore reverse flotation.

Silica tails are collected in the froth launder and flow by gravity to the froth pump box to be pumped to the fine tailings pump box.

Iron ore concentrate is collected in the gravity flotation concentrate pump box and pumped to the concentrate thickener.

17.3.9 Concentrate Dewatering

A basic flowsheet of the concentrate dewatering circuit is represented in Figure 17-10 and is described in the subsection below.

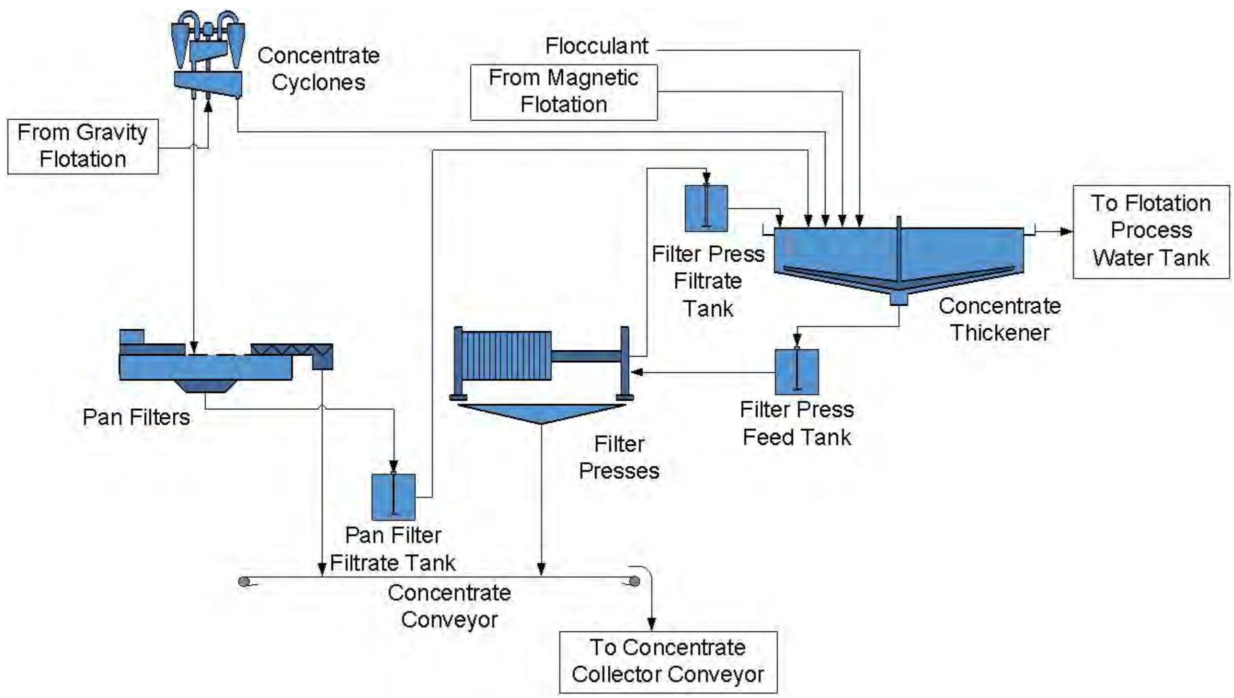


Figure 17-10: Simplified Block Flow Diagram – Concentrate Dewatering Circuit

The concentrate dewatering circuit removes water from the gravity and magnetic flotation concentrates to produce a final concentrate of 4.5% moisture with steam addition and 6% moisture without steam addition. This is accomplished with cyclones, a thickener, pan filters and filter presses.

The gravity flotation concentrate is sent to the concentrate cyclone cluster to generate an underflow consisting of a coarser concentrate at a high density suitable for filtration with pan filters. The cyclone overflow is combined with the magnetic flotation concentrate to be thickened in the concentrate thickener.

The concentrate cyclone cluster has 12 cyclones (eight operating + four standby) of 800 mm diameter. The cyclone underflow launder is divided in four sections fed by three cyclones each, and each of the section feeding by gravity one horizontal 9.6 m diameter pan filter. Each pan filter is provided with a steam hood for steam injection during the winter months. Moisture levels for filtered gravity concentrate are expected to be in the order of 5% without steam addition and 3% with steam. Each pan filter has a filtrate tank to collect the filtrate. The filtrate is pumped back to the concentrate thickener, which permits to recover the concentrate in the event of a filter cloth failure.

The concentrate from the magnetic flotation circuit and the overflow of the concentrate dewatering cyclones is sent to a high rate 22 m diameter thickener that thickens the concentrate to 65% solids. Thickener underflow is pumped to a filter press feed tank prior to being filtered. Flocculant is added in the thickener feed box to assist the thickening process and to reduce the loss of solids to the overflow stream.

The two filter presses, each having a filtration area of 1,150 m^2, further dewater the slurry to a target residual moisture content of 10%. The filter presses operate in batch conditions and filtrates flow to their respective filtrate tank before being pumped back to the concentrate thickener feed well. This permits to recover the concentrate in the event of a cloth failure inside the filter press.

The final concentrate from both the pan filters and filter press is collected on the concentrate conveyor at an average 4.5% moisture and sent to the loadout circuit.

17.3.10 Tailings Thickening and Pumping Circuit

A basic flowsheet of the tailings thickening and pumping circuit is represented in Figure 17-11 and described in the following subsection.

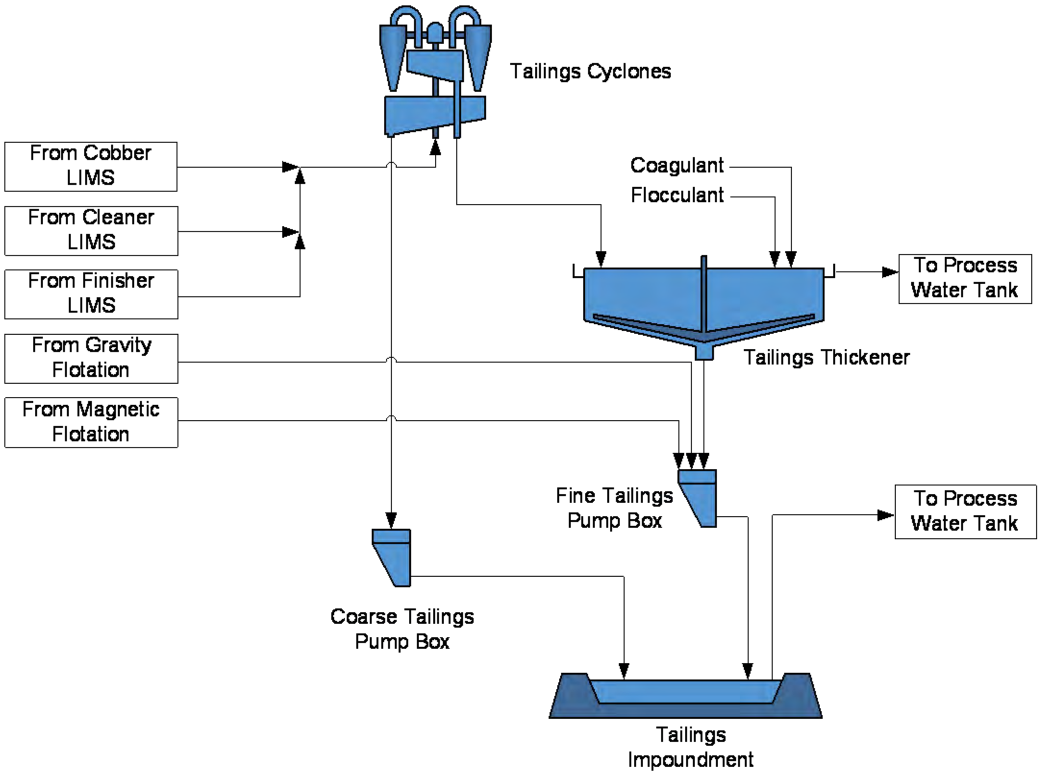


Figure 17-11: Simplified Block Flow Diagram – Tailings Thickening and Pumping Circuit

The tailings thickening and pumping circuit is designed to deliver coarse and fine tailings separately to the TMF.

Tailings from the cobber, cleaner and finisher LIMS are collected within two pump boxes that feed two cyclone clusters, each having five cyclones (four operating + one standby) of 650/500 mm diameter. The tailings cyclones produce a dense and coarse underflow reporting to the coarse tailings pump box and a fine and dilute overflow that reports to the tailings thickener.

The underflow of the cyclones is directed by gravity to a coarse tailings pump box. From there, the tailings stream is pumped via a series of coarse tailings pumps to booster stations as it is transported to the TMF.

The overflow from the tailings cyclones (fine tailings) discharges by gravity into a 47 m diameter high-rate thickener that dewaters the fine tailings to the targeted % solids. Flocculant and coagulant are added to the thickener feed box to assist the thickening process and to reduce the loss of solids to the overflow stream and maintain its clarity. The thickener underflow is pumped into a fine tailings pump box, where it is combined with the gravity and magnetic flotation tailings. From there, it is pumped through a series of fine tailings pumps to the targeted deposition point at the TMF.

The clarified thickener overflow stream flows by gravity to the process water tank. Water from the TMF is reclaimed to the process water tank as required, using a pump station mounted on a floating barge. The TMF area as well as the water reclaim system is described in more detail in Chapter 18 of this report.

For both the coarse and fine tailings pumping systems described previously, additional pumping capacity and piping are added as the tailings deposition plan evolves in time and costs associated with these additions are covered in sustaining capital.

17.3.11 Concentrate Conveying and Load-Out

A basic flowsheet of the concentrate load-out is represented in Figure 17-12 and is described in the subsection below.

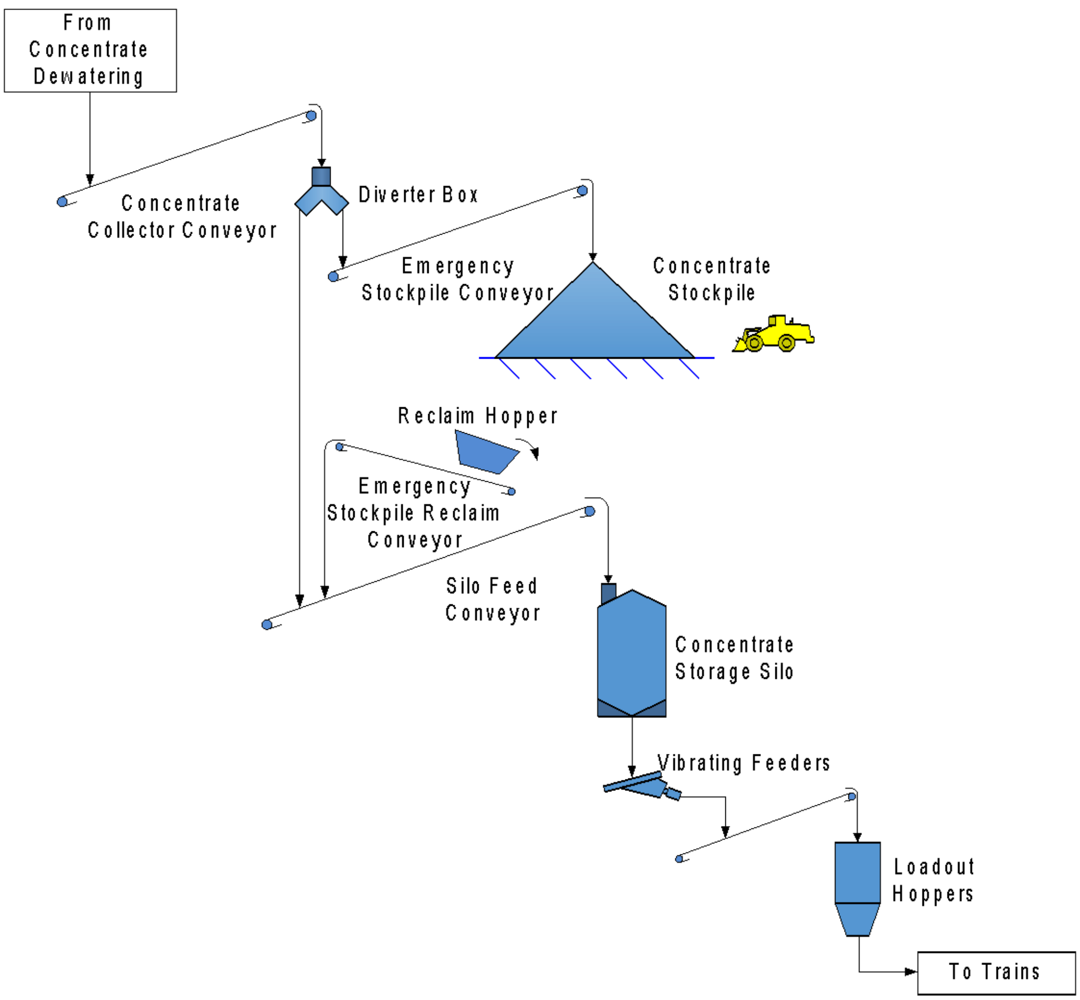


Figure 17-12: Simplified Block Flow Diagram – Concentrate Load-Out Circuit

The concentrate discharged from the pan filters and the filter press is collected onto a common belt conveyor system that discharges into a storage silo. Four vibrating feeders reclaim the concentrate from the silo. Reclaimed concentrate is conveyed to the load-out hopper for railcars loading. An emergency storage/reclaim system is provided.

17.3.12 Handling and Distribution of Grinding Media and Reagents

The grinding media used in the concentrator include:

- Ball Mill grinding media: 25.4 mm steel balls, supplied in bulk;
- Tower Mill grinding media: 25.4 mm and 38.1 mm steel balls, supplied in bulk.

Media addition will be managed manually, and media will be delivered in bulk trucks and unloaded in ball pits according to the media size. Supply of the media to the grinding mills will be done using mobile equipment.

The reagents used in the concentrator include:

- Collector: Diamine supplied in bulk liquid;
- pH Modifier: Caustic soda supplied in bulk liquid;
- Depressant: Dextrin, supplied in bulk solids;
- Flocculant: Anionic supplied in bulk solids;
- Coagulant: PolyDADMAC supplied in bulk solids.

All reagents will be prepared in a containment area in a separate reagent preparation and storage aera.

Liquid reagents will be stored in their respective holding tanks and added in their undiluted form to various circuits via individual metering pumps. Solid reagents will be mixed with fresh water to the required solution strength in their respective mixing tanks, and stored in separate holding tanks before being metered to the process at the required addition points.

Depressant, dextrin, will be prepared onsite from a bulk storage silo. Dextrin will be causticized with water and caustic soda in a mixing tank to produce a gelatinized starch and distributed to various addition points from a holding tank via individual metering pumps.

17.4 Process Plant Utilities

17.4.1 Compressed Air

Three air compressors (two operating and one standby) with a capacity of 2,760 Nm^3/h, each equipped with a desiccant dryer of equivalent capacity, provide process (flotation), service and instrumentation air for the concentrator. Three other air compressors (two operating and one standby) with a capacity of 3,550 Nm^3/h supply compressed air for the blowing and drying operation of the filter presses, and two more air compressors (one operating and one standby) with a capacity of 110 Nm^3/h supply the higher-pressure air for the squeezing operation.

A total of three other compressors supply compressed air for other areas such as the crusher, the mine garage and the concentrate storage silo.

17.4.2 Service Water

A freshwater tank for gland seal water and service water is provided. Each system has a dedicated pump with back-up. Gland seal water is supplied to all the process pumps in the concentrator via two circuits: the low-pressure circuit servicing most of the pumps, the high-pressure circuit servicing the filter press feed pumps and the tailings second and third stage pumps.

Fresh water for the concentrator area is sourced from the Long Lake and a separate tank is provided for cooling water. Fresh water for the mine services area is sourced from Mills Lake.

17.4.3 Process Water

The water circuit maximizes recovery. The flotation circuit has its own process water tank to maximize reuse of water containing reagents within the circuit. Figure 17-13 represents the water balance in a block flow diagram.

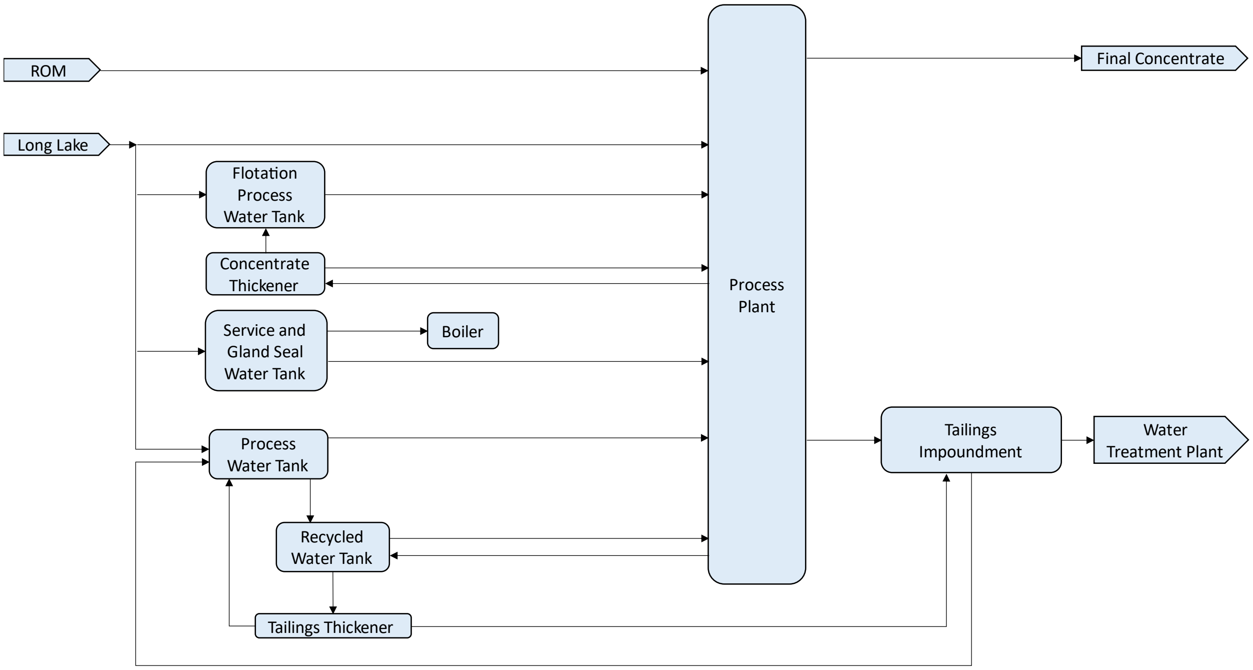


Figure 17-13: Water Balance Block Flow Diagram

Gravity circuit tails dewatering cyclone cluster overflow is recirculated via the Recycle Water Tank to the AG mill, and the scalping and the classification screens undersize pump boxes for density control. The recycled water has higher solids content than process water and is therefore used for stream dilution at various points within the concentrator where operation is insensitive to the small amount of fine solids accompanying the water. Excess recycled water is sent to the tailings thickener.

Although the effect of potential residuals flotation reagents in process water has not been quantified, the water circuit was designed to avoid the presence of residuals flotation reagents in areas where they are not used. The concentrate thickener overflow is sent to the flotation process water tank. This water is directed to the flotation circuits as stream dilution. Excess water is sent to the coarse tailings pump box to be pumped to the TMF.

The tailings thickener overflow feed the process water tank that feeds all the other process water consumers. The level in the process water tank is controlled by modulating water reclaim from the TMF. Process water distribution is provided by a piping network throughout the plant. Process water is supplied in the concentrator via two circuits: a high-pressure circuit servicing the gravity circuit equipment, namely the spirals and the Reflux® Classifiers and a low-pressure circuit servicing the other equipment throughout the plant.

17.4.4 Steam

Steam is used during the winter months to heat the main concentrator building's fresh air needs, the reagents batching, and for drying the concentrate, to reduce moisture levels for rail transport.

There are two 25 MW electrode-type steam boilers working on 13.8 kV, designed to provide full redundancy (one boiler operating, one standby).

17.5 Water Treatment Plant

A water treatment plant (the East Water Treatment Plant-"EWTP") will be required to treat water coming from TMF, which will receive coarse and fine tails from the mill, natural precipitation and catching ponds along the haul road. Total suspended solids ("TSS")and pH are the parameters of interest expected to require treatment to achieve compliance in order to discharge into Long Lake. It is assumed that water received from the TMF for reuse in the process will not need any treatment before being returned to the process tank. For a complete description see Chapter 18.

18. Project Infrastructure

This chapter describes the major infrastructure required to support the Kami Project, as developed in the Pre-feasibility Study ("PFS"). Design is based on the following:

- The general site plot plan for the Kami Project is based on the plan and layout developed during the previous phases of the Project, which used the latest available geotechnical data.
- The overburden waste dump is located to the north of the Rose Pit and the waste rock dump is located to the east of Mills Lake.
- The crushing plant is located near the Rose Pit. Ore is trucked directly from the open pit to the crusher or from blending piles located near the crusher.
- Crushed ore is conveyed from the crusher to the crushed ore stockpile, which is located ahead of the concentrator, to the east of the Waldorf Crossing.
- Crushed waste rocks will be handled through an In-pit Crushing System ("IPCS"), which will convey the waste using a conveying and spreader system from the pit directly to the waste pile.
- The concentrator and ancillary infrastructure are located to the east of Waldorf Crossing.
- Tailings are disposed of in an area to the south of the concentrator.
- Water management will be done through two separate water management systems (east and west areas), where the water collected will be treated within two separate water treatment plants - East Water Treatment Plant (“EWTP”) and West Water Treatment Plant (“WWTP”) - and discharged, respectively, into Long Lake and Pike Lake.
- The concentrate load-out and rail loop are located to the east of the Kami concentrator with a connecting railway to the Québec, North Shore & Labrador (“QNS&L”) main rail line.
- The main access road to the Property follows the new railway, passing to the east of the Tacora rail loop and through the Town of Wabush, to ultimately connect to Highway 500.
- Rail transportation of concentrate from the Kami rail loop to the multi-user port terminal facilities in Pointe-Noire, Québec is owned and operated by third parties.
- Ship loading services are provided by the Port of Sept-Îles.
- A permanent worker camp facility, to be located approximately 1 km northeast of the concentrator, next to the main access road.
- Electric power is assumed to be provided by Newfoundland & Labrador Hydro ("NL Hydro") from the future Flora Lake substation.

18.1 Project Plot Plan

The general plot plan was developed based on the previous phases of the Project to use available geotechnical data where possible. The same positions for the overburden waste dump, waste rock pile, primary crusher, Waldorf Crossing, concentrator, and ancillary infrastructure have been reused. The crushed ore stockpile was moved closer to the concentrator and the load out and train loading station was adjusted with the new rail. A new In-pit Crushing System ("IPCS") was developed to reduce the number of haul trucks for the waste rock. An assessment on the previous tailings management facility ("TMF") has been conducted with an updated deposition plan and TMF design was developed for this PFS. However, the overall position of the TMF has not changed and remained south of the concentrator. Water management infrastructure (dam, reservoirs, treatment plant) were also added. The updated general Kami site plot plan is presented in Figure 18-1.

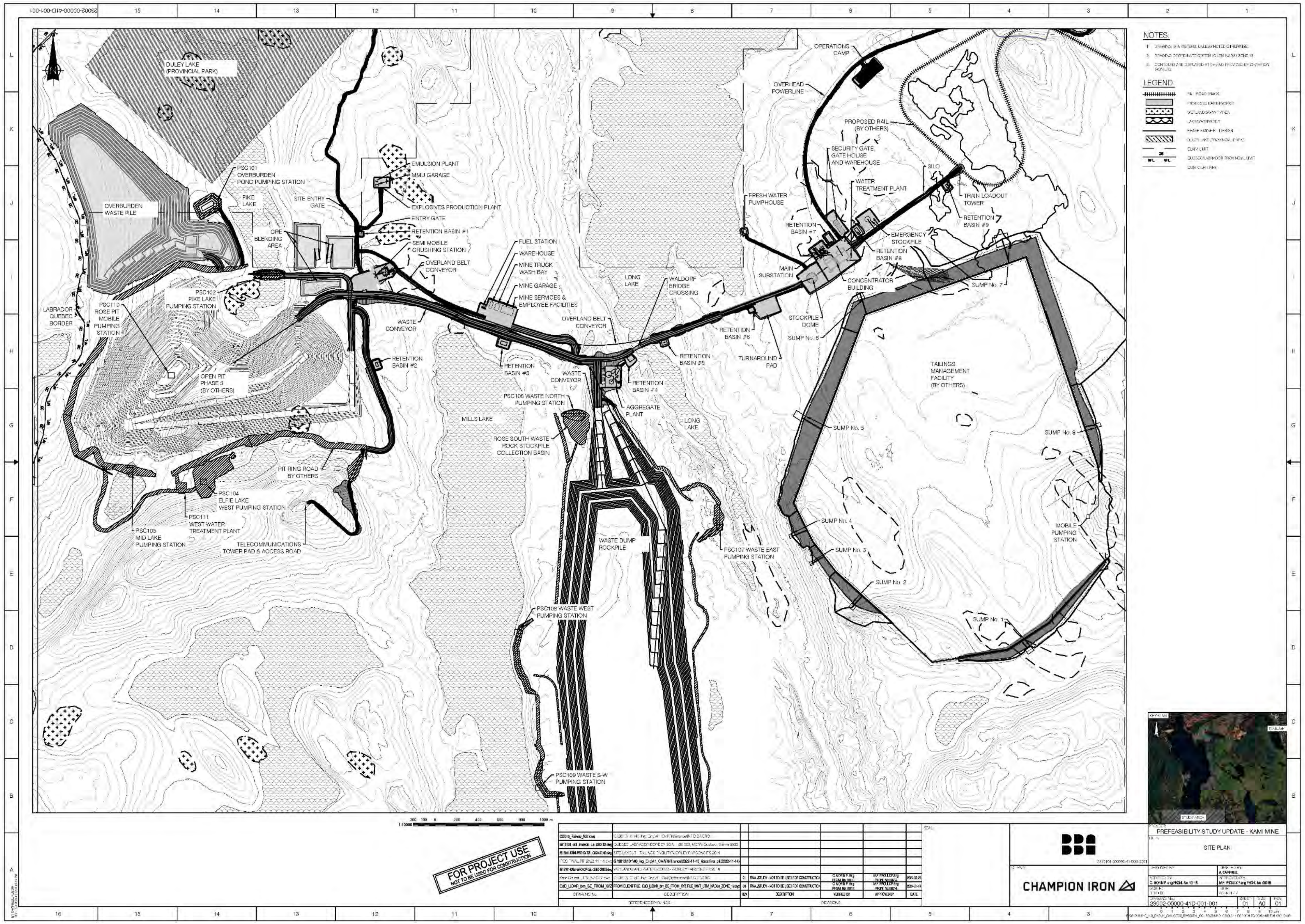


Figure 18-1: Site Plan Kami Iron Ore

18.2 Kami Site Main Infrastructure

The main features of the Kami site are detailed as follows:

18.2.1 Site Access Roads

- Access to the Property will be through a new road from Highway 500 heading south, passing east of the Town of Wabush to the Kami site (length of 18.5 km, width of 10.5 m). This routing was selected so that traffic completely bypasses the Town of Wabush.
- Another access road, to be used mainly during construction, is provided to the west of the Property providing direct access to the Rose Pit and crusher areas.
- Gated guardhouses are provided to control access to the facilities from both access roads.

18.2.2 On-site Roads

- Mine roads connect the open pit to the crusher, to the waste stockpiles and to the TMF, where waste rock will be required for the dam construction over the life of the mine.
- A 25-m wide, single-lane bridge, for heavy traffic, will be constructed over the Waldorf Crossing allowing mine trucks to transport waste rock to the TMF for dam construction.
- Parking areas for both mine trucks and light vehicles are provided.

18.2.3 Mine Services Area

- Initial installation will consist of:
  - Dome type truck wash bay;
  - Temporary dome-shaped type mine garage, workshop and warehouse;
  - Trailer type mine employee facilities;
  - Five 79,000 L capacity diesel fuel tanks for mine operations will be located near the mine garage;
  - One 50,000 L capacity diesel fuel tank for the 2.5 MW emergency generator at the mine garage.
- A permanent mine garage, employee facilities, workshop and warehouse will be built after 5 years of operation, replacing the aforementioned temporary facilities. The temporary dome-shaped facility will be used as a warehouse.
- The diesel fuel tank farm storage capacity could be increased over time if required by the mine plan.

- A core storage and sample preparation area is provided.
- An emulsion plant will be built and operated by a contractor. Explosives will be produced and stored on site, at a safe distance north of the mine. Explosive accessories will be stored in a magazine located near the emulsion plant.

18.2.4 In-pit Crushing and Conveying for Waste Rock

To reduce the number of haul trucks and minimize the Project's carbon footprint, an IPCS will be used to transport the waste rock from the pit to the waste rock pile.

A semi-mobile gyratory crusher, with a drive motor power of 1,200 kW, will be installed at the bottom of the pit and fed by haul trucks carrying waste rock. The inlet particle size F_{100} is 1,200 mm, F_{80} is 800 mm and outlet particle size P_{80} is 150 mm. There will be two dumping points at the crusher. The crusher will be relocated mid-way during the mine life as the pit develops and deepens.

Once crushed, the waste rock will be fed onto a conveyor which will transport the waste rock up the pit ramp to surface, at which point it will be transferred to an overland conveyor. The overland conveyor will run for 2,500 m towards the east to reach the waste rock pile.

Waste rock will be placed on the waste rock pile using a system of relocatable conveyors mounted on skids, cross-belt feeders, index conveyors, bridge conveyors, and a mobile stacker. Track dozers will be used to push the waste rock and level the lifts. The IPCS has a design capacity of 9,000 t/h and an overall operating efficiency ("OEE") of 65%.

An aggregate plant will be installed just north of the waste rock pile. Waste rock will feed the aggregate plant to produce materials for maintenance of the civil infrastructures (see Chapter 16 for more details).

The waste rock pile design considerations and construction sequencing are presented in Section 20.12 of this Report.

It should be noted that Metso provided BBA and GMS teams with considerable support for the design and costing of the IPCS.

18.2.5 Ore Stockpiles

A total of three ore stockpiles have been designed to feed the primary crusher, including an emergency ore stockpile, an on-spec stockpile, and a below-spec stockpile. The piles are located to the north of the open pit just off the main haul road.

The on-spec emergency ore stockpile has a capacity of 0.9 Mt and will be used during periods when the mine cannot feed ore to the primary crusher due to inclement weather or other reasons.

The above-spec stockpile has a capacity of 2.0 Mt and will be used for blending of ores to maintain an adequate feed grade to the concentrator.

The below-spec stockpile has a capacity of 3.3 Mt and will be used to store lower grade material until it can be properly blended and fed to the primary crusher.

18.2.6 Primary Crusher Ore Station

- The primary crusher building is in proximity to Rose Pit, about 640 m from the final pit shell boundary.
- A mechanically-stabilized earth ("MSE") retaining wall will be erected on each side of the crusher building to secure the ROM pad. The crusher is a gyratory type mounted on a permanently installed semi-mobile steel structure. The steel structure will also support a jib crane for service maintenance on the crusher. The takeaway belt conveyor discharges the ore on a surge pile covered by a dome built on a concrete block foundation. The live capacity of the surge pile is 1,640 t, corresponding to 22 minute-buffer at nominal flowrate and to 18 minute-buffer at design flowrate. Under the pile, an apron feeder regulates the ore flow down to the reclaim belt conveyor. Ore is then transferred onto the overland belt conveyor at 4,480 t/h.

18.2.7 Overland Conveyor

- The main overland conveyor transports crushed ore over 4.1 km and discharges directly onto the crushed ore stockpile.
- The overland conveyor will be complete with support structure, hood covers, drives, electrical components, and instrumentation. An enclosed gallery will be installed where the conveyor crosses the Waldorf Crossing.

18.2.8 Crushed Ore Stockpile

- The crushed ore stockpile, located near the concentrator, provides a live capacity of 54,000 t (17 hours at nominal flowrate and 14 hours at design flowrate) and a total capacity of 140,000 t (44 hours at nominal flowrate and 36 hours at design flowrate) (Figure 18-2).
- The crushed ore stockpile will be covered by a 95-m diameter geodesic dome.
- Crushed ore is reclaimed from the stockpile using three apron feeders through an underground tunnel housing a 230-m conveyor which, in turn, directly feeds to the AG mill.

Figure 18-2: Crushed Ore Stockpile
(Source: BBA, 2024)

18.2.9 Process Plant

- The process plant, located to the east of Long Lake, consists of the concentrator and ancillary process areas including thickeners, process water tank, tailings pumps, boiler house, maintenance shop, warehouse, electrical rooms, etc. (Figure 18-3)
- In locating the process plant, consideration was given for keeping the concentrate conveyor to a reasonable length (thus avoiding a heated gallery) in order to minimize risk of freezing during handling and rail transportation in winter. Furthermore, consideration was given to keeping the concentrator in proximity of the TMF to minimize tailings pumping distances. One other critical consideration was to place the concentrator where the AG mill foundation could be on rock.

- The plant administration office, concentrator employee facilities and other services areas are located adjacent to the concentrator in a permanent building. The East Water Treatment Plant is also adjacent to the process plant.

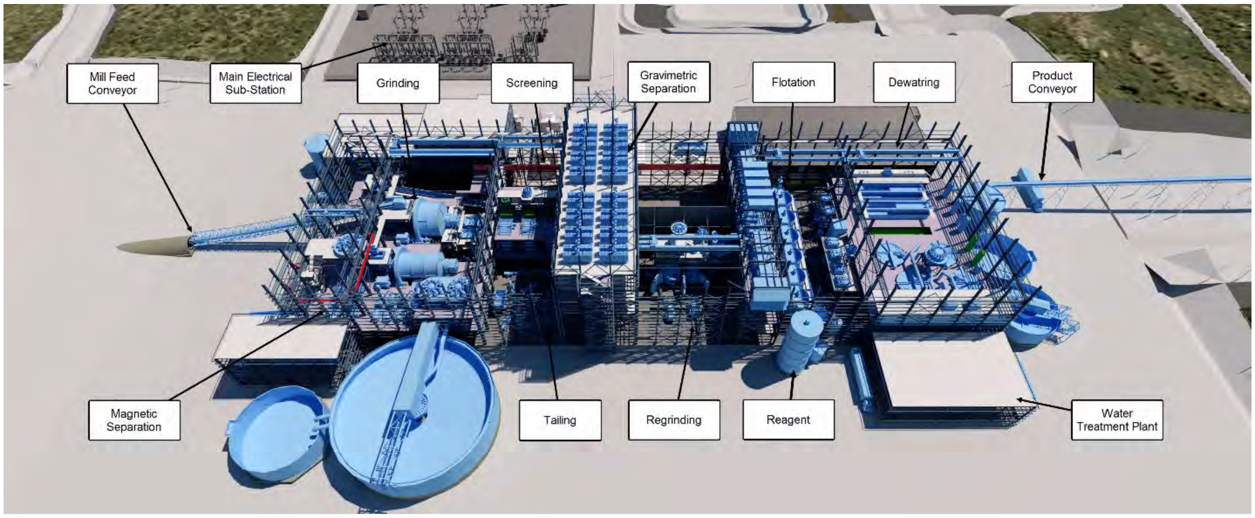


Figure 18-3: Process Plant Section Plan View
(Source: BBA, 2024)

18.2.10 Concentrate Load-out

- Concentrate is conveyed over a distance of 900 m from the concentrator to a concrete (shotcrete type) load-out silo having a capacity of 30,000 t.
- The concentrate can be diverted to an outside concentrate emergency stockpile of 375,000 t capacity, allowing operations to continue in the event of railway problems or full load-out silo. The location of the concentrate emergency pad has been chosen to allow for expansion.
- A concentrate reclaim system will return concentrate from the outside emergency stockpile to the load-out silo.
- Concentrate from the load-out silo is conveyed to a 550-t capacity surge bin, which discharges directly into railcars. Track scales are used to control the weight of the concentrate to the target loading.

18.2.11 Fuel Storage

- Diesel fuel for mine equipment is transported by truck from Wabush.
- A sufficient number of diesel storage tanks is provided to ensure a total storage capacity of eight days. Initially, 5 x 79,000 L reservoirs will be installed (near the mine garage). Over the life of the mine, more reservoirs can be installed as needed.
- A mine truck diesel filling station is provided in the mine services area.
- Two additional diesel storage tanks, with a capacity of 50,000 L each, are provided for emergency generators. One reservoir for the 2.5 MW emergency generator at the mine garage and another for the two emergency generators (2.5 MW each) at the concentrator.
- A gasoline filling station with a tank capacity of 50,000 L will be installed near the concentrator for light vehicles.

18.2.12 Fresh Water Pumping Station

- A fresh water pumping station will be located south-east of Long Lake. This water will be used for freshwater requirements for various areas of the process, occasional make-up water and potable water for the concentrator area.
- The length of the water pipeline from the fresh water pumping station to the concentrator is approximately 1 km.
- A small pumping station located at Mills Lake provides potable service water for the crusher and mine services area.

18.2.13 Borrow Pit

- A total of 8.7 Mm^3 of waste rock is planned for construction use in pre-production and Year 0. This includes the tailings dam, site laydowns, pads, and road construction (see Section 16.7.3).

18.2.14 Power Transmission Line

- NL Hydro will bring power to the future Flora Lake substation. (see Section 21.3.1).
- Champion will build the transmission line from Flora Lake to the Kami substation.
- The main substation is located to the north of the concentrator building.
- Power will be distributed from the main substation to the concentrator, the crusher, and mine services area as well as to ancillary site services (pumphouses, exterior lighting, guardhouse, etc.).

18.2.15 Tailings Management Facility

- The TMF is located on the east part of the Property in an area where natural topography facilitates tailings disposal and management. A more detailed description of the TMF is provided in Section 18.3 of this Report.
- Tailings are pumped from the concentrator to various deposition points in accordance with the TMF phase development plan. Deposition will consist of spigotting of two coarse tailings lines from the dams crest. One coarse tailings line supplies each side of the dike (west and east) and will operate in turn to always have a backup line. Two fine tailings lines will also be provided to discharge the fine tailings into the basin at one single point. One line is needed for the operation, the second line will serve as a backup. The pipelines will be lengthened over the life of the mine and two booster stations (one on each side of the dike) will be installed to compensate for pressure loss as height and distance increase.
- Process water pumped with the tailings (slurry), as well as surface water, will collect in an area within the TMF. This area changes over the course of the TMF development and its water level (height) also increases. Hence, to return this water back to the process water tank, a water reclaim system consisting of a pump accessed by a causeway in the basin.
- Excess water not required in the process water balance is directed to the water treatment plant prior to discharge to the environment.

18.2.16 Boiler Room

- Steam required for the process and to heat the plant building will be generated by two 25 MW electrode-type steam boilers, located in a boiler room attached to the process plant.
- The boiler room will be located on the North-West corner of the process plant building and its dimensions will be approximately 750 m^2. Pedestrian doors will allow access either from the plant or from outside. A garage door leading outside will also allow access for installation and/or maintenance purposes.
- The boiler room will host all the equipment required to generate steam, as well as other mechanical/HVAC equipment such as heat exchangers, pumps, air handling units and/or fire protection equipment.
- Trenches will be implemented in the ground to evacuate streams of water (drains, purge, leaks, etc.) and to avoid any stagnant water on the floor. Heavy-duty galvanized steel grating will provide a levelled and uniform floor, free of tripping hazards.

18.2.17 Fire Protection

- Due to the distance between the different buildings, four local water tanks and pumphouses will be provided across the mine site. Each system will cover one of the following areas:
  - Primary crusher;
  - Mine services area;
  - Process plant and auxiliary buildings;
  - Concentrate load-out area.
- There will be only one fire water pump for each system (diesel powered), except for the process plant where the main fire water pump will be electrical (with a diesel pump as backup).
- No hydrants will be installed along the mine site's access roads or near the buildings. However, the buildings will be equipped with wall hydrants.
- Fire truck(s) will be required for all other areas or sectors.
- The overland conveyor will not be equipped with a fire protection system. A fire truck will be required in the event of a fire. An access road will be required along the conveyor to allow access for the fire truck.
- In areas where the overland conveyor will run higher than 12 m or in inaccessible areas, access towers equipped with open sprinklers, fire hose and catwalk will be connected to the fire truck to provide fire suppression.

18.2.18 Permanent Camp

- The permanent worker camp facilities will be built at approximately 1 km northeast of the concentrator, next to the main access road.
- The permanent camp is designed to provide individual rooms for 600 workers and support staff.
- The camp will be provided with a kitchen and a cafeteria to fit 300 people simultaneously.
- The camp will also be provided with its own potable and wastewater treatment systems.
- For this PFS, it is assumed that a permanent camp will be purchased. Although priority will be given to local employment, it is assumed in this PFS that most of the operating employees will reside within the camp.

18.2.19 Temporary Construction Camp

- The temporary construction worker camp and its facilities will be built beside the permanent camp.
- The temporary construction camp is designed to provide individual rooms for 400 workers and support staff.
- The camp will be provided with a kitchen and a cafeteria to fit 200 people.
- The camp will also be provided with its own potable and wastewater treatment systems.
- For this PFS, it is assumed that the temporary camp will be rented. While priority will be given to local employment, it is assumed in this PFS that most construction workers will reside within the camp. However, some provisions will be made to provide alternative accommodation within the Lab West community.

18.2.20 General

- Communications systems (internal and external) will be provided to support operations and to provide a safe and secure environment.
- Containerized Membrane Bioreactor ("MBR") Sewage treatment systems will be provided at the mine services and at the concentrator.
- Sanitary facilities, as well as domestic waste disposal, are provided according to local conditions and requirements.
- Fire protection is provided to cover various areas of the process plant and surrounding infrastructure.

Major building structures will be made of steel with pre-painted steel cladding. Concrete foundations will consist of spread footings. Secondary buildings will be of pre-engineered or prefabricated type, when applicable. Temporary buildings and warehousing will be of a dome-shaped type. HVAC design for the main process buildings is based on the “H” system (system with air recirculation and heat recuperation) because of its energy efficiency, lower maintenance and operating costs, superior control and air quality. The concentrator is heated using steam. Other buildings are heated using electricity.

Slurry and process water pipelines generally run above ground although some pipework may be buried, such as sewage treatment piping.

For security, two gate houses will be installed, one for the east access road near the concentrator and one for the west access road.

The telecommunication system will be based on Ethernet links throughout the plant and administration buildings. A single-mode fibre optic backbone will be used to accommodate both automation and corporate services on the same cable. For remote sites, such as water pumping stations, a Wimax link will be used for automation and corporate services. A Corporate Ethernet backbone at 1 Gbps in a star-type topology will support the distribution of process and security video.

A light vehicle fleet is planned to support the operations and provide different services on site (see Table 18-1). These vehicles are required at Y0. For the equipment specifically supporting the mining operations, see Chapter 16.

Table 18-1: Light Vehicle Fleet

Description	Quantity
All terrain vehicle (Prinoth Panther T6 or equivalent)	1
Ambulance	1
Boom truck - 40 tons	3
Bus - 40 passengers	3
Fire Truck	1
Flatbed truck - 5 tons	1
Forklift - 10 tons	1
Forklift - 4 tons	2
Fuel Truck	2
Pickup 4x4 - 3/4 ton	15
Scissors Lift	2
Vacuum Truck	1

18.3 Tailings Management Facilities

18.3.1 Background

The tailings management facility ("TMF") was designed to a PEA level in November 2017. WSP (formerly Golder Associates Ltd.) was engaged to complete an updated deposition plan and TMF design to facilitate an upstream embankment raise in 2018. Champion engaged WSP in 2022 to complete a pre-feasibility level design for the TMF, which included an updated siting study and review of the dam cross section. The 2022 design of the TMF included improvements to the layout, cross section, and management of contact water, consisting of the following:

- Realignment of the northwest embankment to minimize the height of the final embankment.

- Selection of a centerline embankment raise to improve overall embankment stability.
- Removal of internal berms to increase tailings storage capacity and simplify tailings deposition and water management.
- Inclusion of downstream runoff collection ditch to collect runoff from the downstream slope of the dam. Collected water is transferred to the TMF.

The dam safety program established in NL requires that the dams be designed, operated and maintained to meet the requirements of Canadian Dam Association ("CDA") Dam Safety Guidelines. In accordance with the dam classification methodology presented in the CDA Dam Safety Guidelines, the proposed TMF dams are classified to have a “Very High” consequence in case of failure. The design of the TMF was carried out to meet required factors of safety under static and pseudo-static loading conditions recommended in the current CDA Dam Safety Guidelines. In addition, emergency spillways for each stage of raise were designed to ensure the CDA recommended design flood is routed through the spillway without overtopping the dams.

An Alternatives Assessment using a Multiple Accounts Analysis ("MAA") was completed to confirm that the previous selection of the TMF location was appropriate. The assessment was extended to consider dam cross sections and tailings dewatering technology (WSP, 2023). The 2016 Environment Canada (EC, 2016) Guidelines for the Assessment of Alternatives for Mine Waste Disposal is considered a best practice for completing an MAA for mine waste management facilities and therefore the MAA for Kami TMF was completed in accordance with these guidelines. A total of 17 potential sites were identified that includes locations suitable for alternate tailings disposal technologies consisting of paste (two locations) and dry stack (one location) tailings disposal. A pre-screening assessment was completed to eliminate TMF site locations and tailings disposal technologies that have fatal flaws prior to advancement of the MAA evaluation. Four locations were identified for advancement through the MAA with centreline embankment raise and one of the locations with a downstream method of raising. The results of the MAA identified the previously identified location for the TMF as the preferred location for the project, utilizing a centreline embankment raise and conventional slurry tailings delivery with the option separating the tailings into coarse and fine tailings streams. Advantages of the preferred location and embankment cross section are reduced embankment stability risks (compared to upstream raise) and utilizing the coarse tailings harvested from the upstream tailings beach to minimize fill material from local borrow sources.

18.3.2 Tailings Management

The revised tailings management plan was developed to provide the following:

- Optimize storage capacity within the basin with deposition modelling.
- Strategic tailings deposition by spigotting from the embankment crest to provide a beach against the embankment slopes to minimize seepage potential.
- Manage the supernatant pond to the southeast of the facility against the natural high ground for water reclaim.
- Minimize fill requirements for embankment construction.

The TMF design concept and material quantitates were determined based on the updated mine plan provided by Champion in 2022.

18.3.3 Design Basis

The design basis for the TMF (WSP, 2013a) was developed for the life of mine (“LOM”) ore production and corresponding tailings solids that will be generated from the on-site processing operations and sent to the TMF for management and storage. A total of 420.4 Mt of tailings was considered for the design of the TMF that corresponds to a storage volume requirement of 280.3 Mm^3 over 25.4 years.

The design of the TMF was completed with the design data available at the time that included the total required volume of tailings solids and corresponding supernatant pond. As part of the project optimization, a slight increase in tailings tonnage to be sent to the TMF was identified in the process design, representing an increase of approximately 2% of TMF design tonnage (see Table 15-1). This additional volume of tailings solids can be accommodated within the current TMF embankment arrangement, based on high-level assessments and contingencies within the current TMF configuration and potentials for optimization of the deposition.

18.3.4 TMF Construction and Operations

The TMF will consist of the starter dam representing Stage 1 for the facility and will be raised over the life of the facility with eight centreline embankment raises representing a total of nine embankment stages to accommodate tailings solids containment and water management. The starter dam will utilize a High-Density Polyethylene ("HDPE") liner on the upstream side with zoned earthfill and non-woven geotextile. The main body of the dam (downstream shell) will be constructed of non-acid generating ("NAG") mine waste rock. The liner will also be protected on the upstream side with a sand cover and riprap zone for protection. The use of the liner for the starter dam will ensure that seepage is controlled during the initial years of operations prior to establishing a tailings beach against the upstream slope. The starter dam will comprise the northwest, west and east embankments and is shown on Figure 18-4. The south dam will be required as the embankments are raised to accommodate tailings storage and water management, to prevent water from entering the protected watershed located to the south of the facility. Table 18-2 provides details on the TMF tailings storage capacity and the embankment elevations for each stage.

Table 18-2: Summary of Embankment Stages

Embankment Stage	Year of Operations	Crest El. (m)	Tailings Volume (Mm^3)
Stage 1 (Starter Dam)	Pre-production to Year 3	598.0 - 604.0	23.4
Stage 2	Year 5	608.0 – 609.5	51.0
Stage 3	Year 8	615.0 – 617.5	84.2
Stage 4	Year 11	622.0	117.5
Stage 5	Year 14	627.0	151.8
Stage 6	Year 17	632.0	182.9
Stage 7	Year 20	637.5	218.0
Stage 8	Year 23	642.5	251.3
Stage 9 (Ultimate Embankment)	Year 25.4	647.0	280.3

All stages of the TMF dam raises are designed with a crest width of 20 m. The starter dam upstream slope will be 3H:1V to accommodate installation of the liner, and the downstream slope will be 2H:1V. The upstream and downstream slopes for the embankment subsequent raises will be 2H:1V (Figure 18-4). The starter dam will be constructed using a rockfill (Zone 3) with upstream slope lined with a geomembrane liner to minimize seepage. The geomembrane liner will be keyed at least 3 m into the glacial till foundation with a 2-m-wide (at the base) seepage cut-off key trench that will be backfilled with compacted glacial till (Zone 7). A transition zone (Zone 2) and a sand bedding zone (Zone 1) are provided beneath the liner. Geotextile will be provided under the geomembrane for protection. The transition and bedding zones extend laterally as a filter blanket beneath the rockfill shell to prevent the migration (piping) of foundation soils into the upstream shell. A layer of road surfacing (Zone 6) will be placed along the dam crest to allow for heavy vehicle traffic during operations.

Embankment raises, consisting of the centreline raise, will continue to utilize rockfill (Zone 3) in the downstream shell and will be maintained at 2H:1V. The internal filter (Zone 1) and transition (Zone 2) will be extended vertically. The upstream shell zone will be constructed of coarse tailings (Zone 4) with a minimum zone width of 6.0 m and an upstream slope of 2H:1V. The coarse tailings will be harvested from the upstream tailings beach and will require compaction to provide competent foundation. A typical embankment cross section is provided in Figure 18-5.

The TMF pond will collect direct precipitation, water discharged from the processing plant with the tailings and water pumped back from the downstream perimeter seepage collection sumps around the facility. Outflows from the pond will consist of reclaim water, evaporation, water locked in tailings voids and seepage. During the mine's operational phase, water will be pumped from the pond via a reclaim system back to the processing plant and excess water will be treated and released. A polishing pond, previously planned as part of the 2018 site infrastructure, has been removed and water will be stored within the TMF. Removal of the polishing pond reduces construction requirements and risks associated with construction, operation and closure of an additional containment facility. Additional water demands for the processing plant can be accommodated with local fresh water. The inclusion of the water treatment plant at the process plant also ensures acceptable water quality for discharge to the environment. The water return system will be required to handle freezing winter conditions and operate during the winter months. The water return system will be accessed with a causeway constructed within the basin and the water reclaim pump will be relocated along the causeway as the supernatant pond moves up. Design of the required pond capacity and operating levels for each embankment stage to manage operational and stormwater was completed to meet CDA guidelines.

Emergency spillways will be provided for each of the nine embankment stages. Runoff and seepage collection ditches will be constructed along the toe of perimeter dam in the TMF. Water collected in the ditches will be directed to sumps at various topographic low points around the dams and pumped back to the TMF. The water collected in the ditches will be conveyed to sumps strategically established at topographic low areas around the perimeter of the alignment. The water collected in the sumps will be pumped back to the TMF with a pump and pipeline system.

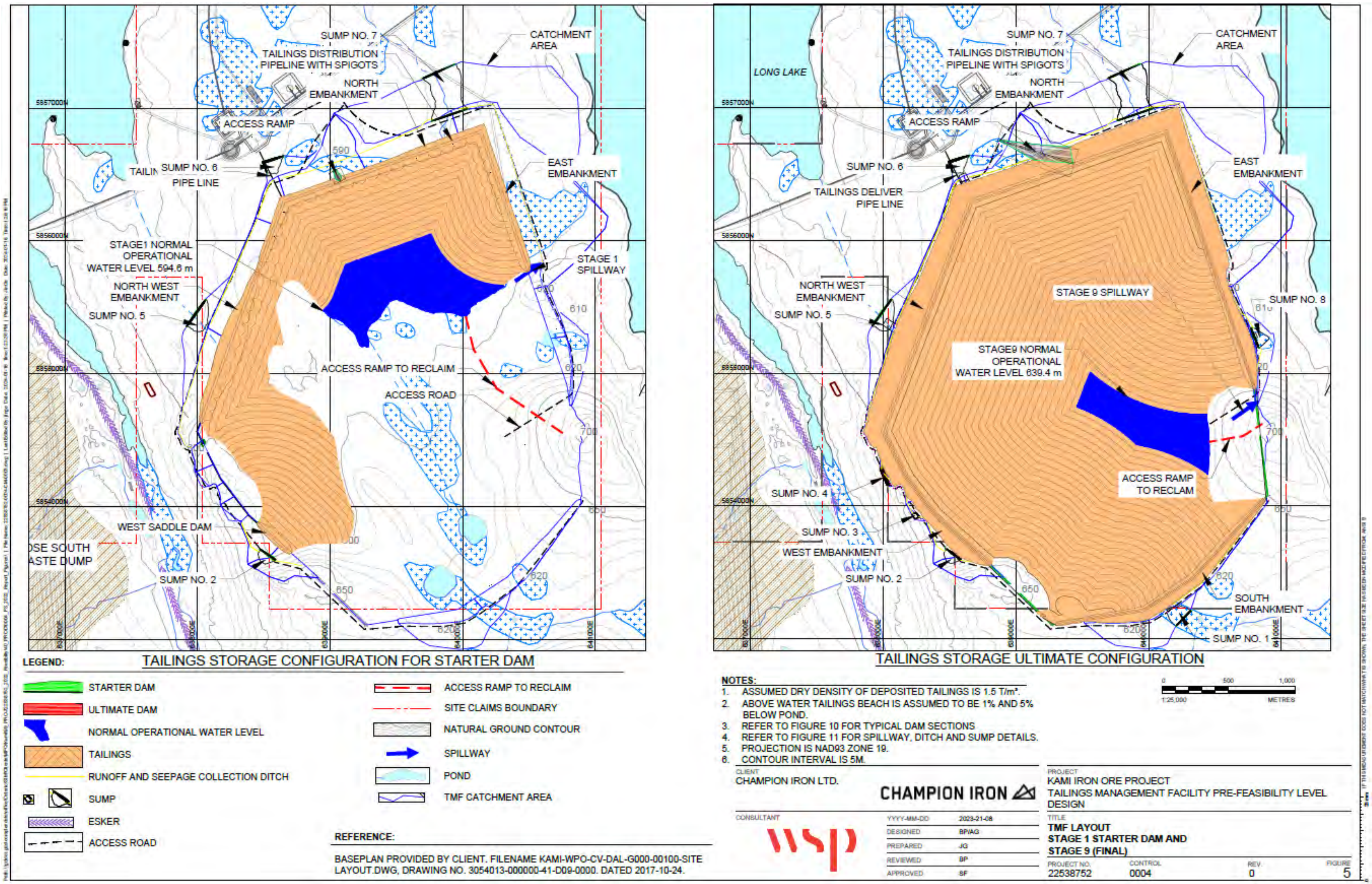


Figure 18-4: TMF Layout – Starter Dam and Ultimate Configuration

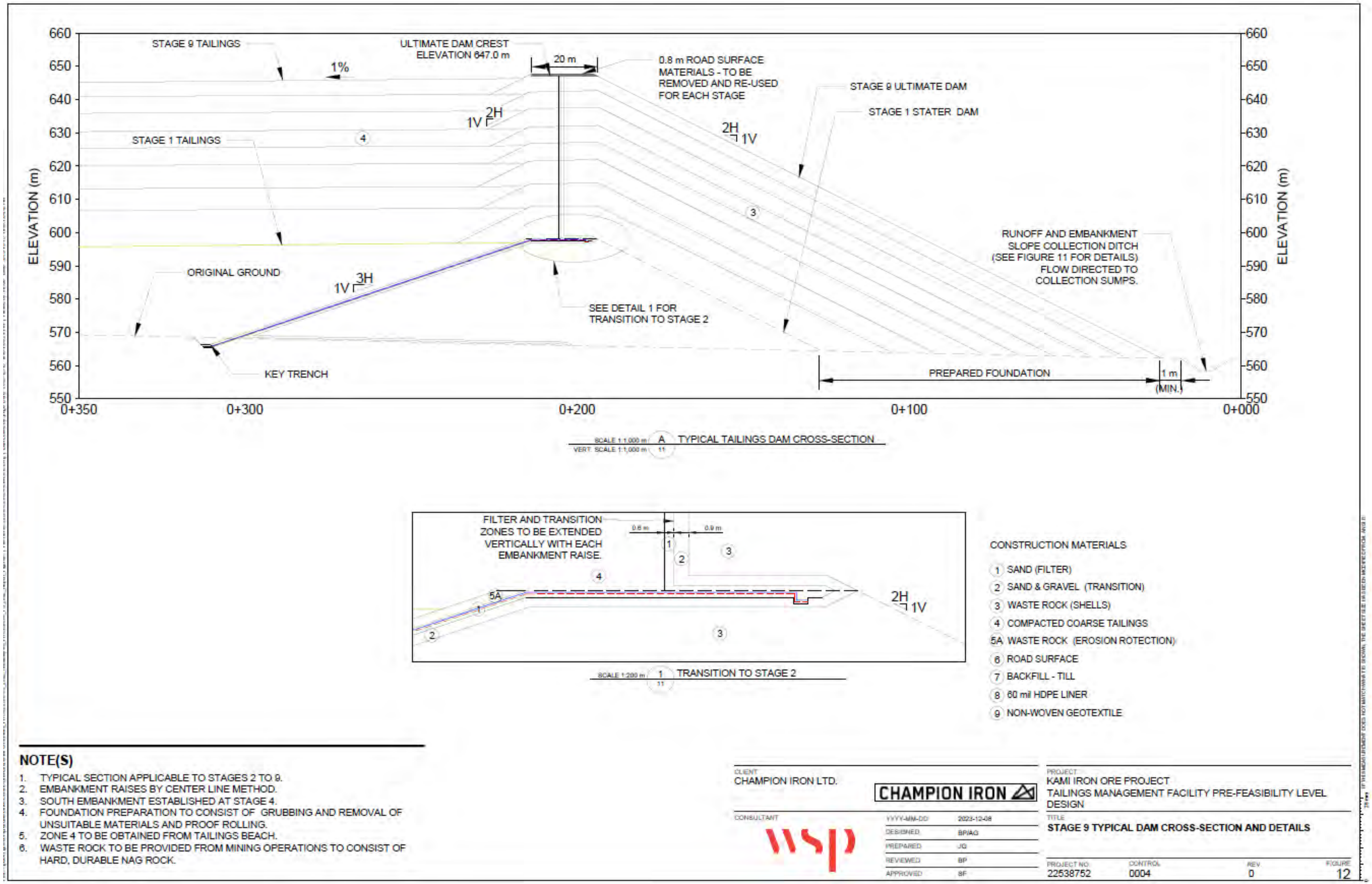


Figure 18-5: TMF Stage 9 (Ultimate) Dam Cross Section

18.3.5 Construction Requirements

Construction of the TMF will require clearing of all trees from the embankment footprints and from the extents of basin area. Foundation preparation activities will consist of stripping and grubbing, removal of unsuitable material and proof rolling. The TMF will be built in stages and the total fill required to complete the construction is approximately 32.7 Mm^3, which consists of 26.8 Mm^3 of mine waste rock for the downstream shell fill, and 4.6 Mm^3 of coarse tailings in the upstream shell zone. The remaining 1.3 Mm^3 of embankment fill will consist of the internal zoned earthfill, road topping and riprap erosion protection that will require sourcing from local borrow areas and processing to meet the design gradation. Approximately 380,000 m^2 of geomembrane liner and 430,000 m^2 of geotextile will be required for the construction of the Stage 1 starter dam, which will be provided by suppliers.

18.4 Water Management

18.4.1 Introduction

The Kami water management system will be divided into two distinct areas: east and west.

The geographical configuration of the infrastructure led to the development of a two-sector strategy, mainly separated by the Waldorf bridge: infrastructure west of Long Lake and infrastructure located east of Long Lake. This strategy results in two points of discharge after treatment namely Pike Lake for the western infrastructure and Long Lake for the eastern infrastructure.

Water management infrastructure developed by Alderon was integrated in the Environmental Impact Statement approved by the government of Newfoundland and Labrador in January 2014.

18.4.2 Stormwater Management

The stormwater management system was designed to contain, treat and discharge runoff water from Rose Pit and other mine infrastructure.

Ditches were designed to allow rainwater to flow via gravity into nine retention basins where it will be pumped into the closest collection pond or into the TMF for treatment and further discharge. Each retention basin is located in a natural low point to minimize the number of pumps required to manage the stormwater into the treatment plants.

18.4.2.1 West Area

The west area is treated by the Rose Pit collection pond and water treatment plant. Basins #1 and #2 drain the crusher, emergency ore stockpiles, and the surrounding roads into the Rose Pit collection pond. Basin #3 drains the shops area, while Basin #4 drains the aggregate plant and the haul road west of Waldorf bridge into the Rose South collection pond to then be pumped into the Rose Pit collection pond for treatment. (Figure 18-6)

18.4.2.2 East Area

The east area is treated by the TMF and its water treatment plant located near the concentrator. Basins #5 and #6 drain the road between Waldorf bridge and the concentrator pad. Basins #7 and #8 drain the concentrator pad, emergency stockpile, and the dome-shaped building area. Basin #9 drains the road between the concentrator pad and the rail line. These basins are then pumped into the TMF. Reclaim water is pumped from a barge to the process plant and any excess water is pumped from a second barge to the EWTP (see Chapter 20) (Figure 18-15)

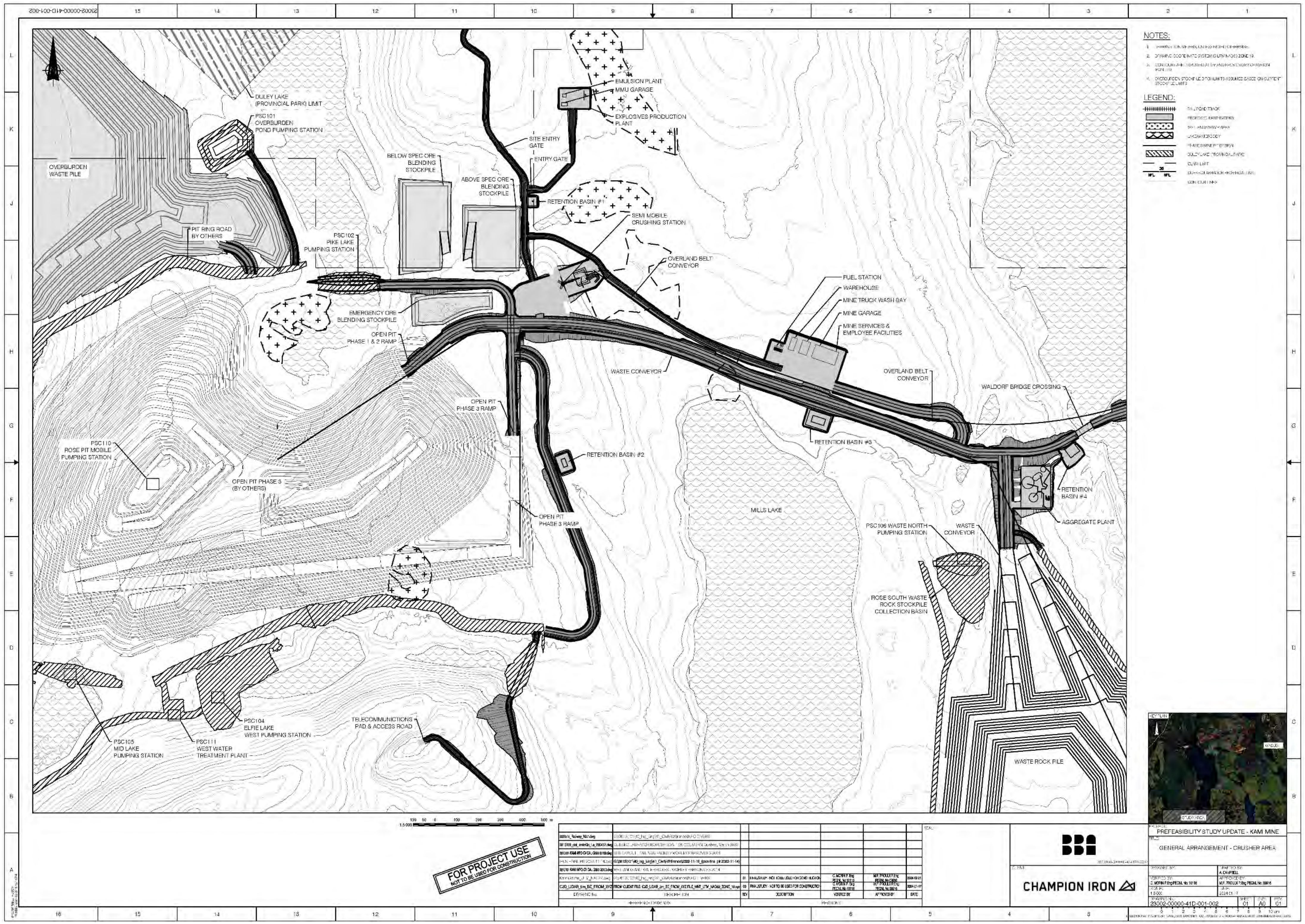


Figure 18-6: Site Plan Kami Iron Ore Project (Zoom on Kami Site Infrastructure- West)

18.4.3 Water Management – West Area

18.4.3.1 Background

Section 18.4.3 presents the design of the water management infrastructure related to the Rose Pit, the Rose North overburden stockpile and the Rose South waste rock stockpile.

Conditions associated with the Project release in 2014 are now integrated in the update of this Project. In particular, the hydrogeological environment knowledge is refined with data review, new field investigations and modelling.

Since the 2014 Project, improvements were made to plan for infrastructure that will reduce water management risks while leaving open the possibility of adapting flow routing as the Project develops. The hydrogeological modelling update carried out as part of this study defines the dewatering rate to be managed and this data is key for improvements made to the water management plan.

To be prepared for the expected flowrate to be managed, the planned capacity of the Rose Pit collection pond has been increased. Another improvement aimed at securing the operation is the planning of the Pike dike, whose objective is to move Pike Lake away from the pit rim. And, finally, runoff on the overburden stockpile and waste rock stockpile has been defined as contact water and will be diverted to the Rose Pit collection pond and treated.

18.4.3.2 Water Management Plan Description

To manage pit dewatering and runoff on the Rose North overburden stockpile and Rose South waste rock stockpile, several water management infrastructure are planned:

- Perimeter diversion ditches around Rose Pit to minimize and prevent external clean water runoff into the pit.
- Diversion dam upstream of Rose Pit (Mid Lake dam).
- Pit dewatering system and collection pond.
- Perimeter diversion ditches around the Rose Pit collection pond.
- A treatment plant (WWTP) to treat water from the Rose Pit collection pond before discharging to the environment.
- A dike to seclude Pike Lake water further from Rose Pit walls (Pike dike).
- Dewatering facilities to manage water upstream of the Pike dike.
- Perimeter collection ditch around the Rose North stockpile (overburden stockpile).
- Pond to collect runoff from the overburden stockpile and pumping facilities to pump the water to the Rose Pit collection pond.
- Perimeter collection ditch around the Rose South stockpile (waste rock stockpile).
- Four basins to collect runoff from the waste rock stockpile and pumping facilities to pump the water to the Rose Pit collection pond.

Figure 18-7 and Figure 18-8 present the proposed water management infrastructure and the water management plan schematic.

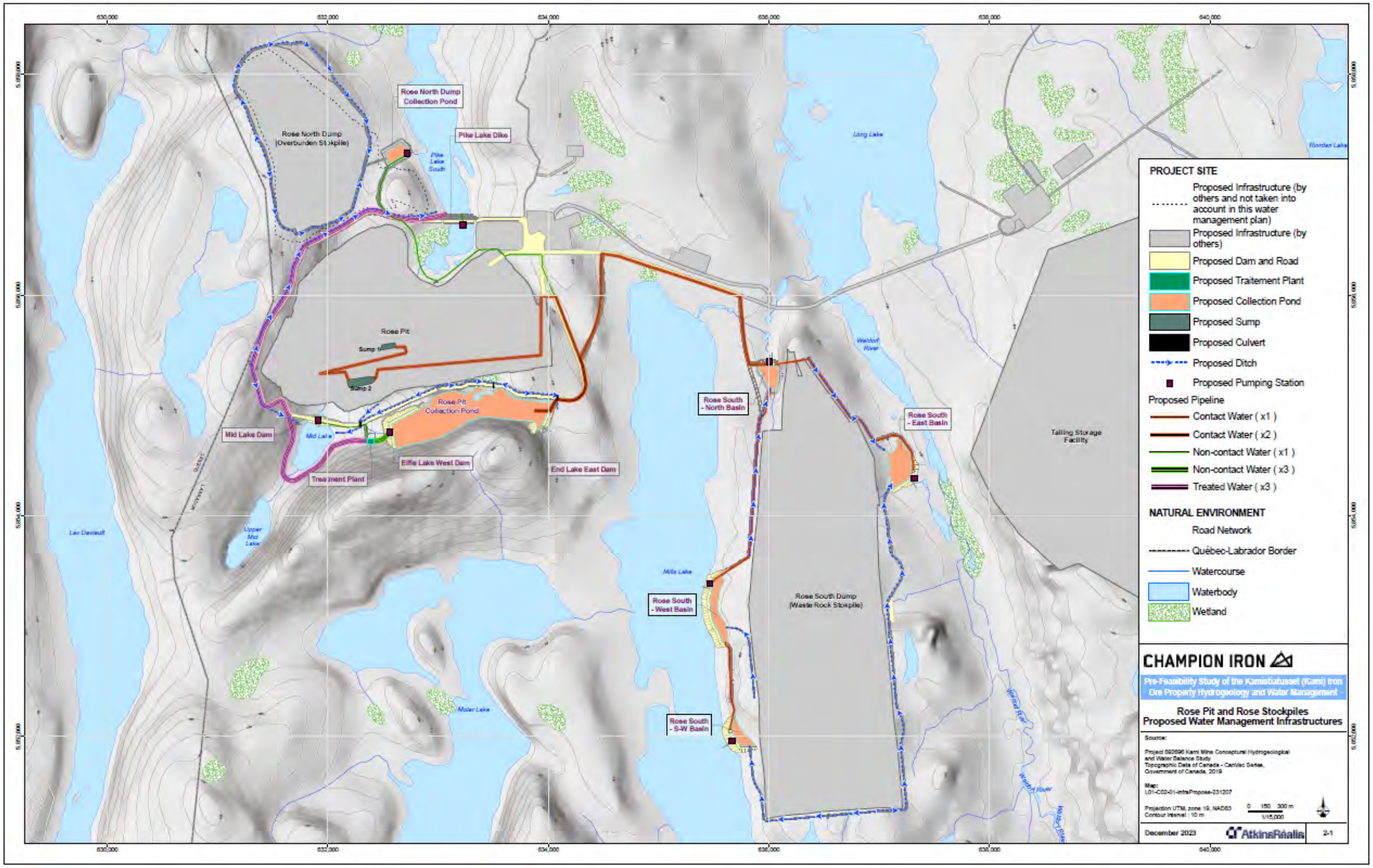


Figure 18-7: Rose Pit and Rose Stockpiles Water Management Infrastructure

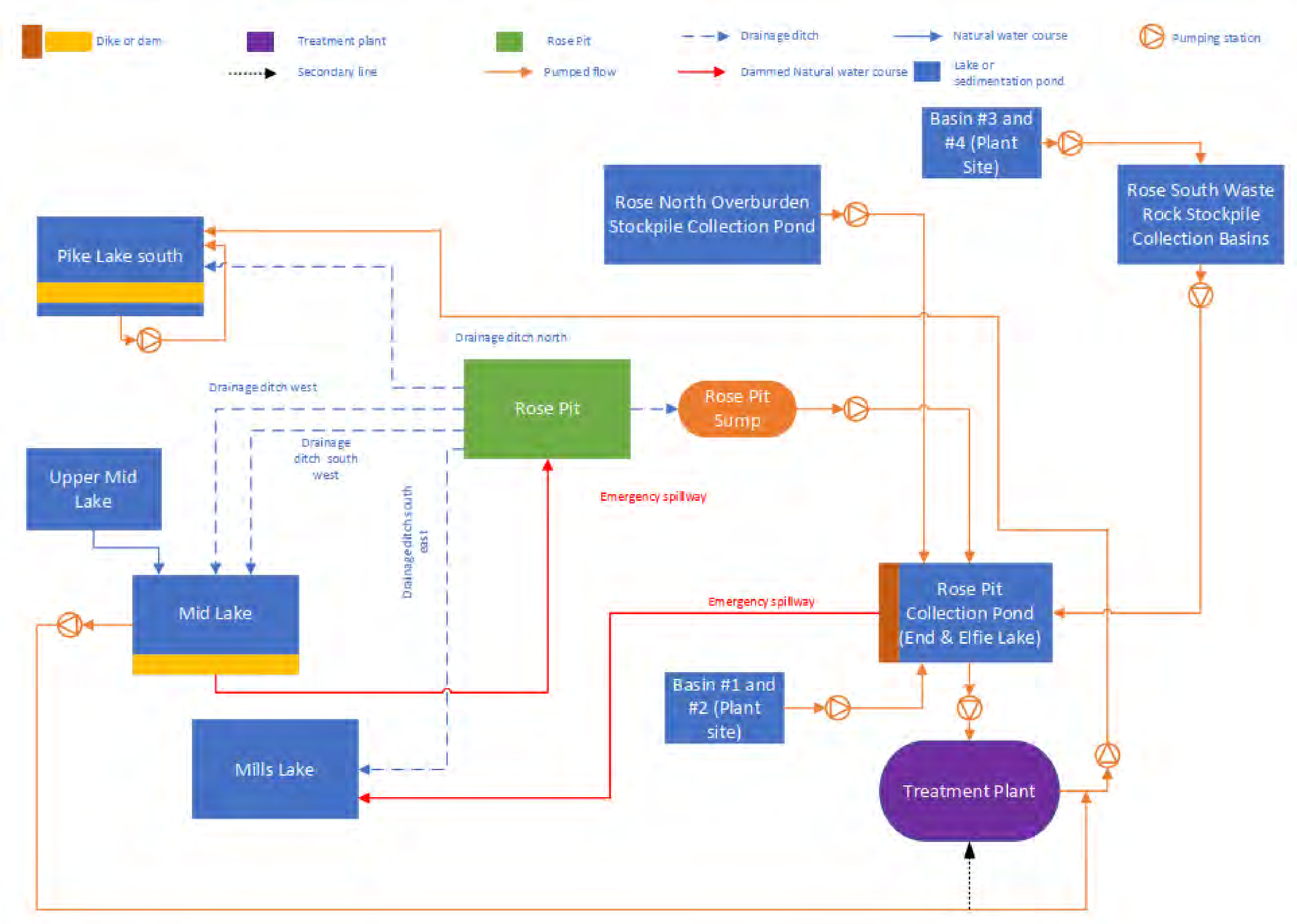


Figure 18-8: Water Management Plan Schematic

As illustrated in Figure 18-7 and Figure 18-8, the runoff on Rose Pit watershed and the infiltration will be pumped to the collection pond. The Rose Pit collection pond will be created with the construction of dams at the outlet of Elfie Lake and End Lake. After the collection pond, water will be pumped to the treatment plant for TSS removal and pH adjustment, if required, and the treated water will be discharged to Pike Lake South. The treatment plant (WWTP) will not be in operation during the coldest months of the year (from January to mid-March), and the collection pond will have sufficient capacity to store the water from the pit dewatering during this period.

As for the water flowing towards Rose Pit from the other watersheds, four diversion ditches will convey water to Mills Lake, Mid Lake, and Pike Lake south.

To ensure that Rose Pit does not get flooded, a dam will be built at the outlet of Mid Lake. The water from Mid Lake will also be pumped to Pike Lake South, with the possibility of treating it at the treatment plant (WWTP) beforehand.

The Pike dike will be constructed towards the south portion of Pike Lake so the lake can be moved farther away from the pit rim and the lake and mining operation can be secured. The south portion of Pike Lake South will be dewatered and kept dry to avoid the backflow of water to Rose Pit and minimize the seepage towards the pit.

The runoff water generated at the Rose North and South stockpiles will be collected in ponds via ditches and will be pumped into the Rose Pit collection pond (End Lake & Elfie Lake) to later be treated at the water treatment plant (WWTP). Treated water will be discharged in Pike Lake.

18.4.3.3 Design Basis

The design basis of the water management infrastructure is mainly based on Canadian Dam Association ("CDA") Guidelines and water quality regulations applicable in Canada and NL.

The level of consequence of all water management infrastructure is based on CDA methodology, and ranges from Low to Very High. It is assumed that all water management infrastructure will be dismantled at closure; therefore, the construction, operation and transition criteria (CDA, 2014) have been selected for the definition of design earthquake and Inflow Design Flood ("IDF").

The seismic parameters for the Kami site were extracted from the 2020 National Building Code of Canada Seismic Hazard Tool (NBC, 2020). According to available information, the first 30 m of soil is generally assumed to be of site Class C (very dense soil and soft rock) with some sectors being of site Class D (stiff soil).

The peak ground acceleration ("PGA") for a 5,000-year and 10,000-year return period was extrapolated based on the 2020 National Building Code of Canada Seismic Hazard Tool.

The loading cases and safety factors criteria for the stability of the dikes and dams are provided in Table 18-3.

Table 18-3: Geotechnical Factors of Safety - Dams

Loading Condition	Minimum FoS Recommended (CDA, 2014)
Static – End of Construction	> 1.3
Static – Long Term	1.5
Pseudo-static	1.0
Post-seismic	1.2

Water management infrastructure will be built with the material available on site. Information on the characteristics of material available on site is based on former field investigations carried out by Stantec (2012e), WorleyParsons (2013a) and Golder (2018a). Material properties for stability and seepage analyses are based on information available in previous site-wide geotechnical studies.

It is assumed that the majority of the good-quality till will be used for the construction of the tailings storage facility. Geomembrane, in combination with cut-off key trench, is prioritized as the sealing method for Rose Pit water management dams.

Geometrical criteria for the width of the roads and dams is established based on the Newfoundland Occupational Health and Safety Regulation (2012) considering the width of trucks that will circulate in the different areas. When needed, room for pipelines is planned along the roads and crest of the dams.

The retained criteria is listed in Table 18-4.

Table 18-4: Geometrical Criteria for Road and Dam Widths

	Circulating Width [m]	Berm Height [m]	Berm Width [m]
Rose Pit Ring Road	21.0	1.8	5.4
Mid Lake Dam	21.0	1.8	5.4
Pike Lake Dike	21.0	1.8	5.4
Other Dikes and Access Roads	10.5	1.0	3.0

The design of the Rose Pit pumps, pipes, collection pond and treatment plant consider the inflow from pit dewatering in addition to runoff. The groundwater inflow is set to 40,000 m^3/d based on the hydrogeological data review and conceptual hydrogeological modelling conducted as part of this Project.

The Environmental Design Flood ("EDF") selected for the water management infrastructure is the most critical of 30-days 100-year rainfall plus snowmelt event or 24-hours 100-year rainfall event.

The effluent discharged from the treatment plant to the environment shall comply with the following regulations:

- Newfoundland and Labrador Environmental Control Water and Sewage Regulations (NL Reg. 65/03);
- Metal and Diamond Mining Effluent Regulations ("MDMER") (SOR/2002-222);
- Wastewater Systems Effluent Regulations (SOR/2012-139).

In terms of quantity, the water treatment plant shall have the capacity to treat the maximum flowrate pumped from the Rose Pit collection pond during the LOM. This flowrate corresponds to the EDF, which is 7,100 m^3/h.

18.4.3.4 Infrastructure Description

Infrastructure related to the water management of Rose Pit and Rose Stockpiles are described by area in the following paragraphs.

Figure 18-9 shows the site block flow diagram, and Table 18-5 summarizes the earthworks.

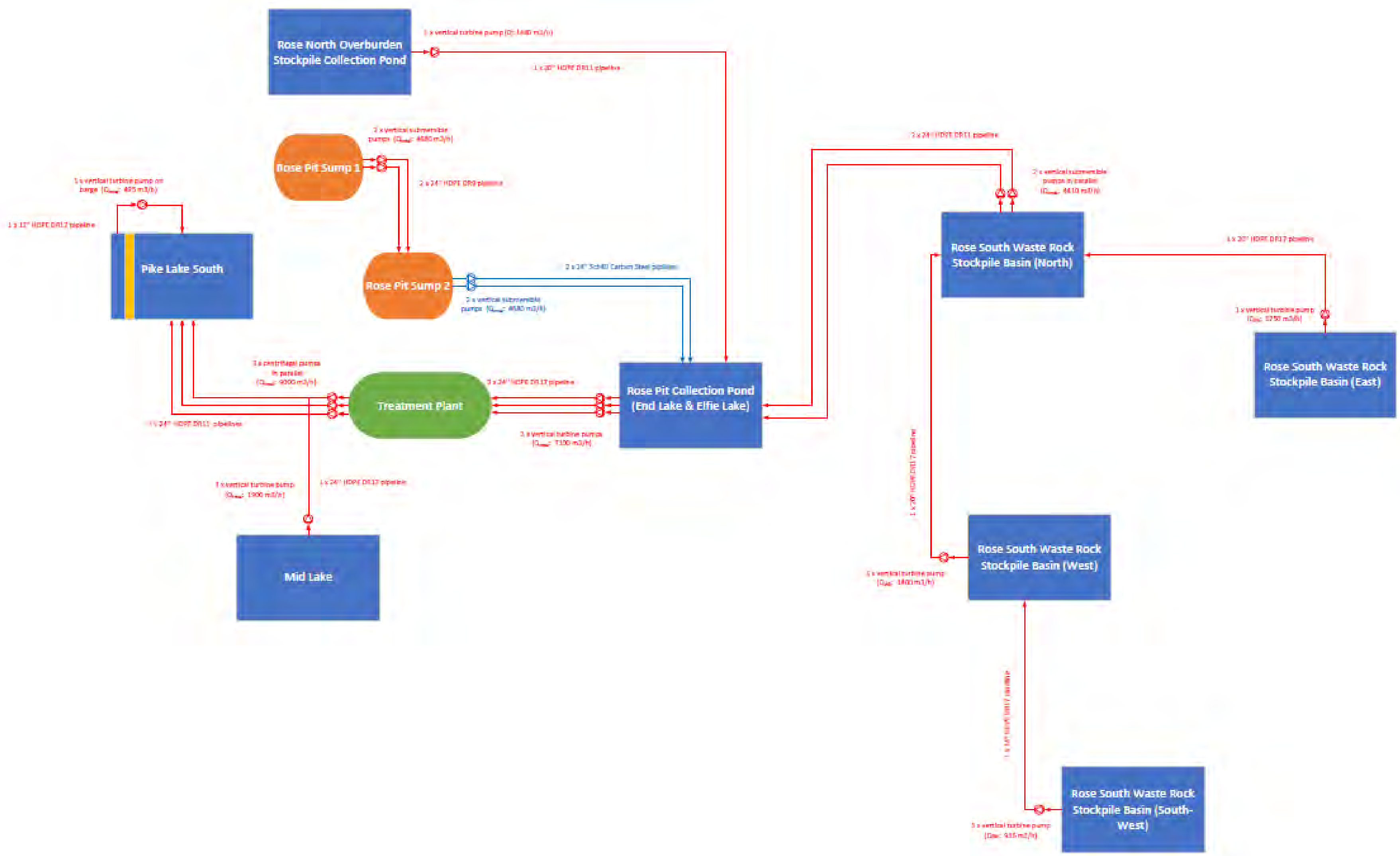


Figure 18-9: Rose Pit and Rose Stockpiles Block Flow Diagram

Table 18-5: Summary of Dams and Dikes

Location	Crest Elevation (m)	Max Height (m)
Mid Lake Dam	584.5	5.5
Rose Pit Collection Pond / Elfie Lake West Dam	627.0	19.0
Rose Pit Collection Pond / End Lake East Dam	627.0	12.0
Pike Lake Dike	570.5	6.0
Overburden Stockpile Collection Pond	572.0	5.0
Waste Rock Stockpile / North Basin	574.0	10.0
Waste Rock Stockpile / East Basin	555.0	9.0
Waste Rock Stockpile / West Basin	599.5	4.5
Waste Rock Stockpile / South-West Basin	605.0	5.0

Eleven pumping stations with capacity ranging between 495 m^3/h and 9,000 m^3/h and one treatment plant with a 7,100 m^3/h capacity will be required for water management. A total length of 40 km of pipeline will be required, with diameters ranging between 12 and 24 inches. All pipelines will be above ground. Pipelines between the pit, the collection pond, the treatment plant (WWTP) and Pike Lake will be heat traced.

18.4.3.4.1 Rose Pit

A pumping system (vertical turbine pump placed on a barge) with a nominal capacity of 495 m³/h will be used for the dewatering of Rose Lake prior to the beginning of the operations. One line of HDPE 500 mm DR17 will be used to discharge the water in Pike Lake within applicable criteria.

A pumping system located at the bottom of Rose Pit will be used for pit dewatering and management of site runoff and pit infiltration. The pumping system nominal capacity required at the end of mine life will be 4,680 m³/h. Two permanent sumps are planned to manage the water. Temporary pumping at the complete bottom of the pit will be part of mining operation.

Four pumps in total will be required in the permanent sumps (two pumps in parallel in sump 1 and two pumps in parallel in sump 2. The pumps will be vertical submersible pumps.

Diversion ditches will be excavated at the perimeter of the pit. The ditches will be adjacent to the ring road. The ditches will convey water towards Mills Lake, Mid Lake, and Pike Lake south. The ditches will have a minimum width of 1.0 m at their base and a minimum height of 1.0 m. They will be protected with geotextiles and with riprap 200-300 mm.

The ring road embankment will be constructed in non-potentially acid generating (“NPAG”) rockfill. The road structure will have a 1 m thickness of sand & gravel material. Figure 18-10 shows a typical section of the ring road and ditch.

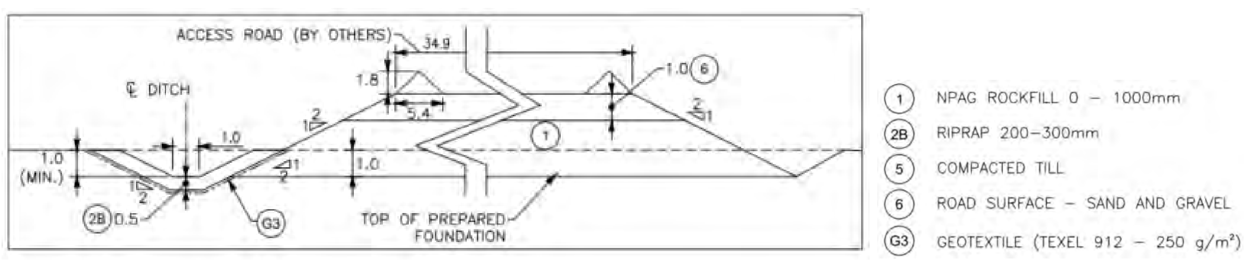


Figure 18-10: Ring Road and Diversion Ditch

18.4.3.4.2 Mid Lake Dam and Related Infrastructure

A 5.5-m high dam will be constructed at the outlet of Mid Lake to stop and divert runoff coming from the upstream area. The dam will be constructed with compacted NPAG rockfill and the upstream slope will be sealed with an HDPE geomembrane. Grouting will also be conducted in the overburden and first metres of bedrock for sealing purposes. A conservative depth of 15 m of grouting in the bedrock has been assumed at this stage.

A pumping system with a nominal capacity of 1,900 m^3/h composed of one vertical turbine pump installed in a manhole will be used to pump water over a 585 m distance to transfer the non-contact water downstream of the outlet of the contact water treatment plant.

One 600 mm diameter HDPE pipeline will be used to transfer non-contact water downstream of the outlet of the treatment plant. The HDPE will be above ground, non-insulated and non heat-traced since no water transfer is planned in the winter months.

18.4.3.4.3 Rose Pit Collection Pond and Water Treatment Plant

The Rose Pit collection pond will be created in the existing Elfie Lake and End Lake. Two dams will be built for this purpose: a 19-m dam will be built on the west side of Elfie Lake, and a 12-m dam will be built on the east side of End Lake. Both dams will be constructed with compacted NPAG rockfill and the upstream slope will be sealed with an HDPE geomembrane. Grouting will also be conducted in the overburden and first metres of bedrock for sealing purposes. A conservative depth of 5 m of grouting in the bedrock has been assumed at this stage. The pond created with the construction of the two dams will have a 4 Mm^3 capacity.

Diversion ditches will be built on the North side of Elfie Lake and End Lake. Runoff water will be diverted towards Mid Lake to the west and Mills Lake to the east. The ditches will be adjacent to the ring road.

A pumping system with a nominal capacity of 7,100 m^3/h composed of three vertical turbine pumps in parallel installed in manholes will be used to pump water over a 255 m distance to reach the treatment plant.

Three 600 mm diameter HDPE pipelines will be used to discharge water towards the treatment plant. The pipelines will be above ground and heat traced to allow water transfer during the winter months.

A treatment plant (WWTP) with a 7,100 m^3/h capacity will be built at the outlet of the Rose Pit collection pond. The treatment plant process will allow the treatment of total suspended solids ("TSS") to meet the discharge criteria. Water will be pumped to Pike Lake over a 4,780 m distance.

Mid Lake Dam, End Lake Dam and Elfie Lake Dam have an identical design. The typical section of Elfie Lake Dam is shown on Figure 18-11. The dams built at Mid Lake, Elfie Lake and End Lake will be used throughout the operating period and dismantled during closure to be returned to their natural state.

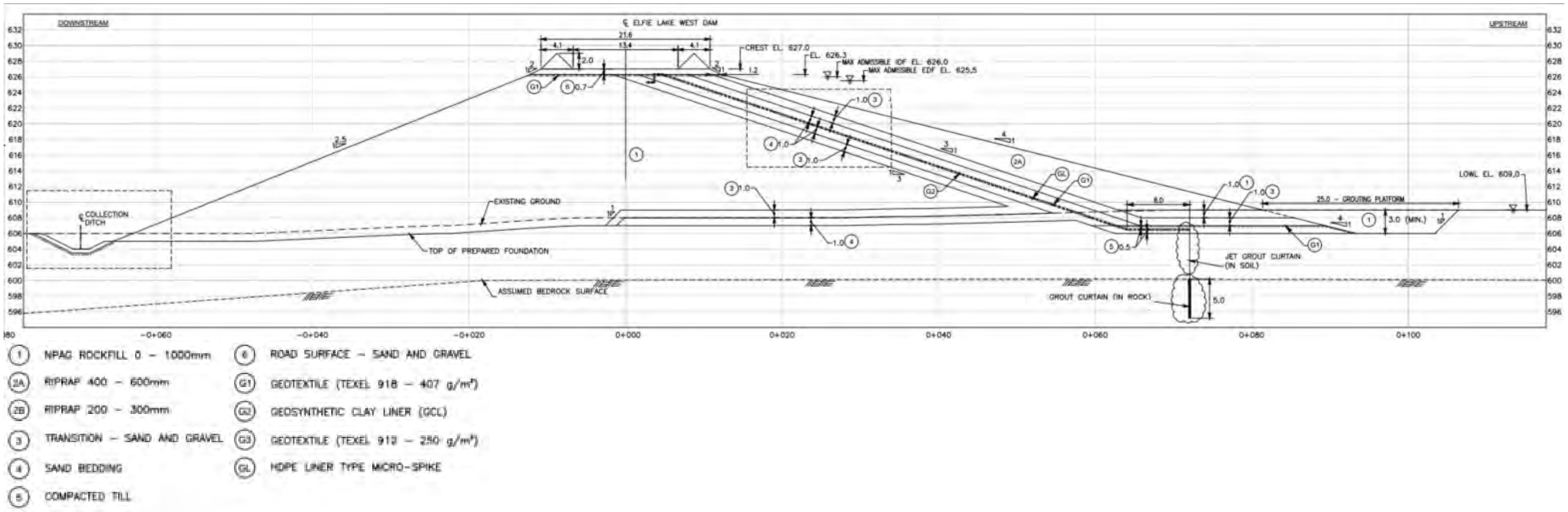


Figure 18-11: Elfie Lake Dam Typical Section

18.4.3.4.4 Pike Lake Dike and Related Infrastructure

A dike will be built at the South extremity of Pike Lake South to empty the part of the lake close to Rose Pit as a risk management approach.

The dike will be built with compacted NPAG rockfill. Grouting will also be conducted in the overburden and first metres of bedrock for sealing purposes. A conservative depth of 5 m of grouting in the bedrock have been assumed at this stage.

A pumping system will be used to empty the portion of Pike Lake South on the South side of the dike. The pumping system nominal capacity will be 495 m³/h. The pump will be a vertical turbine pump placed on a barge.

Figure 18-12 shows a typical section of Pike Lake Dam.

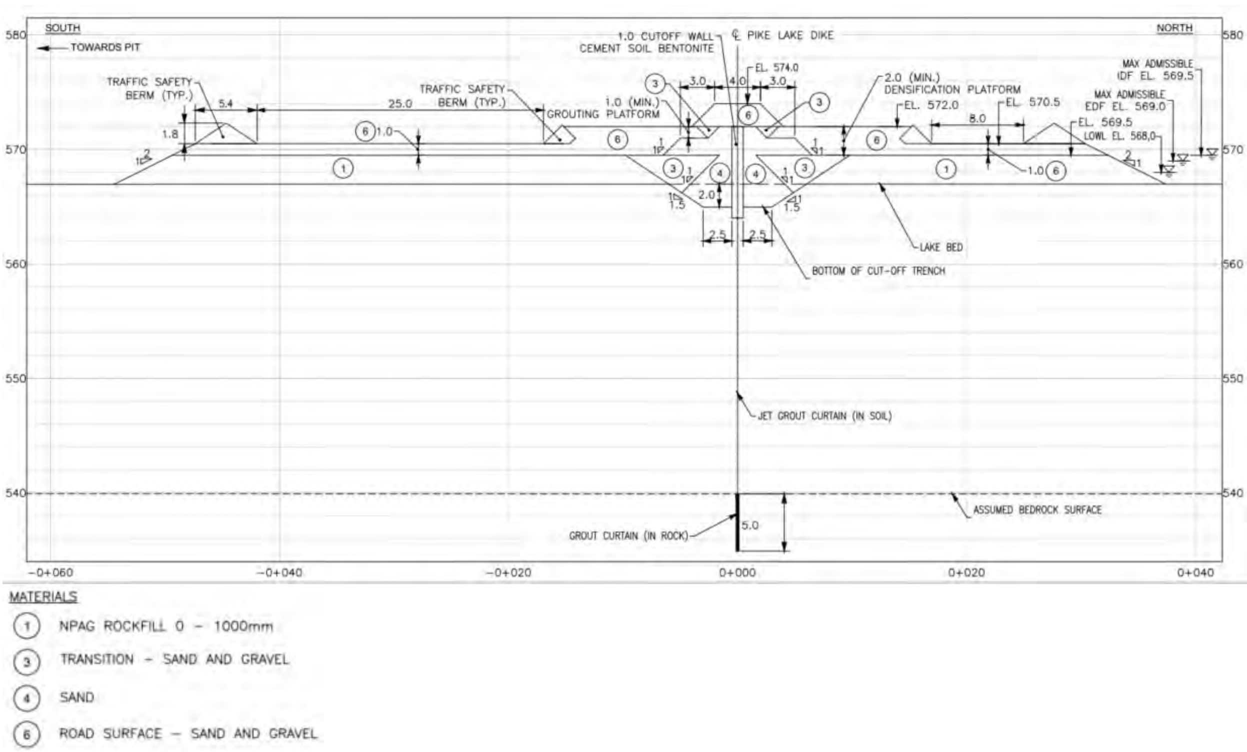


Figure 18-12: Pike Lake Dike Typical Section

18.4.3.4.5 Overburden Stockpile (Rose North Dump) Water Management Infrastructure

The Rose North overburden stockpile collection pond will be constructed with a 5-m high dike and excavation.

The dike will be constructed with compacted till from the excavation, and the upstream slope of the dike and bottom of the pond will be sealed with an HDPE geomembrane.

Catchment ditches will be built on the perimeter of the stockpile to direct runoff to the collection pond.

A pumping system with a 1,480 m^3/h nominal capacity composed of one vertical turbine pump installed in a manhole will be used to pump water over a 4,240 m distance to be discharged in the Rose Pit collection pond.

Figure 18-13 and Figure 18-14, respectively, show a typical section of the catchment ditches and the collection pond.

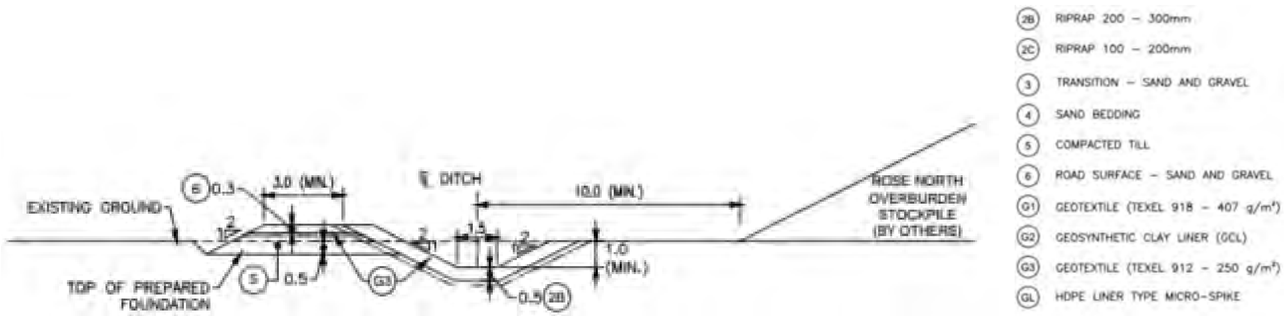


Figure 18-13: Rose North Overburden Stockpile Catchment Ditch Typical Section

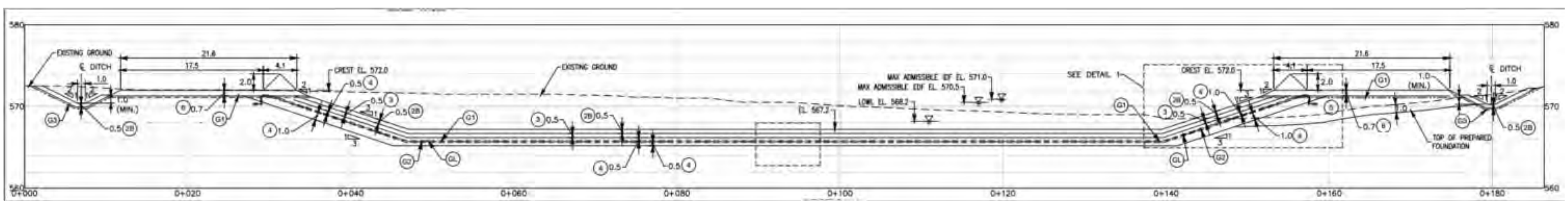


Figure 18-14: Rose North Overburden Stockpile Collection Pond Typical Section

18.4.3.4.6 Waste Rock Stockpile (Rose South Dump) Water Management Infrastructure

Four collection ponds are needed to manage the runoff water from the Rose South waste rock stockpile. Collection ponds will be made with dams constructed with NPAG compacted rockfill. The upstream slope of the dams and bottom of the ponds will be sealed with an HDPE geomembrane.

Catchment ditches will be built on the perimeter of the stockpile to direct runoff to the collection ponds.

Pumping systems (vertical turbine and vertical submersible) with nominal capacities ranging between 936 m³/h and 4,410 m³/h installed in manholes will be used to pump water to the treatment plant (WWTP). All pipelines will report to the Rose South – North basin, and water will be pumped from this basin to the Rose Pit collection pond.

Typical sections for waste rock stockpile infrastructure are similar to those presented for the overburden stockpile (Figure 18-13 and Figure 18-14).

18.4.3.5 Construction and Operation

Prior to the construction of all infrastructure, site preparation will include clearing, grubbing and stripping. The peat will be transported to the overburden stockpile and can be reused for reclamation. The main material used for the construction will be the NPAG rockfill which will come from the mining operation. NPAG rockfill preparation will be started prior to the mining operation so that it can be used to build the various facilities for the required infrastructure.

A staged approach will be used for the construction of the water management infrastructure except for the Mid Lake dam which will be built entirely prior to the start of operation. The End Lake and Elfie Lake dams, necessary for the construction of the Rose Pit collection pond, will be built in stages. This will allow to adjust the raises of the dams according to the mine development and with the dewatering rate of the firsts years. The first stage will have to be ready prior to the first year of operation.

The Pike Lake dike will be built after the start up of the operation. It is not essential to move the lake away from the pit in the first years.

The overburden stockpile will be in operation at the beginning of the construction period, this runoff water needs to be managed from the beginning.

As for the Rose South waste rock stockpile, the two basins north and east of the stockpile will be built prior to the start of the operation. The two others will be built later when the stockpile will have reached the area associated with those ponds.

Operation of the water management infrastructure will resume mainly in the pumping of water and operation of the WWTP. All infrastructure will be powered by electricity. Operation of the treatment plant will require the management of chemical products and their deliveries, the hauling of the dried sludge, and the sampling of the treated water and sludge. Apart from the mechanical operation and maintenance, standard maintenance is expected on the earthworks structures such as grading, erosion repairs and so on.

18.4.4 Water Management – East Area

18.4.4.1 Background

Section 18.4.4 presents the design of the water management infrastructure related to the site portion located east of Waldorf Crossing. This includes the freshwater pump house, the storm water management for the contact water as described in Section 18.4.2, the tailings management facilities described in Section 18.3, the reclaim water system and the water treatment plant (EWTP) described in Section 18.4.4.8.

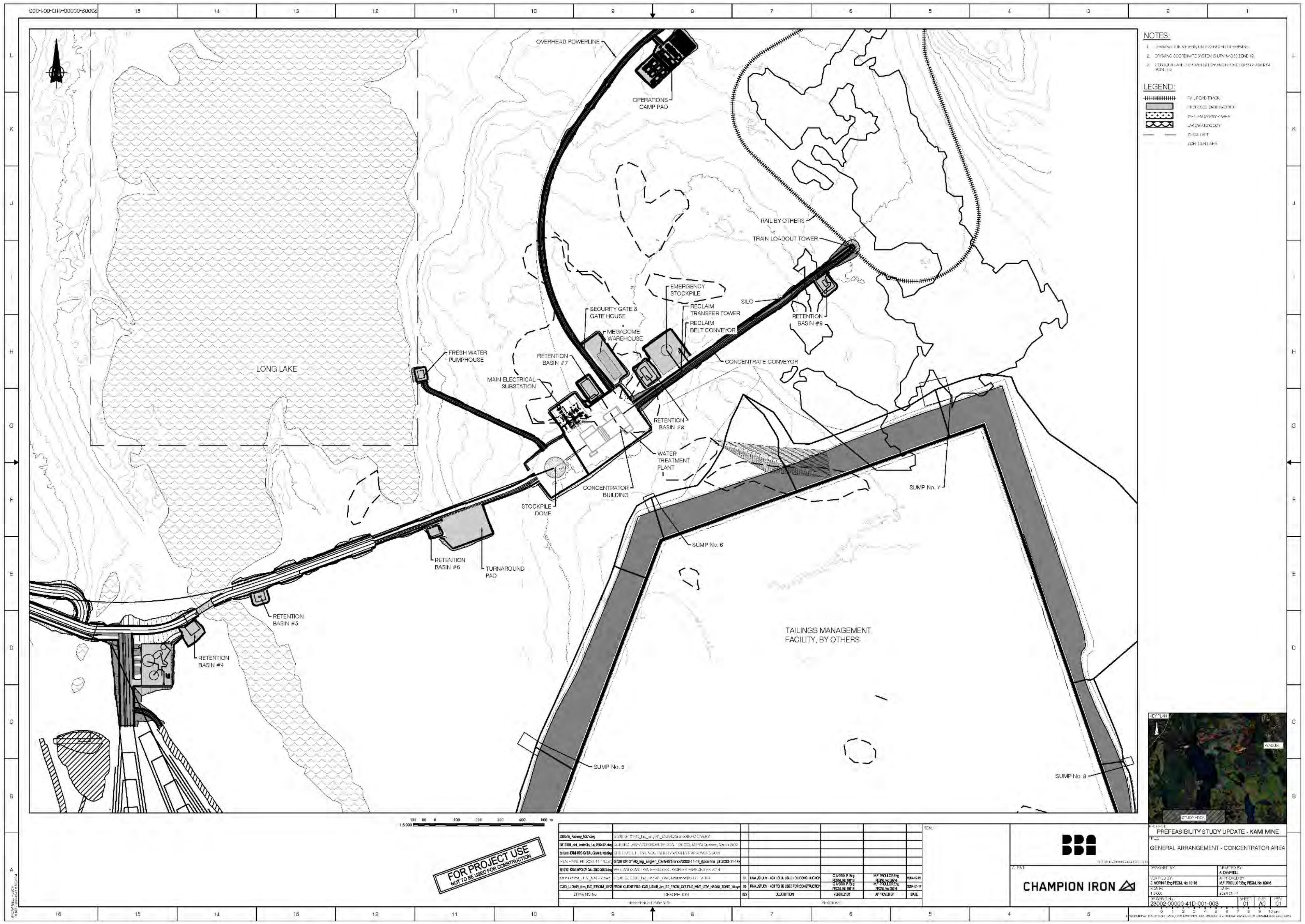


Figure 18-15: Site Plan Kami Iron Ore Project (Zoom on Kami Site Infrastructure - East)

18.4.4.2 Design Basis

The EDF selected for the water management infrastructure is the most critical of 30-days 100-year rainfall plus snowmelt event or 24-hours 100-year rainfall event.

18.4.4.3 Infrastructure Description

The water management infrastructure located east of Waldorf Crossing are described by area in the following paragraphs.

Figure 18-16 shows the water management schematic.

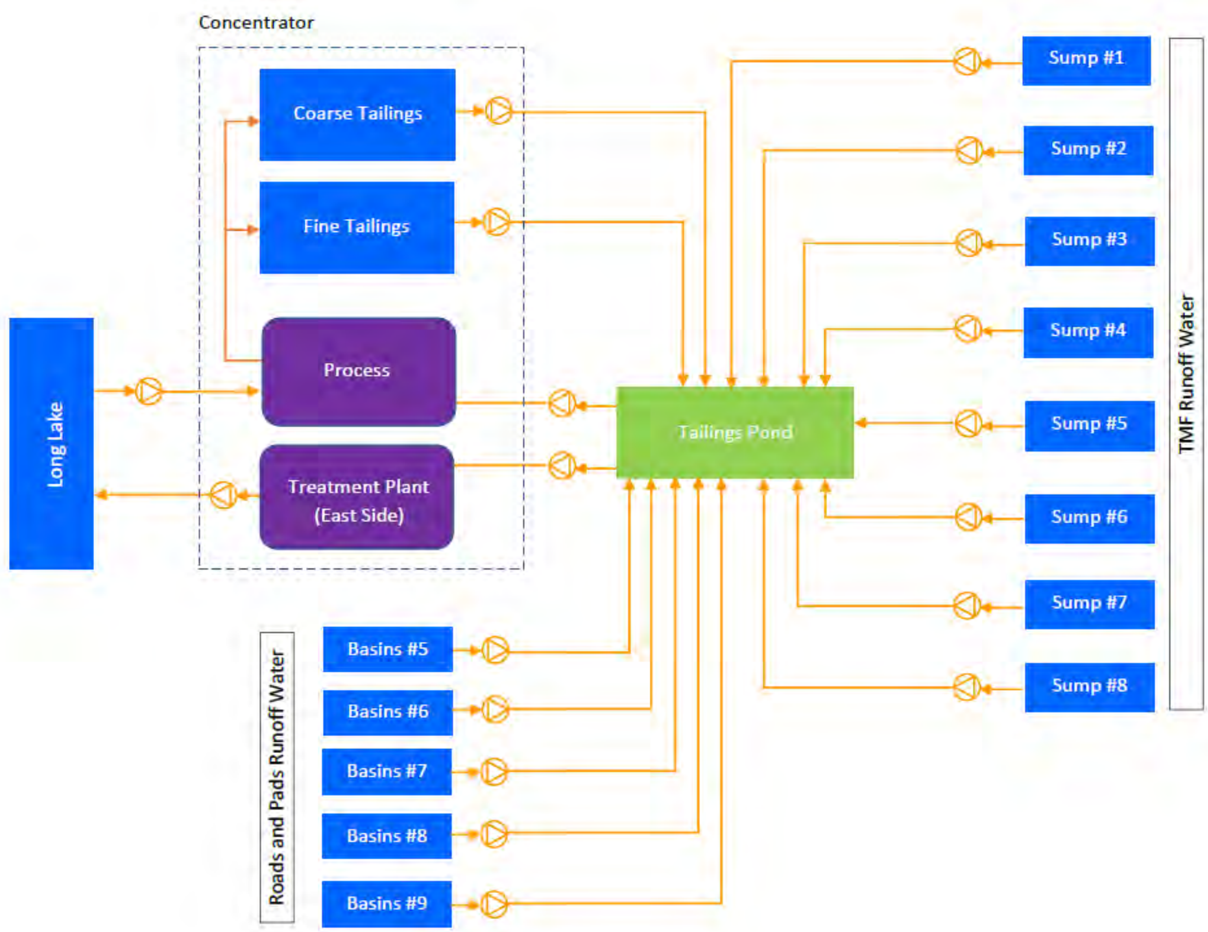


Figure 18-16: Water Management Schematic

Nine pumping systems with capacity ranging between 180 m^3/h and 1,583 m^3/h and one treatment plant with a 1,583 m^3/h capacity will be required for water management. A total length of 13.1 km of pipeline will be required, with diameters ranging between 200 and 500 mm. All pipelines will be HDPE pipe and installed above ground. Reclaim pipelines feeding both the process plant and EWTP will be isolated. The fresh water line from Long Lake to the process plant and the discharge line from the EWTP to Long Lake will both be isolated.

18.4.4.4 Fresh Water Pumping System

A pumping system with a nominal capacity of 318 m^3/h will be used to pump fresh water from Long Lake to the process plant. One HDPE above ground line of 200 mm DR17 insulated is planned.

18.4.4.5 Storm Water Management

Five pumping systems, one for each basin described in Section 18.4.2, will have a nominal flow from 180 m^3/h to 900 m^3/h to pump the contact water in the TMF. Each basin is planned to have its own HDPE, non-insulated, pipe.

18.4.4.6 Tailings Management Facilities

Eight pumping systems, one for each sump as described in Section 18.3, with a nominal capacity of 14 m^3/h to 1,800 m^3/h will be used to pump back the runoff water from the TMF. Each pumping system is planned to have its own HDPE, non-insulated, pipe.

18.4.4.7 Reclaim Water Systems

A pumping system installed on a barge with a nominal capacity of 1,463 m^3/h will be used to pump the reclaim water from the TMF to the process plant. One HDPE above ground insulated line of 450 mm DR17 is planned.

A second pumping system installed on a barge with a nominal capacity of 1,583 m^3/h will be used to pump the excess water from the TMF to the EWTP through. One HDPE above ground insulated line of 500 mm DR17 is planned.

18.4.4.8 East Water Treatment Plant (EWTP)

According to the TMF water balance, the EWTP should be operating at a treatment rate of 3,000 m^3/day from March 15th to April 31st, and from July 1st to October 31st. The operating rate during the freshet is expected to be 38,000 m^3/day (for May and June). Water from the TMF will be pumped in two successive agitated tanks, one for coagulant addition, one for pH treatment (actual order to be determined). The resulting suspended solution will flow into a clarifier designed to remove suspended solids. Sludge will be produced in the clarifier underflow and reintroduced in the flocculation tank. Sludge will have to be purged from the recirculation. The purged sludge will be pumped in a conditioning tank with floc addition to enhance liquid to solid separation for the centrifugation step. Dehydrated sludge will be stored in a container. Further evaluations are required to determine whether the sludge will be disposed in the tailings or with external environmental services. Additional units are considered to handle peak volumes during freshet compared to normal operation.

The treated water will be discharged into Long Lake with a HDPE above ground insulated line of 500 mm DR17.

The Block Flow Diagram summarizes the water treatment process considered (Figure 18-17).

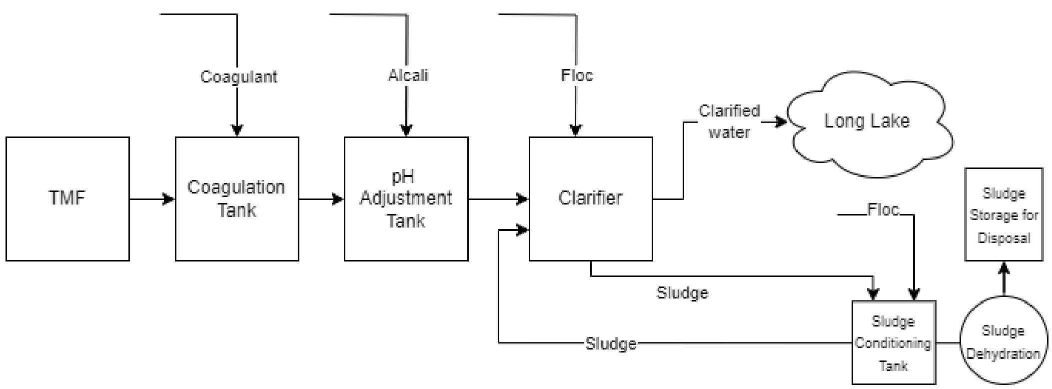


Figure 18-17: Block Flow Diagram for East Water Treatment Plant

18.5 Electricity – Local Site Distribution

The electrical power needs of the Kami site are estimated at 172 MW; this power is delivered at 315 kV through a transmission line taking its source at the planned Flora Lake substation, 18 km away. Champion will build this transmission line, while it is assumed that NL Hydro will build the Flora Lake substation as well as the HV transmission infrastructure between Churchill Falls and Flora Lake. A provision included within the expected rate to be charged to Champion will cover a pro-rated portion of the new infrastructure to be built by NL Hydro to power the Labrador West area.

At the Kami site, the incoming 315 kV is stepped down to 34.5 kV using three transformers of 72/96/120 MVA in a N-1 configuration, i.e., the total load is shared among the three transformers during normal operations, but two transformers can take the whole load while one transformer is out for maintenance or repair. The 34.5 kV is collected onto an outdoor bus within the substation and is delivered to the site using outdoor circuit breakers. The outdoor bus will also feed three 25 Mvar harmonic filter banks located within the substation to improve the power factor.

Power will be delivered from the main substation to the site through eight distinct feeders. Two will use buried cables to the Concentrator, while the other six will use 34.5 kV overhead lines ("OHL").

- The two cable feeders to the Concentrator will feed a 34.5 kV G.I.S. switchgear installed in the main electrical room of the Concentrator. From there, power will be distributed to:
  - Transformers stepping the voltage down to 4.16 kV and 600 V for feeding the majority of the loads;
  - The AG and Ball Mills variable frequency drive systems;
  - Two 24/32 MVA transformers generating 13.8 kV for use by the two boilers.
- Two OHL will power up the mine loads. The 34.5 kV will be stepped down to two 7.2 kV systems in a mining substation, from which two 7.2 V OHL will form a ring around the mine with the ability of one 7.2 kV feeder powering up both lines during an outage or maintenance work on one feeder.
- One OHL will feed the tailings sector and a portion of the waste stockpile sector.
- One OHL will feed a portion of the IPCS and the remaining of the waste stockpile sector.
- One OHL will feed the fresh water pumphouse, overland conveyor drive house, mine garage and the primary crusher area.
- One OHL will feed the workers' camp and the train loadout sector.

The vast majority of process and auxiliary loads use 4.16 kV and 600 V. The 4.16 kV is generally generated using outdoor 34.5/4.16 kV oil-type transformers of 21/28 MVA while the 600 V comes from indoor 4.16/0.6 kV dry-type transformers of 2/2.6/3.6 MVA.

Remote/pre-fabricated electrical rooms are located in the following areas:

- Primary crusher;
- Mine garage;
- Loadout emergency stockpile;
- Loadout silo;
- Train loadout.

Generator sets provide backup power to the plant for selected process loads and critical components requiring power in case of a power failure. Generator sets are provided in the following areas:

- Two 2,500 kW gensets for the concentrator;
- One 2,500 kW genset for the mine garage.

Table 18-6 lists the estimated connected load and power demand for each area.

Table 18-6: Kami Site Power Load Estimate

Area	Description	Connected Power (MW)	Power Demand (MW)
1670	Concentrator – Boilers	50.00	25.00
1670	Concentrator – AG Mill	17.00	15.63
1670	Concentrator – Ball Mill	17.00	15.63
1670	Concentrator – Other loads	64.50	37.78
1170	Mine – Mining equipment	22.20	22.20
1170	Mine – Pumping stations	13.30	13.30
1470	Primary Crusher – Overland Conveyor (1/3)	1.30	1.11
1470	Primary Crusher – Semi-mobile crusher & other loads	3.74	3.20
1121	Mine garage	5.47	4.50
1420	Overland conveyor (2/3)	2.66	2.27
1180	Waste stockpile – Waste equipment	21.50	21.50
1180	Waste stockpile – Waste pumping stations	2.30	2.30
1720	Tailings – Lifting stations	0.50	0.50
1060	Worker's camp	5.00	5.00
1050, 1126, 1662, 1664, 1665	Other site loads – Fresh water pumphouse, Gate house, Emergency stockpile, Silo, Train loadout	2.00	1.48
	Total Site Infrastructure	228.47	171.40

18.6 Automation and Telecommunication

This study for the Kami Project was performed by adapting and applying technologies and configuration recently implanted by Champion at its other iron ore plant in Fermont, Québec, the Bloom Lake Mine Facilities.

18.6.1 Telecommunication Infrastructure

Telecommunication services will be provided to the process plant with a 15-km fibre optic cable using the 34 kV construction and maintenance power transmission line. A Starlink service will be installed and available for telecommunication services during the construction period and afterward as a communication link backup.

The electrical overhead 34 kV network running across the site will be used to support the fibre optic cables used to link all the telecommunication panels, IT and networking equipment required to deploy the service to the different areas. There will be Wi-Fi access points available inside each building.

The information technology and operational technology ("IT & OT") networks will include storage, backup and archiving solutions in addition to virtualization servers, workstations, a complete VoIP telephony system, and all other required equipment. Two server rooms, complete with server cabinets, will provide a redundant setup for Infra, IT & OT.

Mobile communication for the mining activities will be based on a private LTE (Long Term Evolution) network. This LTE network could be expanded to the entire site in addition to public LTE coverage available in this area.

18.6.2 Control Infrastructure

The main control room will be in the administration building, in close proximity to the concentrator. The control system will be based on the Schneider M580 high-end platform with the AVEVA SCADA. Secondary smaller control rooms will be located in the crusher, loadout and in other buildings, but all systems will be monitored from the main control room. An electrical SCADA will be integrated to the control system.

18.7 Railway

18.7.1 Overview of Future Operations

At the Kami mine site, railcars will be loaded with iron ore concentrate, and then the loaded trains will travel on a newly constructed rail line to connect directly to the Quebec North Shore & Labrador railway ("QNS&L"). Loaded trains will then travel south on the railway to reach the Chemin de fer Arnaud (“CFA”) at the Arnaud Junction interchange near Sept-Îles, Québec, where the Société Ferroviaire et Portuaire de Pointe-Noire ("SFPPN") will take over the operation of transporting the loaded train to the port of Pointe-Noire and carry out the unloading process. Specifically, unloading will occur on a new loop track at the Pointe-Noire terminal. Once unloaded, the trains will return to the mine, traveling northbound on the CFA and QNS&L railways.

Train service for Champion will be made up of 240-car unit trains, which will continually cycle between the mine and the port. The 240-car train size is mandated by QNS&L for all new unit train operations on their railway. Train makeup will consist of open top gondola cars, similar to those already in use by the Company. Trains will be flood loaded in a loading tower at the Kami mine. At Pointe-Noire terminal, trains will be unloaded using rotary railcar dumpers.

The operations strategy being pursued for rail haulage includes a train service to be provided by QNS&L between the Arnaud Jct. interchange and the proposed Kami line in Wabush. From there, the empty train is handed to a third-party crew based in Wabush, who will run the train to the Kami mine site for loading.

The following rail infrastructure works are required for the Project:

- A new rail link to connect the Kami mine loading facility to QNS&L Railway, hereafter referred to as the Kami Railway Line.
- New track infrastructure will be added at the Arnaud Junction yard.
- New tracks and the relocation of some existing tracks at Pointe-Noire.

All three alignments are summarized in Table 18-7.

Table 18-7: Alignment Summary

Description	Kami Mine	Arnaud Junction	Pointe Noire
Length of Alignment	23.2 km	3 km	10.45 km
Minimum Curve radius proposed	200 m	300 m	190 m
Maximum Vertical Gradient used	1.15%	0.25%	0.88%
Earthwork Cut Volume	1.62 Mm^3	25,269 m^3	112,710 m^3
Earthwork Fill Volume	2.52 Mm^3	9,483 m^3	1.28 Mm^3

18.7.2 Design Criteria

This section presents the design criteria used for designing the horizontal and vertical geometry of the proposed track alignments. The design criteria used is based on AREMA guidelines and CN Engineering standards, Transport Canada; and is typical for ore rail transport.

To improve train handling and reduce coupler wear, the minimum distance between change of direction of the grade (uphill or downhill) must be long enough to contain a full train length. This ensures that trains are not dealing with more than one change in direction of the grade, which would place them simultaneously in compression and tension.

Maximum grade has a direct impact on the composition of trains operating over the line, with steeper grades requiring shorter trains or additional locomotives for more power. Experience has shown that optimal maximum mainline grades for heavy haul operations are 0.5% for a loaded train and 1.5% for an unloaded train. Since loaded ore trains will always be travelling in one direction, and empty ones returning, grades can be steeper in the return direction. Maximum grades in sidings, stations, yards, and loading/unloading facilities are significantly lower.

In certain circumstances, short sections of exceptional grade are permitted if they provide a significant construction benefit. However, their placement requires careful evaluation of the operational impacts. The design of proposed alignments under this study is based on the criteria provided in Table 18-8 and Table 18-9.

Table 18-8: Proposed Alignment Design – Horizontal Geometry

Criteria	Design Value	Reference
Speed limit	40 km/h (25 mph, for lead tracks) 16 km/h (10 mph, for yard tracks)	CN Engineering Standards for Industrial Tracks
Minimum curve radius	190 m	
Minimum length of straight track between inverted curves	30 m	AREMA, Chapter 5
Minimum spiral length	No spirals have been added at the current stage	
Maximum cant deficiency	51 mm (2 in)	Transports Canada
Turnouts	No. 15 and No. 10	AREMA

Table 18-9: Proposed Alignment Design – Vertical Geometry

Criteria	Design Value	Reference
Maximum uphill grade (loaded)	0.50% (compensated)	
Maximum uphill slope (empty)	1.50% (compensated)	
Minimum distance between vertical curves	Largest value between 30 m and the length of the largest rail vehicle	CN Engineering Standards for Industrial Tracks
Slope compensation	0.04% per degree of curvature	AREMA (Ch. 5, Part 3, section 3.7)

18.7.3 Kami Site

The Kami Railway line, Figure 18-18, is developed to connect the mine south of Wabush to the QNS&L Railway line North of Wabush-Labrador airport. The route of the alignment (Option C1) is illustrated in the figure below. The alignment is of single track and includes the main line connecting QNS&L line and the mine, the loading loop at the mine site along with additional tracks for defective car set-out. The alignment chosen is designed considering factors like topography of the area, environmental impacts, access required for maintenance, visual impact, and construction cost of the Project.

The loading loop is designed to accommodate the operation of 240-car trains efficiently. The alignment was devised to avoid, whenever possible the swamp areas near the mine site and to reduce the length of the conveyor facility required for loading.

Figure 18-18: Kami Loop

The possible locations where the alignment crosses existing ways are expected to provide access to rail vehicles for inspections and maintenance. For the last 10.6 km of alignment towards the loading loop where no easy access is possible, a continuous access road is proposed along the alignment.

The retained alignment requires one bridge where it crosses the lake (single-span through truss type railway bridge with clear span of 85.0 m and with concrete ballasted deck), 10 level crossings and 14 culverts for cross drainage. The total track length is 23.2 km which includes 5.9 km of loop track.

The alignment is designed to provide optimum earthworks solution while complying with the required rail design standards. This proposed alignment will generate around 1.62 Mm^3 of earthworks cut and 2.52 Mm^3 of earthwork fill.

18.7.4 Arnaud Junction

A new track adjacent to the existing tracks is proposed at the Arnaud (CFA) Junction. This is to facilitate additional train operations between Sept-Îles Junction and Pointe Noire terminal (Figure 18-19).

The length of the new track at Arnaud Junction will be approximately 3 km. It will be at the same level as the adjacent existing track and will require the extension of three existing culverts and the relocation of some small parallel culverts. The additional track will generate around 25,269 m^3 of earthworks cut and 9,483 m^3 of earthwork fill.

Figure 18-19: Arnaud Junction

18.7.5 Pointe Noire

At Pointe-Noire, a new siding and an unloading loop is needed to accommodate the increased capacity in trains operations. This design requires existing track line to be realigned around the proposed unloading loop.

18.7.5.1 New Siding

A new 3 km-long siding will be constructed near the entrance of the SFPPN terminal to allow further operational flexibility. The siding will allow the operator to store an incoming loaded train in the event that unloading tracks are already occupied. The siding will be located parallel to the existing CFA track, just north of the level crossing near the entrance of the terminal. This will prevent the level crossing to be blocked by train stopped at the siding (Figure 18-20).

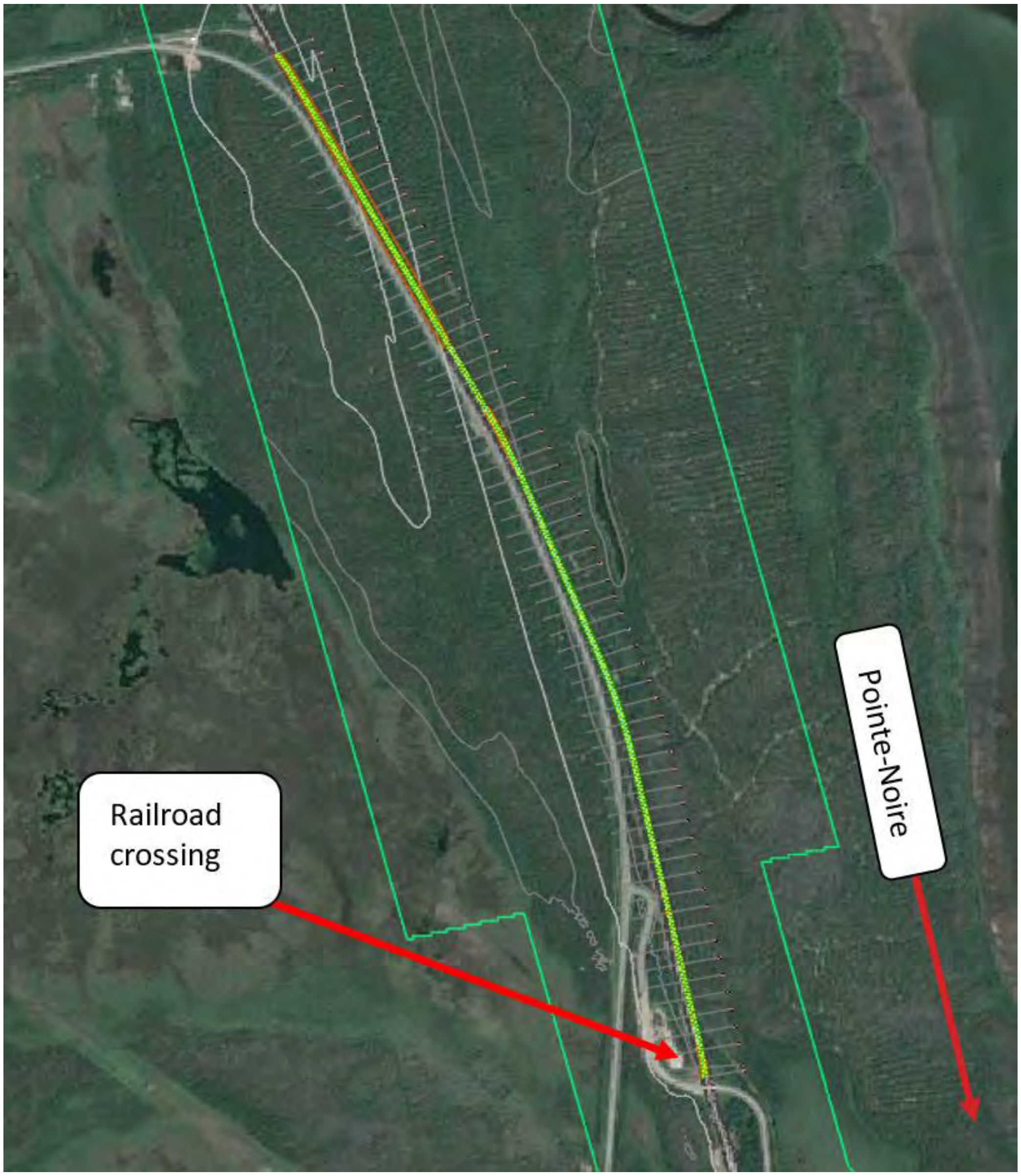


Figure 18-20: New Siding Near the Entrance of the SFPPN Terminal

18.7.5.2 New Unloading Loop

The new loop for unloading at the terminal site will emanate from existing siding ends (Figure 18-21). The dual tracks run at the same levels as the existing tracks before creating the unloading loop. The minimum radius of the loop centerline is 190 m. The existing lane track needs to be removed and realigned to the north.

The total length of the track at the unloading loop is 10.45 km including the additional siding and the realigned existing lane track. There will be two culverts needed for the drainage towards the port.

Figure 18-21: Proposed Loop Location at Pointe-Noire terminal

Since the existing ground at the proposed loop location is low, the loop requires significant fill. The realigned existing line is designed along the north of the loop track and is sufficiently away from the harbor with optimum earthworks requirements. The total earthworks cutting required for the proposed new siding and unloading loop (including the existing track realignment) will be approximately 112,710 m^3 in cutting and 1.28 Mm^3 in filling.

18.7.5.3 Rolling Stock – New Fleet

In order to size the future fleet of railcars, the requirements for both the summer and the winter months were calculated. To transport 25 Mt/y (Kami + Bloom trains combined), as a joint operation, historical operating data were compiled and led to the following conclusions.

Based on the current total cycle time, it was found that, at full production rate, another five train sets would be required in addition to the current fleet of five train sets (Bloom).

While gathering inputs for the simulation with all stakeholders (current operators on Bloom Lake Railway (“BLR”)) and at the port terminal), a consensus emerged that the current cycle time could be easily improved at no cost notably by reducing the waiting times at Arnaud Junction and Bolger. Therefore, at this stage and for the initial phase of the Project (ramp-up), it was decided to retain a new fleet of four train sets. Further analysis will be required to confirm this fleet optimization.

Hence, considering a 5% of spare wagons, the new fleet for Kami would amount to 1,008 cars (4 x 240 + 5%).

18.7.5.4 Rolling Stock – Maintenance Facilities

SYSTRA Canada’s maintenance facilities specialists visited the SFPPN depot and workshops to acquire a good understanding of the existing facilities and equipment, and how they are used. This was also an opportunity to discuss with the SFPPN team the shop modernization and capacity improvement plan already undertaken to increase the shop's capacity for the maintenance of SFPPN's current fleet of railcars and locomotives.

The first part of the plan, which is currently being implemented and close to completion, consisted of the expansion of the wheel shop, with the modernization of the railcar wheelset drop table and the addition of a high-capacity wheel lathe and interior wheelset processing and storage area.

The second phase of the Project, which is still in the planning stage would consist of the following actions to increase the capacity of the actual workshop by making available more spots for railcars maintenance. Some of the opportunities that could lead to a workshop capacity improvement are:

- Rearrangement of track 3 to be dedicated to the maintenance of SFPPN three-pack railcars. This would free space on track 2 for the maintenance of locomotives.
- Relocation of the Welders shop (Shop 5) to a separate existing building, located at the east end of the workshop, and which is currently under-utilized.
- Rearrangement of track 4 and installation of inspection pits.
- Connection of tracks 4 and 5 to yard tracks at the east end of the workshop to improve shop accessibility.

Figure 18-22 shows a proposal for the expansion scenario using a general view of the SFPPN maintenance shop. The new expansion is presented in red with two new tracks and four turnouts in yellow.

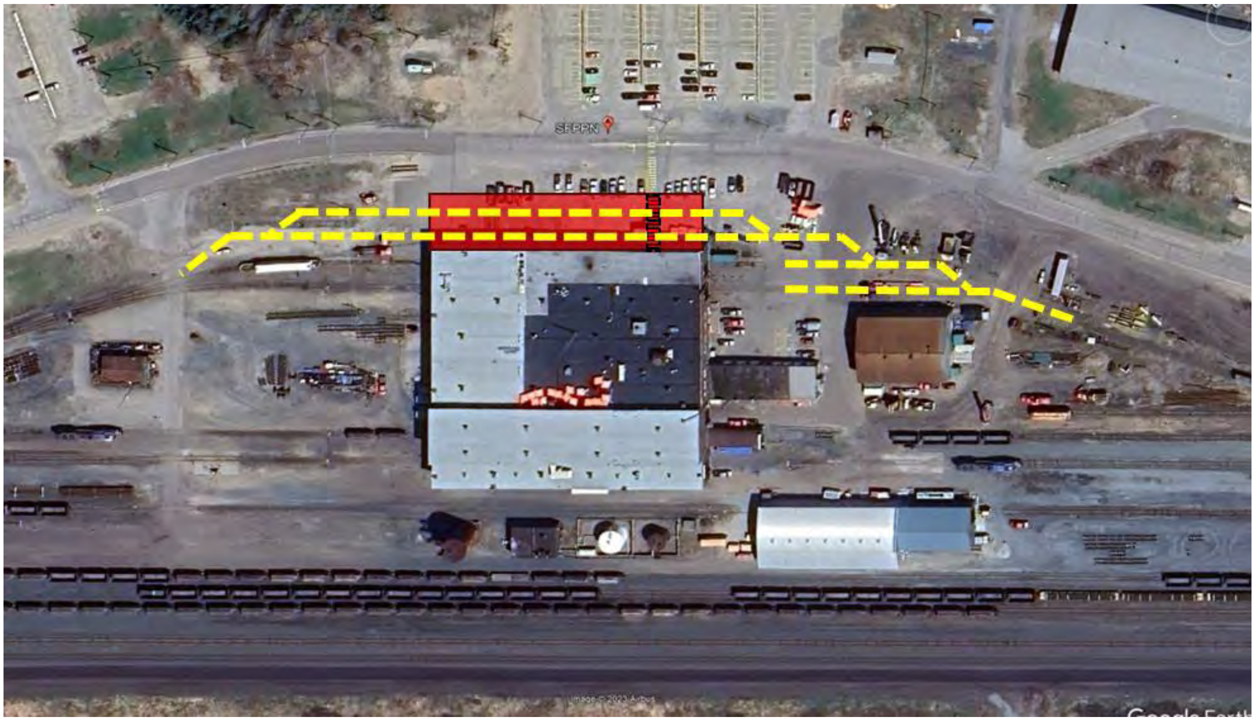


Figure 18-22: Workshop Expansion

18.7.5.5 Kami Site

According to the current operator of the BLR, the following buildings and facilities will be required at the mine site:

- A garage or Dome of 50 m² to store equipment;
- A prefab building of 75 m² for train operations and crew management;
- Electrical power generator and telecommunication systems.

18.8 Port Infrastructure

18.8.1 Overview of Future Operations

CIMA+ was retained to perform a Pre-feasibility Study for the modification and development of the Pointe Noire Terminal Project. The study was done in collaboration with SFPPN and Port of Sept-Îles. CIMA+ has assessed the capacity of each equipment for transshipping iron ore. This involved several steps, such as a concept study for double-car dumper feeding in the Old Wabush yard, assessing the capacity of existing and planned equipment for conveyors and transfer towers on the Pointe-Noire site, and examining options for ship loading requirements.

A global study of the facilities was also carried out, following good structural engineering practice. Drawings of existing structures were examined, along with preliminary loads provided by mechanical engineers.

In the electrical and automation sector, an analysis was carried out of the equipment to be added or upgraded. CIMA+ has carried out several refurbishments and improvements to the port site in recent years, ensuring that the proposed solutions meet SFPPN standards.

Finally, cost tables were prepared to estimate the costs of each option, grouping together all applicable disciplines and contingencies.

The Pre-feasibility Study therefore benefits from a clear and detailed presentation of all the information needed to assess the various options available for the Project.

The 9 Mt/y increase in concentrate from the Kami mine will increase the total annual tonnage transiting trough Pointe Noire terminal to 31 Mt/y, requiring the installation of additional infrastructure.

The actual multiuser port terminal, which is own by SFPPN, will be used to handle Kami's Iron ore. Kami ore concentrate trains will be unloaded through a new rotary dumper and stacked at the Wabush Yard. The car dumper planned for the new requirement capacity will be a double car rotary type dumper capable to achieve a maximum dumping cycle rate of 80 cars per hour. (Figure 18-23)

The iron ore concentrate is discharged into a receiving hopper and transfers onto a series of conveyors and conveyor transfer towers and then onto a stacker/reclaimer. The stacker/reclaimer can either stack out the iron ore concentrate in the storage yard or reclaim it and load it onto a discharge conveyor to be conveyed to the Port of Sept-Îles ship loading system.

A second bucket-wheel stacker/reclaimer will be required in the Wabush yard to avoid stopping vessel loading when train dumping is necessary. This stacker/reclaimer will be of similar capacity than the one recently installed in Wabush yard. The reason for this is to be able to match the design ship loader and car dumper rates of 8,000 t/h.

A second belt conveyor and a moving belt tripper connected to both stacker/reclaimers will allow the two belts to feed material to stacker/reclaimer along the full length of the storage yard.

An additional ore storage pad of approximately 30,000 m² is proposed on the west side of the Wabush yard. The storage pad will be designed to capture all storm water that lands on it. A drainage collection system will be constructed into the base of the ore storage pad.

In terms of berth capacity, the Company is discussing the condition for additional berth capacity with Port of Sept-Îles and have assumed, for the purpose of this study, conditions similar to its last agreement with the port adjusted for inflation.

The proposed terminal infrastructure will not require new electrical power distribution systems. Furthermore, SFPPN already has enough power allocation from Hydro-Québec to meet new demand.

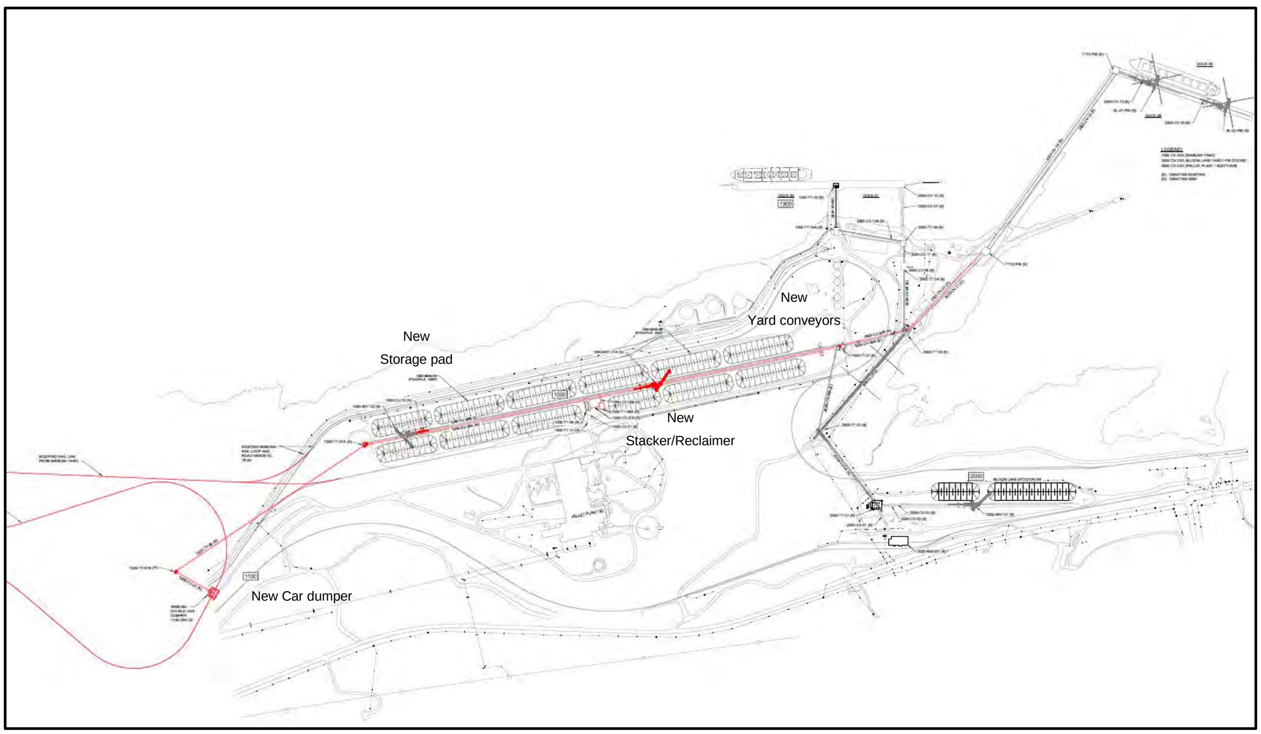


Figure 18-23: Overview of Future Operations (new equipment in red)

18.8.2 Design Criteria

18.8.2.1 General Design Criteria

- The current operation of the Wabush car dumper and rail loop will remain unchanged.
- Rail shipments to Pointe-Noire will occur on a regular basis.
- The Pointe-Noire terminal operates 365 days a year, 24 hours a day.

18.8.2.2 Design Criteria for the New Car Dumper

- Twin cell car dumper capable of unloading all wagons in fully automatic mode.
- Nominal unloading rate: 8,000 t/h
- The loaded and empty wagons in the train must remain coupled throughout the unloading operation.
- Cars shall be indexed into the rotary dumper by a single positioner located at the entrance of the dumper.
- The receiving hoppers will be supplied with grizzly and lump breakers.

18.8.2.3 Design Criteria for the New Stacker Reclaimer and Conveyors

- Cantilever bucket-wheel stacker reclaimer (similar to the one already installed);
- Nominal stacking rate: 8,000 t/h;
- Nominal reclaiming rate: 8,000 t/h;
- Belt width: 72" (1,829 mm);
- Belt tensioner: Gravity type;
- The Stacker/Reclaimer will be a travelling rail-mounted type and be capable of stacking/reclaiming piles while traveling in either direction.

All operations and functions protected by an anti-collision and rail obstruction system.

19. Market Studies and Contracts

Champion Iron Limited ("Champion") has engaged with various, well-recognized, commodity market research and consultancy firms to provide an iron ore market study for use in this Pre-feasibility Study ("PFS").

This section is based on iron ore and steel industry knowledge, experience and analysis, and was conducted on the basis of the available information at the time of the report; however, it contains assumptions, forecasts and forward-looking statements. All research firms quoted in this section make no warranty of any kind regarding its contents and shall not be liable in respect to any matter arising from its use without limitation.

19.1 Market Overview, Supply and Demand

Steel is the backbone of society, yet the steel industry is one of the largest industrial sources of carbon emissions, representing about 8% of global emissions according to the World Steel Association, putting it high on the agenda when it comes to global decarbonization. Moreover, if unaddressed, the steelmaking industry is on a path to grow its share of total global CO_2 emissions to 12% by 2035 as per MineSpans data. To transition towards greener steelmaking, steps to reduce the coal burden in the steelmaking processes will become evident. One proven way to reduce the use of coal and its environmental impact involves a shift away from the Blast Furnace and Basic Oxygen Furnace ("BF/BOF") steelmaking processes, opting instead for the Direct Reduced Iron and Electric Arc Furnace ("DRI/EAF") route, see Figure 19-1. The carbon intensity of the BF/BOF route is approximately 2.2 t/CO_2 per tonne of steel, while the DRI/EAF route goes as low as 0.3-1 t/CO_2 per tonne of steel when using hydrogen, representing a reduction of 2-7x in the carbon intensity of the steelmaking process (MineSpans and Wood Mackenzie data). Wood Mackenzie also estimates the share of EAF steelmaking will increase from 28% today to 38% by 2033. This transition to DRI/EAF steelmaking includes significant recent government financial support from several countries including Canada, USA, France, Netherlands, Japan and Germany. Such financial support, aimed at reducing domestic emissions, is anchoring the visibility of additional DRI/EAF steelmaking capacity in the coming years.

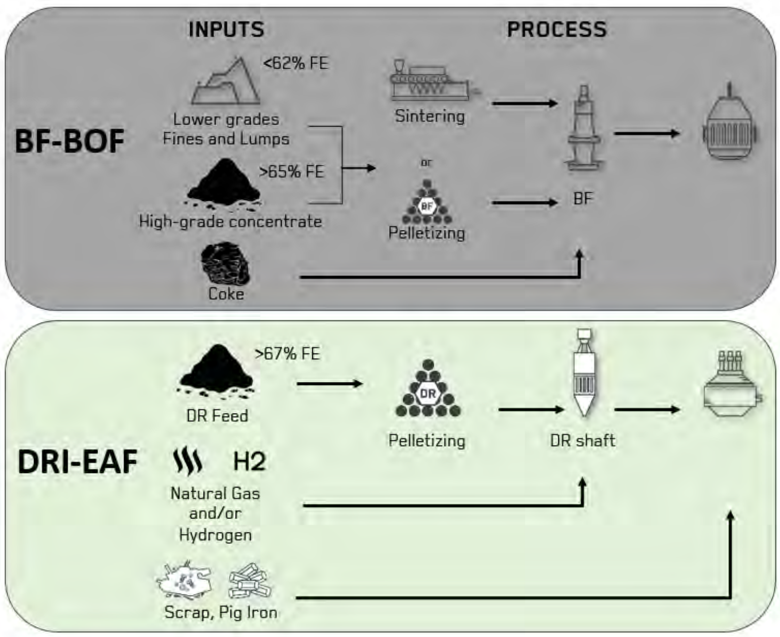


Figure 19-1: Major Steelmaking Process Routes

The BF/BOF process route demonstrates significant efficiency in reducing a broad range of iron ore grades, from low to high, due to its effective slag rejection capabilities. Conversely, the electric arc furnace shows greater sensitivity to impurities. Low-grade iron ore with elevated impurity levels therefore poses a risk to production yield in the EAF and contributes to increased electricity consumption and slag volume. Consequently, the EAF combined with a DRI shaft adheres to specific chemical quality limits for iron ore input. Ideally, the iron ore should exceed 67%, while ensuring gangue elements such as SiO_2 and Al_2O_3 remain below 2.5%, as shown in Figure 19-2.

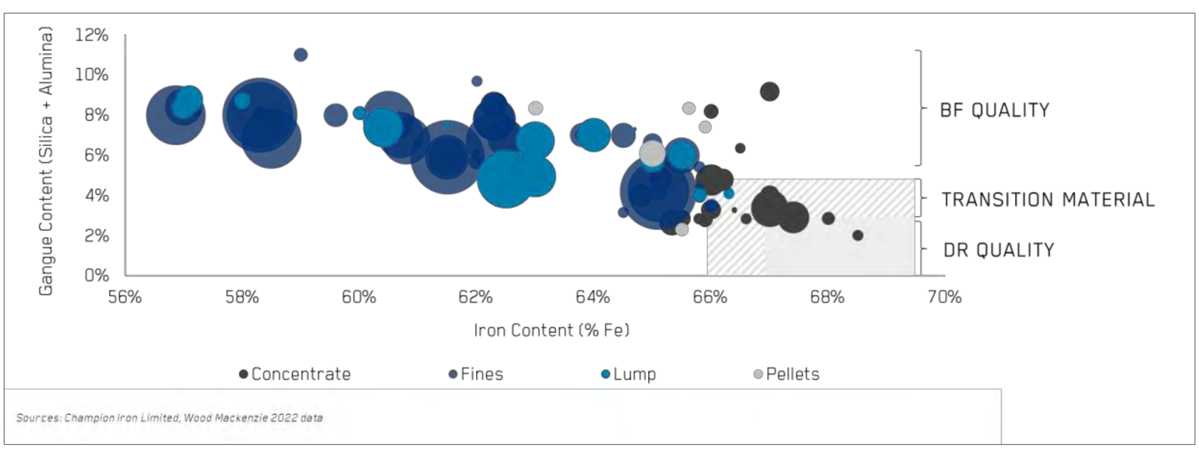


Figure 19-2: Summary of Iron Ore Content and Gangue

The dynamic to decarbonize the industry, in combination with a notable increase in DRI/EAF steel production, is fueling demand for DR-grade pellet feed material similar to the Kami Direct Reduction grade Pellet Feed ("DRPF"). CRU, a globally recognized consulting firm, estimates the demand for DR pellet feed will reach 310 million tonnes ("Mt") by 2050, see Figure 19-3. The Middle East is poised to become a substantial market for pellet feed due to a government desire to expand steel production, while competitively priced and readily available natural gas incentivizes DRI production. Europe is also expected to see significant growth in DR-grade pellets and pellet feed purchases as government pressure to reduce emissions is fueling growth in DRI/EAF-based steelmaking.

Meanwhile, based on currently committed projects, there is expected to be a shortfall in supply of DR quality pellet feed, expected to reach approximatively 100 Mt by 2050, see Figure 19-3. As a result, several new DR-grade iron ore projects will need to come online to fill this gap. Although Australia is the largest producer of iron ore, much of the Australian iron ore is of low quality that cannot be economically upgraded for use in the DRI/EAF steelmaking route. Canada, Brazil, Russia, Ukraine and certain Scandinavian countries are amongst the few countries with deposits allowing the production of high-grade iron ore at scale. It is essential for these deposits to be economically viable for production in order to meet the increasing demand. In tandem with the expected DR quality pellet feed supply shortfall, a more-robust pellet feed market will emerge from countries with ore that can be economically upgraded to such quality, whom are, expecting to benefit from a growing premium for DR pellet feed quality iron ore.

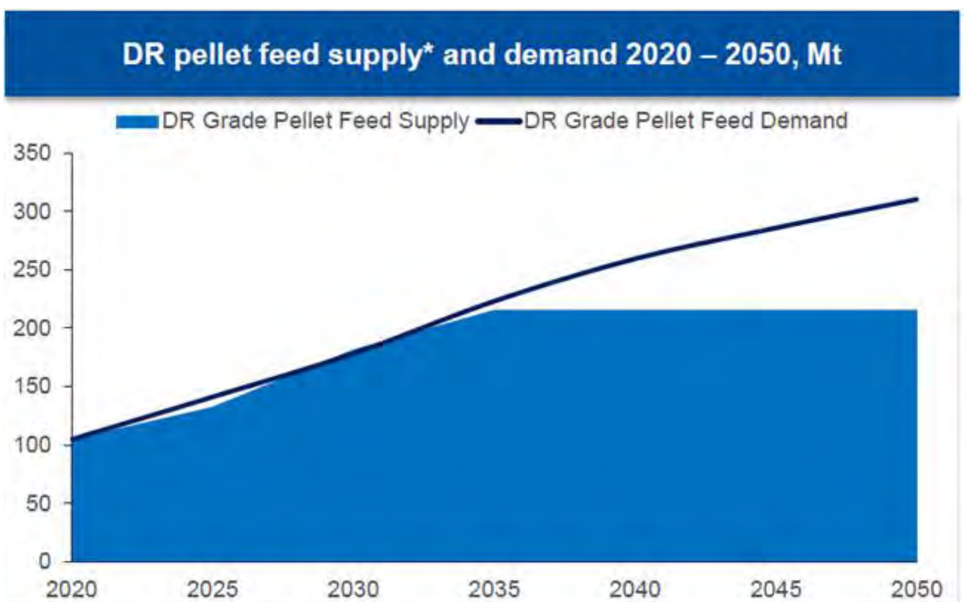


Figure 19-3: Market Supply and Demand of DR Pellet Feed, CRU data

19.2 Marketing Strategy and Pricing

Iron ore is commonly sold on a cost and freight ("CFR") or freight on board ("FOB") basis. Under a CFR sale, the product changes hands as it is unloaded at the arrival port and the pricing includes shipping costs. In recent years, there has been a strong trend to CFR sales, as this gives sellers control over shipping and scheduling. An FOB sale is for iron ore delivered on board a vessel at the loading port, and the price is usually determined by netting back the cost of ocean freight from the CFR price.

Based on the Canadian Institute of Mining, Metallurgy and Petroleum ("CIM") guidance on commodity pricing adopted on November 28, 2015, various methods of estimating prices are accepted as industry standards, therefore a blend of these methods have been used to determine the long-term price for Kami direct reduction product.

Considering there are currently no liquid and readily available transparent indices to accurately assess the value of DR pellet feed products similar to the Kami material, industry practice dictates utilizing an index with comparable product specifications and adjusting for any disparities. In this context, the closest public benchmark is the Platts TSI IODEX 65% Fe CFR China ("65% Fe Index" or "P65 Index") that could serve as a benchmark for evaluating the Kami DRPF. Additionally, a premium is typically applied to the base index for the advantageous properties of DR grade material. Finally, a freight adjustment must be incorporated, considering the base 65% Fe index is currently based on a sale of iron ore being delivered to Qingdao on a CFR basis.

19.2.1 65% Fe Base Index

Various methods were used to assess the 65% Fe Index to be used for this PFS, as outlined in Table 19-1. The long-term forecast prices were obtained from Wood Mackenzie, CRU, and Fastmarkets who have historically taken a conservative stance in their projections. Wood Mackenzie forecasts a long-term outlook of US$92.50 per dry metric tonne ("dmt"), CRU anticipates US$96.00/dmt, and Fastmarkets anticipates a US$120.00/dmt. On a historical basis of the same 65% Fe index, the 3-year trailing price, as of December 31, 2023, averages US$152.20/dmt, while the 5-year trailing price averages US$135.70/dmt.

Table 19-1: Iron Ore Prices: Analyst and Trailing Averages

Description	65% Fe Index CFR China (US$/dmt)
Wood Mackenzie Long-Term Forecast	92.50
CRU Long-Term Forecast	96.00
Fastmarkets Long-Term Forecast	120.00
3-Year Trailing Average*	152.20
5-Year Trailing Average*	135.70
*Trailing averages based on an end date of December 31, 2023.	

After reviewing the methods and the global iron ore market context, Champion has determined a base scenario deemed representative of the global future market dynamics using US$120.00/dmt, aligned with the values presented in Table 19-1.

19.2.2 Premium for Kami Direct Reduction Pellet Feed

Due to the scarcity of iron ore pellet feeds, coupled with advantageous chemical properties for the steelmakers, it is commonly agreed by market participants that DR grade iron ores deserve an additional premium to the 65% Fe Index. It is widely anticipated that the Kami DRPF, given its beneficial properties, will qualify for, and command, this premium.

One widely-recognized technique within the industry for assessing product premiums involves the utilization of a Value in Use ("VIU") methodology. This approach entails determining a premium or discount by taking into account variations in Fe, SiO_2, and Al_2O_3 in comparison to the 65% Fe index. Fastmarkets, a prominent industry consultancy and index provider, releases these VIU-indices, which gauge the price impact of chemical differences between a product and the base index. According to the long-term analysis, a premium of US$27.60/dmt is estimated, see Figure 19-4. It is essential to acknowledge that this approach is not specifically tailored to the Kami product; rather, it is purely theoretical and chemistry-based. Consequently, it may overlook factors such as a green premium, benefits derived from the DR pellet premium, product scarcity, and anticipated carbon cost savings in the steelmaking process.

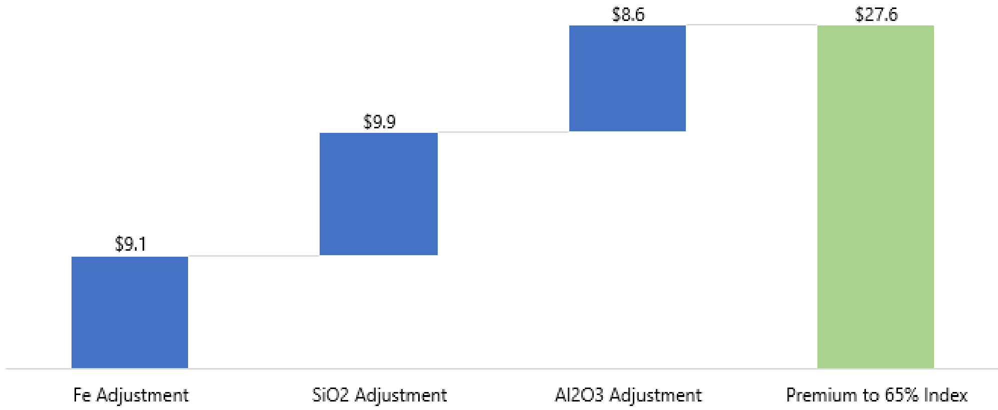


Figure 19-4: VIU premium to P65 Index estimate for chemical characteristics of the Kami Product

Furthermore, CRU was tasked with conducting a customized analysis of the Kami material, in which they use an EAF VIU approach based on a pellet premium, iron content adjustment and a green premium. The long-term premium analysis results in US$40.40/dmt. This analysis excludes the expected scarcity aspect of DR-quality iron ore and the expected carbon cost savings in steelmaking.

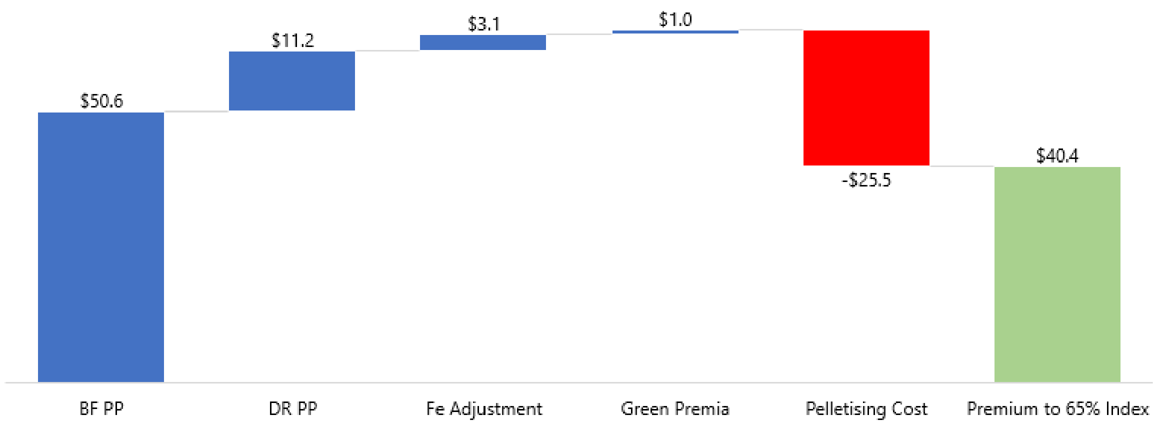


Figure 19-5: Kami Product Premium – CRU Approach

Taking into consideration both the VIU approach and the CRU premium assessment, Champion estimates the average of these assessments as the basis of the future expected premium used in the study of US$34.00/dmt over the 65% Fe Index. This estimate does not consider future cost inflation, future market dynamics, incentive price required to increase supply of DR quality iron ore, DR quality iron ore scarcity and expected carbon cost savings in steelmaking.

19.2.3 Kami Base Case Price Estimate – FOB Sept-Îles Basis

As the majority of iron ore customers are in Asia, the basis for the calculation of freight costs is the C3 Capesize Freight Index, as published daily by the Baltic Exchange. This route represents the spot rate for one trip of a Capesize vessel going to Qingdao, China from Tubarao, Brazil. The long-term outlook of the C3 Index was evaluated according to an arithmetic average of three different methodologies. The first is using Wood Mackenzie's long-term forecasted value of the C3. The second is the 3-year trailing average of the index's daily value, and the third is the 5-year trailing average of the index's value. As shown in Table 19-2, Wood Mackenzie forecasts the expected long-term value of the C3 Index at US$21.30/wmt. Furthermore, the trailing averages for the C3 Index over a 3-year trailing period averages US$23.80/wmt and US$21.00/wmt for the 5-year trailing average. The base case value of the C3 index for the purpose of this study is expected to be at an average value of US$22.00/wmt.

Table 19-2: Iron Ore Prices - Analyst and Trailing Averages

Description	Baltic C3 (US$/wmt)
Wood Mackenzie Long-Term Forecast	21.30
3-year trailing average*	23.80
5-year trailing average*	21.00
*Moving averages based on an end date of December 31, 2023.	

Due to the anticipated growth in DRI/EAF steelmaking, the Kami DRPF is poised to predominantly cater to the MENA and Europe regions, while also being a preferred product in the Asian market. Based on an expected customer base, freight costs are projected to align with the C3 Index value. Calculations factored in the distance differ between the existing C3 route and the prospective customer destinations from Sept-Îles. Also considered were direct costs such as time charter rates of ships in the Atlantic basin, bunker costs, canals, insurance, etc. Finally, passing a portion of freight savings to customers was also considered as this is a current market practice.

As C3 is projected to be US$22.00/wmt, we anticipate the freight of Kami's material to be the same amount.

19.3 Contracts

A number of key contracts and agreements necessary for the development and operation of the Kami mine will need to be put in place. Given the proximity of the Kami project to the Bloom Lake mine, situated a few kilometres southeast, existing contracts offer potential economies of scale. The following items can be considered material to the mine development:

- Marketing agreements with trading companies to support its iron ore sales globally, on a long-term basis;
- Rail contract from the Kami site to the Quebec North Shore and Labrador Railway ("QNS&L") in Wabush;
- Rail transportation from Wabush to Arnaud Junction contract with QNS&L;
- Rail transportation from Arnaud Junction to Pointe-Noire, as well as port handling and loading services with the Société Ferroviaire et Portuaire de Pointe-Noire ("SFPPN") and the Port of Sept-Îles ("PSI") authority.

In addition, the Kami Project would be expected to have many contracts for usual mining supplies aligned with industry rates including, but not limited to: supply of explosives, supply of parts, aggregate crushing, air transport of employees, topography drilling, overburden removal, shutdown maintenance, tailings designs and construction, camp services, fuel delivery, etc. However, these contracts are not considered materially significant to the business.

All contracts are under terms and rates that are within the industry norms.

20. Environmental Studies, Permitting, and Social or Community Impact

The following chapter describes the environmental setting in which the Project is situated, and details the applicable laws, regulations, environmental assessment jurisdiction and potential permits that will be required to complete the Project. The Project had previously completed a provincial and federal environmental impact assessment process, and was released from the EA process. Given the time that has lapsed since being previously released, the Project must re-enter the provincial environmental assessment process.

This chapter also summarizes the environmental studies completed and proposed for the Project, environmental considerations related to critical Project infrastructure, and describes the proposed rehabilitation and closure planning. To conclude the chapter, a summary of Champion Iron Limited ("Champion") approach to Indigenous and Community Relations, including a summary of existing and proposed consultation activities is provided. This chapter also includes a summary of the site’s geotechnical and hydrogeological investigations, geochemical characterization, site water management and environmental considerations relating to the tailings, overburden and waste rock storage facilities. The section concludes with an overview of Champion’s approach to site rehabilitation and closure planning.

The information presented in this chapter is primarily based on activities completed by the previous proponent and Champion’s activities to date related to the Kami Project. Environmental aspects may require further review and assessment by Champion as the Project proceeds through the remaining planning and engineering stages.

20.1 Environmental Setting

The proposed Project is located in Western Labrador, within the Labrador City and Wabush municipal planning areas. Mineral exploration, mining and associated industrial activities have been ongoing in the region since the late 1950s and have become the backbone of its economic sustainability. The Kami Project is situated amongst several other iron ore mines (Iron Ore Company of Canada’s Carol Lake Project, ArcelorMittal’s Mont Wright Mine, Québec Iron Ore’s Bloom Lake Mine and Tacora Resources’ Scully Mine).

The Kami Project is located entirely in Labrador, approximately 7 km and 10 km to the immediate southwest of the Towns of Wabush and Labrador City respectively, and 5 km to the northeast of the Town of Fermont, Québec. These are modern communities that provide a wide range of services and infrastructure. The relatively high standard of living in this region has resulted from the mining developments and associated activities that have characterized the economies of the area over the past several decades. The downturn in the iron ore markets that started in 2013 resulted in layoffs and mine closures, as well as the postponement of several expansion projects, which had a substantial negative impact on the socio-economic conditions for the communities in the region. Since 2016, the unemployment rate within these communities has decreased drastically. The decrease in the unemployment rate has primarily been driven by the commissioning of mining operations in the region, such as Québec Iron Ore's Bloom Lake in 2018 and Tacora's Scully Mine in 2019 (WSP, 2024a).

The existing or baseline conditions of the environment, within and near the Kami Project, reflect the effects of past and ongoing human activities in the region. A range of biophysical surveys (e.g., wildlife, vegetation, freshwater, etc.) have been carried out in the Project footprint and larger region to characterize the existing environmental conditions. The following provides an overview of the biophysical conditions at the Project site based on the studies to date. Additional information about the completed environmental studies is presented in Section 20.3.

Regional ambient air quality monitoring indicates that the average air quality in the region is good overall, with SO_2 and NO_2 ambient concentrations being below applicable standards, though total particulate levels occasionally exceed regulatory guidelines, which is primarily driven by the industrial mining activity in the region (Government of Newfoundland and Labrador, 2022). Prevailing winds are from the west and south.

Several navigable waterbodies are located within or adjacent to the Kami Project area, including Pike Lake south, Mills Lake and Long Lake. Baseline water quality monitoring data show that existing surface water quality is good, though several parameters slightly exceed ecological water quality guidelines on occasion (ECCC, 2023).

The biophysical environment in which the Kami Project lies is within the Mid Subarctic Forest (Michikamau) Ecoregion of Western Labrador. Habitat types common to Western Labrador are found throughout the Kami Project area. These habitat types support a wide range of wildlife species that are common throughout the region. Wildlife species at risk ("SAR") that have been observed in the Kami Project area include: the Olive-sided Flycatcher (Special Concern), and the Rusty Blackbird (Special Concern). No Woodland Caribou (threatened) were observed in proximity to the Kami Project area during the Project surveys conducted in 2011/12 or 2023 (Stantec, 2012f; WSP, 2024b). Several plant species of conservation concern were recorded in the Project area as well as outside the vicinity of the Project.

Wetlands cover a sizable proportion of the natural landscape of Labrador and are common throughout the Kami Project area. Development of the Kami Project has been designed to avoid impacts to wetlands wherever possible; however, the ore body does intersect the Pike Lake South Habitat Management Unit, which is a designated habitat conservation area per the Town of Labrador City's municipal plan. No unique habitat feature was identified within the Management Unit or elsewhere within the area proposed to be affected directly or indirectly by the Kami Project (Alderon, 2012a).

Fish species and fish habitat common to Western Labrador are present within the Kami Project. Recreational fishing is conducted throughout the region and in close proximity to the Kami Project. There was no observation of SAR fish species within the Project area, and no commercial or Indigenous fishery was identified in or near the Kami Project (AMEC, 2012; WSP, 2024).

Current land and resource use in the vicinity of the Project area includes industrial activities and recreational activities such as cabin use, hunting and trapping, angling, wood harvesting, berry picking, snowmobiling, and boating. Due to the close proximity to the towns of Labrador City, Wabush and Fermont, recreational land use in this area is extensive and a number of cabins have been identified within the Project area.

The closest Indigenous communities are the reserve lands of La Nation Innu Matimekush-Lac John, which are located near Schefferville, approximately 200 km to the north. There is no treaty or settled land claim that overlaps the Project area although residents of Western Labrador engage in recreational land and resource use activities throughout the region.

20.1.1 Applicable Federal Legislation and Regulations

Federal acts and regulations can be applicable to projects being carried out in Canada and are administered by the responsible federal regulatory agency or department. A summary of potentially applicable federal legislation and regulations for the Project is provided in Table 20-1.

It should be noted that the permitting requirements and environmental assessment related to the infrastructure required at the Société ferroviaire et portuaire de Pointe-Noire s.e.c. ("SFPPN") and the Port of Sept-Îles for handling iron ore concentrate are not included as part of the study. It is assumed that the SFPPN and the Port of Sept-Îles authority will be responsible for providing these services.

Table 20-1: Potentially Applicable Federal Legislation and Regulations

Act	Regulations	Regulatory Agency
Federal		
Impact Assessment Act	Physical Activities Regulations	Impact Assessment Agency of Canada
Fisheries Act	Metal Mining Effluent Regulations	Environment and Climate Change Canada ("ECCC") and Fisheries and Oceans ("DFO")
	Authorizations Concerning Fish and Fish Habitat Protection Regulations	DFO
	Deposit Out of the Normal Course of Events Notification Regulations	
	Wastewater Systems Effluent Regulations	
Canadian Environmental Protection Act, 1999	Environmental Emergency Regulations, 2019	ECCC
Migratory Birds Convention Act, 1994	Migratory Birds Regulations	
	Migratory Bird Sanctuary Regulations	
Species at Risk Act	Permits Authorizing an Activity Affecting Listed Wildlife Species Regulations	
Explosives Act	Explosives Regulations, 2013	Natural Resources Canada
Transportation of Dangerous Goods Act, 1992	Transportation of Dangerous Goods Regulations	Transport Canada
Canadian Navigable Waters Act	No specific regulations related to this Act	

20.1.2 Applicable Provincial Legislation and Regulations

Provincial acts and regulations can be applicable to projects being carried out in Newfoundland and Labrador and are administered by the responsible provincial department and/or division. A summary of potentially applicable provincial legislation and regulations for the Project is provided in Table 20-2. Details about specific environmental permits, approvals and authorizations that will need to be obtained prior to the construction and operation of the Kami Project are presented in Section 20.3.

Table 20-2: Potentially Applicable Provincial Legislation and Regulations

Act	Regulations	Provincial Department and Division
Endangered Species Act	Endangered Species List Regulations	Department of Fisheries, Forestry and Agriculture
Environmental Protection Act	Environmental Assessment Regulations, 2003	Department of Environment and Climate Change, Environmental Assessment Division
	Air Pollution Control Regulations, 2022	Department of Environment and Climate Change, Pollution and Prevention Division
	Storage and Handling of Gasoline and Associated Products Regulations, 2003	
	Used Oil and Used Glycol Control Regulations	
	Waste Management Regulations, 2003	
	Pesticide Control Regulations, 2012	
Forestry Act	Cutting of Timber Regulations	Department of Fisheries. Forestry and Agriculture
Lands Act	No specific regulations related to this Act	Department of Fisheries, Forestry and Agriculture
Management of Greenhouse Gas Act	▪ Management of Greenhouse Gas Regulations ▪ Management of Greenhouse Gas Reporting Regulations	Department of Environment and Climate Change, Pollution Prevention Division
Mining Act	Mining Regulations	Department of Industry, Energy and Technology, Mineral Lands Division
	Mineral Regulations	
Occupational Health and Safety Act	Occupational Health and Safety Regulations, 2012	Digital Government and Service Newfoundland
Water Resources Act	Environmental Control Water and Sewer Regulations, 2003	Department of Environment and Climate Change, Pollution and Prevention Division
	Well Drilling Regulations, 2003	
Rail Service Act	No specific regulations related to this Act	Department of Transportation and Infrastructure

20.1.3 Environmental Assessment Jurisdiction

Mining projects in the Province are subject to Environmental Assessment ("EA") under the Newfoundland and Labrador *Environmental Protection Act,* and associated Environmental Assessment Regulations. Mining projects in the Province may also be subject to the federal Impact Assessment ("IA") process, which is regulated under the *Impact Assessment Act* (formerly the Canadian Environmental Assessment Act [“CEAA”]).

20.1.3.1 Previously Completed Environmental Assessment

The EA process for the Kami Project was previously initiated in October 2011 with the submission of the Registration/Project Description to the Newfoundland and Labrador Department of Municipal Affairs and Environment ("NLDMAE"), and the Canadian Environmental Assessment Agency (“CEA Agency”). The Registration/Project Description was made available to the public and to government agencies for review. On December 8, 2011, following the provincial review, the Minister of NLDMAE determined that an environmental impact statement ("EIS") was required for the Project under the *Environmental Protection Act*. Similarly, the CEA Agency determined that a comprehensive study was required under the CEAA’s Comprehensive Study Regulations. The Ministers appointed a joint EA Committee ("EAC"), comprised of provincial and federal government agency representatives to review the Registration/Project Description and supporting documentation, and to provide advice to the Ministers regarding the Project.

Final EIS Guidelines for the Project that addressed the requirements of both jurisdictions were issued on June 26, 2012. These guidelines were prepared jointly by the Governments of Canada, and Newfoundland and Labrador to identify the nature, scope, and minimum information and analysis required in the EIS. The EIS was submitted in September 2012. It underwent review by the EAC and was also made available for public and Indigenous review. Comments from the EAC, the public and Indigenous governments and organizations were considered prior to the federal and provincial governments making a determination about the potential environmental impacts of the Project.

At the completion of the EIS review period, the Ministers advised that additional information was required in order to make a decision, and a number of information requests were issued to obtain that information. Once it was determined that sufficient EIS information had been provided, the two levels of government advised that the Project could proceed.

Conditions of Approval and Commitments made in Previous Environmental Assessment

On January 10, 2014, the Minister of Environment and Conservation informed Kami Mine Limited Partnership ("Kami Mine LP") that under the authority of Section 67(3) (a) of the Environmental Protection Act SNL 2002, cE-14.2, the Lieutenant-Governor in Council has released the Kami Iron Ore Federal Environmental Assessment Process, subject to several conditions, which were presented in Appendix A and Appendix B of the Comprehensive Study Report (CEAA 2013). On February 17, 2014, the Honourable Leona Aglukkaq, Minister of the Environment, had reviewed the federal environmental assessment of the Kami Project. Having taken into consideration the Comprehensive Study Report and the public comments filed pursuant to subsection 22(2) of the former Act, the Minister is of the opinion that:

- The Project is not likely to cause significant adverse environmental effects, taking into account the implementation of the mitigation measures described in the Comprehensive Study Report;
- The mitigation measures and follow-up program described in the Comprehensive Study Report are appropriate for the Project.

Through the ongoing planning and advancement of the Kami Project, Champion is committed to meeting all of the previously issued provincial conditions of environmental release and implementing the applicable mitigation measures and monitoring programs outlined in Appendix A and B of Comprehensive Study Report. Table 20-3 summarizes the 2012 EIS commitments or conditions of EA release Champion has advanced or is planning to advance as part of this stage of Project planning.

Table 20-3: Summary of 2012 EIS Commitments or Conditions of EA Release Champion is Advancing

Discipline	2012 EIS Commitment or Condition of EA Release	Summary
Completed		
Groundwater and surface water resources	As part of ongoing Project design, continue field work and analyses to update and refine the current model of the existing hydrogeological environment around the proposed open pit, and the potential impacts of the open pit development. Present the results of the advanced hydrogeological work for review by regulators.	Champion completed a desktop review of Project data, undertook new site investigations and developed an updated conceptual hydrogeological model, including updated hydraulic conductivity estimates. The investigations and updated model provide a better understanding of the hydrogeological conditions at the site. A description of baseline hydrogeology is presented in Section 20.7.
	Refine and update hydraulic conductivity estimates when additional investigation of soil and bedrock hydraulic properties is carried out during the detailed engineering and design phase of the Project.	

Discipline	2012 EIS Commitment or Condition of EA Release	Summary
	Conduct water sampling for total and fecal coliforms in Long Lake to identify background levels prior to development of the Kami mine.	Water quality sampling and testing for total and fecal coliforms in Long Lake was completed in 2023 as part of Champion's surface water baseline field program. A description of environmental studies is presented in Section 20.3.
	Implement additional mitigation measures as required, if further test work, groundwater and surface water modelling and design, conducted as part of the detailed design phase of the Project, indicate that there is a potential impact to groundwater or surface water resources.	Champion is proposing additional water management infrastructure to mitigate the predicted increases in dewatering rates and effects to groundwater and surface water resources. A description of this water management infrastructure is presented in Chapter 18.
Geochemistry	Confirm environmental assessment predictions related to Acid Rock Drainage by basing future characterization of waste rock acid-generating potential on the results of direct measurement of total carbonate and sulphide content.	Champion undertook an updated geochemical characterization study to characterize metal leaching / acid rock drainage risk of units identified as future mine rock, building from the previously completed study for the 2012 EIS. Additional samples were also analyzed for static and kinetic testing. A description of the completed and ongoing geochemistry characterization program is presented in Section 20.6.
Planned		
Hydrogeology	Undertake long-term pumping tests when site access is approved to assess the role and impact of geological features such as faults and fractures.	Champion is planning to undertake additional hydrogeological site investigations, including the completion of long-term pumping tests to better estimate bedrock parameters at a larger scale and confirm conceptual hypotheses, such as the continuity of the faults and their hydraulic connection to the lakes surrounding the Project.
	Update the 3D numerical groundwater flow model for the Project to include data from pumping tests that focuses on dewatering of the open pit prior to and during operation.	The results of hydrogeological site investigation will be incorporated into a 3D numerical groundwater flow model to refine dewatering predictions.

Discipline	2012 EIS Commitment or Condition of EA Release	Summary
Geochemistry	Conducting humidity cell and batch cell tests to confirm drainage interaction within the waste rock disposal areas.	Champion is currently completing humidity cell testing, shake-flask extraction, and x-ray diffraction analysis on additional units identified as future mine rock. Results from these analyses were not available for integration into the Project Registration. A description of the completed and ongoing geochemistry characterization program is presented in Section 20.6.
Human health	Conduct a country food sampling program to evaluate any changes in the environment that may occur as a result of the Project.	Complete country food sampling program.

20.1.3.2 Federal Environmental Assessment Process

The federal assessment process has changed substantially since the 2014 decision statement was issued. The previous EA for this Project was commenced under the CEAA before the *Canadian Environmental Assessment Act, 2012* (CEAA, 2012) and the more recent *Impact Assessment Act* ("IAA") came into force; thus, the EA for the Kami Project was completed under very different legislative requirements than would be applied today.

Most notably, the types of assessments have changed, the process has several new timelines and outputs by both the proponent and the Agency, there are earlier consultation requirements, and several additional factors must be considered in the assessment (e.g., climate change commitments, Indigenous rights, and gender-based impacts). Table 20-4 provides a limited summary of the evolution of the federal assessment legislation since the previous assessment of the Project.

Table 20-4: Evolution of Federal Assessment Legislation

Year	Legislation	Agency	Types of Assessments	Decision Statements
1992 (Royal Assent) 1995 (Proclaimed)	*Canadian Environmental Assessment Act* (CEAA)	Canadian Environmental Assessment Agency (CEA Agency)	▪ Screening ▪ Comprehensive Study[1] ▪ Panel Review ▪ Mediation	No date by which proponent must substantially begin to carry out the Project. Generally, no conditions regarding changes to the Project or Proponent.
2012	*Canadian Environmental Assessment Act, 2012* (CEAA 2012)		▪ Environmental Assessment (EA) by: - the Agency - a review panel ▪ Effects evaluation for projects on federal lands or outside Canada (s. 67)	No date by which proponent must substantially begin to carry out the Project. Many have conditions regarding changes to the Project or Proponent.
2019	*Impact Assessment Act* (IAA)	Impact Assessment Agency of Canada (typically called IAAC or the Agency)	▪ Impact assessments (IAs) led by the Agency ▪ IAs led by a review panel ▪ Cooperation and coordination with other jurisdictions ▪ Integrated review panels ▪ Regional and strategic assessments ▪ Effects evaluation for projects on federal lands or outside Canada (s. 81)	Must provide date by which proponent must substantially begin to carry out the Project. Expect all will have conditions regarding changes to the Project or Proponent[2].

(1) The comprehensive study process for the Kami Project previously commenced under the CEAA in 2011 and was completed in 2014, after CEAA 2012 came into force. CEAA 2012 had transitional provisions that allowed comprehensive studies started under CEAA, but not completed when CEAA 2012 came into force, to continue in accordance with the requirements of the former Act (CEAA).

(2) On October 13, 2023, the Supreme Court of Canada issued an opinion about the constitutionality and interpretation of the IAA. In response, the Government of Canada has stated its intent to amend the legislation quickly to ensure the IAA is consistent with the decision. The amendments may impact the application of the IAA in the near future.

Under the IAA subsection 70(1), the Minister's decision statement must now contain a time limit within which the Proponent must substantially begin to carry out the designated project. This means the decision statement is valid for a set time period that is described within the decision statement itself. If the proponent does not begin work within that time period, the decision statement expires. Under subsection 70(2) of the new Act, the Minister may extend the period by any period that the Minister considers reasonable.

This was not a requirement under the CEAA (1992) when the Kami Project was previously assessed; thus, there does not appear to be a date by which Champion had to substantially begin to carry out the Kami Mine Project. This may suggest that the decision has no expiry and would still be considered valid for the Project today.

Where a period of time elapses from the release decision to the start of construction, federal regulators may revisit the Project description to determine if there have been any significant changes from the original Project. The Proponent is also not identified in the Decision Statement for the Kami Project, there were no conditions indicating that the Proponent must notify the Agency of changes in ownership and the CEAA was not clear on the issue of changes to proponency. Because the Kami Decision Statement does not have specific conditions relating to Project or Proponent changes, it is possible that the Agency would not have a mechanism to request an update at this point. As the main infrastructure of the Project are still located in the same area (pit, mine rock facilities, tailings facilities, process plant and rail), it is expected that the level of change will be considered low. Most of the improvements to the Project are related to addressing previous conditions and consultations made by the previous owner following the Project release.

Alternatively, there are several scenarios in which the Agency may determine that the previous comprehensive study decision is no longer valid. These include:

- Agency determines there are material changes to the Project such that Champion is proposing a new project;
- Agency determines that Champion cannot adopt the role of the Proponent as described in the Comprehensive Study report and is therefore not bound by the conditions set out in the 2014 Decision; thus, the Decision Statement is considered void due to the change in the proponent; or
- Agency determines that too much time has lapsed, and the proponent has not substantially begun to carry out the Project; thus, the Decision Statement is expired.

In such a case, Champion would need to confirm whether its proposed Project is listed as a "Designated Project" under the IAA *Physical Activity Regulations*. The Regulations identify the types of projects that may require an impact assessment under the IAA. Subsection 18c of the

Physical Activity Regulations states that "the construction, operation, decommissioning and abandonment of a new metal mine, other than a rare earth element mine, placer mine or uranium mine, with an ore production capacity of 5,000 t/day or more". This would suggest that the Kami Project would be considered a "Designed Project", and therefore, may require an impact assessment under the IAA.

Champion will continue to consult with the Agency and other federal regulators to confirm the validity of the previous decision statement and potential federal impact assessment requirements.

20.1.3.3 Provincial Environmental Assessment Process

No expiry dates were included in the provincial EA decision statement; however, Section 17 of the Environmental Assessment Regulations, 2003 under the *Environmental Protection Act* indicates that there is a 3-year term within which a release from the Minister remains in force. After the expiration of the 3-year period, if the Project (Undertaking) has not commenced, the release is considered to be void. The 3-year term can be extended for three 1-year periods (for a total of 6 years); however, such an extension must be made by the Minister or Lieutenant-Governor in Council. No such extension was requested or granted for the Kami Project and, as such, the provincial environmental assessment process will need to be restarted for the Project. Champion anticipates submitting an updated Project Registration to the Newfoundland and Labrador Environmental Assessment Division of the Ministry of the Environment and Climate Change in 2024.

As mentioned above, the provincial governments presented commitments and conditions of approval to which the previous proponent was required to adhere. Champion is maintaining a conditions/commitments register to track their status and progress and these conditions/ commitments are being considered as planning and design of the Project advance.

20.2 Environmental Permitting

Numerous approvals, permits and authorizations are required from municipal, provincial and federal regulators, prior to Project initiation. In addition, throughout Project construction and operation, compliance with terms and conditions of approval, various standards contained in federal and provincial legislation, regulations and guidelines are required.

Permits, approvals and authorizations generally contain conditions which, combined with other regulatory requirements and environmental constraints, make up commitments that Champion will need to address through Project design and during the construction, operation and closure phases. A conditions/commitment register for the Project will need to be considered during the remaining design, construction, operations and closure phases of the mine. Preliminary lists of future permits, approvals and authorizations that may be required from various regulatory agencies are presented in Table 20-5, Table 20-6 and Table 20-7.

Table 20-5: Potential List of Federal Permits, Approvals or Authorizations

Act	Permit, Approval or Authorization Activity	Responsible Authority
Impact Assessment Act	Decision Statement	Impact Assessment Agency of Canada
Fisheries Act	Fisheries Act Authorization	Fisheries and Oceans (DFO)
	Amendment to the Metal Mining Effluent Regulations	Environment and Climate Change Canada (ECCC) and DFO
Species at Risk Act	Permit to carry out an activity involving a species at risk	ECCC
Explosives Act	License for the manufacture and storage of explosives	Natural Resources Canada
Canadian Navigable Waters Act	Approval to Interfere with Navigation	Transport Canada

Table 20-6: Provincial Approvals, Licences, and Permits

Act or Regulation	Permit, Approval or Authorization Activity	Issuing Agency
Environmental Protection Act	Release from EA Process	Department of Environment and Climate Change, Environmental Assessment Division
	▪ Certificate of Approval for construction and Operations Industrial Facility ▪ Certificate of Approval for Diesel Generators ▪ Pesticide Operators License	Department of Environment and Climate Change, Pollution Prevention Division
Water Resources Act	▪ Water Use Licence ▪ Permit to Construct Drinking Water and Wastewater Infrastructure ▪ Permit for Development Activity in a Protected Public Water Supply Area ▪ Permit for Constructing a Non-Domestic Well ▪ Permits for Alterations to a Body of Water, including: - Schedule A: Culverts - Schedule B: Bridges - Schedule C: Dams - Schedule D: Fording	Department of Environment and Climate Change, Water Resources Management Division

Act or Regulation	Permit, Approval or Authorization Activity	Issuing Agency
	- Schedule E: Pipe Crossing – Water Intake - Schedule F: Stream Modification or Diversion - Schedule G: Small Bridges - Schedule H Infilling, Dredging and Debris Removal	
No applicable Act or Regulation	Real-time Water Monitoring Network Agreement	
Mining Act	Approved Development Plan, Rehabilitation and Closure Plan, and Financial Assurance	Department of Industry, Energy and Technology, Mineral Development Division
	▪ Mining Lease ▪ Surface lease ▪ Mineral License ▪ Approved Quarry Permit or Lease	Department of Industry, Energy and Technology, Mineral Lands Division
Lands Act	Crown Land Lease	Department of Fisheries. Forestry and Agriculture
Endangered Species Act	Permits under Endangered Species Legislation	
No applicable Act or Regulation	Permit to Destroy Problem Animals	
Forestry Act, Cutting of Timber Regulations,	Operating Permit to Carry out an Industrial Operation During Forest Fire Season on Crown Land	
	Permit to Cut Crown Timber	
	Permit to Burn	
Numerous Acts and regulations	▪ Approval of Storage and Handling Gasoline and Associated Products Registration ▪ Environmental Approval for Waste Management System ▪ Approval of Used Oil and Used Glycol Storage Registration ▪ Approval of Application for the Establishment of Fuel Caches at Remote Sites ▪ Approval for Septic or Water System Greater Than 4546 L Per Day ▪ Approval of Application for Building Accessibility Design Registration	Digital Government and Service Newfoundland and Labrador
Rail Service Act	Approval to Purchase, Operate or Construct a rail service	Department of Transportation and Infrastructure

Table 20-7: Municipal Permits, Approvals and Authorizations

Issuing Agency	Permit, Approval or Authorization Activity
Town of Labrador City	▪ Building Permit ▪ Corporate Stewardship Agreement related to Habitat Management Units ▪ Development Permit ▪ Excavation Permit ▪ Fence Permit ▪ Occupancy – Commercial Permit ▪ Open Air Burning Permit ▪ Signage Permit
Town of Wabush	▪ Building Permit ▪ Corporate Stewardship Agreement related to Habitat Management Units ▪ Development Permit ▪ Excavation Permit ▪ Fence Permit ▪ Occupancy – Commercial Permit ▪ Open Air Burning Permit ▪ Signage Permit

20.3 Environmental Studies

Various environmental studies for the Kami Project area have been undertaken prior to and since the previous Feasibility Study was prepared for the Project in 2018. As part of the previous EA process, environmental baseline studies for the Kami Project were completed in 2011-2012. Environmental and baseline studies were focused on the following:

- Air quality and noise;
- Water resources;
- Freshwater fish, fish habitat and fisheries;
- Socio-economic conditions;
- Archaeology;
- Vegetation;
- Wetlands;
- Birds;
- Wildlife.

An analysis of predicted Project effects for each valued ecosystem component ("VEC") defined in the EIS guidelines were completed in the previous EIS. Upon completion of the effects analyses, it was concluded that the Project was not likely to result in significant adverse residual environmental effects during construction and normal operating conditions. In the case of economy, employment and business, the residual effects were predicted to be positive.

Through the ongoing planning and advancement of the Kami Project, Champion is committed to meeting the previously issued provincial conditions of environmental release and implementing the applicable mitigation measures and monitoring programs presented in Section 20.1.3.1, which includes updating the previously completed baseline studies and collecting additional data. In 2023, Champion undertook a comprehensive environmental baseline field program which sought to replicate the field programs that were completed for the Kami Project in 2011 and 2012, supplemented with additional stations or sampling locations, where feasible. The details of these environmental baseline studies will be presented in the provincial Project Registration and related EA documents. Champion is planning to continue baseline field investigations in 2024, including the hydrogeological investigations which will include completion of long-term pumping tests.

20.4 Community Relations

Champion’s dedication to developing strong relationships with Indigenous groups and local community stakeholders is built on three pillars, namely:

1. Supporting human rights.
2. Engaging with communities.
3. Contributing to local economic development through local hiring, sourcing, and community investments.

Champion views relationships of trust with Indigenous Peoples and local communities as key to the success and sustainability of its operations. It is through community relationships that Champion can successfully create lasting benefits, minimize negative social and environmental impacts in the areas where they operate, and advance their contributions towards sustainable development.

In this subsection, Champion summarizes the interest and issue topics raised through previous consultation on the Kami Project, Champions approach to engaging with Indigenous groups and local community stakeholders and Champions plans for future consultation with Indigenous groups and local community stakeholders on the Kami Project.

20.4.1 Summary of Interest and Issue Topics Raised through Previous Consultation on the Kami Project

The previous proponent of the Kami Project completed consultation activities with Indigenous groups and local community stakeholders. Figure 20-1 summarizes how frequent topics of interest and concerns were raised in the course of this consultation.

Through the development of the EIS, the five topics of interest and concerns most frequently raised by Indigenous groups were:

- Indigenous employment and business opportunities;
- Indigenous consultation;
- Interaction with existing Indigenous Rights or title;
- Traditional land use activities by Indigenous persons;
- Potential effects to wildlife species.

The five topics of interest and concerns most frequently raised by local community stakeholders were:

- Public participation;
- Potential effects of dust;
- Availability of housing for workers;
- Potential effects on cabins; and
- Potential noise effects.

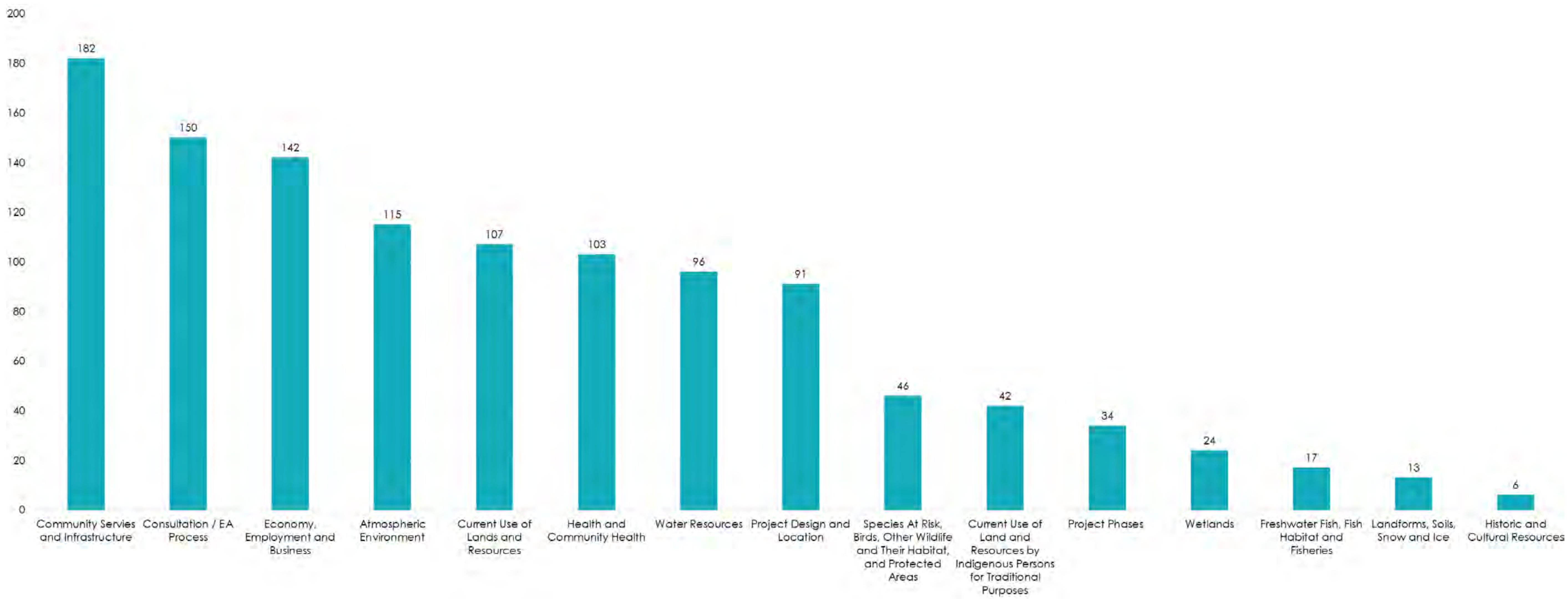


Figure 20-1: Summary of Frequency of Topics Interest and Concern Categories Raised Through Consultation on Previous EIS

Following submission of the EIS, an EIS review process was initiated. As part of the EIS review process, a total of 421 information requests ("IRs") were received from regulatory agencies, 62 IRs from Indigenous groups and 14 submissions were received from the public. These IRs pertained to various issues and associated requests for information and clarification that were submitted by government departments and agencies, Indigenous groups, communities and stakeholder organizations and members of the general public during the EIS review. Figure 20-2 provides a general overview of the IRs received through the review of the EIS and the main topics and themes that they related to.

Champion is committed to discussing these issues and topics of interest with Indigenous Groups and key community stakeholders during planned consultation activities through the development of the Project Registration and EIS.

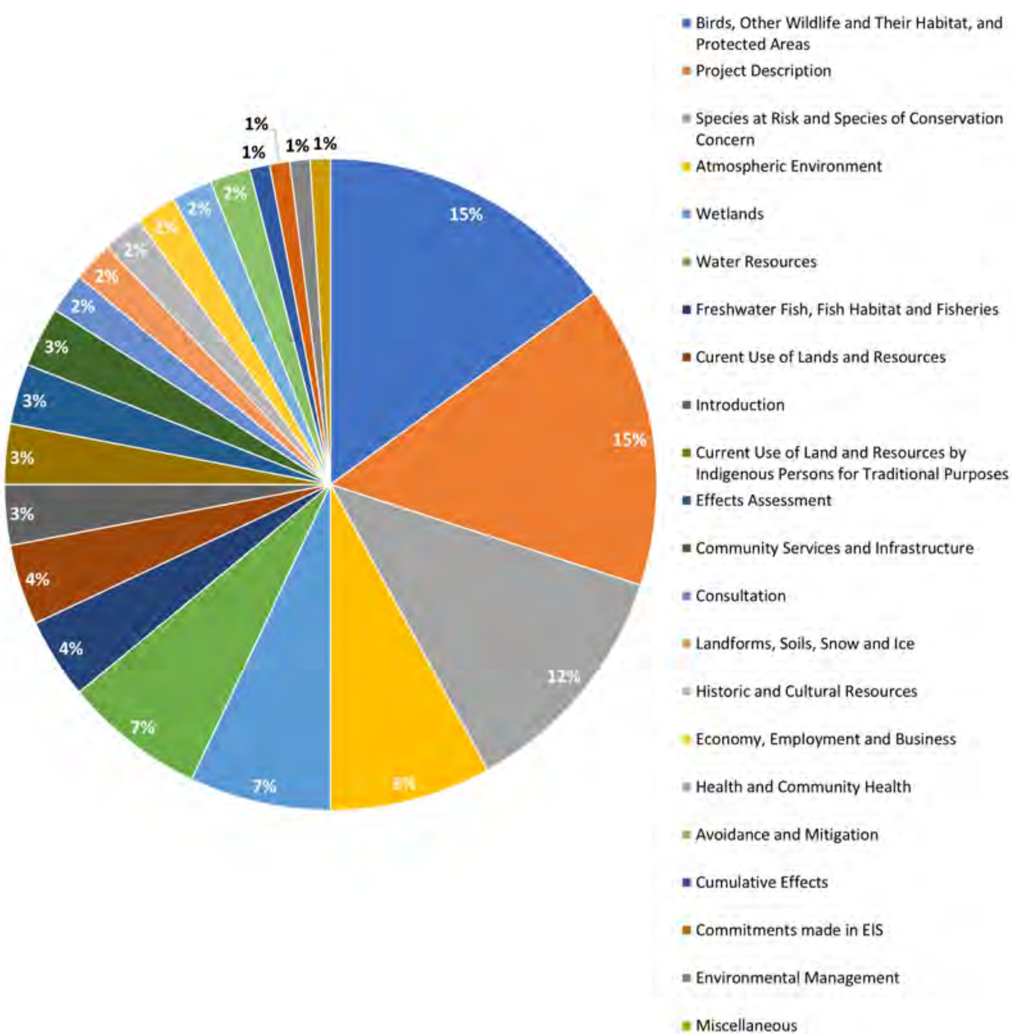


Figure 20-2: Summary of Information Requests Received Through EIS Review

20.4.2 Indigenous Consultation

Approach to Indigenous Consultation

Champion recognizes the unique relationship that Indigenous Peoples have with the natural environment in which they live. Champion is committed to developing and maintaining lasting relationships with Indigenous Peoples to ensure fruitful collaborations conducive to the establishment of a climate of understanding, trust, transparency, and mutual respect. Champion is therefore committed to:

- Respecting the Rights, interests, aspirations, culture, and natural resource-based livelihoods of host communities and Indigenous groups in the design and development of its projects and operations;
- Seeking to reflect the diversity of host communities and Indigenous groups in Champion's human capital;
- Applying mitigation measures to address adverse effects of Champion's activities on host communities and Indigenous groups and offer them positive and lasting benefits;
- Seeking to obtain the voluntary, prior, and informed consent of Indigenous groups with recognized rights when significant impacts are likely to occur, either due to the relocation of property or the disturbance of land, territories, or cultural heritage that is important to them;
- Incorporating the results of discussions and consultation processes with host communities and Indigenous groups in agreements with them.

Identification of Indigenous Governments and Organizations

The Government of Canada and Province of Newfoundland and Labrador have a duty to consult, and where appropriate, accommodate Indigenous groups when it considers conduct that might adversely impact potential or established Aboriginal or treaty rights. In the previous EIS, Five Indigenous Groups were identified by the Impact Assessment Agency of Canada ("IAAC") as having potential Indigenous rights that could be adversely affected by the Project. These include:

- Innu Takuaikan Uashat mak Mani-Utenam ("ITUM");
- La Nation Innu Matimekush-Lac John ("NIMLJ");
- Innu Nation;
- Naskapi Nation of Kawawachikamach ("NNK");
- NunatuKavut Community Council ("NCC").

As Champion has advanced development of the Project, Champion has reviewed publicly available information, including information directly provided to Champion by Indigenous governments and organizations, to gain a general understanding of the nature of known Indigenous interests in the Project area and the priority Indigenous Groups to be engaged for the Project. This has included consideration of:

- Historic and modern treaties;
- Traditional territories;
- Traditional and current land uses;
- Settlement or ongoing land claims, and/or litigation;
- Review of the previous EIS;
- Proximity of the Project to Indigenous communities;
- Existing relationships with the Project and Champion;
- Potential Project impacts to health and safety, the environment, and any potential or established Aboriginal and/or treaty rights and related interests.

20.4.3 Community Consultation

Identification of Local Community Stakeholders

The term “stakeholder” refers to a broad range of interested and affected individuals and groups including communities, government agencies, and businesses. In the context of this Project, a stakeholder may be any person or group of people who have an interest to protect, who have a stake in the issue, or who have knowledge to contribute. This includes a person or group who would be directly affected by the Project and a person or group with more general or varying degrees of concern, interest, and desire to engage with issues related to the Project.

Stakeholders for this Project have been identified based on previous experiences and the information acquired from Champion, as well as from a review of available secondary information. Champion determined interested stakeholders using the following criteria:

- Proximity of persons or groups who reside near, have property near, an interest near or in the proposed Project area, or could be potentially affected due to distance from the proposed Project area;
- Past or current interest of persons or groups in the Kami Project, or similar projects or developments;
- Potential impact to persons of groups by possible effects from the outcomes of the Project.

As documented in the Project's 2013 environmental impact assessment, previous consultation with the following stakeholders groups took place:

- Public stakeholders included residents of the communities of Labrador City, Wabush, Fermont, and Sept-Îles;
- Other potentially impacted or interested stakeholders beyond these boundaries, including provincial and federal government agencies and departments, non-governmental organizations ("NGOs"), economic development organizations, and outdoor recreations users and outfitters.

Table 20-8 outlines community stakeholders for the Project. Additional stakeholders may be identified through ongoing community consultation activities.

Table 20-8: Community Stakeholders

Category	Stakeholder
Municipal Governments	Town of Wabush
	Town of Labrador City
	Town of Fermont
Local Economic Development	*Centre local de développement (CLD) de Caniaspicau*
	Conseil de développement économique d'Uashat mak Mani-Utenam
	Hyron Regional Economic Development Board
	Labrador West Chamber of Commerce
	Labrador West Employment Corporation
	Labrador West Tourism Corporation
	Newfoundland and Labrador Organization of Women Entrepreneurs
	Town of Labrador City Economic Development Department
	Women in Resource Development Corporation
Local Environment Interest Groups	*Conseil régional de l'environnement de la Côte-Nord*
	Le Mouvement citoyen de Fermont
Local Education, Social Services, and Health Services	College of the North Atlantic
	Centre de santé et service sociaux de L'Hematite
	Labrador Grenfell Health
	Labrador Institute of Memorial University, Labrador Campus
	Labrador West Status of Women
	Labrador Friendship Centre
	Newfoundland and Labrador English School District

Category	Stakeholder
	Conseil Scolaire Francophone
	Newfoundland and Labrador Housing Corporation
	Provincial Advisory Council on the Status of Women
	Royal Newfoundland Constabulary
Outfitters and Recreation	Cabin Owners
	Duley Lake Family Park
	Newfoundland and Labrador Outfitters Association
	White Wolf Snowmobile Club

20.4.4 Completed and Planned Consultation Activities

Champion has been consulting on the Project with Indigenous groups, the public and local community stakeholders since the acquisition of the Project in 2021. Consultation activities between Champion, Indigenous groups, the public and local stakeholders to date have been focused on introducing the Project and holding initial meetings to discuss concerns and expectations for consultation. A summary of key consultation activities is provided below:

- In November 2022, Champion held a meeting in Québec City with representatives from the Innu Nation to provide an overview of the Project and discuss the Innu Nation's concerns and expectations for consultation.
- In August 2023, letters were sent via email to cabin owners regarding an upcoming hydrogeological drilling program, aimed to better understand groundwater flow at the Project site. Champion later met with individual cabin owners in regard to the groundwater field program in September and October 2023.
- In October 2023, Champion sent letters via email to the Innu Nation, NNK, NIMLJ and ITUM, providing an overview of the Project, noting that Champion is undertaking a Pre-feasibility Study ("PFS") and evaluating the opportunity of re-entering the provincial EA process, and offering to meet, in person or virtually, based on the Nations' preferences, to further discuss the Project. Meetings were held with representatives from ITUM, the Innu Nation, NIMLJ and NNK in October 2023 (ITUM), November 2023 (Innu Nation), and January 2024 (NIMLJ and NNK) to discuss the Project.
- In October 2023, Champion held a meeting with Duley Lake cabin owners and the White Wolf Snowmobile Club to provide an overview of the Project, and discuss consultation expectations for the Project. Champion also held a meeting with the Town of Wabush to provide an update on the Project. Champion highlighted the site plan improvements, environmental programs and field investigations, and the anticipated timing of the Project Registration.

- In December 2023, Champion sent a letter via email to the NCC, providing an overview of the Project, noting that Champion is undertaking a Pre-feasibility Study and re-entering the provincial EA process, and offering to meet, in person or virtually.
- In December 2023, Champion met with the White Wolf Snowmobile Club (“WWSC”), cabin owners, the Towns of Labrador City and Wabush, and Ville de Fermont, as part of ongoing consultation activities.
- In February 2023, Champion met with ITUM, the Innu Nation, NIMLJ, NNK, NCC, WWSC, cabin owners, the Towns of Labrador City and Wabush, and Ville de Fermont to present results of the PFS study and discuss of the expected consultation process for EIS from the perspective of these stakeholders and rightsholders.

As the Project progresses through the Project Registration and provincial EA process, Champion plans to continue to engage with Indigenous groups, the public and local communities. Topics of discussion will be identified collaboratively with key community stakeholders. Some proposed topics for future consultation meetings and events could include, but are not limited to:

- Review of previous interests and concerns related to the Kami Project;
- Identification of new interests and concerns related to the Kami Project;
- Follow-up discussions related to identified interests and concerns
- Input and consideration of Project design and alternatives;
- Input and consideration of Project baseline studies;
- Review and consideration of adverse environmental effects and mitigation.

20.5 Site Geotechnical

Substantial geotechnical investigations, assessment and design were completed on the Kami Property in the past phase of the Project. When it was a good technical solution, the position of previous infrastructure was reused to maximize the use of previous geotechnical investigation. The following section summarizes the findings of the previous investigations. No additional geotechnical works were done by Champion for the PFS. Additional work will be performed where needed to get sufficient data for the next phase.

The ground surface elevations across the five areas of infrastructure development vary significantly. Soils in the general Project area consist of a relatively thin surficial layer of root mat/peat/topsoil underlain by glacial till materials consisting of compact to very dense granular sand with gravel and occasional silt layers overlying bedrock. Tills up to 50 m thick were encountered in the Rose Pit area and in general, the depth to bedrock in this area is highly variable.

In general, foundations will be constructed on the dense native soils and/or on bedrock. Locally where loose sand and silt layers were encountered, such as the southern end of Long Lake, pile foundations will be required. For all structures, the surficial organic materials will require removal prior to setting foundations or structural fills.

20.5.1 Crusher Area

The crusher area is located within the central portion of the Project site and may be further subdivided into the following components: crusher, ROM stockpile, mine service building and employee facilities, explosive magazine storage building, mine fuel station, large vehicle parking area, and mine parking area for small vehicles.

Crusher foundations will be located on bedrock. The bedrock in the proposed crusher area is of good quality and is capable of supporting the anticipated crusher loading. The remainder of the infrastructure, including the explosive magazine storage building, mine fuel station building, mine service building and employees facilities, are suitable for the use of shallow foundations founded on native soil or bedrock.

20.5.2 Tailings Impoundment

The tailings impoundment is located to the southeast of the process plant area in the eastern portion of the site and consists of a tailings pond, dams and structures.

The organic soils will be removed in the footprint of the proposed dams and control structures. The competent in-situ granular soils will serve as a layer for constructing the dams upon.

20.5.3 Rail Loop

The rail loop area is located in the easternmost portion of the site and may be further subdivided into the following facilities: Kami rail loop dual-culvert, Kami rail loop, reclaim transfer tower and load-out silo.

The rail loop structures will be either founded on competent in-situ native soils with shallow foundations and/or on piles. The foundation type will depend upon the structure details. Approach embankments for the rail crossings over streams and rivers may be constructed with native granular sand materials or rockfill materials. Due to the high groundwater levels, construction of temporary cofferdams will likely be required for the construction of crossing structure foundations.

The proposed rail loop will cross some wetland areas. Removal of existing root mat and/or peat soils will be necessary. The use of geosynthetics between the peat and the fill materials may be required. It is likely that regular maintenance of rail tracks due to consolidation settlement will be required in the wetland areas. Control of groundwater and surface water will be required during earthworks and excavation.

Bedrock excavation or blasting may be required in some locations. The use of wire meshing and/or rock bolting will be required to stabilize local instabilities in rock cut slopes. Fill embankments may be constructed with select native granular soils or rockfill materials.

Based on the soils encountered in the boreholes, both the concentrate reclaim transfer tower and the concentrate load-out silo can be supported on a shallow foundation system founded on intact bedrock. With a very thin soil cover over bedrock, the emergency concentrate stockpile can be constructed on in-situ soils following removal of the root mat and topsoil.

20.5.4 Process Plant Area

The process plant area is located to the west of the access road area in the eastern portion of the site and may be further subdivided into the following infrastructure: crushed ore stockpile, process plant building and structures, fuel unloading and tank farm, and concentrator parking area for small vehicles.

The crushed ore stockpile will be approximately 27 m high. All surficial deposits of organic soils will be removed from the proposed stockpile footprint. The base of the reclaim tunnel located below the stockpile will be excavated in bedrock, at an average depth of approximately 1 m.

In the area of the process plant buildings, infrastructure will be supported on shallow foundations founded on native granular sands or bedrock, or on piles.

In the area of the fuel unloading and tank farm, these structures will be founded on shallow foundations on competent in-situ granular soils and/or bedrock.

20.5.5 Access Roads

Site access roads extend from the northeastern end of the Property to the southwest portions, providing access to the various areas of the site. Based on the heavy traffic loads, site access roads will require removal of all organic materials to expose competent in-situ granular soils or bedrock prior to placement of structural fill. Bridges, rail and/or conveyor crossings will require piled foundations to address the loose/soft sediment deposits within the river valleys.

20.5.6 Structural Fill

A preliminary aggregate source assessment study was conducted during the previous phases of the Project. Additional assessment will have to be done for the next phase of development. Key findings include:

- Some of the waste from the open pit development that could be used as structural fill is PAG. These materials could be used as structural fill in the TMF, so long as sufficient and permanent water cover is provided to prevent development of poor-quality drainage.
- The near-surface bedrock, east of the Waldorf River and Long (Duley) Lake, is of poor quality with respect to its use as structural fill; however, it can be used for light structural loading conditions or for roadways, provided it is capped with a better-quality structural fill.
- A good quality rock source was encountered in a ridge northeast of the rail loop. The cost of developing rock from this quarry needs to be considered against the cost of transporting waste rock from the open pit.
- An aggregate source, an esker, was identified along the Waldorf River, south of the proposed site development. This esker formation is a source of sand and gravel that should be suitable for on-site concrete production.

20.5.7 Rose Pit, Rose North Stockpile and Rose South Stockpile Areas

Field investigations near the water management facility area have been conducted by Stantec between 2010 and 2012.

No specific investigation has been conducted specifically for the water management infrastructure as part of the current update. The nearest data is from the Stantec campaigns. Additionally, only the 2011 campaign provides information on the overburden.

Based on information from these campaigns, soils generally consist of the following:

- Organic soils;
- Loose to compact sandy silt to silty sand with gravel;
- Dense to very dense sandy silt to silty sand with gravel (till). Occasionally, a loose to compact layer was noted more in depth. Cobbles and boulders were encountered in this layer.

Overburden thickness ranges approximately from less than 1 m to 60 m. Thicker overburden areas are generally associated with topographic depressions, whereas a surface bedrock is found on topographic heights.

A more detailed description of each layer is provided in the following sections.

Organic Soils

A layer of loose organic soils is present at the surface of all boreholes. The thickness of this layer varies from 0.1 m to 2.1 m, with an average thickness of 0.5 m.

Loose to Compact Sandy Silt to Silty Sand with Gravel

A loose to compact layer of sandy silt/silty sand with gravel is generally found directly under the organic soils. Thickness of this layer varies from approximately 1.0 m to 29.0 m.

Close attention should be paid to areas where loose soils have been encountered in depth, notably:

- At ROB-11-01, between 26.0 m and 28.0 m of depth;
- At ROB-11-16, between 11.1 m and 11.7 m of depth;
- At ROB-11-17, between 29.0 m and 29.6 m of depth.

Some cobbles and boulders can be found in this layer.

Dense to Very Dense Sandy Silt to Silty Sand with Gravel

Under the previous layer, a dense to very dense sandy silt to silty sand with gravel (till) is noted. Cobbles and boulders are present in this layer.

The thickness of this layer varies from approximately 2.0 m to 51.0 m and SPT “N” (Standard Penetration Test) values range from 30 to over 50 blows per 0.3 m.

20.6 Site Geochem

During the development of this PFS, Champion has characterized the metal leaching/acid rock drainage ("ML/ARD") risk of units identified as future mine rock during the mining operations of the Kami Project. To meet updated best practice guidelines for this stage of the Project, Champion has completed additional geochemical sampling and analysis of existing core. Geochemical sampling and analysis expanded upon previous characterization work (Stantec, 2013b) and provides a comparison based on interpretations of initial static test results (i.e., acid-base accounting (“ABA”) and whole rock analysis) received to date. Additional samples are currently undergoing humidity cell testing, shake-flask extraction, and x-ray diffraction analysis, however, results from these analyses were not available at the time of drafting this report. In total, 705 spatially distributed waste rock, ore, and tailings samples have been tested to date.

Results from the ongoing characterization program are generally consistent with previous analyses (Stantec, 2013b). ABA indicates that potentially acid generating ("PAG") material is present in all rock units except for the Attikamagen, although most of the PAG samples were concentrated in the Menihek Formation (particularly the graphitic schist lithology). However, more samples were identified as PAG within the Sokoman and Wishart Formations within the new sample set, which may be related to different block models used between the two studies or naturally occurring heterogeneities. Natural Resources Canada recommended a column test consisting of blended mine rock be tested to investigate the effectiveness of blended mine rock in neutralizing acidity from higher risk materials. One blended humidity cell test is currently undergoing testing with composition and neutralization potential ratios ("NPR") based on weighting estimated from the geochemical characterization program, which will confirm the capacity for excess neutralization potential ("NP") to maintain neutral conditions against the higher risk units based on the planned end of mine life average composition, as well as measurements for metal leaching under neutral conditions at the laboratory scale.

Whole rock analysis results indicate that several potential contaminants of concern (including silver, bismuth, cadmium, sulfur, selenium, tellurium, and uranium) were high relative to global crustal abundances. However, high relative crustal abundance is not indicative of their release. Additional ongoing test work will be used to investigate implications for metal release. Key contaminants of concern (arsenic, copper, nickel, and zinc) previously identified by Stantec (2013) were all below the 5x crustal abundance threshold in Kami mine rock solids. However, further geochemical characterization is needed to confirm there is low potential for water quality issues. Findings are currently being further assessed with shake flask extraction and kinetic study data.

Cross sections of the Kami Project deposit were developed showing sample locations and their respective NPR. Interpretation of these results show that zones of PAG mine rock may be present at relatively shallow depths in the Kami deposit. While sufficient NP is available within the deposit to buffer acid potential ("AP") generated, this assumes mine rock will be sufficiently blended over the life of mine to prevent development of acidic zones or initial sulfide oxidation at the surface during early years of mine life. Consideration for the extraction or deposition schedule of these zones may be required to ensure a well-mixed mine rock stockpile and tailings storage facility embankments to avoid high-risk pockets near the base of the waste rock pile.

Previous characterization work has focused on ABA characterization based on formation type. However, this approach presented challenges to constraining the total risk – for example, the Menihek Formation is classified as PAG, and represents approximately 34% of the total waste rock. However, the highest risk had previously been identified from the graphitic schist lithologies, which were estimated by Stantec (2013b) to make up approximately 7% of the total waste rock. As noted, all rock units (except for the Attikamagen) contain some PAG. In order to address these uncertainties, Champion is currently integrating acid rock drainage risk into the geological model to assess the spatial distribution of higher-risk zones, and additional investigations into developing greater resolution for tonnages of lithology units are underway. Early results of the geological model update indicate that a reduction in total expected proportion of PAG rock (from 34%) is likely, but detailed results of this exercise were not available at the time of drafting this report. Ore, concentrate, and tailings were previously determined to be non-acid generating ("NAG"), with low metal-leaching potential based on static tests (Stantec, 2013b). Champion is currently completing additional geochemical characterization including acid base accounting, elemental analysis, shake flask extraction, and kinetic testing including unsaturated and saturated kinetic column tests.

20.7 Baseline Hydrogeology

One of the conditions associated with the Project release in 2014 (Section 20.1.3.1) was the necessity to gain further knowledge on the hydrogeological aspect of the Project. This has been integrated in the current update with a data review, new field investigations and modelling.

The Kami Property is situated in hilly terrain, marked by lakes and valleys with a northeast-southwest orientation. Topography across the site is generally governed by the underlying geological structures with elevations ranging from 594 m to 700 m (Stantec, 2012h).

Overburden materials consist of veneers of organic soils (peat) overlying sequences of glacial till, and occasional glacio-fluvial and fluvial deposits overlying bedrock (Stantec, 2012d). Based on the geotechnical and exploration boreholes, the overburden exhibits a highly variable range in thickness. In general, glacial till thicknesses range from 0.2 m to 62.2 m, with an average of 21.6 m. In the study area, the hydraulic conductivity (K) of the overburden (till) was measured at 6 wells and an average hydraulic conductivity of 1.2×10^{-6} m/s was obtained by calculating the geometric mean of the measurements.

The rocks of the Kami Property form part of the highly metamorphosed and deformed metasedimentary sequence in the Grenville Province of the Labrador Trough (Stantec, 2012d). From the deepest to the shallowest, the sequence consists of Archean gneiss (Katsao formation), dolomitic marble (Denault formation), quartzite sandstone (Wishart formation), iron formations (Sokoman formation) and mica schist (Menihek formation).

In the study area, bedrock hydraulic conductivity (K) was measured in 24 wells, mostly located south of Long Lake, in the superficial bedrock. In the pit area, bedrock information is available from exploration boreholes (K-series) and geotechnical boreholes (ROB-series). An average hydraulic conductivity of 1.2×10^{-7} m/s was obtained for the bedrock, by calculating the geometric mean of the measurements.

Bedrock hydraulic conductivities (K) were also measured in-depth through a series of packer injection tests in two inclined boreholes: RBR-12-01 and RBR-12-02. The packer tests were performed by Stantec in 2012 within the proposed pit footprint. Average hydraulic conductivities of $2.4x10^{-6}$ and $1.5x10^{-6}$ m/s were obtained for the RBR-12-01 and RBR-12-02 respectively, by calculating the geometric mean of the measurements. Local high hydraulic conductivity intervals ($K>1x10^{-5}$ m/s) were found during the testing of RBR-12-01 and were attributable to the presence of a Central fault, within the Sokoman formation.

Across the Kami Property, the general groundwater flow follows the hydrographic drainage and flows towards the North (Pike Lake) and North-East (Long Lake). In the Rose Pit area, groundwater levels closely correlate with topography and range from 11.64 mbgs (metre below ground surface) in areas of high elevation, to artesian conditions in areas of low elevation. The center of the valley represents a local discharge area where an alignment of lakes such as Mid, Rose and Pike lakes is formed. In contrast, topographic highs to the west (near Gleeson Lake) and south-east of the pit (North of Elfie Lake) act as preferential recharge areas. Considering annual precipitation for a dry or wet year, evaporation and runoff, recharge is estimated between 0 mm and 130 mm/year.

Horizontal gradients were estimated between different pairs of wells, in the till/bedrock or the bedrock. Strong gradients are seen on slopes, in the bedrock, between K-08-10 and K-08-18 (0.08 m/m, Northerly towards Pike Lake) and ROB-11-05A and K-11-113 (0.17 m/m, NE-SE towards Rose Lake). More gentle gradients were estimated in the center of the valley, at the till/bedrock interface, between ROB-11-07 and ROB-11-02 (0.02 m/m, SW-NE towards Pike Lake) and between ROB-11-04 and ROB-11-02 (0.03 m/m, Easterly towards Pike Lake).

In 2012, the groundwater quality in the Rose Pit area was characterized from 15 wells and boreholes. Groundwater quality was analyzed for the till, the till/bedrock, and the bedrock:

- In the till, all parameters except manganese (average concentration of 297 µg/L) meet the Guideline for Canadian Drinking Water Quality ("GCDWQ") (Health Canada, 2010). In contrast to the deeper till/bedrock and bedrock chemistry, the overburden chemistry appears to be slightly higher in sodium, chloride, and TDS concentrations, and lower in alkalinity, organic carbon, and trace metals concentrations.
- In the till/bedrock, all parameters except iron (average 517 µg/L) and manganese (average 442 µg/L) meet GCDWQ. The till/bedrock chemistry typically has a higher total organic carbon concentration (mean 27.5 mg/L, maximum 120 mg/L) than the other units.
- In the bedrock, GCDWQ are typically exceeded for iron (average 1469 µg/L) and manganese (mean 286 µg/L). In comparison to the overburden wells, the bedrock typically has higher concentrations of alkalinity, pH, copper, iron, and zinc.

A 3D numerical model of the site was built to establish the pit dewatering flow rate. The boundary conditions applied to the hydrogeological model are presented in the next Figure. The model domain is bound by physical boundaries that extend from the topographic highs west of Daviault Lake, where a no flow condition is applied, to Wahnahnish Lake in the east, where fixed head conditions are applied to represent the natural flow from Wahnahnish Lake to Labrador City.

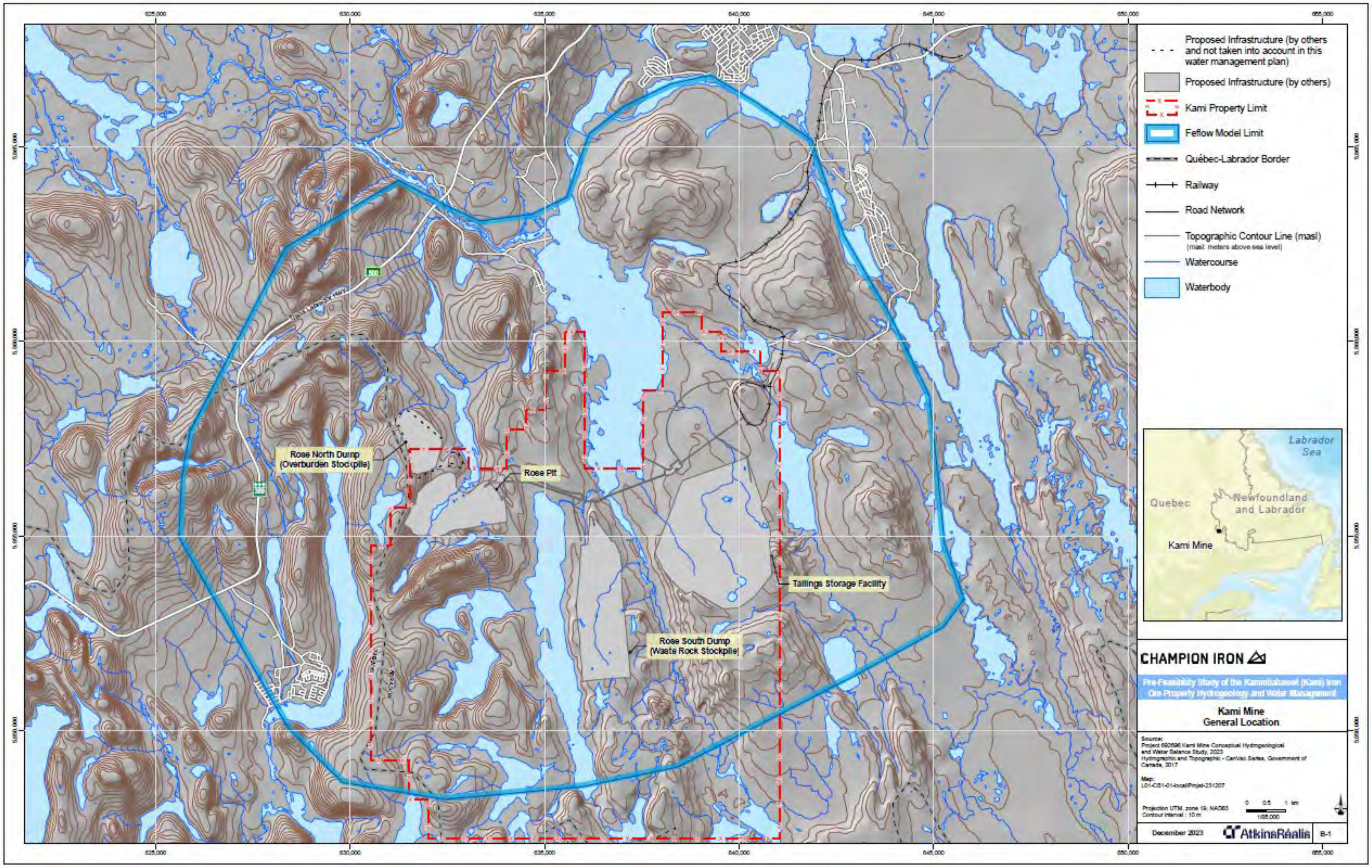


Figure 20-3: FEFLOW Model Limits

To the north, the model boundary follows a hydrographic limit to a topographic low near Labrador City. To the south, the model boundary follows a succession of topographic highs (no flow boundary condition) which correspond to the catchment basin limits, then joins Wahnahnish Lake. Major lake water elevations are assumed to represent groundwater levels. Based on topographic data and punctual lake water level measurements, a fixed head boundary condition was applied on Daviault, Molar, Pike, Mills, Long and Riordan lakes. Different recharge rates were used based on the topography of the area: from 35 mm to 150 mm per year on the topographic highs and no recharge on the topographic lows or steep slopes.

The numerical model was based on the interpretation of geological and hydrogeological data available at the site. Analysis of hydraulic conductivity data led to creation of four distinct hydrostratigraphic units: the overburden (from 0 to 60 mbgs), the bedrock surrounding the pit (from 0 to 450 mbgs), the deep bedrock below the pit (from 450 to 650 mbgs) and the fault zones (from 0 to 450 mbgs). Two fault zones have been identified at the site: the Katsao-Wishart fault and the Central fault. These two faults were represented in the hydrogeological model as zones of higher permeability that could be preferential flow paths.

The hydrogeological model was calibrated in steady-state against water levels from 29 piezometers, measured between November 2011 and June 2012. the model's calibration was considered satisfactory and complied with the usual standards set by the industry. Calibrated and measured hydraulic conductivity values for each hydrostratigraphic units are presented in Table 20-9.

Table 20-9: Measured and Calibrated Hydraulic Conductivity

Hydrostratigraphic Units	Hydraulic Conductivity K (m/s)	
	Mean Selected Value Estimated Through Slug Tests and Packer Tests	Calibrated Values
Overburden	1.2E-06	1.0E-06
Bedrock	1.2E-07	5.0E-08
Deep Bedrock	1.0E-08	1.0E-08
Faults	>1.0E-05	1.0E-05

After the calibration, to estimate dewatering flow rates, a steady-state simulation was carried out using the pit's maximum depth (450 m) at the end of operation (Year 26). The simulation results represent the base case scenario with a dewatering rate of 12,432 m^3/day. In a conservative approach, a baseline scenario was selected for infrastructure design purposes (selected case), assuming the faults hydraulic conductivity was 5 times higher than the base case (i.e., $5x10^{-5}$ m/s). The simulation result for the selected case provided a dewatering flow rate of 40,849 m^3/day.

It should be noted that in the former Alderon studies, a dewatering rate of 3,838 m^3/d (Stantec 2012d, WorleyParsons 2014a) was considered for infrastructure design, and a dewatering rate of 10,659 m^3/d was estimated as part of the pit slope design (Stantec 2012h).

As part of the current study, it was observed that of the estimated 40,849 m^3/day, 29,460 m^3/day would originate directly from Pike Lake. The dewatering rate for the selected case is higher than for the base case, due to the increased hydraulic conductivity of the faults. Because of its proximity to the pit and hydraulic connection to the fault, Pike Lake's contribution would be greater than that of the other lakes. Water contributions during dewatering (inflow rate) from lakes Daviault, Mills and Molar for the base and the selected case are presented in Table 20-10.

Table 20-10: Pit Dewatering Rate and Lakes Contribution (Y26)

Dewatering Scenario (Y26)	Pit Outflow Rate (m^3/day)	Inflow Rate (m^3/day)			
		Pike Lake	Mills Lake	Daviault Lake	Molar Lake
Base Case(1)	12,432	7,051	520	1,133	84
Selected Case(2)	40,849	29,460	525	7,017	110

(1) The base case represents the calibrated scenario.

(2) The selected case represents a conservative scenario (higher dewatering flow rate) selected for the water infrastructure design.

The estimation of pit dewatering flow rates relies on a set of conservative conceptual assumptions, such as:

- The representation of faults as homogeneous zones of high hydraulic conductivity ($5x10^{-5}$ m/s) directly connected to the lakes (Pike and Daviault);
- The representation of faults throughout the pit's depth (450 m);
- The extension of the Katsao-Wishart fault to Daviault Lake, with a high hydraulic conductivity ($5x10^{-5}$ m/s). It is worth noting that, based on the regional geology, the Katsao-Wishart fault is interpreted to be continuous up to Daviault Lake. However, the geological continuity of the fault, does not necessarily translate to a high hydraulic conductivity zone that would extend over the 2.6 kilometres separating the lake from the pit. This hypothesis is therefore conservative with respect to dewatering rates;
- Maintaining constant water levels for Daviault and Pike lakes throughout dewatering, which maintains a high hydraulic gradient towards the pit.

The completion of the following steps will help reduce the uncertainty in predicting groundwater dewatering flow rates:

- Evaluate fault connectivity to Pike Lake by characterizing overburden and lakebed sediments with field investigations;
- Conduct a pumping test to evaluate the connectivity and extent of the fracture network;
- Install pressure transducers in the northern sector of the pit to assess potential groundwater drawdown in the direction of Pike Lake during the pumping test;
- Install pressure transducers in the central and southwestern sector of the pit to assess potential groundwater drawdown in the direction of Daviault Lake during the pumping test.

20.8 Baseline Hydrology and Water Management – Rose Pit Area

20.8.1 Overview

Drainage across the Kami Property is generally directed North and East through a series of wetlands, lakes and connecting streams that form part of the headwaters of the Churchill River watershed.

The planned Rose Pit and Rose North Overburden Stockpile are in the west section of the site in Pike Lake South, Rose Lake, and Mills Lake watersheds. The Rose South Waste Rock Stockpile is in the east portion of the site in Waldorf River, Mills Lake, and Long Lake watersheds. Ultimately, Pike Lake South drains in Long Lake.

The following figures show natural watersheds on a regional and local scale, and the modified watershed on a local scale following the completion of the Project.

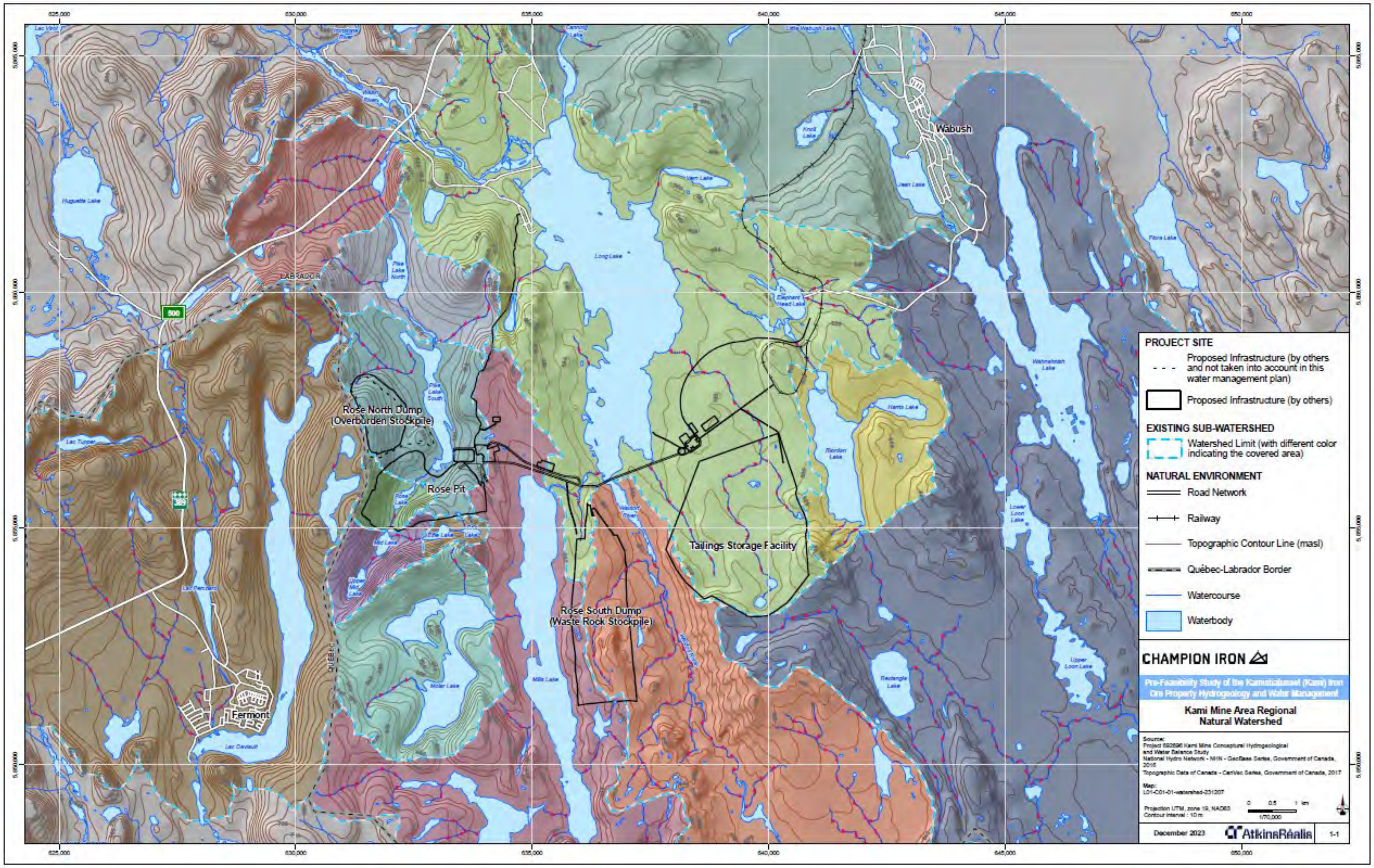


Figure 20-4: Kami Mine Area Regional Natural Watersheds

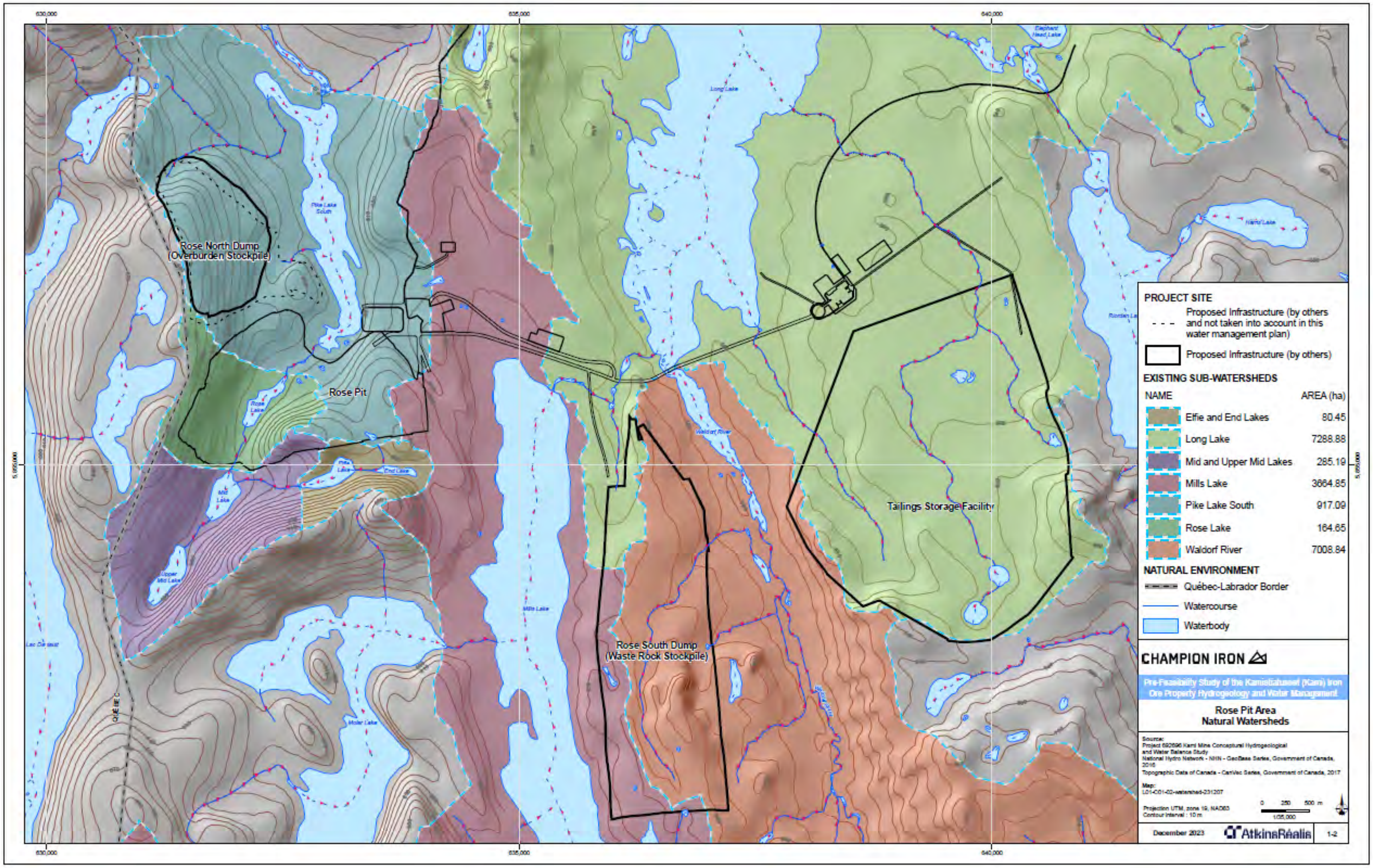


Figure 20-5: Rose Pit Area Natural Watersheds

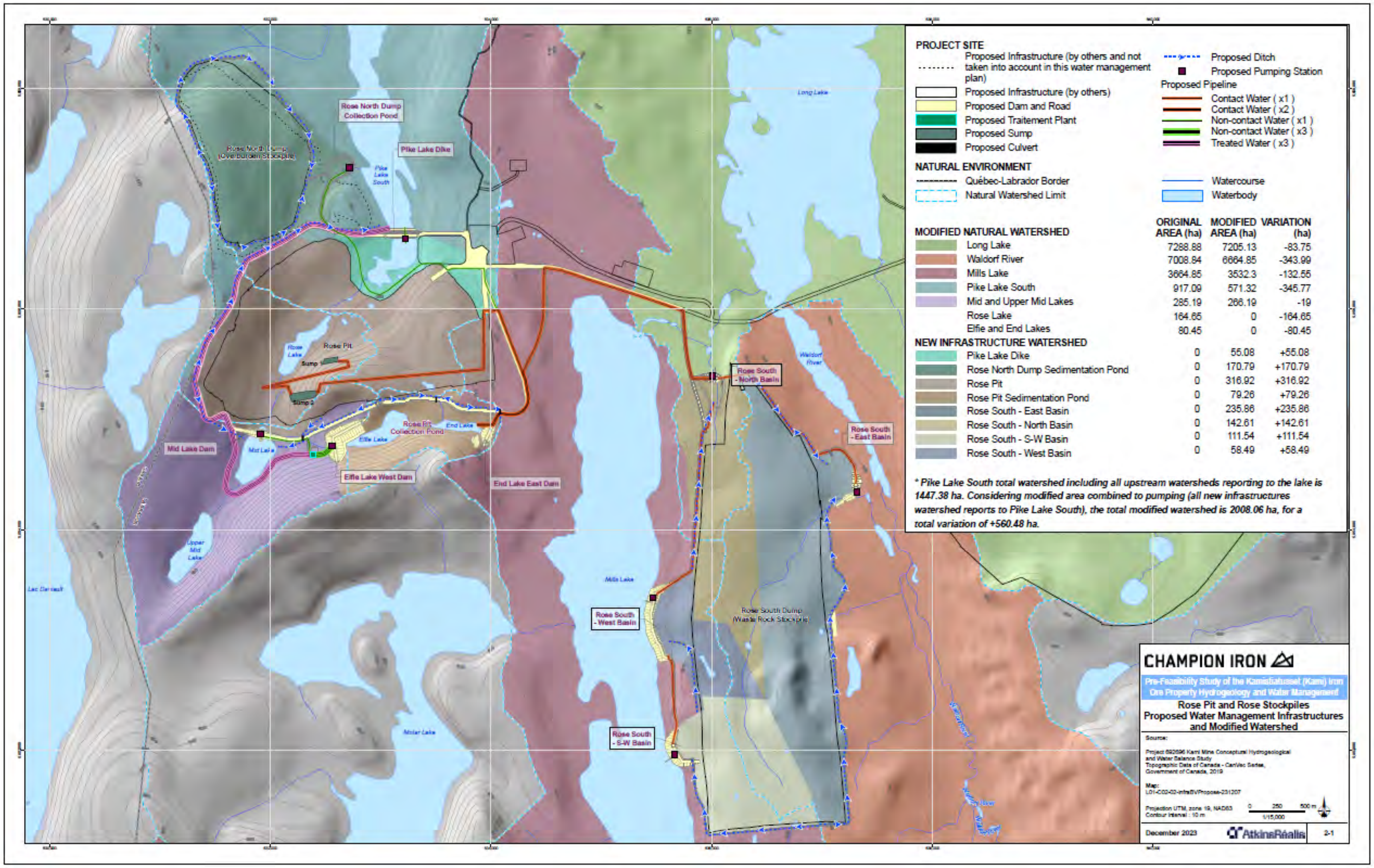


Figure 20-6: Rose Pit Area Modified Watersheds

Rose Lake, Elfie Lake and End Lake will be integrated in the water management infrastructure of the Project. Effects on the hydrology of Mills Lake and Long Lake will be negligible, due to their large natural watershed.

Pike Lake South will undergo more changes due to the Project development. Considering the watershed of Pike Lake South itself, it will be reduced by 38% following the development of the Project. However, considering the total watershed, including the upstream watersheds reporting to Pike Lake South combined with pumping once the Project is developed (runoff from all new infrastructure related to Rose Pit and the Rose North and South stockpiles reports to Pike Lake South), the watershed will pass from 1,447 ha to 2,008 ha, a raise of 39%.

As presented in Section 20.7, it is expected that some water in Pike Lake will be lost through infiltration towards the Rose Pit, which means that the natural water level in the lake could be affected despite the raise of watershed area reporting to the lake. Mitigations for potential effects on Pike Lake water level will be developed in the next phase of engineering.

20.8.2 Hydrological Data Used for Design

The hydrological data used for the design of the water management infrastructure related to the Rose Pit, Rose North Stockpile and Rose South Stockpile are based on Environment Canada Weather stations measurements. Of the three weather stations in the vicinity of the site, Wabush Lake A-ID 8504175 (1961–2012) station data was selected due to the longer and more reliable data record. Precipitation, rain, and snowfall averages were estimated based on data obtained from that station. Inflow design flood ("IDF") curves for the 2041–2070 time horizon were extracted from the report “Intensity-Duration-Frequency Curve Update for Newfoundland and Labrador” (CRA, 2015)

20.8.3 Water Quality

West Area

The water stemming from the Rose Pit and from the overburden and waste rock stockpiles is not expected to generate any adverse environmental effects associated with acid rock drainage ("ARD") and metal leaching ("ML"). Given the fact that nitrogen-based explosives will be used during the blasting operations, Ammonia, Nitrates and total suspended solids (“TSS”) are assumed to be the parameters of concern.

At this stage of the Project, the assumptions on Ammonia, Nitrates and TSS concentration in the Rose Pit Collection Pond are based on the available information from similar infrastructure at the Bloom Lake Mine located close to the future Kami mine and operated by Champion.

Considering the flowrates applicable to the Kami Project, a mass balance done on the nitrogen species (NH_4^+, NO_3^-) has shown that there will be no need to treat NH_4^+, NO_3^-. Following the same methodology, a mass balance was done on the TSS and has shown that the treatment plant for the Rose Pit area shall be designed to treat TSS.

East Area

At this stage of the Project, assumptions on the TSS concentration from the TMF are based on the available information from similar infrastructure at the Bloom Lake Mine located close to the future Kami mine and operated by Champion.

The water treatment plant in the East Area was therefore designed to treat only suspended solids before it is discharged to Long Lake.

20.8.4 Annual Water Balance – Rose Pit Area

A water balance for a typical year was developed for the different infrastructure on the West Area of the Kami Project. The Project site was divided into sub-basins considering their characteristics in terms of proportion of forests, lakes, road and their watershed area.

Table 20-11: Runoff Coefficients and Watershed Characteristics

Description	Runoff coefficient		Rose Pit	Rose North	Rose South EB	Rose South NB	Rose South WB	Rose South SW	End & Elfie Lake	Mid Lake	Pike Lake Dike
	Winter	Summer	% of Total Watershed								
Water Surface	1.0	1.00	0%	1%	1%	0%	1%	1%	14%	7%	18%
Forest	1.0	0.19	9%	0%	0%	0%	0%	0%	81%	91%	69%
Road	1.0	0.50	57%	25%	4%	3%	2%	4%	4%	1%	13%
Pit Walls	1.0	0.90	33%	0%	0%	0%	0%	0%	0%	0%	0%
Overburden Stockpile	1.0	0.30	0%	73%	0%	0%	0%	0%	0%	0%	0%
Waste Rock Stockpile	1.0	0.25	0%	0%	95%	97%	97%	96%	0%	0%	0%

Based on calculation made for an average year and considering the Rose Pit infiltration to be at 40,000 m³/d, the following table shows the amount of water expected to be managed by the main infrastructure related to the Rose Pit at the end of mine life. Most of the water to manage on a yearly basis comes from the pit dewatering.

Table 20-12: Annual Volume of Water to Manage for an Average Year – End of Mine Life

Infrastructure	Annual Volume to Manage (m^3)
Rose Pit	15,779,492
Water Treatment Plant	17,736,576
Mid Lake Dam	683,102
Rose North Overburden Stockpile	486,094
Rose South Waste Rock Stockpile (North Basin)	1,249,874
Pike Lake Dike	163,000

20.9 Baseline Hydrology and Water Management – East Area

20.9.1 Overview

The drainage across the TMF area is generally directed towards the east or north. The proposed Kami TMF area drains north into Long Lake.

In the central Property area, forest fires have contributed to the exposure of outcrops, while the rest of the Property has little exposure to outcrops. The vegetation cover consists mainly of various coniferous and deciduous trees, with alder growth on areas exposed by forest fires.

Figure 20-7 provides the general topography and watershed areas for the proposed TMF site. Drainage from the site flows northwards into Long Lake. Riordan Lake is located east of the TMF and close to the site, although runoff from the site does not drain into it. Riordan Lake also drains into Long Lake.

20.9.2 Water Balance

Management of precipitation and process flows are completed within the disposal facility (TMF) and are required over the operating life of the facility. Management of the collected water is required within the TMF over a wide range of climatic and operating conditions as the facility expands during the operating phase of the mining operations.

Assessments are required to predict inflows related to varying climate conditions. A tailings facility does not have a single unique flow model as the operating and climatic conditions can vary throughout the year. The mean average values are statistically determined and may never occur. Evaporation is a function of the surface area of the ponds and wet tailings surface, which are changing daily, embankment seepage is an estimate, discharge slurry density can vary and the production rate can change.

During the mine operation phase, water will be pumped from the pond via a portable pump system for process make-up water needed to operate the process plant. Water recycled from the tailings pond will be approximately 0.69 Mm^3 per month during Stage 9. The additional clean make-up water required in the process plant is about 0.275 Mm^3 per month and can be provided from an external source (i.e., Long Lake) during Stage 9. Water management components for the TMF are shown in Figure 20-8.

The portable pump system will be required to handle freezing winter conditions and operate during the winter months. A side hill pumping system is an alternative, but a portable pump is preferred because the pond will move during the life of the facility. Access to the water return system will be provided by a rockfill berm established within the basin with access from the east side of the facility.

Runoff and seepage collection ditches will be constructed along the toe of perimeter dam in the TMF. Water collected in the ditches will be directed to sumps at various topographic low points around the dams and pumped back to the TMF.

During the winter, tailings water may freeze in the tailings beach before getting to the pond. This frozen water may not thaw during the next summer if tailings are deposited above the frozen layer. This will reduce the capacity of the basin to store tailings and limit the amount of water available in the tailings pond for recycling to the plant. When sizing the tailings pond, an allowance of 2 m was included as frozen tailings water that corresponds to the volume assumed not to reach the pond during winter months. This volume becomes stored in the pond before winter and can be allocated as required reclaim water to the plant.

The maximum monthly accumulation in the TMF pond under the average climate conditions is 1.36 Mm^3 for Stage 1 and 1.12 Mm^3 for Stage 9. The maximum monthly accumulation in the TMF pond under the average climate conditions considering climate change for Stage 9 is 1.25 Mm^3. In dry climate conditions, water is always available to supply the water demands of the mill. The maximum monthly accumulation in the TMF Pond under the 100-year wet and 100-year dry climate conditions for Stage 9 is 1.71 Mm^3 and 0.87 Mm^3, respectively.

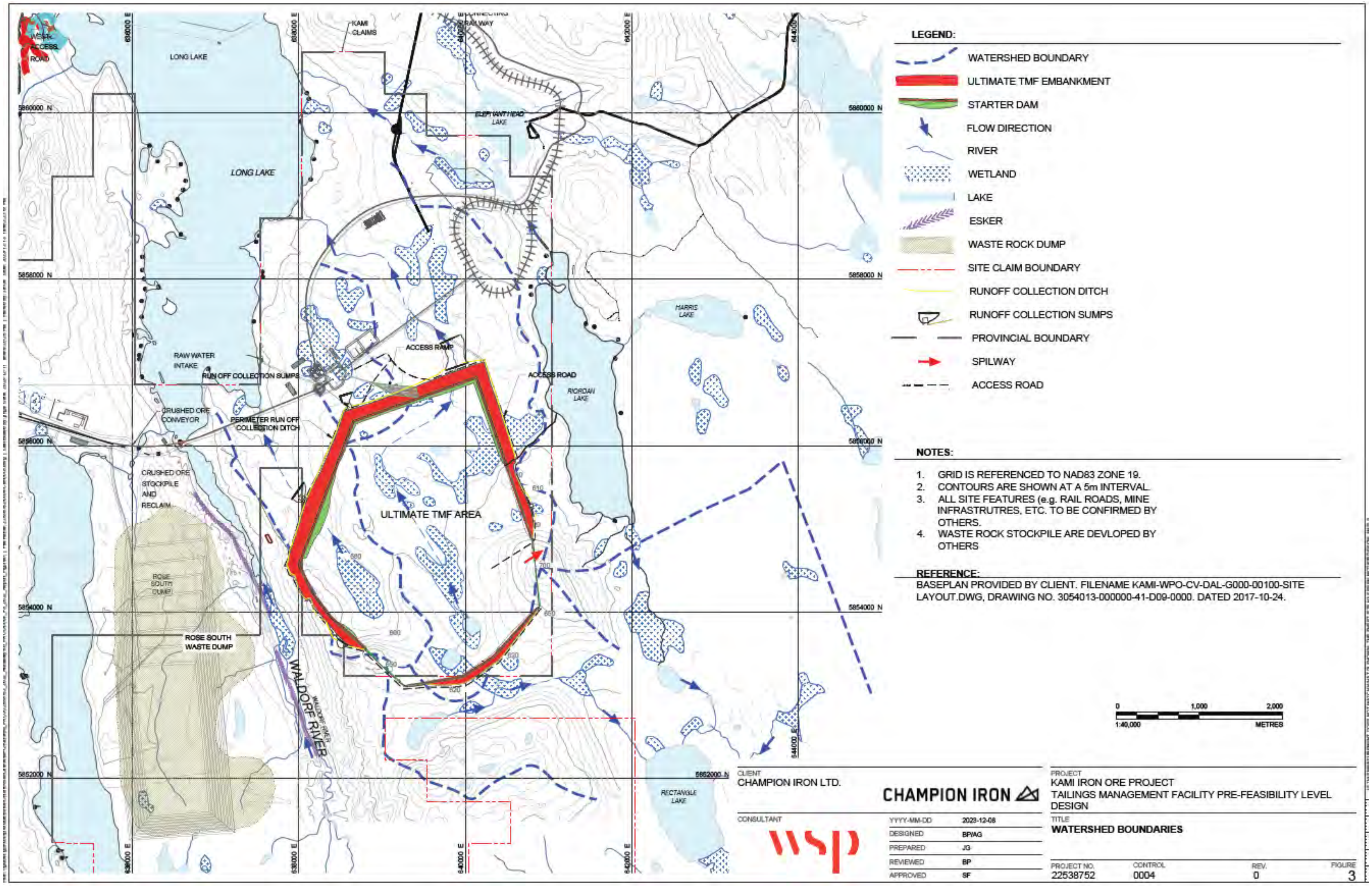


Figure 20-7: TMF Watershed Boundaries

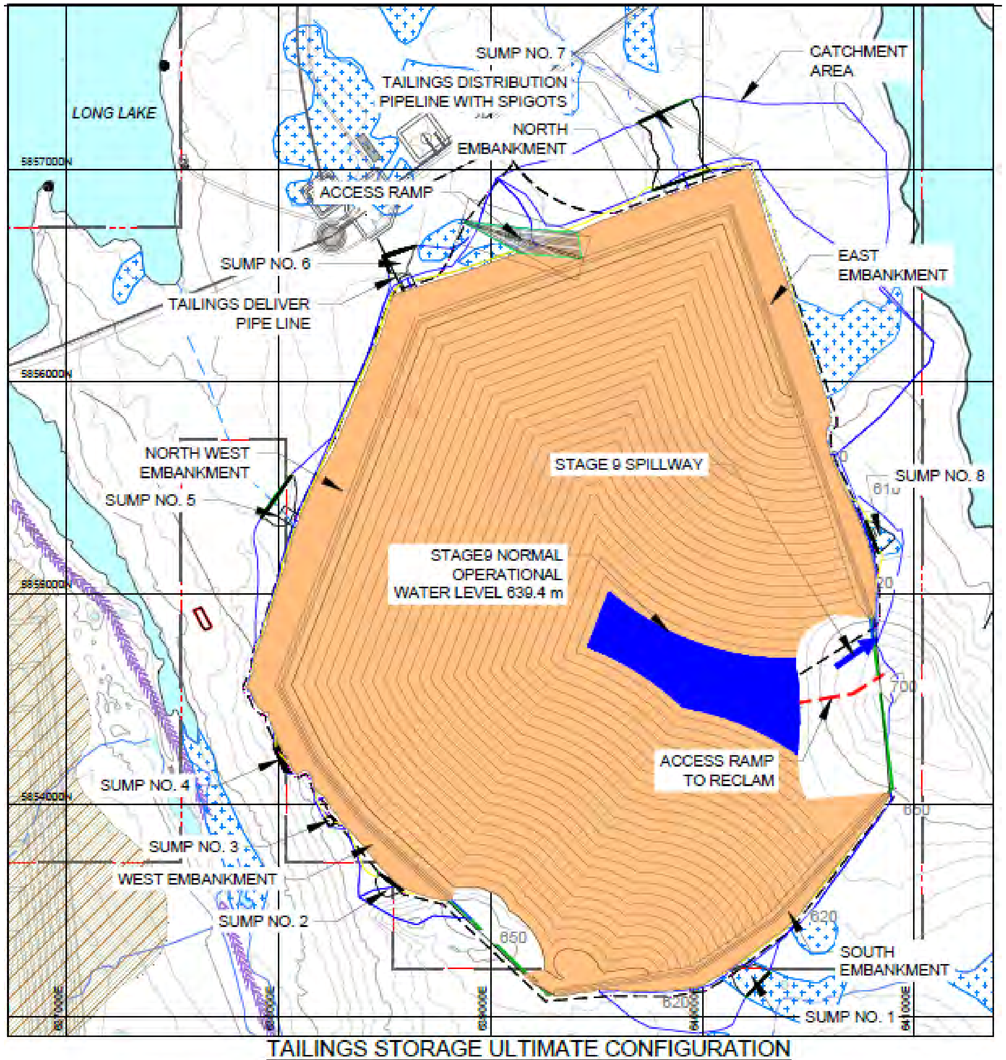


Figure 20-8: TMF Ultimate Configuration and Location of Water Management Features

20.10 Tailings Management

20.10.1 TMF Design and Operation

The tailings management facility ("TMF") design and operation is presented in Chapter 18 of this Report.

20.10.2 Environmental Considerations

Based on studies and testing performed to date, the tailings are considered to be non-acid generating ("NAG") with low metal leaching potential. However, it is estimated that 27.3% of the overall planned Rose South MRS may consist of PAG rock (Okane, 2024), with an additional 6.7% of the mine rock being uncertain. The total PAG mine rock is estimated between 249 Mt to 312 Mt. Champion proposes to use waste rock in the construction of the starter dam and embankment raises for the tailings facility. Therefore, care will have to be taken to ensure that PAG and/or metal leaching waste rock will not be used for the TMF construction. Runoff water that comes into contact with PAG material will be directed to runoff collection ditches along the perimeter of the TMF. This contact water will be collected and pumped back into the TMF. Water collected within the TMF will either be pumped to the effluent treatment plant or to the processing facility.

The potential for red water and sedimentation will need to be evaluated with respect to the updated TMF design.

20.10.3 TMF Rehabilitation and Closure

If feasible, the TMF cells should be substantially drained at closure to reduce maintenance and to reduce risk of dam failure. Directed flow channels will be provided at each cell to allow for the surface runoff to drain safely to the nearby water courses.

For rehabilitation and closure planning and to provide a cost estimate for closure, in consideration of existing local site conditions, it is assumed that the final tailings surface will be revegetated using techniques employed by adjacent mine operations for most of the exposed tailings area. This cover minimizes erosion and dust release while allowing local, natural vegetation to take over with time.

20.11 Overburden Stockpile

Overburden stripped from the open pit will be placed in the overburden stockpile located to the northwest of the pit. The overburden stockpile will be built in 10 m high lifts, with an overall slope of 19 degrees. The stockpile has a capacity of 60 Mm^3, a maximum elevation of 700 m and a surface area of 145 ha. The stockpile is offset a minimum 50 m from both the provincial border and the recreational park.

20.12 Waste Rock Pile

As presented in Section 18.2.4, waste rock will be placed in the waste rock pile using an IPCS. The waste rock pile is located to the southeast of the open pit, east of Mills Lake. Waste rock will be placed on the pile with the mobile stacker in 60 m high lifts. A 30-m wide berm has been considered in the waste rock pile design to provide an overall slope of 28.4 degrees. The total height of the waste rock pile at completion will be 180 m and reach the 760 m elevation. The waste rock pile has a capacity of 430 Mm^3 and a surface area of 430 ha.

The waste rock pile will be built in six phases. The first three phases, which will be completed in Year 7 of the operation, ensure that the waste rock pile remains in the same watershed, which defers the construction of certain water management infrastructure. The waste rock pile includes a system of access ramps at the north end, which will be used to install some of the IPCS conveyor components. The ramps will be built with the mobile stacker.

The waste rock pile has been designed to optimize the IPCS, but it also allows haul trucks to access the pile and place waste rock during periods when the IPCS is being relocated or shut down for maintenance.

20.13 Rehabilitation and Closure Planning

Champion is developing a Rehabilitation and Closure Plan in accordance with the Newfoundland and Labrador Mining Act (SNL 1999 M-15.1 Sections 8, 9, and 10), and Mining Regulations (42/00 Section 7). The intent of the Rehabilitation and Closure Plan is to ensure long term physical and chemical stability at the operation's ultimate closure while ensuring maximum benefits to the local area surrounding the mine site and the Province of Newfoundland and Labrador. The intent of the Rehabilitation and Closure Plan is to limit long term potential impacts of the mining operation and associated facilities on the surrounding environment. The Rehabilitation and Closure Plan will be aligned with the environmental assessment process.

The Rehabilitation and Closure Plan is being developed to support future land use of accessible environmental, recreational, and future development opportunities where possible across the rehabilitated site. Key activities in achieving this future land use include:

- Accelerated flooding of the Rose Pit with limited recontouring to support stability and vegetation establishment, while maintain surface flow rates in surrounding water bodies. Temporary access control measures will be in place during the flooding period (anticipated to be approximately 10 years);
- Soil cover and revegetation of the tailings management facility;
- Progressive regrading, soil cover and revegetation of the Overburden stockpile and Waste Rock Storage Facility;
- Dismantling and removal of buildings, equipment and electrical infrastructure not required for monitoring or support of future land use purposes;
- Grading, scarification and revegetation of pads and roads not required for monitoring or support of future land use purposes;
- Dismantling and removal of railway infrastructure;
- On-site treatment of contaminated soil or off-site disposal in accordance with regulations;
- Re-establishment of passive surface water drainage following the pit-flooding period;
- Water treatment until acceptable water quality is achieved for passive discharge (anticipated to be approximately 5 years).

Additional interim care and maintenance and monitoring activities are expected during the closure and post-closure period. The post-closure period is defined as the period following pit flooding. These additional activities include interim care and maintenance during the anticipated 10-year pit flooding period, 5 years of short-term post-closure monitoring and maintenance, and 40 years of long-term post-closure monitoring. Short-term monitoring and maintenance is anticipated to include water quality, air quality, wildlife effects, and vegetation monitoring, as well as cover system and vegetation maintenance. Long-term monitoring is associated with monitoring tailings dam structures (Rehabilitation and Closure Plan Guidance Document Section 17.7 h.). Duration of those monitoring periods could be reviewed following demonstration that the site reached long term stability.

The total cost for rehabilitation and closure has been estimated at $300.4M. This value assumes third party implementation costs, no salvage value of mechanical or mobile equipment, and cost to dispose of all equipment on site as waste. Financial assurance will be phased over the life of mine, in line with estimated increases in closure liabilities.

21. Capital and Operating Costs

21.1 Basis of Estimate

21.1.1 General

Initial capital costs and sustaining costs were developed by various engineering firms as per the following:

- BBA Inc. – Process plant and site Infrastructure;
- G Mining Services Inc. ("GMS") – Rose Pit mine development inclusive of major production equipment, operational blending stockpile, IPCS waste stockpile, blending stockpile, mobile equipment fleet, overburden stockpile and explosives management;
- WSP Canada Inc. – Tailings Management Facility;
- AtkinsRéalis Inc. – Rose Pit and Rose stockpiles water management infrastructure;
- SYSTRA Canada Inc. – Kami railway line to connect the mine south of Wabush to the QNS&L Railway line;
- Okane – Closure costs.

BBA was mandated by Champion Iron Limited ("Champion") to integrate third party estimates, to assist in development of indirect costs and to perform a contingency analysis.

21.1.2 Type and Purpose of Estimate

The Technical Report reflects an advanced PFS with a target accuracy of +/-20%, based primarily on engineering deliverables developed to a Class 3 estimate, as defined in AACE International Recommended Practice No. 47R-11 for the Mine and Concentrator portions of the estimate and a Class 4 level estimate for Tailings and Water Management ("TWM")portion of the estimate.

The capital cost estimate, totalling CAN$3,864M, encompasses all capital expenditures anticipated during the pre-production years (Y-4 to Y-1) and the ramp-up year (Y-0) up to the commencement of ore feed. This comprehensive cost also includes initial operational expenditures incurred in the pre-production phase, such as mine pre-stripping, construction of the mine waste stockpile, initial TWM, operational costs, and capital costs associated with the In-Pit Crushing System ("IPCS").

Note, costs anticipated to be incurred before Y-4 are categorized as sunk costs and, as such, are not included in the Project CAPEX estimate or the financial model. The excluded costs covering future studies and permitting expenses incurred prior to Project approval are estimated at $52M.

21.1.3 Capital Cost Contributors

The BBA portion of costs covers the concentrator and major site infrastructure including:

- Site preparation;
- 600-bed permanent camp (used initially to support construction);
- Temporary 418-bed construction camp;
- Wabush to Kami site access road;
- 315 kV power line from Flora Lake to Kami site;
- 34.5 kV power line from Wabush to Kami site to support construction;
- Temporary and permanent mine garage, wash bay, warehouse, and offices;
- Mine haul roads;
- Main electrical substation;
- Local power lines to feed substations for 3rd party estimates related to the TWM;
- Overland conveying, crushing and ore storage;
- Tailings pipelines and pumping stations.

Third party capital cost estimates were received and integrated by BBA for the following scope elements:

- Mine – Rose Pit inclusive of major production equipment, operational blending stockpile, IPCS waste stockpile, mobile equipment fleet, overburden stockpile and explosives management – prepared by GMS with a specified accuracy exclusive of contingency of -10%; +15% except for the IPCS, which was based on a Class 4 estimating approach with input from BBA;
- Mine Site Water management of Rose Pit, Mid Lake Dam, sedimentation pond and West Area water treatment plant, Pike Lake Dike, and overburden and waste stockpiles – prepared by AtkinsRéalis within a specified accuracy exclusive of contingency of -27%; +20%;
- Tailings Management Facility – prepared by WSP within a specified accuracy exclusive of contingency of +/-25%;
- Capital cost related to the Kami railway line to connect the mine south of Wabush to the QNS&L Railway line. Costs developed by SYSTRA are inclusive of indirect costs and 10% contingency (Class 4 estimate).

21.1.4 Offsite Facilities Costs

Costs related to offsite facilities such as rail and port facilities have been provided by various third parties covering the following major scope items:

- Offsite Rail Infrastructure, rolling stock & rolling stock maintenance infrastructure – SYSTRA;
- Yard and port material handling costs – Cima+.

Rail Rolling stock is treated as leased and captured in the financial model but excluded from the CAPEX.

All other costs related to the transport of iron ore concentrate and material handling at the port, such as operational costs or maintenance of infrastructure, are excluded from the CAPEX and are covered as OPEX in the financial model, based on Champion existing and potential agreements with the rail transport, yard and port providers.

21.1.5 Estimate Base Date

The estimate is expressed in constant Canadian dollars with a base date of December 22, 2023.

21.1.6 Base Currency and Exchange Rates

The estimate base currency is Canadian dollars ($). All bulk material pricing is based on Canadian dollars.

Budgetary pricing received for equipment has been converted to Canadian dollars using the following exchange rates provided by Champion.

Table 21-1: Currency Exchange Rates

Currency Code	Currency Name	Unit	Rate	% Content
CAN	Canadian Dollar		1.00	89.6%
AUD	Australian Dollar	CAN$: AU$	0.92	0.2%
USD	US Dollar(1)	CAN$: US$	1.30	7.8%
EUR	Euro(2)	CAN$: Euro	1.57	0.4%

(1) US$ to CAN$ based on direct Champion coverage average analyst consensus.

(2) Euro to CAN$ based on the 5-year Bloomberg forward quote as of November 2023.

21.1.7 Estimate Coding

Estimate Structure

- The estimate is structured by work breakdown structure ("WBS") and by work element coding ("WEC") representing BBA's commodity coding structure to collect the estimate items into groups of work of a similar nature or discipline.
- The estimate is based on metric units of measure

Estimate Cost Type

The estimate direct costs are captured in three principal cost categories: labour, permanent equipment and permanent material, which have been identified with a pricing basis according to the following parameters:

- Budgetary – budgetary pricing with corresponding technical and commercial review;
- In-house – pricing from previous studies, escalated PO, etc.;
- Estimated – unit price applied to developed quantities;
- Allowance – accepted industry prorated costs for supplies/services.

21.1.8 AtkinsRéalis Pricing and Quantity Basis

Pricing Basis

The direct cost for the estimate is developed based on unit costs from several sources. Earth works unit costs were based on benchmarking of the Bloom Lake mine site. Pumps and piping cost were provided by specialized suppliers.

Quantity Development

All material take-offs ("MTO") are "neat" quantities, reflecting the count or measure generated by modelling tools and/or captured from documents (i.e., drawings, etc.). These MTOs are identified with the relevant WBS (provided by BBA). Basis of quantity development for specific engineering disciplines are provided below by engineering discipline.

Earthworks

Earthworks, quantities are developed based on typical sections and quantity for each material is calculated based on geometry. Quantities for grouting include only one grout curtain. For Mid Lake Dam, Elfie Lake and End Lake, clearing quantities include clearing along the lakes to the future water level. For all ditches excavation, an assumption of 5% of the excavated quantity is assumed to be excavated in rock.

Architectural

Building items are factored.

Pumps and Pipes

Pipe quantities are developed based on linear distances measured on the plan. The pipeline will be placed on a bedding foundation twice the pipe's diameter in width.

It is assumed bedding is an enlargement of road. Required enlargements were provided to BBA for the roads under their scope and are excluded from this estimate. Bedding for pipeline routing on roads under AtkinsRéalis scope is included directly in the road MTO. No special foundation is considered, apart from a supplementary width of road. Bridges, overpass, culverts, and other civil structures necessary in the pipeline path are included in BBA's infrastructure estimate.

Pump capacity is developed to manage the Environmental Design Flood ("EDF") and based on a hydraulic model of the site.

Pump specifications are provided by suppliers to obtain budgetary proposal. Piping costs are also estimated based on budgetary proposal from Vendors.

Water Treatment

Water treatment process equipment is provided by suppliers. The total direct cost is factored to include buildings and ancillaries. No quantities were estimated.

Electricity

Costs for power supply are excluded from this estimate. Costs for electricity connection and equipment are factored.

BBA has provided costs for electrical feed and connection to local substations. Local distribution is included within the factors.

Design Growth

The following factor has been applied to neat engineering quantities:

- Earthworks: 10% on all items.

21.1.9 WSP Pricing and Quantity Basis

Quantity Basis

The following defines the quantity basis by major construction elements.

- Stripping and grubbing – Civil 3D for area and estimated depth;
- Embankment fill placement – Muk3D volume;
- Spillways excavation – Muk3D volume;
- Spillways cleans and slush grout and concrete – Civil 3D estimate volume;
- Embankment geosynthetics – Civil 3D area of embankment;
- Surface water management excavation and geosynthetics – Civil 3D;
- Surface water pipeline – Length based on highest embankment height.

Pricing Basis

Unit costs for civil works are based on a combination of WSP in-house data and on benchmarking of Bloom Lake mine site.

Additionally budgetary pricing was received from contractors for haul and placement of 0-1,000 mm embankment rock shell.

21.1.10 GMS Pricing and Quantity Basis

Initial Capital costs and sustaining capital costs were developed by GMS. The capital costs include pre-stripping and pre-production OPEX incurred prior to Year 0.

The capital cost portion includes pre-stripping and initial development of Rose Pit, main production equipment, mine mobile fleet, in-pit crushing system for waste and preparation of stockpiles for operational blending, large blending and waste.

Pre-production mining will take place for about a year to provide material for construction and to remove overburden to allow access to the pits.

Mine haul roads and stockpile pads for the various stockpiles are included within the BBA cost estimate.

Haulage will be performed by 300-t class off-highway mining trucks. The ore material will be hauled to the ore crusher located outside of the pit, while the waste will be hauled to the in-pit semi-mobile gyratory crusher. It will then be conveyed to the waste storage facility, where it will be spread into a pile using a spreader system.

Budgetary pricing was received from multiple vendors for the mine main production equipment and mine mobile equipment.

Production equipment pricing is inclusive of tires, transport to site, and assembly and commissioning.

The mining fleet purchased at Year -1 and Year 0 represents $183M. This amount is included in the CAPEX (Table 21-2) and is modelled as leased in the financial model.

21.1.11 BBA Pricing and Quantity Basis

The approach chosen for the estimate was the standard one of issuing key engineering deliverables to the estimating group in a timely fashion and in such a manner that any subsequent revisions to these key core documents were clearly identified. All MTOs and lists were identified with a revision date.

All quantities generated for the estimate exclude contingency. Growth allowances have been applied to the MTOs and are managed with a unique column within the details of the estimate.

Allowances fabrication losses, cut and waste losses and wastage have been applied to the material unit price. Table 21-2 provides a summary of the factors used.

Table 21-2: Growth and Waste Allowances

Commodity	Growth (on MTO)	Growth (on pricing)	Waste (on material)
Civil	10%	none	none
Civil – Compacted Fill	15%	none	none
Concrete	5%	none	3%
Steel MTOs – Structural Members	5% growth 10% connections	none	none
Architectural	10%	none	none
Mechanical and Electrical Equipment	none	none	none
Piping	15%	none	5%
Wire and Cable	none	none	5%

21.1.12 Major Quantity Summary

Table 21-3: Major Quantity Summary

Cost Element	Unit	Current Estimate
Excavation	m^3	4,564,143
Backfill	m^3	2,558,232
Piles	m	4,280
Concrete	m^3	66,744
Structural Steel	t	11,572
Roofing	m^2	30,566
Siding	m^2	39,929
Piping – Process Piping	m	21,237
Piping – Pipelines	m	29,090
Piping – Allowances (small bore, services)	m	12,800
Electrical – 1 kV to 46 kV Cable	m	144,815
Electrical – Overhead Lines	m	50,200
Electrical – Cable Tray	m	29,200

21.1.13 Pricing Development Overview

The estimate is expressed in Canadian dollars reflecting market pricing as of the 4th quarter 2023 (Q4 2023) for all bulk material pricing and equipment supply. All estimate pricing is exclusive of forward escalation.

Budgetary pricing was received from multiple vendors for major mechanical equipment packages. Technical reviews were performed by package. Equipment pricing is exclusive of spare parts or vendor assistance for installation and commissioning. These costs are captured separately in the indirect costs.

Table 21-4 provides a summary of mechanical equipment pricing basis.

Table 21-4: Mechanical Equipment Pricing Basis

Pricing Category	% Content
Budgetary +/-10%	36.3%
Budgetary +/- 15%	34.8%
historical Escalated	6.4%
In-house	3.2%
Estimated / Internal Database	19.4%

21.1.14 Costs Basis by Discipline

Civil

Quantity Basis

Engineering has provided a detailed MTO for all civil-related scope items including:

- Site Preparation (clearing, grubbing, rough grading, ditching, excavation and backfill);
- Main Access Road;
- Mine Haul Roads;
- Site Roads;
- Retention Basins;
- Pads for process areas and mine lending, waste and overburden stockpiles.

Pricing Basis

Earthworks have been priced using BBA standard unit rates and in-house data.

Concrete

Quantity Basis

Concrete quantities have been estimated from preliminary design calculations and sketches or 3D model, where applicable. Concrete volumes were grouped by type (footings, piers, columns, walls, slab on grade, equipment foundations). Foundations for equipment have been identified separately by process area.

Quantities are based on historical ratios but have been generated in sufficient detail to distinguish between foundation, columns slabs, etc.

Pricing Basis

Concrete cast-in place pricing rates has been built-up for each type of concrete with formwork and rebar densities based on historical data (where no engineering information is available). Rebar pricing includes supply and shop fabrication as part of the material price. The cost of concrete supply is based on the premise that a concrete batch plant produces concrete at the Kami site.

Structure and Architecture

Quantity Basis

Engineering has provided steel MTOs for all process buildings and major non-process buildings such as the permanent Mine Garage complex.

MTOs were developed according to preliminary 3D structural models developed as part of preliminary structural calculations. As such, basic load cases were used to be able to size the necessary structural elements of each structure.

Steel quantities were segregated as follows:

- Light <30 kg/m;
- Medium 31-60 kg/m;
- Medium 61-90 kg/m;
- Heavy 90-155 kg/m;
- Very Heavy >150 kg/m;
- Crane girders and rails;
- Girts and SAG rods;
- Truss;
- Grating;
- Handrails;
- Roof decking.

Architectural quantities have been estimated by the Architect for all buildings.

Pricing Basis

Structural steel fabrication costs are based on budgetary pricing from local fabricators.

Pricing for architectural items was provided by the Architect, based and validated by BBA against recent Project data and or in-house pricing.

Permanent Camp

The permanent camp is based on modular design and includes executive room dormitories with a 600-bed capacity, cafeteria and service center modules and connecting corridors.

The cost is based on budgetary pricing and includes engineering and shop drawings, fabrication, delivery of modules and site installation.

Mechanical

Quantity Basis

The mechanical scope of work is defined by the material mass and water balances, process flow diagrams, and detailed mechanical equipment list which has been structured by WBS and provides the following data:

- Physical area (WBS);
- Equipment tag number;
- Equipment description;
- Equipment capacity;
- Retained vendor and reference to model number where applicable;
- Dimensions;
- Material of construction;
- Empty weight;
- Loaded weight;
- Width, length and lift for conveyors;
- Motor power (hp or kW);
- Supply package number;
- References to budgetary quotations.

The list is inclusive of all platework including chutes, pump boxes, launders, tanks and silos.

Pricing Basis

All major equipment is based on budgetary pricing which has been evaluated technically and commercially.

Pricing for minor equipment is based on a combination of budgetary pricing, informal quotes and in-house pricing.

Mechanical Services

Mechanical services are defined by the following broad categories:

- Plumbing and drainage;
- HVAC;
- Industrial ventilation;
- Fire protection;
- Cooling.

Engineering has provided a preliminary MTO for mechanical services. Pricing is based on in-house data.

Piping

Quantity Basis

Engineering has provided a detailed piping line list / MTO for all process and utility piping. The document includes the following information:

- Physical area (WBS);
- Diameter;
- Fluid code / pipe service;
- Fluid name / type;
- Line number;
- PFD drawing number;
- Pipe service;
- Piping material;
- Piping schedule;
- Insulation material, thickness;
- Length (m);
- Complexity factor.

The MTO covers all large bore piping (3 inches and above) with quantities calculated based on PFD information, preliminary sizing calculations and lengths generated manually from the 3D model.

The remaining small-bore piping (below 3 inches) within process areas has been factored based on a comparison of benchmark data.

A manual valve list has not been generated for the PFS study. An allowance has been included to cover manual valves.

Pricing Basis

Piping material and fabrication pricing is based on in-house pricing.

Material pricing includes supply and fabrication of pipe and fittings. Pricing reflects the level of complexity (number of fittings per 100 linear feet of pipe) specified in the Engineering MTO.

Allowance has been added to cover manual valves, scaffolding and domestic and firewater distribution.

Electrical

Quantity Basis

Engineering have provided a detailed MTO covering the main electrical substation and electrical equipment and distribution for local substations.

The MTO specifies the quantity and sizing of major electrical equipment and provides electrical distribution quantities evaluated by the electrical engineering department based on electrical layout drawings, site electrical distribution layout, and load list.

The MTO specifies the quantity and size of local substations which are based on prefabricated E-rooms.

Additionally, the MTO identifies all overhead power lines and identifies all distribution cables and trays.

Lighting fixtures, lighting transformers and lighting cables for buildings are not included and have been captured by building based on allowance per unit area of building.

Pricing Basis

Pricing for some of the major equipment is based on a combination of recent purchase order information and or budgetary pricing from a Champion project currently in detailed engineering.

Pricing for all other equipment, electrical wire and cable, and cable trays are based on in-house pricing from recent projects.

Automation, Telecommunications, and IT

Quantity Basis

- Engineering has developed a detailed list for instrument cables, field instruments and control valves without benefit of P&ID's;
- Engineering has defined the DCS/PLC hardware, software, and control room furniture;
- Communication is based on an MTO for the backbone supply, cables terminations, control access and all other items needed for a complete and functional installation;
- IT and software for all the pertinent management systems such as warehouse management system, laboratory information system, production, and planning platform software, etc., is based on a factor / allowance.

Pricing Basis

Pricing for instruments, hardware and software is based on informal pricing or recent in-house pricing. Bulk materials and components are estimated as per BBA's historical data based on recent quotes.

As specified above costs for IT and software for management systems is based on an allowance.

21.1.15 Labour Costs

Labour Rates

Construction labour costs at Kami are based on a seventy-hour work week (7 x 10) deploying a single day shift and a rotation of two weeks on and one week off (2/1).

This strategy reflects transferable experience from Champion at the Bloom Lake mine site and favoured over a 3/1 model from a HSE and productivity perspective and considered to be a preferred model to attract and retain skilled workers.

Wage rates for trades have been established based on construction industry labour collective agreements in Newfoundland and Labrador ("NL") for industrial projects for 2023. Double time is considered after 8 hours per day and weekends.

As part of the available accommodations, it is assumed the Kami site's permanent and temporary lodging provisions are sufficient to house all contractor direct and indirect staff. Therefore, the labour crew rates do not cover air travel expenses or room and board allowances for these individuals.

Composite crew wage rates have been established for each commodity based on trade teams comprised of a foreman, journeymen, apprentices, and general labour across all construction trades. The composite crew rates include the following costs:

- Trade base rates fringe benefits and overtime;
- Mobilization & demobilization of contractor items;
- Non-manual labour (general foreman, superintendent, project manager, etc.);
- Indirect manual labour;
- Small tools and consumables;
- Ownership and operational costs of construction equipment (inclusive of fuel);
- Construction cranes up to 130 T;
- Health, safety and environmental requirements;
- Site supervision and administration;
- Contractor temporary site facilities;
- Overhead and profit.

Construction equipment is developed and assigned by specific crew. Hourly equipment costs include the material portion (depreciation, interest, cost of repair and maintenance, insurances permits and taxes) and operating portion (fuel, lubricants, and filters). Sources for rates include the yearly Québec Government publication titled "*Taux de Location de Machinerie Lourde*" used by the Ministry of Transport for civil contracts related to public works, roads and highways, contractor pricing and or pricing received by crane suppliers. The cost of the operator is excluded from the hourly operating cost and included in the crew mix.

The following table provides a summary of the blended rates per discipline.

Table 21-5: Blended Hourly Labour Crew Rates per Discipline Summary

Hourly Crew Rates Based on 70 Hours/Workweek (CAN$)				
Typical Crew	Labour Rate		Construction Equipment	Total
	Direct	Indirect		
Civil Works	94.23	57.08	107.11	258.40
Concrete Works	93.96	55.83	19.05	168.85
Metal Works	94.74	60.75	44.48	199.95
Heavy Architectural Works	94.10	58.11	14.27	166.50
Light Architectural Works	93.64	57.83	5.34	156.80
Mechanical	98.92	63.14	30.27	192.35
Piping	95.37	60.86	26.13	182.35
Piping insulation	92.48	55.48	6.02	154.00
Electrical	98.43	61.35	12.31	172.10
Automation/Telecom	96.92	60.45	8.33	165.70

Labour Hours and Productivity

Direct field labour is the skilled and other labour required to install the permanent plant equipment and bulk materials at the Project site. Unit installation hours are exclusive of contractor's non-manual labour (site supervisors, accountants, clerks) and indirect manual labour which are captured in the composite crew rates. The following items were considered when developing the labour productivity factors:

- Site location
- Extended overtime
- Access to work area
- Height – Scaffolding
- Availability of skilled workers
- Labour turnover
- Inspection + QA / QC
- Sophisticated specifications
- Materials + Equipment Handling
- Weather conditions
- Scattered items of work
- Complexity
- Overcrowded / Tight work areas
- Efficiency
- Supervision
- Revamps / Connections / Tie-ins
- Fast-track requirements
- Safety / Security

Table 21-6: Labour Productivity Factors

Activity	Factor
Civil Works	1.31
Concrete Works	1.40
Metal Works	1.40
Heavy Architectural Works	1.40
Light Architectural Works (flooring/painting/gypsum board)	1.36
Mechanical Works	1.40
Piping Works	1.45
Electrical/Automation/Telecom.	1.40

21.1.15.1 Indirect Costs

EPCM Services

Costs related to engineering, procurement and construction management ("EPCM") are currently based on the following:

- BBA scope – 12% of BBA-related direct costs for EPCM services inclusive of basic engineering, detailed engineering, construction management and programming (amount of $10M allotted for basic engineering is anticipated to be spent in Y-5 prior to project approval and, therefore, excluded from the CAPEX and financial model);
- GMS scope – $500K for detailed engineering proposed by GMS;
- AtkinsRéalis (SNC Lavalin) scope – 15% of related direct costs for EPCM services related to initial CAPEX;
- WSP scope – 7% of related direct costs for EPCM services associated with initial CAPEX (amount provided by WSP);
- SYSTRA – 10% of related direct costs for EPCM services associated with initial CAPEX (amount provided by SYSTRA).

Temporary Construction Facilities and Services

These costs are based on 5% of BBA direct costs and 3% of direct costs for third parties and cover site services and temporary facilities:

- Temporary roads, fencing and facilities, lay down areas, signage, and parking;
- Temporary buildings such as trailers, offices, sheds, portable toilets;
- Material handling and warehousing;

- Construction site services (surveying, security, medical, scaffolding, janitorial, concrete testing, craft training, etc.);
- Temporary utilities such as potable water supply pipe and sewage drainage pipe;
- Site safety inductions for contractor personnel.

A preliminary estimate has been developed by BBA for a total amount of $86M.

Temporary Construction Camp

The hourly labour crew rates exclude room and board allowances as it is assumed 100% of construction personnel will be accommodated within the construction camp.

A high-level camp peak calculation has been performed resulting in a projected camp size at peak of 990 beds.

The construction strategy will see construction of the permanent operator camp in Y-3 to accommodate up to 600 site personnel during construction.

A temporary 418-bed camp will be deployed for 24 months to accommodate the expected construction peak occurring in Y-2, Y-1.

The cost for the temporary camp rental and installation is based on a budgetary price.

Camp catering costs during construction are based on $70 per camp day based on a projected total of ~780,000 camp days.

Contractor Travel

An allowance is included in the indirect costs to cover contractor airfare equivalent to $1,000 per person based on a 2 weeks on / 1 week off rotation and 140 hours worked per rotation. Airfare for contractor direct and indirect staff is excluded from the hourly labour crew rates.

A total of 48,800 contractor round-trip flights have been estimated to support construction.

POV & Mechanical Acceptance

An allowance equivalent to 3.2% of the value of equipment is included to cover costs for pre-operational verification and mechanical acceptance.

Heavy Lift Crane

The estimate includes an allowance for mobilization and operation of a 300-t crane over a period of 16 months.

Freight

Bulk material pricing is inclusive of inland freight.

Freight costs were evaluated by mechanical purchase package based on optional quoted shipping costs and or information provided by vendors related to shipping weights, volumes, and container quantities. Ocean and or trucking rates were applied in consideration of point of origin. Port and demurrage charges were established as a function of container quantity and or percentage of shipping costs.

The analysis resulted in a freight rate of 7.9% of the equipment supply value which is aligned with Champion's benchmark of Bloom Lake operation procurement data.

Freight costs are, therefore, based on 8% of the value of equipment.

Spare Parts

The estimate contains separate amounts for spare parts related to commissioning, capital, or wear and first year of operations.

Amounts were established by package based upon lists and or cost data provided by vendors.

The following represents the basis for spare costs for the BBA portion of the CAPEX:

- Commissioning spares cost is based on 0.8% of the equipment supply value;
- Capital spares cost is based on 6% of the equipment supply value;
- Six months operating spares cost is based on 2% of the equipment supply value.

Spare parts are included in GMS's cost estimate.

Vendor Site Representatives

Vendor support for installation and commissioning support was derived by an assessment of estimated days required to support installation, commissioning, and training by package. The assessment includes allowance for vendor travel.

The resulting analysis yields an amount equivalent to 1.2% of the equipment supply value.

First Fills

First fills cover oils, lubricants, grinding media and reagents.

The following elements have been considered:

- General first fills: 0.5% of the value of equipment;

- Grinding media: allowance based on 3,000 t of grinding media;
- Reagents: allowance to cover 1st week of reagents.

21.1.16 Project Contingency

Contingency is an integral part of the estimate and can best be described as an allowance for undefined items or cost elements that will be incurred, within the defined Project scope, but cannot be explicitly foreseen due to a lack of detailed or accurate information.

Contingency analysis does not consider Owner's costs, project risk, currency fluctuations, escalation beyond predicted rates, or costs due to potential scope changes or labour work stoppages.

Contingency was first established deterministically based on the following:

- BBA CAPEX – 15% of direct + indirect costs;
- GMS CAPEX – 12.5% of direct + indirect costs;
- AtkinsRéalis (SNC-Lavalin) CAPEX – 20% of direct + Indirect costs;
- WSP CAPEX – 25% of direct + indirect costs;
- SYSTRA CAPEX – 10% of direct + indirect costs.

This approach yielded a total contingency amount of $474M, which is expected to yield approximately P50.

BBA subsequently developed a probabilistic range analysis contingency model using Monte Carlo simulation. The model excluded pre-production OPEX and Owner's Costs.

The probabilistic range analysis approach provides:

- Contingency amount at Pmean (P50);
- Provides contingency amounts as a function of probability of underrun;
- Provides the level of confidence, or probability the estimate falls within the estimate target precision;
- Establishes the estimate accuracy (variation from P50 to the min / max simulation results).

The results of the analysis are shown in Table 21-7 and demonstrate:

- Contingency amount of $476M at P50 or 15.8% of direct + indirect costs excluding Owner's Costs and pre-production OPEX;
- Estimate accuracy of -18.8%, +18.5% measured from P50 to the extreme points of the simulation results.

Table 21-7: Contingency Results

Percentile	Simulation Values	Contingency Amount	%
5%	3,221,537,710	210,887,748	7.0%
10%	3,276,627,465	265,977,503	8.8%
15%	3,315,667,961	305,018,000	10.1%
20%	3,347,961,378	337,311,416	11.2%
25%	3,375,047,611	364,397,649	12.1%
30%	3,398,236,803	387,586,841	12.9%
35%	3,422,979,264	412,329,302	13.7%
40%	3,444,832,696	434,182,735	14.4%
45%	3,465,725,869	455,075,907	15.1%
50%	3,486,500,197	475,850,235	15.8%
55%	3,506,416,858	495,766,896	16.5%
60%	3,528,619,700	517,969,738	17.2%
65%	3,551,579,114	540,929,152	18.0%
70%	3,575,493,113	564,843,151	18.8%
75%	3,601,776,426	591,126,464	19.6%
80%	3,628,519,590	617,869,629	20.5%
85%	3,658,761,766	648,111,804	20.5%
90%	3,699,777,918	689,127,956	22.9%
95%	3,761,276,319	750,626,357	24.9%

21.1.16.1 **Owner's Costs**

Owner's Costs of $105M were developed by Champion based on the benchmarking of the Bloom Lake operation and include:

- Owner's team (salaries, expenses, travel);
- Owner's Project office;
- Legal fees and land acquisition;
- Owner's site offices;
- Owner's Contingency;
- Environmental monitoring, water and soil analysis, etc.;
- Cost of future studies;
- Pre-production operational readiness;

- Project insurance;
- Permitting;
- Operator Training.

Note costs anticipated to be incurred before the Y-4 timeframe are categorized as sunk costs and, as such, are not included in the Project CAPEX estimate or the financial model. These excluded costs, which cover future studies and permitting expenses incurred prior to project approval, are estimated at CAN$52M.

21.2 Estimated Capital Cost

21.2.1 Initial Capital Cost

Table 21-8 provides a summary of capital costs by major area in constant dollars.

Table 21-8: Capital Cost Summary by Area

Initial CAPEX	Unit	CAN$	US$
Mine Site	M	627	483
Mining Fleet	M	183	141
Mining Pre-production OPEX	M	64	50
Processing	M	1,135	873
Tailings and Water Management	M	472	363
Pre-production OPEX	M	5	3
Other	M	41	32
Total Direct CAPEX	M	2,528	1,945
Owners Cost	M	105	81
Contingency	M	474	365
Others Indirect	M	551	424
Total Indirect	M	1,130	870
Total direct and Indirect	M	3,659	2,815
Kami Railroad	M	205	158
Total CAPEX Initial CAPEX	M	3,864	2,972

CAPEX Leased

Mining Fleet purchased at Year -1 and Year 0 represent $183M. This amount is included in the table above and is leased in the financial model. The leasing rate is based on a SOFR forward market rate and a benchmarking of Champion interest rate premium. A deposit of 10% is applied on the mining equipment leased based on benchmarked contractual terms based on the Bloom Lake operation.

The cost of $122M in railcars is included in the financial model as of Year -1 and leased including a market benchmarked leasing cost for a period of 20 years; these costs are not presented in the initial CAPEX Table 21-8.

The total undiscounted estimated interests represent $112M in the financial model over the life of mine.

21.2.2 Sustaining Capital Cost

Table 21-9 provides a summary of sustaining capital costs over the life of mine by major area in constant dollars.

Table 21-9: Sustaining Capital by Area Over the LOM

Sustaining CAPEX	CAN$ (M)	US$ (M)
Mine Site	325	250
Processing	137	105
Mining Fleet	589	453
Tailings and Water Management	900	693
Total Sustaining	1,952	1,502

Closure and Rehabilitation

Based on the site layouts and LOM, a provisioned cost of $300 M was estimated for the closure and rehabilitation of the mine site. As described in Chapter 20, the closure and rehabilitation costs include the dismantling, removal of all facilities, flooding of the Rose Pit, and revegetation of the area. The costs include a 7% of project management, 3% of engineering allowance, and 15% of contingency. Possible revenue from the salvage of equipment and materials was not considered. The cost is assumed to be incurred on a cash basis in the model at the last year of the operation (Year 25). This amount is not included in Table 21-9 above and in the all-in sustaining cost (“AISC”) of $89.50/dmt conc.

A yearly bonding cost (insurance like financial instrument) is included in the financial model to account for the accrued cost. This fee is incurred as of the beginning of the construction in Year -4 and until the end of the LOM. The effective bonding rate as a percentage of the accrued closing liability insurance is based on the commercial terms benchmarked for the Bloom Lake operation. The bonding cost is included in the AISC of $89.50/dmt conc.

21.3 Estimated Operating Cost

21.3.1 Basis and Summary

The operating cost estimate was based on Q4 2023 assumptions. The operating cost estimate does not include contingencies. Many items of the operating cost estimate are based on firm supply quotations, budgetary quotations, benchmarking from Bloom Lake operation and allowances based on in-house data. The overall estimate combined inputs from BBA, GMS, WSP, AtkinsRéalis, Okane, SYSTRA, Cima+ and on benchmarking of the Champion Bloom Lake operation.

Costs are based on the Ore Reserve Estimate and LOM plan, presented in Chapters 15 and 16, respectively.

All site staff are expected to work in 12-hour shifts on a 14 days (on) / 14 days (off) basis comparable to the Bloom Lake operation.

The energy rate was estimated by Champion based on the NL Hydro forward industrial rate energy forecast considering transmission demand charges, generation demand charges and an allowance for an expansion build to supply transmission and distribution infrastructure of electricity to the Kami Site. Based on the estimate, the average rate would be estimated at $52/MWh based on the forward average rate between 2030-2040, including the fixed transmission and generation charges at spot rate and an addition over the LOM to finance transmission infrastructure. This cost is also in line with the Hydro-Québec L tariff.

The diesel and fuel rates were based on comparative current prices per litre based on Champion's Bloom Lake rate in Québec and the rates in NL, adjusted for the expected taxes and credits to according to the NL regulation. These rates have been prorated to Champion's Bloom Lake historical average 3-year trailing prices.

Rates used in the estimate are summarized in Table 21-10.

Table 21-10: General Rate Assumptions

Factor	Unit	Value
Production Life of Mine	year	25
Mining (Tonnes Ex-pit) - LOM	M dmt	1,645
Mill Feed - LOM	M dmt	643
LOM Concentrate Production	M dmt	212
Clear Diesel	CAN$/L	1.51
Coloured Diesel	CAN$/L	1.34
Gasoline	CAN$/L	1.24
Site Electricity Price (on site)	CAN$/KWh	0.052

21.3.2 Site Operating Costs

Estimated average operating costs over the LOM for the Kami Project are summarized in Table 21-11 and Table 21-12.

Table 21-11: Total Estimated Average LOM Operating Cost

Operating Cost Summary Over LOM	Unit	CAN$	US$
Mining Cost	$/dmt mined	2.89	2.23
Processing Cost	$/dmt milled	7.66	5.89
Tailings and Water Management	$/dmt milled	0.91	0.70
Mine-site G&A	$/dmt milled	2.48	1.91
Logistics Port and Rail	$/dmt concentrate	20.19	15.53
Total Cash Cost (C1 Cost)	$/dmt concentrate	76.08	58.52
CSR and Bonding(1)	$/dmt concentrate	2.84	2.18
Sustaining CAPEX	$/dmt concentrate	9.19	7.07
CAPEX Leased(2)	$/dmt concentrate	1.44	1.11
Total All-in Sustaining Costs (AISC)	$/dmt concentrate	89.54	68.88

(1) Bonding closure cost are included, while closure cost itself is excluded from presented AISC. It is included in the financial model.

(2) Leasing interests are included in the model but not included in the illustrated table.

Table 21-12: Total Estimated Average LOM Operating Cost ($/t dry concentrate)

Operating Cost Summary Over LOM	Unit	CAN$	US$
Mining Cost	$/dmt concentrate	22.41	17.23
Processing Cost	$/dmt concentrate	23.21	17.85
Tailings and Water Management	$/dmt concentrate	2.76	2.12
Mine-site G&A	$/dmt concentrate	7.51	5.78
Logistics Port and Rail	$/dmt concentrate	20.19	15.53
Total Cash Cost (C1 Cost)	$/dmt concentrate	76.08	58.52
CSR and Bonding(1)	$/dmt concentrate	2.84	2.18
Sustaining CAPEX	$/dmt concentrate	9.19	7.07
CAPEX Leased(2)	$/dmt concentrate	1.44	1.11
Total All-in Sustaining Costs (AISC)	$/dmt concentrate	89.54	68.88

(1) Bonding closure cost are included, while closure cost itself is excluded from presented AISC. It is included in the financial model.

(2) Leasing interests are included in the model but not included in the illustrated table

21.3.3 Site Workforce Requirements

Each sector has estimated the number of people needed to operate. For Mining, Processing, and Tailings and Water Management most of the positions were associated with a shift roster of 14 days on and 14 days off. A few positions are considered local and are on a 5/2 schedule. For Labour OPEX, salaries, benefits, and bonuses were provided by Champion and based on the benchmarking of the Bloom Lake operation.

Mine-site G&A position were estimated on benchmarking from Bloom Lake operation.

Table 21-13 shows estimated annual workforce requirements. The site's workforce peaks at 677 people between Years 7 and 16.

Table 21-13: Annual Peak Site Workforce Requirements

Category	Unit	Labour Required at Peak
Mining	#/year	327
Processing	#/year	210
Tailings and Water Management	#/year	61
Mine-site G&A	#/year	79
Total Labour Required	#/year	677

21.3.4 Mine Operating Costs

Table 21-14 shows the breakdown of the estimated mining operating costs for the average over the LOM. The mine operating costs were developed from first principles based on the mine plan and production schedule, distances to the waste piles, crusher and TMF drop points, re-handle, equipment operating parameters from vendors and internal information for similar projects.

Table 21-14: Average LOM Mining Operating Costs

Category	$/ t mined	$/t milled	$/t conc.
Loading, Hauling, IPCS, and Crusher Feed	0.87	2.24	6.78
Drill and Blast	0.95	2.42	7.33
Other Labour Salaries	0.26	0.66	1.99
Other Mining Cost	0.81	2.08	6.31
Total	2.89	7.40	22.41

Loading, Hauling, IPCS, and Crusher Feed

Most of the mining equipment will be electric (shovels, drills and IPCS). Haul trucks and support equipment (dozer, grader, etc.) will be operated using fuel. Electric and fuel consumption were estimated for each year of operation based on equipment specifications and equipment utilization. This category also includes the labour cost, the maintenance, and other items to operate the equipment.

Drill and Blast

Explosives costs for ore and waste rock have been estimated based on the parameters and powder factors presented in Chapter 16 and on pricing received from several vendors. This category also includes the labour cost, the maintenance, and other items to operate drill and blast's equipment.

Other Labour Salaries

Labour requirements have been estimated to support the mine plan developed in this Study, as outlined in Chapter 16 of this Report. This includes mine operations, mine geology, mine maintenance admin, and mine engineering. The mine workforce peaks at 327 individuals in Year 7.

Other Mining Cost

Additional items are included in the mine operating cost such as an allowance for mine dewatering accessories, ore grade control, support equipment, Topographic drilling contract, overburden mining contract, and miscellaneous items.

21.3.5 Processing Cost

The operating cost estimate for the processing plant includes all expenses incurred to operate the processing plant at a plant throughput of 3,200 t/h and 92.8% plant utilization. The concentrator operating costs are based on the mine plan, as described in Chapter 16, and are estimated to be $196M per year.

It is expected 643 Mt of ore will be processed; producing approximately 212 Mt of concentrate having an iron content above 67.5%. The average operating cost of the concentrator over the life of the mine is estimated to be $7.70/t of ore crushed ($23.20/t concentrate).

A breakdown of the concentrator operating costs is shown in Table 21-15.

Table 21-15: Processing Operating Cost

Category	$/t Milled	$/t Conc.	Distribution (%)
Labour	1.33	4.03	17
Energy	1.46	4.42	19
Grinding media	0.39	1.18	5
Reagents	1.45	4.40	19
Maintenance & Others	3.03	9.17	40
Total	7.66	23.21	100

Labour

The processing plant workforce peaks at 210 employees, divided into management, operations and maintenance departments are required in the concentrator and laboratory as presented in Chapter 17. The estimated personnel cost, excluding the portion attributed to G&A, represents approximately 17% of the total processing operating cost.

Energy

The power demand for the concentrator is approximately 98 MW, including two electric boilers for steam generation, and the estimated annual energy consumption is 716 GWh. The electrical power of the process plant represents approximately 19% of the total Processing operating costs.

Grinding Media

The consumption rates for ball mill grinding media were calculated using Giblet and Seidel's correlation, which give the wear rate in pounds of metal wear per kilowatt-hour (lb/kWh) of energy used in the comminution process. The input data considered the abrasion index, issued from previous studies, the nominal throughput, and the nominal power draw of the mill. The consumption rates (lb/kWh) for Vertimills grinding media were obtained from benchmark of similar operations.

Grinding media represents approximately 5% of the total operating cost for the processing.

Reagents

The reagent consumptions were estimated based on testwork, and industrial references.

The reagent unit costs ($/t reagent) were established through recent vendor quotations and include delivery to site. The reagents represent approximately 19% of the total processing operating costs.

Maintenance and Others

The replacement costs for major equipment consumables, such as crushing and grinding equipment wear parts and liners, screen decks and filter cloths, were calculated based on recommended change-out schedules, budgetary quotations and internal database. An additional allocation equivalent to 5% of the estimated plant equipment cost was also included to cover for other maintenance costs.

Separate costs for Laboratory, Mobile equipment and maintenance contractors were also included based on those currently incurred at the Bloom Lake site.

Maintenance and Other represent approximately 40% of the total processing operating costs.

21.3.6 Tailings and Water Management

Operating costs for both tailings and surface water management for the Kami Project were derived by WSP, AtkinsRéalis, BBA, and benchmark on the existing Bloom Lake operation. The results displayed in Table 21-16 are for an annual Tailings production of 17.4 Mt per year. The OPEX includes the operating costs, required each year, during the mine operation. It covers the equipment, personnel, and subcontractor to support and operate Kami's' water management and tailings management operations.

Tailings and surface water management cost is $0.91/t milled and $2.76/t concentrate.

Table 21-16: Tailings and Water Management Operating Costs

Category	$/milled	$/conc.
Labour	0.39	1.18
Electricity	0.17	0.52
Diesel	0.02	0.05
Maintenance and Spare Parts	0.11	0.33
Consumable and Others	0.10	0.30
External Services	0.12	0.37
Total	0.91	2.76

21.3.7 General and Administrative

The G&A costs include camp operations, G&A personnel, transportation, accommodation, health, safety, and environmental programs as well as miscellaneous Project costs.

Most G&A costs are benchmarked on the Champion Bloom Lake operations, as well as suppliers' proposals and adjusted to the Kami Project.

The General and Administrative cost was established at $2.50/dmt milled or $7.50/dmt conc.

Table 21-17: General and Administrative Operating Costs

Category	$/milled	$/conc.
Labour	0.59	1.78
Energy	0.03	0.09
Transport	0.48	1.46
Maintenance and Spare Parts	0.02	0.05
Consumable and Others	0.06	0.19
External Services	1.08	3.29
Admin Expenses and Others	0.22	0.65
Total	2.48	7.51

21.3.8 Logistics Port and Rail

Iron ore concentrate will be shipped from Labrador by railcar, at the mine production rate of 9M wmt/year. At the Kami mine site, railcars will be loaded, after which the loaded trains will travel on a newly constructed rail line (23.2 km) to connect directly to the Québec North Shore & Labrador Railway ("QNS&L"). Loaded trains will then travel south on the railway to reach the Chemin de fer Arnaud ("CFA") at the Arnaud Junction interchange near Sept-Îles, Québec, where the Société Ferroviaire et Portuaire de Pointe-Noire ("SFPPN") will take over the operation of transporting the loaded train to the port of Pointe-Noire and carry out the unloading process. Specifically, unloading will occur at a new car dumping facility, via a new 3.5-km loop track at the Pointe-Noire terminal. Once unloaded, the trains will return to the mine, travelling northbound on the CFA and QNS&L railways. Handling will be carried out by the SFPPN, via the stacking and reclaiming facilities and conveyed out to the Administration Portuaire de Sept-Iles' ("APSI") port ship loaders and loaded aboard cargo vessels.

Costs for the iron ore concentrate transportation were established using Champion existing and potential agreements with the rail transport, yard and dock and port providers. The cost of concentrate transportation, handling and ship loading is variable according to the wet tonnage of concentrate produced and does not consider transport and handling losses. Costs provided are based on average concentrate moisture of 4.5%.

The concentrate land logistics and port cost were established at $20.20 per tonne of dry concentrate.

21.3.9 Corporate Social Responsibility and Other

The Corporate Social Responsibility ("CSR") costs were developed based on the benchmarking of the Champion Bloom Lake operation. These costs include insurance, municipal tax, school tax, IBA payment and mining permit.

The yearly bonding cost for the closure and rehabilitation between Year 0 and Year 24 are included in this category.

The CSR cost over the life of mine is expected at $2.80/dmt conc. including the yearly bonding cost of $0.20/dmt conc.

22. Economic Analysis

The economic and financial analysis of the Kami Project contained in this Technical Report was carried out using a discounted cash flow approach on a pre-tax and after-tax basis. The analysis is based on the Project Mineral Reserves, capital and operating costs assembled in the study, and market economic assumptions.

All costs are expressed in calendar Q4 2023 Canadian Dollars without allowance for inflation, escalation, currency fluctuation, or interest during construction. Unless otherwise indicated, all costs in this section of the Technical Report are expressed in Canadian dollars. An exchange rate of US$1 = CAN$1.30 US was retained based on the direct forward consensus and applies to revenues in US$ and the costs incurred in US$.

The financial performance of the Project was calculated based on 100% equity financing except select leased items, even though Champion Iron may decide in the future to finance part of the Project with debt financing. The net present value ("NPV") was calculated based on the cash flow generated by the Project, on pre and post-tax basis, based on a discount rate of 8%. The internal rate of return (“IRR”) on total investment was calculated on pre and post-tax basis from the moment of the 1st cash outflow for construction. The Project payback is calculated on the undiscounted after-tax cash flow basis as of the construction end (first operating cash inflow).

The economic analysis presented in this section contains forward-looking information with regard to the mineral reserve estimates, commodity prices, exchange rates, proposed mine production plan, projected recovery rates, operating costs, construction costs and Project schedule. The results of the economic analysis are subject to a number of known and unknown risks, uncertainties and other factors that may cause actual results to differ materially from those presented in this report.

22.1 Assumptions

The economic analysis was performed using the following key assumptions and basis.

Table 22-1: Key Assumptions and Basis

Key Assumptions Summary	Unit	LOM	
Mineral Reserves	M dmt	643	
Production Life of Mine	year	25	
Average Annual Production Dry	M dmt	8.6	
Average Annual Production Wet	M wmt	9.0	
Average Fe In-situ Grade to Plant	%	29.2%	
Average Fe Metallurgical Recovery	%	76.4%	
Average Concentrate Grade Sold	% Fe	DR quality iron ore above 67.5%	
Average Concentrate Moisture	%	4.5%	
Average Stripping Ratio	Waste : Ore	1.6	
Macroeconomic and Market Assumptions		**CAN$**	**US$**
P65 Index CFR China Iron ore price	$/dmt	156.00	120.00
Average Shipping Cost	$/wmt	28.60	22.00
Average Diesel Clear	$/L	1.51	1.16
Average Electricity	$/KWh	0.052	0.040
Average Foreign Exchange	C$:US$	1.30	
Mining Duties	%	15.0%	
Tax Rate Provincial and Federal	%	30.0%	
Discount Rate	%	8.0%	
Capital Costs		**CAN$**	**US$**
Construction Period	month	48	
Initial CAPEX	M	3,864	2,972
Total CAPEX Sustaining over LOM	M	1,952	1,502
Total Closure Costs at end of LOM	M	300	231
Operating Cost per Tonne Sold		**CAN$**	**US$**
Total Cash Cost (C1 Cost)	$/dmt	76.10	58.50
Total AISC (excluding royalty)	$/dmt	89.50	68.90

Further assumptions:

- Project revenue is derived from the sale of iron ore concentrate into the international marketplace;
- All products are assumed sold in the same year they are produced;
- Two price scenarios have been considered and based on index data:
  - Base Case based on a conservative pricing dynamic;
  - Trailing 3-years price for CY21-CY23.
- Shipping destinations and incurred shipping costs are based on potential client demand based on benchmarked commercial assumptions;
- Marketing and shipping costs, such as ice premium and demurrage terms, have been benchmarked on the Champion, Bloom Lake operation;
- CAPEX and OPEX are as described in Chapter 21;
- Ramp-up is scheduled to begin in Year 0. Commercial production is expected to be reached in the first year of production. Operations are estimated to span a period of approximately 25 years;
- Certain costs covering future studies and permitting expenses incurred prior to Project approval, as described in Chapter 21, are anticipated to be incurred before Y-4 and have been categorized as sunk costs and, as such, are not included in the Project CAPEX estimate or the financial model.
- Final rehabilitation and closure costs have been illustrated as incurred at the last year of operation (Year 25). As describe in Chapter 21, an insurance bonding mechanism is assumed in line with comparable QIO Bloom Lake operation terms;
- No financing and/or leverage is considered for the Technical Report financial model except for the leased mining first fleet (Year -1 and Year 0) and the railcars as described in Chapter 21;
- No subsidies or other financial incentives have been taken into consideration for the financial analysis as part of the Technical Report;
- Based on previous operating dynamics at Bloom Lake a cash advance to reserve capacity at Port of Sept-Îles is assumed and is reimbursed on a per tonne basis on benchmarked contractual terms, until reimbursed;
- The Kami property is subject to a 3% Royalty payable to Altius, as per the agreement entered by the previous project owners with Altius in November 2009;
- Simple annual working capital terms are assumed based on a benchmark of Bloom Lake operation.

22.2 Taxation

The Kami Project is subject to three levels of taxation, including federal income tax, provincial income tax and provincial mining taxes. BBA has relied on Champion Iron's in-house taxation model and expertise for the calculation of income and mining taxes applicable to the cash flow. The tax regime under the Canadian federal and provincial jurisdiction applicable to the Project would include the following:

- Income tax payable to the Federal government of Canada, pursuant to the Income Tax Act (Canada). The applicable Federal income tax rate is 15% of taxable income;
- Income tax is payable to the Province of NL at a tax rate of 15% of taxable income;
- Mining Tax of 15% payable in NL.

The technical report tax calculations are based on the following key assumptions:

- The Project is expected to be held 100% by a corporate entity and the after-tax analysis does not attempt to reflect any future changes in corporate structure or property ownership;
- Expects 100% equity financing and therefore does not consider further interest and financing expenses that could affect the economics, except for the leased items;
- Takes into consideration processing allowance for mining taxes and mining tax credit where, for mining tax purpose, the Kami Project is entitled to claim a processing allowance equal to 8% of the original cost of eligible processing assets used during a year;
- Under certain conditions, it is assumed that the Kami Project would benefit from a tax credit against its mining tax payable for the first ten years following the achievement of the commercial production;
- The calculations are based on applicable provisions and interpretation of the Income Tax act as at the issuance date of the study. The calculations do not otherwise consider or anticipate any changes in tax law which is subject to change;
- The effective combined tax rate ("ETR"), as per the base case scenario, is approximately 37% of estimated eligible taxable Project earnings before taxes ("EBT") and would vary under different price scenarios, depending on profitability.

22.3 Cash Flow Analysis

The summary of the financial evaluation for the Project is presented in Table 22-2. Cash flows on a pre-tax and after-tax basis have been discounted at an 8% discount rate using a mid-year convention to Project Year -4.

Table 22-2: Economic Summary

Economic Results	Base Price Scenario		Market Price Scenario (3-Year Trailing Scenario: CY2021-2023)	
	CAN$	US$	CAN$	US$
P65 Index CFR China Iron ore price	156.00	120.00	197.86	152.20
C3 Index Price ($/wmt)	28.60	22.00	31.20	24.00
Pre-tax				
NPV In M At 8% Discount Rate	1,482	1,140	4,034	3,103
IRR	12.1%		18.0%	
After-tax				
NPV in M at 8% Discount Rate	541	416	2,195	1,688
IRR	9.8%		14.8%	
Payback Period (year)	7		5	

The pre-tax base case financial model resulted in an internal rate of return of 12.1% and a net present value of $1,482M with a discount rate of 8%. On an after-tax basis, the base case financial model resulted in an internal rate of return of 9.8% and a net present value of $541M with a discount rate of 8%. The after-tax undiscounted payback period as of the first cash inflow is 7 years.

The summary of the base case of the Kami Project discounted cash flow financial model and key metrics is presented in Table 22-3.

Table 22-3: Kami Project Financial Model Summary

Category	Unit	Y-4	Y-3	Y-2	Y-1	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Production Summary																
Total tonnes mined	M dmt	0.0	0.0	0.0	18.0	77.0	77.0	77.0	77.0	77.0	78.7	77.0	77.0	77.0	77.0	75.3
Total tonnes milled	M dmt	0.0	0.0	0.0	0.0	17.3	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
Recovery	%	0.0%	0.0%	0.0%	0.0%	77.0%	74.5%	75.8%	76.1%	78.3%	75.5%	73.6%	74.2%	75.3%	75.8%	76.5%
Concentrate Sold	M dmt	0.0	0.0	0.0	0.0	5.4	8.2	8.5	8.5	8.7	8.6	8.5	8.5	8.4	8.5	8.6
Financial Model Summary																
Revenue	M CAN$	-	-	-	-	1,079	1,650	1,696	1,709	1,749	1,728	1,700	1,698	1,685	1,708	1,715
(-) Shipping, Marketing and Royalty	M CAN$	-	-	-	-	(203)	(310)	(319)	(321)	(329)	(325)	(319)	(319)	(317)	(321)	(322)
Revenue FOB net	M CAN$	-	-	-	-	877	1,340	1,378	1,388	1,420	1,403	1,381	1,379	1,368	1,387	1,392
(-) Mining cost (incl. rehandle)	M CAN$	-	-	-	-	(287)	(257)	(253)	(235)	(215)	(201)	(190)	(208)	(206)	(193)	(186)
(-) Processing cost	M CAN$	-	-	-	-	(163)	(198)	(198)	(198)	(198)	(198)	(198)	(198)	(198)	(198)	(198)
(-) TWM cost	M CAN$	-	-	-	-	(21)	(22)	(22)	(22)	(22)	(23)	(23)	(23)	(23)	(24)	(24)
(-) Minesite G&A	M CAN$	-	-	-	-	(48)	(55)	(64)	(64)	(65)	(63)	(64)	(65)	(65)	(65)	(65)
On-site operating costs	M CAN$	-	-	-	-	(519)	(532)	(537)	(519)	(500)	(485)	(474)	(493)	(491)	(479)	(473)
(-) Transportation	M CAN$	-	-	-	-	(127)	(166)	(169)	(170)	(172)	(171)	(170)	(170)	(170)	(172)	(173)
C1 Costs	M CAN$	-	-	-	-	(646)	(698)	(706)	(688)	(672)	(656)	(644)	(663)	(661)	(651)	(646)
(-) CSR and Misc. Costs	M CAN$	-	-	-	-	(16.2)	(21.9)	(22.3)	(22.4)	(22.7)	(22.4)	(22.2)	(22.2)	(22.1)	(22.3)	(22.3)
(-) Closure bonding and liability	M CAN$	-	-	-	-	(1.1)	(1.1)	(1.1)	(1.5)	(1.5)	(1.6)	(1.6)	(2.0)	(2.0)	(2.0)	(2.0)
Operating Cost	M CAN$	-	-	-	-	(663)	(721)	(729)	(712)	(696)	(680)	(668)	(687)	(685)	(676)	(670)
EBITDA	M CAN$	-	-	-	-	214	619	648	676	724	723	713	691	683	711	723
(-) D&A	M CAN$	-	-	-	-	(978)	(774)	(596)	(466)	(367)	(297)	(251)	(209)	(175)	(163)	(156)
EBIT	M CAN$	-	-	-	-	(764)	(155)	52	210	357	426	462	482	508	549	566
(-) Leasing Interests	M CAN$	-	-	-	-	(15)	(15)	(13)	(11)	(8)	(6)	(6)	(6)	(5)	(5)	(5)
EBT	M CAN$	-	-	-	-	(779)	(170)	39	199	349	419	456	477	502	544	562
(-) Taxes	M CAN$	-	-	-	-	-	-	-	-	-	(8)	(30)	(159)	(170)	(182)	(200)
NOPAT	M CAN$	-	-	-	-	(779)	(170)	39	199	349	411	426	318	333	362	362
Bridge to FCF																
(+) D&A	M CAN$	-	-	-	-	978	774	596	466	367	297	251	209	175	163	156
(-) CAPEX Expansion	M CAN$	(124)	(998)	(1,228)	(1,155)	(175)	-	-	-	-	-	-	-	-	-	-
(-) CAPEX Leased	M CAN$	-	-	-	(50)	(37)	(31)	(33)	(35)	(25)	(5)	(5)	(6)	(6)	(6)	(7)
(-) CAPEX Sustaining	M CAN$	-	-	-	-	(29)	(58)	(67)	(83)	(56)	(123)	(97)	(72)	(75)	(176)	(96)
(-) Cash advance reserve capacity	M CAN$	(30)	-	-	-	1	2	2	2	2	2	2	2	2	2	2
(-) Change NWC	M CAN$	-	-	-	-	10	(31)	(2)	(3)	(5)	(1)	0	3	1	(3)	(1)
FCF (Post- Tax)	M CAN$	(154)	(998)	(1,228)	(1,205)	(31)	487	535	546	633	583	577	454	430	341	416
FCF (Pre-Tax)	M CAN$	(154)	(998)	(1,228)	(1,205)	(31)	487	535	546	633	590	607	613	600	523	616

Category	Unit	Y11	Y12	Y13	Y14	Y15	Y16	Y17	Y18	Y19	Y20	Y21	Y22	Y23	Y24	Y25	Y26	Total
Production Summary																		
Total tonnes mined	M dmt	77.0	70.0	70.0	70.5	81.4	73.1	65.1	58.5	50.2	43.2	39.1	35.8	33.0	30.9	0.0	0.0	1,662.9
Total tonnes milled	M dmt	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	25.9	26.0	26.0	25.7	26.0	26.0	2.4	0.0	643.4
Recovery	%	76.3%	75.9%	76.3%	76.6%	76.6%	77.3%	77.7%	77.6%	77.3%	77.4%	77.1%	77.3%	77.4%	77.6%	76.6%	0.0%	
Concentrate Sold	M dmt	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.7	8.6	8.6	8.8	9.0	0.8	0.0	212.4
Financial Model Summary																		
Revenue	M CAN$	1,726	1,715	1,716	1,713	1,721	1,715	1,721	1,730	1,727	1,738	1,728	1,726	1,757	1,808	164	-	42,521
(-) Shipping, Marketing and Royalty	M CAN$	(324)	(322)	(322)	(322)	(323)	(322)	(323)	(325)	(325)	(327)	(325)	(324)	(330)	(340)	(31)	-	(7,991)
Revenue FOB net	M CAN$	1,401	1,393	1,393	1,391	1,397	1,393	1,398	1,405	1,402	1,411	1,403	1,402	1,427	1,468	133	-	34,530
(-) Mining cost (incl. rehandle)	M CAN$	(182)	(176)	(173)	(177)	(189)	(179)	(175)	(168)	(162)	(152)	(150)	(150)	(147)	(147)	(1)	-	(4,759)
(-) Processing cost	M CAN$	(198)	(198)	(198)	(198)	(198)	(198)	(198)	(198)	(198)	(198)	(198)	(197)	(198)	(198)	(19)	-	(4,930)
(-) TWM cost	M CAN$	(24)	(24)	(24)	(24)	(24)	(24)	(24)	(24)	(24)	(24)	(24)	(24)	(24)	(24)	(2)	-	(586)
(-) Minesite G&A	M CAN$	(65)	(65)	(65)	(65)	(65)	(65)	(65)	(65)	(64)	(64)	(64)	(64)	(64)	(63)	(12)	-	(1,596)
On-site operating costs	M CAN$	(469)	(463)	(460)	(464)	(476)	(465)	(462)	(454)	(448)	(438)	(436)	(434)	(433)	(432)	(34)	-	(11,870)
(-) Transportation	M CAN$	(174)	(173)	(173)	(173)	(173)	(173)	(173)	(174)	(174)	(175)	(174)	(174)	(176)	(177)	(24)	-	(4,288)
C1 Costs	M CAN$	(643)	(636)	(633)	(637)	(650)	(639)	(635)	(628)	(622)	(612)	(610)	(608)	(609)	(609)	(58)	-	(16,158)
(-) CSR and Misc. Costs	M CAN$	(22.0)	(21.9)	(21.9)	(21.9)	(22.0)	(21.9)	(22.0)	(22.0)	(22.0)	(22.1)	(22.0)	(22.0)	(22.2)	(22.6)	(2.1)	-	(550)
(-) Closure bonding and liability	M CAN$	(2.0)	(4.2)	(2.1)	(2.1)	(2.1)	(2.4)	(2.4)	(2.4)	(2.4)	(2.4)	(2.7)	(2.7)	(2.7)	(2.7)	(298.3)	-	(351)
Operating Cost	M CAN$	(667)	(662)	(657)	(661)	(674)	(663)	(660)	(653)	(646)	(637)	(634)	(633)	(634)	(634)	(358)	-	(17,059)
EBITDA	M CAN$	735	731	736	731	724	730	738	752	756	774	769	769	793	834	(225)	-	17,472
(-) D&A	M CAN$	(140)	(123)	(119)	(122)	(113)	(101)	(90)	(84)	(80)	(75)	(73)	(76)	(75)	(65)	(50)	-	(5,817)
EBIT	M CAN$	595	608	617	609	610	629	648	668	677	699	696	693	718	769	(276)	-	11,654
(-) Leasing Interests	M CAN$	(4)	(4)	(3)	(2)	(2)	(1)	(1)	-	-	-	-	-	-	-	-	-	(112)
EBT	M CAN$	591	604	614	607	608	628	648	668	677	699	696	693	718	769	(276)	-	11,543
(-) Taxes	M CAN$	(210)	(222)	(228)	(233)	(230)	(231)	(239)	(247)	(256)	(259)	(268)	(267)	(266)	(276)	(169)	-	(4,350)
NOPAT	M CAN$	381	382	385	374	378	397	409	421	421	440	428	425	452	493	(445)	-	7,193
Bridge to FCF																		
(+) D&A	M CAN$	140	123	119	122	113	101	90	84	80	75	73	76	75	65	50	-	5,817
(-) CAPEX Expansion	M CAN$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(3,681)
(-) CAPEX Leased	M CAN$	(7)	(8)	(8)	(9)	(9)	(10)	(8)	-	-	-	-	/-	-	-	-	-	(305)
(-) CAPEX Sustaining	M CAN$	(89)	(54)	(161)	(99)	(77)	(49)	(62)	(69)	(67)	(54)	(78)	(93)	(53)	(13)	(0)	-	(1,952)
(-) Cash advance reserve capacity	M CAN$	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
(-) Change NWC	M CAN$	(1)	0	(1)	1	1	(1)	(1)	(1)	(1)	(2)	0	(0)	(2)	(3)	76	(33)	-
FCF (Post- Tax)	M CAN$	426	445	337	389	406	438	427	434	433	459	422	408	472	541	(319)	(33)	7,072
FCF (Pre-Tax)	M CAN$	636	668	565	621	636	669	666	682	689	718	691	675	738	818	(150)	(33)	11,422

22.4 Sensitivity Analysis

A sensitivity analysis has been carried out, with the base case described above as a starting point, to assess the impact of changes in total pre-production (initial) capital expenditure ("CAPEX"), operating costs ("OPEX"), product prices (price) and the US$/CAN$ exchange rate on the Project's NPV @ 8% and IRR. Each variable was sensitized one-at-a-time on a linear basis. The sensitivities are based on an interval of ±30% with linear increments of 10% and are presented in Figure 22-1 and Figure 22-2.

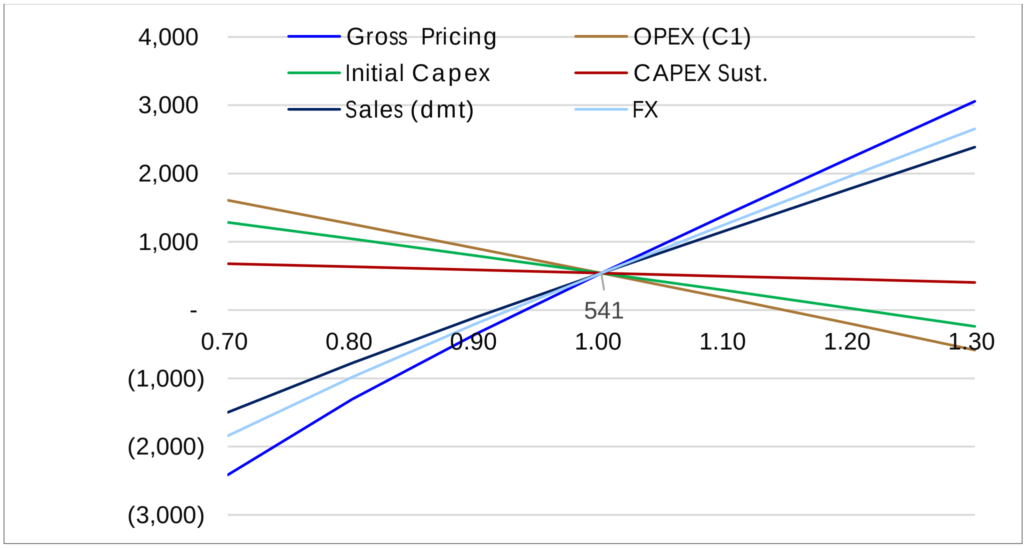


Figure 22-1: NPV ($M) Sensitivity Results (after-tax)

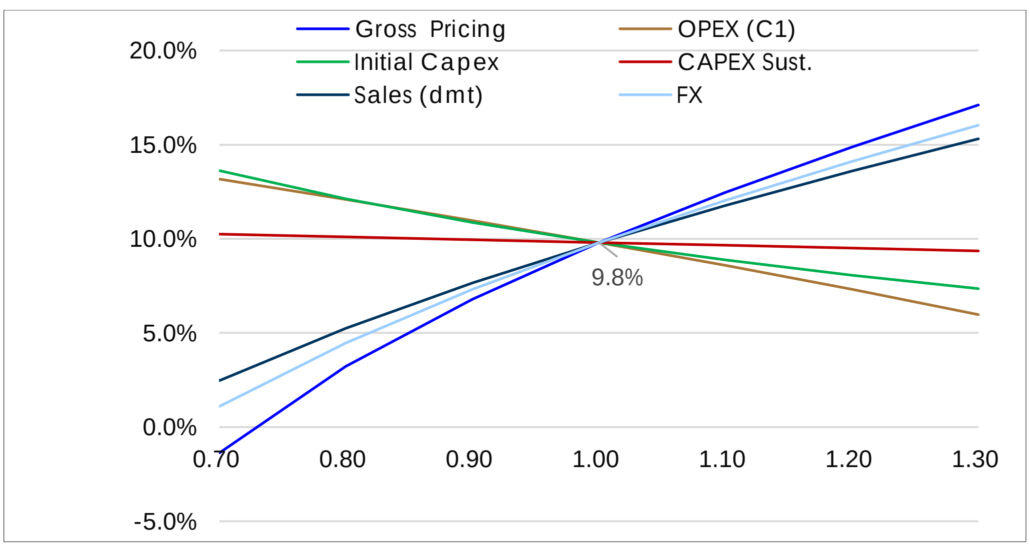


Figure 22-2: IRR Sensitivity Results (after-tax)

The sensitivity analysis reveals the iron ore concentrate price has the most significant influence on both NPV and IRR compared with other parameters, based on the range of values evaluated. After the iron ore price, the sensitivity is most impacted by changes in the US$:CAN$ exchange rate and the OPEX. The sensitivity demonstrates that the NPV and IRR are least affected by Sustaining CAPEX and CAPEX delta. A negative NPV is recorded when the iron ore concentrate price is decreased by approximately 10% or more from the base case scenario.

23. Adjacent Properties

The Kami Project is located within an active iron ore mining district.

Located north of the Kami Project is the Iron Ore Company of Canada ("IOC"), whose major shareholder is the international mining group Rio Tinto. IOC has recorded production rates for a combination of concentrate and pellets of 17.5 Mt in 2022. Ore is sent to a concentrator for upgrading to 65% iron. Upgrading takes three processes involving the spiral, magnetite and hematite plants. Most of the concentrate is pelletized with the remainder sold as concentrate.

Also located directly north of the Kami Project, near the town of Wabush, is the Scully Mine owned by Tacora Resources ("Tacora"). Tacora has recently reactivated operations at Scully Mine; the first train of concentrate from the concentrator arrived in Pointe Noire at the end of June 2019. Tacora uses the same multiuser ship loading terminal as Bloom Lake.

Located west of the Kami Property, on the Québec side of the border, Bloom Lake is own by Champion Iron Mine. Operations consist of open pit mining, crushing and grinding and gravity and magnetic concentration.

The DSO Mine (Tata Steel) is not adjacent, but it also uses the same multiuser terminal and rail as Bloom Lake in Pointe-Noire.

The Mont-Wright Mine owned by ArcelorMittal Mines Canada ("ArcelorMittal"), is also located west of the Kami Project, about 1 km south of the Bloom Lake property. Further south, the Fire Lake Mine is also operated by ArcelorMittal. Both mines have a combined production of 26 Mt of concentrate per year.

24. Other Relevant Data and Information

This chapter of the Report provides a summary and general description of the Project Execution Plan upon which, the Project Schedule and the Capital Cost Estimate were developed.

24.1 Project Execution Plan

The major Project milestones are provided in Table 24-1.

Table 24-1: Project Major Milestones

Milestones Description	Relative Date (Quarters)
Project Registration Submission	Q-27
EIS Decision on Project Registration	Q-26
Start Feasibility Study	Q-25
Draft EIS Guidelines	Q-25
EIS Submission	Q-23
Complete Feasibility Study	Q-21
Start Basic Engineering	Q-20
Start Detailed Engineering	Q-18
Certificate of Authorization Received	Q-16
Start Construction Early Work	Q-16
Construction Power Available	Q-13
Concentrator First Concrete	Q-12
Start Tailings Management Facility (TMF) Construction	Q-12
First Room Available in Permanent Camp	Q-10
Permanent Camp Construction Completed	Q-6
Permanent Full Capacity Power Required	Q-3
TMF Facility Ready for Year 1 Operation	Q-1
Concentrator Mechanical Completion	Q0
First Ton of Concentrate Produced	Q+1
Commercial Operation Achieved	Q+4

The Project Execution Strategy developed in this Study and described herein covers the period from the start of the Feasibility Study ("FS") to the end of commissioning of the In-pit Crushing System ("IPCS"). All dates are expressed in quarters relative to the start of production ramp up. The major assumptions driving key milestones in the preliminary Project Execution Schedule are as follows:

- The environmental assessment process restarts with an updated project registration submission in Q-27. Based on the expected duration of the various regulatory proceedings, it is expected that the permits will be received in Q-16. No site work is anticipated prior to this. The environmental assessment review process, expected to last 2 years, is on the project execution critical path;
- Start the FS with Hydrogeological, metallurgical and geotechnical studies in Q--25;
- The FS is completed at Q-21;
- Early work construction is set to start in Q-16, as soon as the permit is received, and is based on a construction schedule of 48 months including Pre-Operational Verifications ("POV") and plant handover to operations. A permanent camp and a temporary construction camp will be used to lodge the greater majority of direct and indirect personnel required for the Project.

To support the execution schedule, some activities need to be executed as follows:

- Complete the hydrogeological, metallurgical, and geotechnical studies, perform the various trade-off studies and then complete the FS;
- The multiple engineering firms that contributed to the Pre-feasibility Study ("PFS") will be invited to contribute to the FS and during this phase establish the definitive basic engineering and detailed engineering execution plan for their respective sections. The current study hypothesis is that the procurement and construction management ("PCM") services will be performed by either an integrated team, lead by Champion personnel with increased contribution from the engineering consultants, or under a PCM execution model;
- During the FS, lead times for major mining, mechanical and electrical equipment will be confirmed for the development of the execution schedule. The expected longest manufacturing lead times which include the major power transformers, the grinding mills, spirals, and the in-pit crushing and conveying system, are expected to be as long as 24 to 28 months.

Engineering and Procurement

The execution phase engineering will begin with basic engineering starting one year before the start of early work construction. Basic engineering activities will focus on the procurement of long-lead items, early works detailed engineering and freezing the site and major building layouts. Basic engineering is expected to be completed by Q-18. Following basic engineering, the detailed engineering phase is expected to last 24 months.

Construction Lodging

For early works construction starting in Q-16, the workforce is expected to reside in West Labrador nearby municipalities. At the start of Q-12, the permanent camp construction will begin, and rooms will, progressively, be made available starting by Q-10. The permanent camp is expected to be fully operational with its 600 rooms 12 months later. The detailed engineering and procurement activities of the permanent camp will be developed in parallel with the process plant engineering. An additional 400 rooms will be made available through the rental of a temporary construction camp for the last two years of construction, allowing for a peak of direct, indirect and owner personnel to reach 1,000 lodging on site.

It is expected that some engineering and construction management staff, construction workers, contractor supervision and Owner's team members will be residing within the nearby municipalities and not necessarily in the construction camp.

An analysis of the construction schedule and the estimated labour hours developed for the pre-feasibility Capital Cost Estimate for the Project shows an estimated peak at 1,000 direct and indirect workers on site. The construction plan to be developed in the course of the FS will confirm this estimate and finalize the size of the construction lodging facilities.

Construction

When the construction permit will be received in Q-16, early work construction will be launched with the construction of the west and east access roads, the construction of a 34.5 kV transmission line to the permanent camp location and the clearing of the overburden stockpile area. Champion will need to get the required permits ahead of construction to use the west access road. This road will provide initial and temporary access to the Property until such time that the permanent road work accessing the Property from the east is built.

Starting in Q-14, a contractor will begin the pit pre-stripping. In parallel, the construction of the Waldorf Crossing bridge and the tree clearing of the rest of the site will start with a completion expected by the end of the year. Q-12 will focus on site preparation work and the permanent camp. Tree clearing activities will be completed with the tailings management facility ("TMF") area by Q-10.

Early work contractors will initially use generators to produce required power for construction. This will be the case until the end of Q-13 when the Waldorf bridge and the 34.5 kV line from Wabush will be completed.

Ideally, concrete work in winter conditions will be minimized. The preferred project seasonality for construction would show the major concrete works starting in April or May. The majority of the Project concrete work will take place through Q-11 and Q-10. From that period, until the end of Q-8, the concrete supply will be from a portable concrete batch plant installed on site.

Steel erection is planned to start towards the end of Q-10. The concentrator building shall be a closed shell by the end of Q-7.

Mechanical installation of the overland conveyor will be starting in Q-6 and be completed and commissioned by Q-1. Most of the equipment installation inside the process plant and the crusher will take place during Q-7 to Q-5. The remaining mechanical installation beyond that will be for the in-pit crusher and conveying system that will be completed only at Q4.

Pre-operational verifications ("POV") will start during the spring of Q-3, when the permanent power supply is targeted to be available.

When the permanent power is available and POV sufficiently advanced, the commissioning will be able to start with the main substation, followed by the utilities systems. Some systems may have to be commissioned using portable generators. The process systems will be commissioned starting with the TMF and at the crusher in Q-2. Sequentially, the tailings and concentrate loadout systems, the conveying, stockpile and reclaim, mill system, gravity circuits, and flotation circuit will be commissioned and transferred to Champion Operations Personnel. The commissioning process is scheduled to occur until full handover, which is planned for Q1. The first ton of iron concentrate is planned for Q1.

25. Interpretation and Conclusions

25.1 Geology and Mineral Resources

The Kami deposit is an iron formation of the Lake Superior-type, located in a highly metamorphosed and deformed metasedimentary sequence of the Grenville Province of the Labrador Trough. The resulting mineral resource presented in this report is drawn from a geological interpretation of two deposits (Rose and Mills Lake) relying mainly on magnetite and hematite iron content. The Rose deposit is comprised of two sub-deposits, namely Rose North and Rose Central, each divided into sub-domains of varying hematite and magnetite content. The total Mineral Resource Estimate ("MRE") is reported inside optimized open-pit shells based on a long-term reference iron price of CAN$150/dmt (P65 Index). The open-pit Measured and Indicated Mineral Resource for the Kami Project, including the Rose and Mills Lake pits is estimated at 975.5 Mt with an average grade of 29.6% Fe, and an open-pit Inferred Mineral Resource at 163.0 Mt with an average grade of 29.2% Fe. Mineral resources that are not mineral reserves do not have demonstrated economic viability.

The following conclusions on geology, mineralization and the MRE are described as follows:

- The geology of the Rose deposit is folded and faulted, whereas Mills Lake is simpler and more tabular with no interpreted faulting.
- Mineralization at Rose is mainly composed of magnetite and/or hematite, which are the main sources of iron. The Rose deposit is sub-divided into various domains based on magnetite and hematite content and ratio, geological logs, MnO content, specularite occurrences and grain size. Mills Lake deposit is sub-divided into magnetite-rich domains and a hematite-rich domain,
- Magnetite and hematite content come from Satmagan and FeO by titration analyses respectively.
- The MRE relies heavily on the 3D geological model, which is easily followed from section to section. The continuity of mineralization is well understood, as well as the more complex, folded nature of Rose Central. The geological model is a reinterpretation of the previous model used in Grandillo et al. (2018).
- There is some uncertainty on the exact location and attitude of the interpreted NW-SE faults.
- The mineral resource classification is mostly based on drill spacing, confidence in the geological model and recovery methods.
- Comparison with alternate interpolation methods and the previous model, visual checks, as well as global and local grade statistical validations were to support the current MRE.
- The nature of mineralization shows that there is a low variability in Total Fe grades, but more in the magnetite versus hematite content, and in deleterious elements such as MnO.

The proportion of measured, indicated and inferred mineral resources reported reflects the confidence the QP has on the deposit. The QP is also confident that the current method employed is a good representation of the iron deportment in economic minerals (magnetite and hematite) and that the geological model is a good representation of the geological complexity of the area.

25.2 Mining

The Kami Project is planned as a mix of conventional open pit mine for the ore combined with an In-pit Crushing System ("IPCS") for the waste. The Project consists in the Rose pit, which is split into one pit of three phases. The milling rate is planned at 26.0 Mt/y with a ramp up period of 1 year at 17.0 Mt/y. The mill will run for 25 years and produce 212.4 Mt iron ore concentrate having an iron content above 67.5%Fe. The total ore stockpile will reach a total of 5.9 Mt to allow steady mill feed and blend. The maximum stockpile is reached at Year 6.

The main conclusions on the mining and reserves estimation are as follows:

- The production schedule is based on mining to ensure a steady mill feed of 26 Mt/y at the mill during production periods.
- The geotechnical data provided for the previous Feasibility Study by Stantec were used.
- The open pit mining method is planned as a mix of conventional open pit mine for the ore combined with an IPCS for the waste reaching a maximum of 81.0 Mt.
- Open pit mine design including ramps to accommodate double lane traffic and a conveyor, block model dilution, time cycle study, and sequence optimization was done for all phases.
- The reserves comprise of 643 Mt at an average diluted grade of 29.2% total Iron.
- Mine equipment selection includes a truck fleet and an IPCS. The primary production equipment includes 29 m^3 electric-hydraulic production shovels and 300 t off-highway mining trucks combined with a semi-mobile gyratory in-pit crusher and conveyor system for the waste. Drilling will be done using electric DTH production drills.

GMS has estimated the Mineral Reserves in accordance with CIM Standards and reported them in accordance with NI 43-101. The Mineral Reserve Estimate was prepared under the supervision of Mr. Alexandre Dorval, P. Eng., Open Pit Mining Engineering Coordinator with GMS, who is an independent QP.

25.3 Metallurgy and Mineral Processing

This Pre-feasibility Study (the "PFS") is based on the historical metallurgical testwork and on the testwork performed specifically for this PFS. The following conclusions and interpretations can be drawn from the testwork carried out during the PFS.

Samples were selected to be representative of the mineralogical types considering the available samples and the weight required. Mineralogical analysis conducted on the samples provided important information to support the understanding of the mineralogical and metallurgical differences between the ore types found in the Rose deposit. It showed that:

- Iron oxides (hematite and magnetite) are the main economic minerals;
- RC1 and RN1 contain the highest Fe proportion as hematite, while RC3 and RN3 have the highest proportion of Fe as magnetite;
- The main gangue minerals are quartz, calcic amphiboles, ferromagnesium amphibole and ankerite;
- The RC1 and RN1 samples present the highest content of manganese minerals with up to 4.2% of rhodonite and 1.4% of pyrolusite.
- The liberation of iron oxides by size fractions showed the liberation degree drops below 80% for the +212 µm fraction and the -425 +300 µm fraction highlighted the high proportion of fine iron oxide inclusions within quartz particles, which supported the selection to go at a finer grind (100% -600 µm) than the previous studies (100% -1,000 µm) for the spirals testwork and the design.
- The proportions of economic iron in each sample are significantly lower than what was observed in previous phases but are closer to the proportion of economic iron in the current LOM (89.8%).

The spiral testwork showed that:

- The performance and product quality are variable depending on the mineralization units, as observed in previous studies;
- Fe recovery tends to increase with Fe feed grade;
- The results obtained are in line with those obtained with actual spirals in previous study;
- The rougher spirals testwork consistently generated a concentrate above 49% Fe with a Fe recovery above 80%, which is satisfactory considering the economical Fe level of the samples.

The Reflux® Classifier testwork showed that:

- The Reflux® Classifier performs better than the combined cleaner and recleaner WW6 spirals tested by Mineral Technologies in the detailed engineering phase;
- The cleaner testwork showed a spiral rougher concentrate could be upgraded to a concentrate with less than 4.5% SiO_2 achieving Fe recoveries above 90%.

The magnetic separation circuit testwork showed that:

- The increase in the cobber magnetic field and the removal of the cleaner LIMS allowed an increase in the magnetite recovery;
- Grinding at a P_{80} of 45 µm is required to achieve the target SiO_2 grade around 5% SiO_2.
- Magnetic recoveries between 86% and 95.7% were achieved at a P_{80} of 53 µm producing a final concentrate grading between 9.4% SiO_2 to 14.4% SiO_2;
- Magnetic recoveries above 98% were achieved on the cobber concentrate reground at a P_{80} of 45 µm to produce a final concentrate grading between 4.0% SiO_2 to 6.2% SiO_2;
- Based on the Davis Tube results, the Reflux® Classifier overflow is expected to perform similarly to the spirals tails in similar conditions.

The flotation testwork showed that:

- The flotation of the gravity concentrate achieved an average SiO_2 grade of 1.8% at an average Fe recovery of 94%.
- The flotation of the magnetic concentrate achieved an average SiO_2 grade of 2.7% at an average Fe recovery of 98%.
- The High RC sample led to higher SiO_2 grades in the flotation concentrate.

The testwork performed during the PFS permitted to design a revised processing flowsheet that will enable the production of a low silica grade concentrate suitable for direct reduction. Based on the testwork results, recovery models were developed for the Fe and MnO and included in the process mass balance for the concentrator and metallurgical performances. From there, variability of the iron feed grade and magnetic iron proportion from the different ore blends was taken into account in the stochastic simulations used for the design. This permitted a thorough definition of the future plant performance, with a nominal production of a 67.6% Fe iron concentrate, with combined silica and alumina grades below 2.4% and MnO content of 1.1% for an iron recovery of 76.4%.

25.4 Site Infrastructure

The site infrastructure presented in this prefeasibility study first consists of the primary crusher, the ore conveying system and the mill feed stockpile near the concentrator. They also cover all the concentrator equipment, namely the AG Mill and Ball Mill, the gravimetric and magnetic separation systems, tertiary grinding, flotation and dewatering systems. Iron ore concentrate conveying system, emergency stockpile and loadout infrastructure are also included in this study. The power line which supplies the Kami substation was also considered and is capable of providing the required power.

The QP is of the opinion that this study regrouped the required infrastructure for the operation of the Kami concentrator. However, a more in-depth review needs to be carried out during the feasibility study, in order to optimize all production systems. The power line supplying the Kami substation will also have to be studied in more detail and its final route established, taking into account all technical, social and environmental factors.

25.5 Water Management

25.5.1 West Area

The prefeasibility study carried out for the water management in the West Area of the site focused on the Rose Pit area, the waste rock stockpile, and the overburden stockpile. The study concluded that several infrastructures are required to manage the water in this area. The preparation of a conceptual hydrogeological model allowed to estimate an expected pit infiltration rate of 40,000 m³/d. A 4 Mm³ collection pond, located south of the pit and formed by the construction of two dams, is planned to manage the water from the pit and the stockpiles. A treatment plant for total suspended solids (“TSS”) removal, with a capacity of 7,100 m³/h, will receive the water from the collection pond. The water will then be discharged to Pike Lake.

The study showed that other infrastructure will be required to manage non-contact water in the area, such as diversion ditches around the pit and stockpiles, the Mid Lake dam at the outlet of Mid Lake, to prevent runoff from flowing into the pit, and the Pike dike to move the lake away from the pit and secure operation.

Eleven (11) pumping stations and 40 km of pipelines will be required to manage the water in the western area of the site.

It is recommended to continue the study at the feasibility level. This will allow more field information to be gathered, such as geotechnical data for the design of the earthworks, and to refine the expected pit infiltration rate with more field data and modelling. New hydrogeological field data will help reduce the risks related to the amount of water to manage.

The current study identified possible optimizations for the water management of the site, and the feasibility study would be an opportunity to look at these optimizations in more detail and improve the overall project. Possible optimizations regarding infrastructure design and global site flow diagram have been identified.

25.5.2 East Area

The prefeasibility study carried out for the water management in the east area of the site focused on the concentrator, the road network, and the tailings management facility (“TMF”). Several infrastructures are required to manage the water in the east area.

Contact water, collected from roads and pads in this sector of the site, is directed to five basins, each with their own pumping system, then pumped as required to the TMF pond.

The TMF pond will collect direct precipitation and water discharged from the processing plant with the tailings. Runoff and seepage collection ditches will be constructed along the toe of the perimeter dam. Water collected in the ditches will be directed to eight pumping stations around the dams and pumped back to the TMF. Emergency spillways will be provided for each of the nine embankment stages to provide increased stability protection.

During the mine’s operational phase, water will be pumped from the pond via a reclaim system back to the processing plant. Excess water will be pumped to the East Water Treatment Plant (“EWTP”) for TSS removal with a capacity of 1,500 m^3/h. The water will then be discharged to Long Lake.

It is recommended to continue the study at the feasibility level to assess the potential optimization of the water management infrastructure.

25.6 Environmental Permitting

The Project benefits from the advanced environmental assessment and permitting work completed by the previous owner. Preliminary meetings with regulatory agencies were held in order to define the permitting process for the updated Project. Through these discussions and review of available guidance, the provincial environmental assessment process needs to be reinitiated.

Several conditions associated with the provincial Ministerial Release and federal Decision Statement from 2014 have been advanced during the pre-feasibility study, specifically conditions related to groundwater and surface water resources and geochemistry. The conclusions of the studies undertaken to address these conditions has reduced uncertainty and improved the overall environmental risk management for the Project.

Champion Iron Limited ("Champion") has been consulting on the Project with Indigenous groups, the public and local community stakeholders since the acquisition of the Project in 2021. Consultation activities between Champion, Indigenous groups, the public and local stakeholders to date have been focused on introducing the Project and holding initial meetings to discuss concerns and expectations for consultation. As the Project progresses through the Project Registration and provincial EA process, Champion plans to continue to engage with Indigenous groups, the public and local communities.

Champion is developing a Rehabilitation and Closure Plan with the intent of ensuring long-term physical and chemical stability while ensuring maximum benefits to the local area surrounding the mine site and to the Province of Newfoundland and Labrador. The intent of the Rehabilitation and Closure Plan is to limit long-term potential impacts of the mining operation and associated facilities on the surrounding environment. The total cost for rehabilitation and closure has been estimated at CAN$300M.

It is recommended to complete the Project Registration following the issuance of the Pre-feasibility Study to initiate the permitting process. Champion should continue working on addressing the conditions associated with the provincial Ministerial Release and federal Decision Statement from 2014 as part of future environmental assessment work.

25.7 Project Economic Analysis

The economic and financial analysis of the Kami Project, as detailed in Chapter 22, utilizes a discounted cash flow approach on both pre-tax and after-tax basis and demonstrates the economic potential of the Project. The analysis is conducted in Q4 2023 Canadian Dollars ("CAN$" or "$") without considering inflation, currency fluctuations and employs a US$1 = CAN$1.30 exchange.

The pre-tax base case financial model resulted in an internal rate of return ("IRR") of 12.1% and a net present value ("NPV") of $1,482M with a discount rate of 8%. On an after-tax basis, the financial model resulted in an IRR of 9.8% and a NPV of $541M with a discount rate of 8%. The after-tax undiscounted payback period as of the first cash inflow is seven years. Sensitivity analysis indicates the Project's NPV and IRR are most influenced by iron ore concentrate prices, US$:CAN$ exchange rates, and operating expenses, demonstrating the Project's susceptibility to market fluctuations yet underscoring its potential financial robustness under the outlined parameters.

25.8 Project Risks and Opportunities

During the Pre-feasibility Study, a number of risk management workshops were held where risks and opportunities were identified and rated by the Project key team members.

Table 25-1 lists the more significant risks the study team has identified and the mitigation strategies to reduce their impact.

Table 25-1: Project Risks (Preliminary Risk Assessment)

Area	Risk Description and Potential Impact	Mitigation Approach
Geology and Mineral Resources	1. Exact location of faults may locally impact mineralization continuity (attitude and thickness) and can be a geotechnical and safety risk. 2. Underestimation of limonite/goethite in Rose North.	1. Structural interpretation and localized diamond drilling to intercept interpreted faults. 2. Relogging of drill core with attention to heavily weathered material on drillholes missing quality information.
Open Pit Mine	1. Local community disturbed by mining activities.	1. Ensure proper mining procedures, develop control and monitoring plans.
Geotechnical and Hydrogeology	1. Inferior rock mass characteristics could locally result in shallower slopes, negatively impacting LOM due to surface constraints (Lakes, borders, claims, etc.) 2. Changes to current hydrogeological parameters. Could modify the amount of water to be pumped out of the mine. 3. Insufficient hydrogeological characterization leading to underestimation of groundwater inflows to the pit from Pike Lake.	1. Additional geotechnical drilling and studies to confirm the rock mass characteristics. 2. Continued hydrogeological studies. 3. Planned hydrogeological. investigations, including pumping tests and groundwater model updates. Review options to mitigate with pit sequencing. 4. Additional drilling and hydrogeological studies.
Site Infrastructure	1. Electrical Power availability is not confirmed. 2. Delays in construction of the 735 kV powerline by NL. 3. Increased cost of electrical power.	1. Develop and execute an agreement with NL Hydro during the feasibility study phase. 2. Review construction timeline during the FS stage and adjust Project schedule if required. 3. Discuss and execute an agreement with NL Hydro during the next study phase and incorporate results in OPEX evaluation.

Area	Risk Description and Potential Impact	Mitigation Approach
Ore, Waste, and Water Management	1. ML/ARD (metal leaching/acid rock drainage) emanating from Rose South Stockpile.	1. Mitigated by an environmental component to block model and a waste rock management plan.
Construction (Costs and Schedule)	1. Shortage of direct and supervisory construction labour force.	1. Expand resource sourcing Canada-wide and adjust construction labour costs to incorporate extra travel time and expenses.
Environmental, Permitting and Social License	1. Project Registration triggers the need for an EIS and additional EIS guidelines/requirements are identified, extending the permitting period and/or the compensation plans. 2. Municipal, public or indigenous group opposition to the Project. 3. Insufficient precipitation data available to forecast effect of climate change.	1. Undertake reassessment of previous EIS scope with current plan to incorporate into Project Registration. 2. Engagement program underway with targeted approach for each consultation group/stakeholder. 3. Mitigated by year-round water treatment capacity for discharge to Pike Lake and/or Long Lake and conservative dimensioning of contact water storage capacity.
Ore Shipping and Export	1. Freezing of concentrate during transportation because of combination of humidity of concentrate and low temperature at load-out. 2. Increased blockage at car dumper grizzly because of increased humidity level. 3. CAPEX & OPEX cost increase for using QNS&L rising tariff higher than estimated.	1. Identify the most efficient way to heat concentrate in winter and optimize/increase summer transportation and shipping. 2. Provide material specification to port facility and continue filtration testwork and develop strategy to decrease humidity level. 3. Approach QNS&L and prepare joint time and movement simulation.

Table 25-2 shows the more significant opportunities that the project team has identified.

Table 25-2: Project Opportunities

Area	Opportunity Description and Potential Impact	Implementation Approach
Geology and Mineral Resources	1. Add material to the MRE at the southwestern extremity of Rose Central, where the ground and aerial magnetic surveys show a potential extension of the southern fold limb.	1. Exploration drilling campaign.
Open Pit Mine	1. Expansion of the mine closer to Pike Lake dyke and the geotechnic parameters to exploit potential ore reserves identified at the limit of Pike Lake that were not accessible without a dyke in place. 2. Superior rock mass characteristics could result in steeper slopes, positively impacting LOM and strip ratio. 3. Optimize pit slope design using updated structural model resulting in better LOM and lower strip ratio.	1. Implementation of findings of the geotechnical and hydrogeological studies.
Mineral Processing and Metallurgy	1. Opportunity to produce a final 2% silica grade concentrate without flotation.	1. Additional testwork in next phase.
Environmental, Permitting and Social License	1. Leveraging existing approval and relationships with Indigenous communities.	1. Engage with authorities.

25.9 Conclusions

A number of potential project risks have been identified during the course of this Pre-feasibility Study that can materially affect project execution and project economics.

However, based on the information available and the degree of development of the Project as of the effective date of this Report, the QP is of the opinion that the Project is, technically and financially, sufficiently robust to warrant proceeding to the next phase of Project development, feasibility study.

26. Recommendations

26.1 Environmental and Stakeholder Engagement

Champion Iron Limited ("Champion" or the "Company") has developed a conditions/ commitments registry based on the conditions and commitments outlined in the federal decision statement and provincial Environmental Assessment ("EA") release and these conditions/commitments should be used as a planning and design tool to advance the updated Project.

Federal and provincial regulations pertaining to environmental assessment, fish and fish habitat, and other environmental regulatory aspects have changed since the Project was previously assessed and permits issued. Champion should consult with regulatory agencies and continue to monitor and understand these changes to recognize how they might influence the environmental assessment and permitting processes as the Project advances. Specifically, Champion should consult with the Impact Assessment Agency of Canada ("IAAC") to verify the validity of the previous decision statement and clarify federal requirements, if any.

Champion should consult with Indigenous groups, the public, local and community stakeholder and regulators regarding design changes or improvements made to the Project since it previously completed the provincial and federal EA process. As the Project progresses through the EA process, Champion should regularly engage all stakeholders to provide updates on Project planning and schedule and to ensure existing agreements, permits, and relationships are maintained.

Champion should initiate efforts and discussion with regulators to acquire permits requiring longer lead time to obtain in parallel with the provincial EA process. This could include federal permits like those issued under the *Fisheries Act,* or provincial permits, like those issued under the *Water Resources Act*.

Champion should continue to advance baseline environmental studies to further characterize existing conditions within the local and regional environment of the Project. These baseline studies will further reduce uncertainty in Project design, improve confidence in predicted environmental effects and can be used to support permitting applications. Recommendations related to hydrogeology, hydrology and surface water quality, geochemistry and closure are provided below.

26.1.1 Geochemistry

Champion should identify a system for constraining the highest risk waste rock material with respect to metal leaching/acid rock drainage ("ML/ARD") and identify when in the mine life it is expected to be stockpiled. Identifying the timing of mining highest risk material will be important to the underlying assumption that sufficient neutralization potential is available to neutralize acidity within the waste rock stockpile over the 25 years of mine life. As more potentially acid generating ("PAG") samples may be located towards the surface and there are some PAG samples in all formations (with the exception of Attikamagen), it is important to define total volumes and an extraction and stockpiling schedule for PAG and non-acid generating ("NAG") material to avoid construction of the mine rock stockpile or tailings management facility ("TMF") dam embankments with zones of PAG materials.

Additional geochemical characterization should be completed to assess the risk of:

- The immediate release of acidity from sulfide oxidation of waste rock samples with paste pH below 5 with relatively high sulfate-S;
- Neutral mine drainage due to the presence of samples with relatively high abundance of As, Cu, Ni, and Zn.

It is understood that Champion is currently undertaking this additional characterization.

26.1.2 Closure

There are a number of studies, investigations, and reports required to ensure the site will be left in a physically and chemically stable condition. An updated reclamation and closure plan must be submitted at a minimum of every 5 years, or if there is a significant change to the Project. Onset of production is assumed to be a significant change, triggering an update to the reclamation and closure plan. The following studies should be undertaken in preparation for an updated closure plan:

- An ML/ARD assessment and monitoring plan for operation and closure;
- Agronomist report, revegetation studies and trials;
- Infrastructure decommissioning plan;
- Climate and precipitation data are limited to complete proper forecast of long-term site hydrological conditions, and assess the effect of climate change. Conservatism in the design of the water management infrastructure has been considered for the operation phase; however, a climate station should be installed at site to reduce uncertainty for the closure and post-closure period;

- Updated slope stability studies for overburden and waste rock dump under closure configurations;
- Updated hydrogeological studies reflecting the expected closure conditions;
- Expected hydrology, water management and water quality in closure conditions.

26.2 Other Recommendations

26.2.1 Water Management (West Area)

The following is a list of new data acquisition and further work recommended for the Feasibility Study and next step of engineering design:

- Geotechnical information for the main dams and dikes: There are no geotechnical boreholes available in the alignment of all the water management infrastructures planned in the West Area of the site. A geotechnical campaign would allow to add more accuracy to the design and confirm the necessity and type of foundation grouting required.
- Groundwater flow into the pit: The assumed water infiltration rate of 40,000 m^3/d needs to be refined with supplemental hydrogeological field data. It is recommended to carry out pumping tests to estimate the faults transmissivity in the vicinity of Rose Pit and their possible connections to the surrounding lakes. An update of the hydrogeological model is recommended following these tests.
- Lakes sediment characteristics: Characterization of these sediments is important for estimating the degree of hydraulic connection between Pike Lake, Elfie Lake, End Lake, Mid Lake and the future pit.
- Effects of mining activity on Pike Lake: Following additional hydrogeological work, the potential effect of dewatering on Pike Lake water levels will be assessed by performing a water balance including groundwater and surface flows.
- Water quality: Runoff water quality from the Rose Pit and from the overburden and waste rock stockpiles is, for the moment, based on data collected from the Bloom Lake mine. Following the ongoing geochemical assessment completion, the new information will need to be considered to prepare better assumptions on the characteristics of the water to be treated.

It is also recommended to study some possible optimizations on the Project in the next step of engineering. The design being currently based on conservative assumptions, optimizations are proposed for the following aspects:

- Consider that the West Water Treatment Plant ("WWTP") is in operation all year-round. The capacity of the Rose Pit collection pond could be reduced, without the need to accumulate pit dewatering water during the coldest winter months. Elfie and End Lake Dams' height would be reduced. Year-round treatment would also reduce the risk of affecting Pike Lake's water level with mining operations, allowing water to be pumped back into the lake all year-round to compensate for losses due to infiltration in the pit.
- Carry out a comparative study for the sealing of the Rose Pit collection pond (Elfie Lake and End Lake) between using jet grouting and grout curtain to seal the dikes, or installing a geomembrane on the entire basin.
- Analyze various possible scenarios for the global site water management, in particular by considering the use of the tailings facility to manage water from the mine or the stockpiles, which could reduce the need for a large Rose Pit collection pond and associated treatment plant.

26.2.2 Mineral Resources

The following is a list of recommended work to be completed to validate and improve current assumptions used for the Project:

- Conduct a relogging of Rose North drill core targeting limonite/goethite weathering, with an emphasis on the exact location and the intensity of weathering.
- Conduct a structural study on the NW-SE faulting currently interpreted in the geological model. Evaluate potential displacement and attitude of those potential faults with offset and localized diamond drilling.
- Relogging of waste units, particularly between Rose North and Rose Central (Menihek and Sokoman), with a particular attention to graphitic schist units and uniformization of logging codes and level of detail of unit intervals.

26.2.3 Mining

Further studies need to be done to validate the assumptions used for the Project, such as:

- Geotechnical drilling campaign and studies to confirm the open pit geotechnical parameters such as bench face angle, berm width, and geotechnical berms. This study should also provide a better understanding of overburden thickness in areas where few drillholes are available.
- Additional studies on Autonomous Hauling Solutions ("AHS").
- Mining study on the effects of the Pike Lake dike location on potential reserves and resources.
- Local-specific mining salary study to confirm the wages used for the cost estimation of labour.
- A condemnation report for all permanent mining infrastructure including the tailings management facility, mine rock stockpile, and overburden stockpile.

26.2.3.1 Waste Rock Stockpile

- A geotechnical study should be carried out to validate the constructability and long-term stability of the waste rock pile, considering that it will be built with crushed rock rather than run of mine blasted material.

26.2.4 Metallurgy and Mineral Processing

In order to improve the developed flowsheet and process performances, the following additional testwork should be conducted:

- Reflux® Classifier testwork on rougher spirals concentrate at P_{100} = 600 µm to improve the performances achieved during the Pre-feasibility Study ("PFS"). The testwork should be conducted with an adequately instrumented Reflux® Classifier unit:
  - Adequate Relative Density automated control through the valve opening;
  - Better control on the feed density testing range;
  - Electronic recording of the operating data (relative density, underflow valve opening, teeter water addition, etc.).
- Reflux® Classifier testwork on rougher spirals concentrate at P_{100} = 212 µm to achieve a gravity concentrate below 2% SiO_2 with a recovery above 85%. The testwork should be conducted with an adequately instrumented Reflux® Classifier unit, as mentioned above. Positive outcomes from this testwork may lead to the simplification of the flowsheet, as the subsequent flotation stage may not be required anymore.

- Flotation tests on gravity and magnetic concentrate to improve the current performances. The testwork plan should include, but not be limited to:
  - Recipe optimization on variability samples within the Rose Central deposit;
  - Recovery optimization including scavenger circuit;
  - Column flotation testwork on magnetic concentrate;
  - Alternative flotation technology testwork;
  - Evaluation of the effect of water temperature on flotation efficiency;
  - Improve the overall water and reagent balance;
  - Evaluate alternative flotation reagents;
  - Piloting.
- Investigate MnO reduction processes such as low- and high- intensity magnetic separation.
- Magnetic separation confirmation testwork with the circuit final flowsheet with a feed consisting of spirals tails and Reflux® Classifier's overflow.
- Testwork on fine filtering optimization with alternative technology to press filter.

In order to improve the developed flowsheet and process performances, the following additional process engineering work should be conducted:

- Develop an operation strategy to maximize the use of the magnetic separation circuit to stabilize and improve Fe recovery, SiO_2 grade and MnO reduction when the run of mine contaminants grade varies;
- Improve the confidence level on the magnetic Fe proportion in the feed to reduce the magnetic separation circuit size.

26.2.5 Water Treatment (East Area)

For the PFS, it was assumed that water coming from the TMF will be treated only for total suspended solids ("TSS") before being returned to the environment. In order to properly evaluate the quality of the water to be treated from the TMF, it is recommended to conduct more testwork in the next phase of the Project.

It is also recommended to obtain more data on TSS levels from similar operations to confirm the sizing of the East Water Treatment Plant ("EWTP").

Finally, according to the TMF water balance in the current study, the EWTP would operate at a flow of 38,000 m^3/day during the months of May and June to handle additional water from freshet compared to 3,000 m^3/day in normal operation. As a recommendation, the water management strategy could be reviewed to spread the treatment of additional water from freshet over a longer period, thereby reducing the capacity of the EWTP.

26.2.6 Automation & Telecom

To reduce uncertainties, it is recommended to conduct a more detailed study of the LTE coverage for the entire site and the life cycle of the Project. This wave propagation study will review the quantity and location of additional communication towers including the future mine pits and evaluate the option of sharing the existing MFQ Bloom Lake private LTE network with Kami.

26.2.7 Powerline from Flora Lake

The following recommendations are provided for the subsequent levels of design of the power line from Flora Lake:

- The location of Flora Lake's terminal station being still under evaluation, coordination with Newfoundland & Labrador Hydro will be required early in the Project to confirm the actual location.
- The transmission line routing being located near the Wabush airport, coordination with authorities will be required to approve the proposed routing.
- Environmental and social studies must also be carried out regarding the route of the transmission line.
- Technical studies (geotechnical, geomorphology, grounding, electric, corrosion, electromagnetic induction, climatic, LIDAR) must be conducted prior to pre-engineering.

26.2.8 Tailings Management Facility

The following recommendations are provided for the subsequent levels of design of the tailings management facility:

- Review and update of the meteorological data for the site will be required as the Project is advanced. Consideration of future climate change should also be reflected with the design.
- Complete a borrow source reconnaissance program to confirm findings of the desktop level assessment completed as part of this study. The program would be used to collect samples for laboratory testing and to delineate the extents and corresponding volumes of borrow areas.
- An additional site investigation program is recommended. The program would be developed to assess the proposed northwest embankment that has been relocated from past layouts, the north embankment to determine depth of muskeg and swamp within the footprint area, and to investigate the sub-surface conditions in the proposed areas of the spillways.

- Confirm/finalize tailings deposition methods and tailings parameters from laboratory testing.
- Develop a site-specific seismic hazard potential and de-aggregation analysis.
- A dynamic cone penetration investigation program is recommended prior to the completion of Stage 1 deposition to characterize the tailings beach slope within the footprint area of the upstream shell of the embankment raise. Results of the investigation will be used to design the embankment raises and identify foundation preparation requirements on the tailings beach.
- Carry out a series of advanced laboratory triaxial testing to determine the state parameters of tailings (i.e., contractive vs dilative), to assess the liquefaction potential, and to estimate the residual strength of materials. The results will be used to calibrate the future in-situ testing including cone penetration testing ("CPT").
- Develop a waste rock management plan with consideration of materials to be used for construction of the dams that are non-acid generating and non-metal leaching.
- Review using a geosynthetic clay liner ("GCL") in addition to the high-density polyethylene ("HDPE") liner as a secondary containment for seepage management for the Stage 1 embankment.
- Evaluate tapering the east and south embankments based on the tailings beach profile to minimize embankment fill requirements in later embankment stages. This can also affect the post Stage 1 spillway invert placements.
- Evaluate using the maximum operational water level (“MOWL”) in conjunction with the Environmental Design Flood (“EDF”) for stormwater management instead of the normal operational water level (“NOWL”). This would provide additional storage for stormwater and may be viable as the perimeter embankment heights are controlled by the tailings beach post Stage 1 and has additional capacity. Also review the freeboard requirements with revised wind and wave set up with the MOWL.
- Develop a detailed construction sequencing plan to fully understand the scope and risk of a construction season limited to non-freezing periods. The plan must include contingency measures if insufficient construction plant is available for embankments construction/raising and long winter periods when berm construction may be delayed.
- Appropriate regulatory agencies must be consulted, and relevant permits and approvals must be acquired.

26.2.9 Railway – Mine to Port

In order to further refine and optimize the railway infrastructure and associated operations, the following recommendations are proposed:

- Acquisition of supplemental survey data (hydrography, topography and geotechnical) as documented in SYSTRA's report 23022-IFRT-0001_C (SYSTRA, 2023);
- Arbitration on optimal options at the Mine and Pointe-Noire sites;
- Integration of the results of the December 2023 geotechnical campaign at Pointe-Noire into the design;
- Further discussions with *Société ferroviaire et portuaire de Pointe-Noire s.e.c.* ("SFPPN") regarding their maintenance strategy for Champion's rolling stock;
- Embedding any compensatory measures that current environmental studies may find relevant;
- Further explore cost optimization initiatives by bringing value engineering to the design (e.g., Option 2B at the Port) and streamlining to operations (fleet size based on improved cycle time).

26.2.10 Civil Infrastructure – Roads and Pads

To further refine and optimize access and mining roads, pads, and stormwater management infrastructure, the following recommendations are proposed:

- Additional geotechnical investigations around the explosives area, shop/fuel pad, overburden area, camp, and communications tower would be beneficial to establish bedrock levels in those areas to optimize the design and obtain more accurate material estimates.
- Bulk sampling and laboratory testing of the borrow pit materials would be required to adequately characterize the physical and engineering properties of these materials to determine their viability as aggregate material.

26.2.11 Business Development

In the development of the Kami Project, Champion is to continue a multifaceted approach to ensure the Project's long-term success and business sustainability. Active engagement with stakeholders will be undertaken by the Company to maintain transparency and build trust, while also adapting to changing market demands. This will involve effective communication and the fostering of collaborative partnerships to address stakeholder concerns effectively.

Furthermore, the Company will undertake, in the future, the negotiation of offtake and marketing terms with potential stakeholders. Securing favourable agreements is essential for stabilizing revenue streams, enhancing financial projections, and maximizing profitability by aligning production with specific market demands. This strategic initiative will reduce market entry barriers and financial risks, making the Project more attractive to investors and financial institutions.

Continuation of technical marketing efforts with clients will be key and the Project will benefit from the relations Champion fostered with clients across the world. Effective communication of the technical advantages and sustainability aspects of the product will differentiate the Company in a competitive market, fostering long-term partnerships and driving demand. Exploration of potential joint venture (“JV”) partners will provide access to additional resources, expertise, and guaranteed markets, enhancing the Project's viability.

Negotiating major contracts and agreements is crucial for securing favourable terms that support the Project's objectives while ensuring regulatory compliance and positive community relations. Additionally, establishing a robust fiscal and partnership structure, prudent consideration of leverage, through debt financing, would enhance returns but requires a balanced approach to risk management.

In essence, a focused strategy that encompasses stakeholder engagement, strategic marketing, fiscal prudence, leveraging financial structures, and forging strategic partnerships and agreements is imperative for the Project's success. Champions comprehensive approach to the Project development of Kami will lay a solid foundation for sustainable development and growth, positioning the Project favourably.

26.3 Recommendations and Proposed Budget

As recommended in the sections above, additional work should be carried out to better define several aspects of the Kami Project. The first phase would consist of field work and additional testwork to collect sufficient data to perform value engineering/trade-off work to set the scenario to be evaluated during the Feasibility Study and to complete it based on the selected options. In parallel, an Environmental Impact Study (“EIS”) will be conducted. This first phase is estimated at CAN$36.2M.

Following positive Feasibility Study results, and prior to coming to a Final Investment Decision ("FID"), it is recommended to go through a second phase, which will consist of basic engineering to minimize the financial risk involved in performing sufficient engineering to obtain firm prices for the most critical components. This phase is estimated at CAN$15.8M.

Table 26-1: Proposed Field Work, Value Engineering, Feasibility Study, Permitting and Early Works

Field Works	Cost (CAN$)
Phase I	
Rail & Port	
Geotechnical Work and Report	4,588,000
TMF	
Geotechnical Work and Report	925,000
Additional Testwork	75,000
Mining	
Hydrogeological Testwork and Report	5,825,000
Geotechnical Work and Report	575,000
Slope Stability Study	100,000
Dam and Water Management	
Geotechnical Work and Report	3,906,000
Process Plant	
Geotechnical Work and Report	100,000
Additional Testwork/Additional Material Needed[1]	3,800,000
Infrastructure (Civil)	
Geotechnical Work and Report	625,000
Infrastructure (Electrical/Power Line)	
Geotechnical Work and Report	200,000
Water Quality	
Additional Testwork	1,215,000
Subtotal - Field Work & Tests	21,934,000
Value Engineering	2,000,000
Feasibility Study	3,200,000
Permitting and Land Acquisition	9,090,000
Total Phase I	36,224,000
Phase II	
Basic Engineering	15,818,500
Grand Total (Phases I & II)	52,042,500

[1] Including drilling to collect representative metallurgical samples.

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