Turnagain Nickel Project Pre-Feasibility Study, NI 43-101 Technical Report

PREPARED FOR:

Giga Metals Corporation

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PREPARED BY:
HASSAN GHAFFARI, M.A.SC., P.ENG., TETRA TECH CANADA INC.
GARTH DAVID KIRKHAM, P.GEO., FGC, KIRKHAM GEOSYSTEMS LTD.
CHRISTOPHER JOHN MARTIN, CENG. MIMMM, SACANUS HOLDINGS LTD.
MAUREEN E. MARKS, P.ENG., TETRA TECH CANADA INC.
IAN STILWELL, P.ENG., BGC ENGINEERING INC.
MATTHEW CLEARY, P.GEO., BGC ENGINEERING INC.
JIANHUI (JOHN) HUANG, PH.D., P.ENG., TETRA TECH CANADA INC.
BEREKET FISSEHA, PH.D., P.ENG., TETRA TECH CANADA INC.
DAVID MOSCHINI, P.ENG., TETRA TECH CANADA INC.
RONALD J. MONK, M. ENG., P.ENG., ICD.D, KERR WOOD LEIDAL ASSOCIATES LTD.

719-22037.01

Tetra Tech Canada Inc.
Suite 1000 – 10th Floor, 885 Dunsmuir Street
Vancouver, BC V6C 1N5 CANADA
Tel 604.685.0275 Fax 604.684.6241

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ACRONYMS & ABBREVIATIONS

Abbreviation	Definition
AACE	Association for the Advancement of Cost Engineering
AAS	Atomic Absorption Spectrophotometer
ACME	Acme Analytical Laboratories Ltd. (Now Bureau Veritas)
AEP	Annual Exceedance Probability
AeroQuest	AeroQuest Ltd.
AET	Accelerated Energy Transition
AGORATEK	AGORATEK International
AHS	Autonomous Haulage System
AMC	AMC Mining Consultants (Canada) Ltd.
AMEC	AMEC of Americas Ltd.
ANFO	Ammonium Nitrate-Fuel Oil
APS	Announced Pledges
ARD	Acid Rock Drainage
BAFAun	Boreal Altai Fescue Alpine
BC	British Columbia
BCMEM	BC Ministry of Energy and Mines
BCMOF	BC Ministry of Forests
BCR	Blue Coast Research
BCWQG	BC Water Quality Guidelines
Benchmark	Benchmark Mineral Intelligence
BGC	BGC Engineering Inc.
Bren-Mar	Bren-Mar Resources Ltd
BWBSdk	Boreal White and Black Spruce Dry Cool
CAGR	Compound Annual Growth Rate
CANMET	Canada Centre for Mineral and Energy Technology
CCME-PAL	Canadian Council of Ministers of the Environment - Protection of Aquatic Life
CCTV	Closed-circuit Television
CDA	Canadian Dam Association
CIM	Canadian Institute of Mining, Metallurgy and Petroleum
CLS	Commissioned Land Surveyor
CMC	Carboxymethyl Cellulose
CME	Canadian Metals Exploration Limited
Conic	Conic Metals Corp.
DCS	Distributed Control System
DGPS	Differential Global Positioning System

Abbreviation	Definition
DRC	Democratic Republic of Congo
EDI	Environmental Dynamics Inc.
EGL	Effective Grinding Length
EMPA	Electron Probe Micro-Analyzer
EMS	Environmental Management System
ESG	Environmental, Social and Governance
ETO	Energy Transition Outlook
EV	Electric Vehicle
Falconbridge	Falconbridge Nickel Mines Ltd.
FS	Feasibility Study
GCVW	Gross Combined Weight Rating
GHG	Greenhouse Gas
Giga Metals	Giga Metals Corporation
GLU	Glaciolacustrine Unit
GPS	Global Positioning Survey
HADD	Harmful Alteration, Disruption, or Destruction
HCNC	Hard Creek Nickel Corporation (From 2022)
HDPE	High Density Polyethylene
HIG	High-Intensity Grinding
HNC	Hard Creek Nickel Corporation (Till 2017)
HPGR	High-Pressure Grinding Rolls
HSES	Health, Safety, Environmental and Security
ICP	Inductively Coupled Plasma
ICP-AAS	Inductively Coupled Plasma Atomic Absorption Spectroscopy
ICP-AES	Inductively Coupled Plasma Atomic Emission Spectroscopy
ICP-ES	Inductively Coupled Plasma Emission Spectroscopy
ICP-MS	Inductively Coupled Plasma Mass Spectrometry
IEA	International Energy Agency
IP	Induced Polarization
IPL	International Plasma Laboratories Ltd.
IRR	Internal Rate of Return
JK	Julius Keriest
Kirkham	Kirkham Geosystems Ltd.
KP	Knight Piésold
KWL	Kerr Wood Leidal Associates Ltd.
LCT	Locked Cycle Test
LFP	Lithium-Iron Phosphate

Abbreviation	Definition
LG	Low Grade
LiDAR	Light Detection and Ranging
LME	London Metal Exchange
LNG	Liquified Natural Gas
LOM	Life-of-Mine
LRMP	Land and Resource Management Plan
MCC	Motor Control Centre
MDMER	Metal and Diamond Mining Effluent Regulations
MEMLCI	Ministry of Energy, Mines and Low Carbon Innovation
MHP	Mixed Hydroxide Precipitate
MIBC	Methyl Isobutyl Carbinol
MINS	Magnesium, Iron, Nickel and Sulphur
Mitsubishi	Mitsubishi Corporation
ML	Metal Leaching
MSDS	Material Safety Data Sheets
NAG	Non-Acid Generating
NBK	Norman B. Keevil
NCA	Nickel-Cobalt-Aluminum Battery Chemistry
NCM	Nickel-Cobalt-Manganese Battery Chemistry
NI	National Instrument
NOH	Net Operating Hours
NP	Neutralization Potential
NPAG	Non-Potentially Acid Generating
NPR	Neutralization Potential Ratio
NPV	Net Present Value
NSR	Net Smelter Royalty
NTL	Northwest Transmission Line
OCS	Operator Control Stations
PAG	Potentially Acid-Generating
PEA	Preliminary Economic Assessment
PFS	Pre-Feasibility Study
PGE	Platinum Group Element
PGM	Platinum Group Metal
Piteau	Piteau and Associates Engineering Ltd.
PLC	Programmable Logic Controllers
PRA	Process Research Associates Ltd.
QA	Quality Assurance

Abbreviation	Definition
QC	Quality Control
QEMSCAN	Quantitative Evaluation of Materials by Scanning Electron Microscopy
QP	Qualified Person
RF	Revenue Factor
ROM	Run-of-Mine
RQD	Rock Quality Designation
Sacanus	Sacanus Holdings Ltd.
SAG	Semi-Autogenous Grinding
SCT	Super Cycle Test
SG	Specific Gravity
SGS	SGS Laboratory
SIPX	Sodium Iso-Propyl Xanthate
SMC	SAG Mill Comminution
SME	Society for Mining, Metallurgy & Exploration
SRC	SRC Laboratories (formerly TSL Labs)
SSD	Stopping Sight Distance
STEPS	Stated Policies
SWBmk	Spruce-Willow-Birch Moist Cool
SWBmks	Moist Cool Scrub
TCG	Tahltan Central Government
TEEM	Tahltan ERM Environmental Management
Tetra Tech	Tetra Tech Canada Inc.
TLU	Traditional Land Use
TMF	Tailings Management Facility
UBC	The University of British Columbia
UMEX	Union Miniere Exploration and Mining Corporation Ltd.
UNDRIP	United Nations Declaration on the Rights of Indigenous Peoples
VFD	Variable Frequency Drive
Wardrop	Wardrop Engineering Inc.
WHMIS	Workplace Hazardous Materials Information Systems
XPS	Xstrata Process Support

UNITS OF MEASURE

acre	ac
ampere	A
annum (year)	a
bags	bgs
billion	B
billion tonnes	Bt
billion years	Ga
British thermal unit	BTU
centimetre	cm
cubic centimetre	cm^3
cubic feet per minute	cfm
cubic feet per second	ft^3/s
cubic foot	ft^3
cubic inch	in^3
cubic metre	m^3
cubic yard	yd^3
Coefficients of Variation	CVs
day	d
days per week	d/wk
days per year (annum)	d/a
dead weight tonnes	DWT
decibel adjusted	dBa
decibel	dB
degree	°
degrees Celsius	°C
diameter	ø
dollar (United States)	US$
dollar (Canadian)	C$
dry metric tonne	dmt
foot	ft
gallon	gal
gallons per minute (US)	gpm
gigajoule	GJ
gigapascal	GPa
gigawatt	GW
gram	g
grams per litre	g/L
grams per tonne	g/t
greater than	>
hectare (10,000 m^2)	ha
hertz	Hz
horsepower	hp
hour	h
hours per day	h/d
hours per week	h/wk
hours per year	h/a
inch	"
kilo (thousand)	k
kilogram	kg
kilograms per cubic metre	kg/m^3
kilograms per hour	kg/h
kilograms per square metre	kg/m^2
kilometre	km
kilometres per hour	km/h
kilopascal	kPa
kilotonne	kt
kilovolt	kV

kilovolt-ampere	kVA
kilovolts	kV
kilowatt	kW
kilowatt hour	kWh
kilowatt hours per tonne (metric ton)	kWh/t
kilowatt hours per year	kWh/a
less than	<
litre	L
litres per minute	L/m
megabytes per second	Mb/s
megapascal	MPa
megavolt-ampere	MVA
megawatt	MW
metre	m
metres above sea level	masl
metres per minute	m/min
metres per second	m/s
metric ton (tonne)	t
microns	µm
milligram	mg
milligrams per litre	mg/L
millilitre	mL
millimetre	mm
million	M
million bank cubic metres	Mbm^3
million bank cubic metres per annum	Mbm^3/a
million pounds	Mlb
million tonnes	Mt
minute (plane angle)	'
minute (time)	min
month	mo
ounce	oz
pascal	Pa
pico	p
centipoise	mPa·s
parts per million	ppm
parts per billion	ppb
percent	%
pound(s)	lb
pounds per square inch	psi
revolutions per minute	rpm
second (plane angle)	"
second (time)	s
specific gravity	SG
square centimetre	cm^2
square foot	ft^2
square inch	in^2
square kilometre	km^2
square metre	m^2
thousand tonnes	kt
tonne (1,000 kg)	t
tonnes per day	t/d
tonnes per hour	t/h
tonnes per year	t/a
tonnes seconds per hour metre cubed	ts/hm^3
volt	V
week	wk
weight/weight	w/w
wet metric tonne	wmt
year (annum)	a

1.0 SUMMARY

Giga Metals Corporation (Giga Metals), the majority owner of Hard Creek Nickel Corporation (HCNC), commissioned Tetra Tech Canada Inc. (Tetra Tech) to complete this Pre-Feasibility Study (PFS) Technical Report for HCNC's Turnagain project (the Project), located in northern British Columbia (BC), Canada, following the National Instrument (NI) 43-101 Standards of Disclosure for Mineral Projects. HCNC is a joint venture company formed in August 2022 between Giga Metals (CVE: GIGA) with Mitsubishi Corporation (Mitsubishi). HCNC currently holds 100% interest of the Turnagain Project and all its assets.

The consultants commissioned to complete this Technical Report are presented in Table 1-1.

Table 1-1: List of PFS Consultants

Consultant	PFS Components
Tetra Tech Canada Inc. (Tetra Tech)	Overall project management, mineral reserve estimate, mining methods, recovery methods, project infrastructure (overall site layout, access roads, ancillary infrastructure, tailings management and reclaim water system, overall site water management, power distribution), marketing studies, environmental, capital and operating cost estimates, economic analysis, project execution plan and overall Technical Report compilation
Kirkham Geosystems Ltd. (Kirkham)	Project description and location, accessibility, history, geological setting, deposit types, exploration, drilling, data verification, mineral resource estimate, adjacent properties
Sacanus Holdings Ltd. (Sacanus)	Mineral processing and metallurgical testing
BGC Engineering Inc. (BGC)	Pit slope evaluation, geotechnical assessment, hydrogeology
Kerr Wood Leidal Associates Ltd. (KWL)	Power supply (Transmission line design)

Unless otherwise noted, all currencies are expressed in US dollars (US$ or $) in this Technical Report.

1.1 Project Location

The Turnagain Project is located in northern BC, Canada, 1,350 km northwest of Vancouver and 65 km east of the township of Dease Lake. Current access is by paved road (Provincial Highway 37) to Dease Lake and then light aircraft to the site, landing at a coarse gravel strip adjacent to the exploration camp. A seasonal exploration trail provides vehicular access to the site; this trail will require significant upgrades to meet Project requirements. The current power supply for the exploration camp is by diesel generators.

1.2 Project History

After the initial discovery of nickel and copper sulphides in the Turnagain River in 1956, Falconbridge Nickel Mines Ltd. (Falconbridge) acquired the Property in 1966 and conducted various geophysical, geochemical and exploratory drilling programs up until 1973. Between 1973 and 1996, minimal exploration work was carried out and the work that was completed focused more on Platinum Group Elements (PGEs).

Bren-Mar Resources Ltd. (Bren-Mar) optioned the Property in 1996 and conducted further exploration work and some preliminary metallurgical test work in the period of 1996 to 1998, resuming exploration activities after the name change to Canadian Metals Exploration Limited (CME) in 2002.

In 2004, after a change of management, CME became Hard Creek Nickel Corporation (HNC) and from then until 2010 several exploration programs were conducted, including mapping, soil and sediment sampling, geophysical surveys, metallurgical studies, diamond drilling and environmental baseline studies. Until 2010, 79,910 m in 320 holes had been completed.

In 2017, after a period of relative dormancy, HNC changed its name to Giga Metals, and in 2018, drilled 10,835 m in 40 drill holes and restarted metallurgical and environmental baseline studies. In 2021, a further 6,295 m in 15 drill holes were completed for resource classification upgrading and pit geotechnical investigations. In the summer of 2022, 415 m of heli-supported combination sonic and diamond drilling was completed in five drill holes for Tailings Management Facility (TMF) geotechnical investigations.

In September 2022, Giga Metals announced a transaction with Mitsubishi Corporation to form a joint venture corporation named Hard Creek Nickel Corp. (HCNC), to jointly pursue the advancement of the Turnagain Project.

To date, 97,455 m in 380 holes have been completed.

The first resource estimate for the Property was produced in 2003 by N.C. Carter. Several have since been produced by Ron Simpson of Geosim, including updates dated May 2009 and December 2011, respectively. For this report, Garth Kirkham of Kirkham has prepared an updated resource estimate current to the 2021 drilling year.

Five previous Preliminary Economic Assessments (PEAs) have been prepared for the Property: two by AMEC of Americas Ltd. (AMEC) in 2006 and 2008; a third by Wardrop Engineering Inc. (Wardrop) in 2010; a fourth by AMC Mining Consultants (Canada) Ltd. (AMC) in December 2011 and a fifth by Hatch Ltd. (Hatch) with an amended report date of February 3, 2021.

1.3 Geology and Mineralization

The Turnagain ultramafic Alaskan-type complex comprises a central core of dunite with bounding units of wehrlite, olivine clinopyroxenite, clinopyroxenite, representing crystal cumulate sequences, hornblende clinopyroxenite and hornblendite. The complex is elongated and broadly conformable to the northwesterly-trending regional structural grain.

The ultramafic rocks are generally fresh to mildly serpentinized; however, more intense serpentinization and talc-carbonate alteration are common along faults and restricted zones within the complex. The central part of the ultramafic body is intruded by granodiorite to diorite and hornblende-plagioclase porphyry dykes and sills.

The sulphide mineralization, which is unusual for an Alaskan-type deposit, is thought to be associated with meta-sediment wall-rock inclusions which provided the sulphur source. The sulphides are mainly pentlandite and pyrrhotite with minor amounts of chalcopyrite, pyrite and trace bornite. Anomalous levels of platinum and palladium are also present and may be of minor economic interest in a nickel sulphide concentrate product.

1.4 Mineral Resource Estimate

The Mineral Resource was estimated in conformity with the generally accepted Canadian Institute of Mining and Metallurgy's (CIM) "Estimation of Mineral Resources and Mineral Reserves Best Practices Guidelines" (December 2019) and is reported in accordance with NI 43-101 guidelines.

Using a cut-off grade of 0.1% Ni, the Turnagain Property contains an estimated 1,574 Mt of Measured and Indicated resources at 0.21% Ni and 0.013% Co. An additional 1,164 Mt grading 0.21% Ni and 0.012% Co is classified as Inferred. Table 1-2 summarizes the total Mineral Resource for the Turnagain Project, effective September 22, 2023.

Table 1-2: Mineral Resource Estimate Statement for Turnagain Deposit

(Effective Date: September 22, 2023)

Classification	Tonnage (kt)	Ni Grade (%)	Contained Ni (kt)	Co Grade (%)	Contained Co (kt)	Pd Grade (g/t)	Contained Pd (koz)	Pt Grade (g/t)	Contained Pt (koz)
Measured	454,552	0.215	977	0.014	64	0.023	336	0.022	320
Indicated	1,119,387	0.207	2,317	0.013	146	0.019	679	0.021	770
Measured + Indicated	**1,573,939**	**0.210**	**3,305**	**0.013**	**205**	**0.020**	**1,015**	**0.022**	**1,090**
Inferred	1,163,830	0.206	2,397	0.012	140	0.016	583	0.018	674

Notes:

1. All mineral resources have been estimated in accordance with Canadian Institute of Mining and Metallurgy and Petroleum definitions, as required under National Instrument 43-101.
2. Mineral resources are reported in relation to a conceptual pit shell to demonstrate reasonable expectation of eventual economic extraction, as required under NI 43-101; mineralization lying outside of these pit shells is not reported as a mineral resource. Mineral resources are not mineral reserves & do not have demonstrated economic viability.
3. Open pit mineral resources are reported at a cut-off grade of 0.1% Ni. Cut-off grades are based on a price of US $9.00 per pound, nickel recoveries of 60%, mineralized material and waste mining costs of $2.80, along with milling, processing and G&A costs of $7.20.
4. Inferred mineral resources are considered too speculative geologically to have economic considerations applied to them that would enable them to be categorized as mineral reserves. However, it is reasonably expected that the majority of inferred mineral resources could be upgraded to indicated.
5. Due to rounding, numbers presented may not add up precisely to the totals provided and percentages may not precisely reflect absolute figures.

1.5 Mineral Processing and Metallurgical Testing

Punctuated with the occasional hiatus in work, metallurgical testing on the Turnagain deposit has been ongoing for more than 20 years. Early work focused on the production of low-grade nickel sulphide concentrates combined with on-site hydrometallurgical processing. Work since 2010, however, has focused on the production of saleable concentrates. This work was initially done at SGS Laboratory (SGS) in Vancouver, Canada and more recently at Blue Coast Research (BCR) in Parksville, Canada.

Turnagain material is hard. Eighteen Semi-Autogenous Grinding (SAG) Mill Comminution (SMC) tests established Julius Keriest (JK) parameters that have established a picture of quite poor amenability to SAG milling. The data from ten Bond Rod Mill work index tests pointed to the same conclusion. Accordingly, the focus in recent years has been on the use of High-Pressure Grinding Rolls (HPGR) for primary comminution. HPGR testing has been conducted at both laboratory scale and pilot plant scale, the latter using the Köppern pilot HPGR at the Norman B. Keevil (NBK) Institute of Mining Engineering, University of British Columbia (UBC). This testing concluded that the

Turnagain material is suitable for HPGR comminution. Bond Ball Mill tests were run on the HPGR feed and product and established the product to be marginally softer than the feed.

At least 131 Bond ball mill tests have been run on Turnagain material. The average Bond Ball Mill work index from tests run to a product size of 150 µm was 19.5 kWh/t, the 25th and 75th percentiles of the data were 17.3 and 22 kWh/t, respectively. The mean abrasion index from nine tests was 0.23 g.

Flotation flowsheet development was undertaken in test programs prior to the PFS and has been reported in the 2020 PEA. This flowsheet employed rougher flotation and up to five stages of cleaner flotation without a regrind. Sodium Iso-Propyl Xanthate (SIPX) was used as a collector, Calgon as a gangue dispersant and Methyl Isobutyl Carbinol (MIBC) as a frother. Guar gum was used as a final polish silicate depressant in the final stage of cleaning.

Using generally higher nickel recovery/higher sulphur samples, this created a baseline flowsheet and established a database of Locked Cycle Tests (LCTs) on which to base the design of the PFS test work. The flowsheet was conventional and quite robust, suggesting only limited technical risk in scale up. However, the test work did not encompass the entire range of materials that the 2020 PEA envisioned would be milled through the life of the project and much of the metallurgical technical risk with the project was associated with the processing the entire range of materials in the mine plan. The focus of the PFS work has been to address this by building a robust geometallurgical database encompassing all these material types. This database would include geological, mineralogical and flotation parameters, each with defined data quality control systems. It would allow for better prediction of metallurgy based on the available data in the drill hole database and ultimately the block model.

Some 70 samples were carefully selected for mineralogy and flotation testing. The comminution sample database was deemed acceptable for the PFS. The flotation samples were chosen based on source location, head grades (widely distributed across the range of mined material by nickel, sulphur, magnesium and iron grade) and PEA pit phase (with some bias towards early production material).

Each sample underwent grind calibration testing, head assaying and mineralogical analysis using QEMSCAN™ automated scanning electron microscopy. Total mineral and nickel sulphide grain counts were monitored to ensure good particle statistics and one in ten samples underwent a repeat analysis for Quality Control (QC) purposes. The 70 samples averaged 3% sulphide minerals. The non-sulphide gangue was dominated by serpentine (53%) and olivine (31%). Pyroxenes (4.1%) and amphibole (3.6%) dominate the remaining mineralization. Talc averages just 0.3% of the mineralization. Nickel recovery was linked, albeit quite weakly, directly to pyroxene and serpentine content and inversely to olivine content. The proportion of nickel as a sulphide rises with the presence of very little sulphur (above 0.2%) but essentially plateaus at a sulphur assay of less than 0.7-1%. Additional sulphur above about 1% is present as pyrrhotite and appears not to influence the proportion of pentlandite as sulphide.

All 70 samples underwent flotation testing using a standard geometallurgical procedure, with one sample in ten being subjected to a repeat test to establish error levels (average 2% deviation in nickel recovery between replicates).

As expected, the 70 samples responded in a widely variable manner, describing the entire spectrum of nickel recoveries from 8% to 84%. Nickel recovery is linked closely to the assay ratio of sulphide nickel (AC-Ni) to total nickel (4A-Ni). The link is linear. Side-by-side comparisons of assays done on 100 geochemical samples at BCR vs Acme Analytical Laboratories (Vancouver) Ltd. (Now Bureau Veritas) (ACME), where all geochemical AC-Ni assays were obtained, showed excellent agreement between the two laboratories. This is the best geometallurgical predictor of flotation recovery, however as only 80% of the PFS drill hole assay database contained AC-Ni assays, use of this parameter became problematic in block modelling so other algorithms were sought.

Sulphur assay was used as a crude predictor of nickel recovery in the PEA but is known to be problematic as sulphur grades above 0.75% neither show any relationship with the sulphide nickel in a sample, nor with nickel recovery. Further, even at very low S assays the link between S content and sulphide nickel content is quite poor. Accordingly, this approach was not adopted for the PFS.

Instead, a third approach, using algorithms consisting of Mg, Fe, Ni and S assays was developed. All these were present as reliable attributes in the block model. This approach delivered a good prediction of nickel recovery on a deposit-wide scale, leading to a near linear link with Ni recovery from the geometallurgical database with an R-sq of 0.85. This method tracked quite well the nickel recovery by the AC-Ni/4A-Ni ratio; using assays from the drill hole database and modelling the resource using Leapfrog showed nickel recoverability within the resource to follow similar spatial trends. Accordingly, this was adopted as the approach of choice to predict nickel recovery from rougher flotation.

An algorithm was developed to predict cleaner flotation stage recovery based on nickel rougher recovery. This was done through batch and LCTs on composites of samples of similar rougher recovery characteristics. Cleaner stage recoveries in the LCTs were quite consistent, but concentrate quality, especially in terms of MgO content, dropped away for the lowest recovery samples, so the cleaner recovery algorithm was set up with a recovery penalty for poorer rougher recovery material associated with the need to produce concentrates within typical smelter specifications for MgO.

Cobalt, platinum and palladium all report, to different degrees, to the concentrate. Cobalt mostly occurs in pentlandite, so its recovery is linked with nickel recovery. Palladium and platinum recoveries were hard to assess in testing due to the very low tails grades, but in each case the palladium and platinum contents in the concentrate were linked to the respective head grade, with an upgrading ratio of 64x and 50x, respectively. This infers a mean recovery of about 40% for palladium and 32% for platinum.

1.6 Mineral Reserve Estimate

Mineral Reserves for the Turnagain deposit are based on the Measured and Indicated Resources presented in Section 14.0 and use PFS-level engineering designs for the pit and associated operating parameters. The Mineral Reserve estimates are based on a mine plan and pit design developed using modifying parameters, including mining bench geometry provided by BGC, metal price and metal recovery algorithms developed by metallurgy Qualified Person (QP) and operating cost estimates. Proven and Probable Mineral Reserves are summarized in Table 1-3 and match the production plan described in Section 16.0.

Table 1-3: Mineral Reserve Estimate Statement for Turnagain Deposit (Effective Date: September 22, 2023)

Category	Tonnage (kt)	Ni Grade (%)	Contained Ni (kt)	Co Grade (%)	Contained Co (kt)	Pd Grade (g/t)	Contained Pd (koz)	Pt Grade (g/t)	Contained Pt (koz)
Proven	408,106	0.219	894	0.013	55	0.024	341	0.022	321
Probable	542,379	0.194	1,055	0.012	66	0.020	385	0.022	418
Total	**950,485**	**0.205**	**1,949**	**0.013**	**121**	**0.022**	**727**	**0.022**	**739**

Notes:

1. The Mineral Reserve estimates were prepared with reference to the 2014 CIM Definition Standards (2014 CIM Definition Standards) and the 2019 CIM Best Practice Guidelines.
2. Reserves estimated assuming open pit mining methods.
3. Reserves are reported on a dry in-situ basis.
4. Reserves are based on a Nickel price of US $21,500/t, Cobalt price of US $58,500/t, ore mining cost of $2.24/t mined, waste mining cost $2.41/t mined, mining sustaining capital of $0.57/t mined, milling costs of $5.35/t feed, TMF sustaining capital of $0.70/t feed and G&A cost of $0.76/t feed.
5. Mineral Reserves are mined tonnes and grade includes consideration for a 2 m dilution width between ore-waste contact and mining losses of 1%.
6. Ore-waste cut-off was based on $6.63/t of Net Smelter Royalty (NSR).
7. Due to rounding, numbers presented may not add up precisely to the totals provided and percentages may not precisely reflect absolute figures.

1.7 Mining Methods

Based on the resources and reserves defined in Sections 14.0 and 15.0, the Turnagain deposit will be mined using conventional open pit mining methods consisting of drilling, blasting, loading and hauling with large-scale mining equipment. Vegetation, topsoil and overburden will be stripped and stockpiled for future reclamation use. The ore and waste rock will be drilled and blasted on 15 m benches and loaded into autonomous trolley-assist diesel haul trucks with a fleet of electric rope shovels and front-end wheel loaders.

The total mining of the project takes place for approximately 29 years of mining, with an additional 2 years of ore feed from the low-grade stockpile. In the pre-production year or year -1, a total of 17 Mt of waste will be stripped, leaving an average of 6 Mt waste mining per year for the first 9 years which will facilitate effective waste fleet management. The mining rate will ramp up to 55 Mt in year 12 to accommodate the highest strip ratio of the mine life. After year 20, the mining rate will start to ramp down to 40 Mt as the strip ratio decreases. Over Life-of-Mine (LOM) the strip ratio is determined to be 0.41.

Mining is to be carried out using conventional open pit techniques with electric cable shovels, wheel loaders and mining trucks in a bulk mining approach with 15 m benches. Equipment requirements are based on the design parameters of the pit and production rate requirements. Equipment is estimated on a first principles basis, with haul truck requirements based on measured haul profiles. Equipment availability and utilization are based on Tetra Tech's experience and vendor guidance.

Loading will be done using a mix of electric rope shovels and large front-end wheel loaders. The shovels will be matched with a fleet of Komatsu 830E-5 mining trucks, or similar model. The wheel loaders will primarily be responsible for the Low-Grade (LG) stockpile rehandling activities while complementing the shovel to improve the loading unit's physical availability and reduction of the truck queueing time.

The Turnagain project will implement both trolley assist and autonomous technologies as part of the hauling fleet. The associated performance parameters are based on other existing mining operations using these technologies. The total Net Operating Hours (NOH) by period combined with truck's productivity was used to determine the number of trucks required.

The open pit will operate continuously, with two 12-hour shifts daily, 365 days per year. This can be achieved by four crews. The total labour was estimated to match the primary and support mining equipment requirements and total tonnage mined per year.

1.8 Recovery Methods

The processing plant has been designed to process ore from the Turnagain Nickel deposit at a nominal throughput of 45,000 t/d for the first year and then increased to 90,000 t/d in Year 2, producing a market-grade nickel sulphide concentrate. The LOM average diluted mill feed grade is estimated to be 0.205% Ni based on the mine plan and the anticipated average nickel recovery will be 51.4% based on the test results. The LOM average annual concentrate production will be 196 kt/y at 18% Ni (LOM average) for the full operation years and the peak production is expected to be 237 kt/y at 18% Ni (LOM average).

A single gyratory crusher operating as the primary crushing unit will reduce the Run-of-Mine (ROM) ore to a particle size of approximately 80% passing 150 mm. The crushed material will be conveyed using an overland conveyor to a covered crushed ore stockpile with a live capacity of 90,000 t. The material will be reclaimed from the crushed ore stockpile in two parallel lines to two secondary crushing circuits to reduce the particle size to approximately 80% passing 38 mm. The crushed ore will be fed to two parallel HPGR circuits to further reduce the particle size to approximately 80% passing 3.5 mm before grinding. Two parallel two-stage ball mill circuits will further reduce the particle size to approximately 80% passing 80 µm. The ground ore will be fed to rougher flotation cells, followed by three stages of cleaner flotation to produce the final concentrate containing approximately 18% Ni. The final concentrate will be thickened, pressure filtered to a final moisture content of 9% (w/w) and stockpiled onsite. The stockpiled concentrate will be transported by trucks to a port facility at Stewart, where the concentrate will be stored and loaded into ships for ocean transport overseas. Concentrate can also be trucked to a rail connection at Kitwanga for domestic processing.

The flotation tailings will flow by gravity to the TMF via tailings pipelines. Process water recovered from the concentrate thickener and the TMF will be combined for reuse in the grinding and flotation circuits. The reagents will comprise SIPX as a collector, MIBC as a frother, Calgon as a dispersant and Magnafloc 10 or equivalent as a flocculant. An onsite assay laboratory will provide all the routine assays for the mine, the processing plant and the environmental and geological departments.

1.9 Project Infrastructure

The Project will require the development of several infrastructure items. The locations of Project facilities and other infrastructure items take into consideration local topography, environment and capital and operating costs. The Turnagain project infrastructure will include the following major items:

- Offsite and onsite access roads, including bridges,
- An open pit mining operation,
- A network of site haul roads,

- A waste rock pad and a low-grade stockpile,
- Processing plant and ancillary facilities,
- A TMF, along with diversion ditches and channels, tailings transport and disposition systems, plus a reclaim water system,
- Fresh water supply and distribution system,
- Sewage treatment plant and waste disposal,
- Power supply and distribution network,
- Communication system.

1.9.1 Site Layout

There will be three major separate areas of infrastructure associated with the Turnagain PFS: the open pit mine area, the camp/office area and the processing plant area. The open pit mine area is the centre of mining activity and includes the primary crushing facilities and the overland crushed ore conveyor loading station. The accommodation camp area consists of the permanent accommodation camp, mine dry and administration building and is about 1 km south of the ultimate pit boundary. Process facilities and the TMF will be located in the processing plant area, approximately 4.5 km southeast of the mine site. The overland conveyor will be constructed from the south side of the primary crusher into the crushed ore stockpile at the processing plant. The onsite Turnagain River crossing will be located approximately 1 km southeast of the primary crusher along the overland conveyor route. The TMF is located in a valley located approximately 1.5 km south of the processing plant.

The overall site, the open pit mine area and the processing plant area layouts are presented in Section 18.1.

1.9.2 Access Road

The site access road will be a year-round, radio-controlled, single-lane road between BC Highway 37 and the Project site with pullouts capable of carrying the legal axle loading for trucks on BC highways. The road is required to provide vehicle access for the development of the mine site and year-round road access for supplies, equipment and personnel transport.

The route will mostly follow the existing Boulder trail from Highway 37 to the Turnagain River crossing for approximately 59 km and the existing trail south of the Turnagain River to the Project site for approximately 19 km. The access road from Highway 37 to the Turnagain project site is approximately 78 km. The general design criteria for the offsite access road and the road profiles are presented in Section 18.2.

The road will require 16 culvert crossings of varying diameters and 3 clear-span bridges. The bridge lengths are anticipated to be 20 m to 25 m each. For every 300 m of the access road, smaller cross-drain culverts are also provided to maintain natural drainage as prescribed in the Ministry of Forests Engineering Guidebook (2002).

1.9.3 Tailings Management Facility

The TMF design incorporates stable tailings storage, embankments as containment system, a network of deposition pipeline, seepage collection ponds, rockfill buttress, surface water diversion and runoff management features and perimeter access roads. The facility will be constructed in stages to suit construction materials availability and the tailings production schedule.

The transportation of slurry tailings to the TMF will be facilitated through gravity conveyance using pipelines from the nearby process plant. The pipeline requirements for the TMF are determined based on the locations of tailings discharge points specified in the deposition plan.

The geotechnical field investigation conducted by Knight Piésold (KP) in 2022 provided the data for engineering studies and future planning related to the proposed TMF Main Dam and Saddle Dam design considerations. The geotechnical analysis of the TMF included a comprehensive seepage and stability analysis. The seepage analysis focused on assessing long-term conditions to determine the steady-state phreatic surface through the embankment. The geotechnical analyses aimed to evaluate the performance of the embankments and determine appropriate design assumptions and considerations. The embankment design process included numerous iterations by adjusting various parameters to optimize embankment performance and construction and cost intensity. Geotechnical assessments indicate that the facility will achieve a long term stable phreatic surface and that the stability of the TMF will meet regulatory and guideline requirements.

1.9.4 Overall Site Water Management

Tetra Tech completed a flood inundation study and developed a site-wide water balance model as a part of the overall site water management plan, along with designing a network of drainage systems.

The flood inundation extent for the 2-year, 100-year and 200-year return period events were analyzed, and the results indicated that it is unlikely that the mining pit shell will be impacted by a flood event along the Turnagain River.

A site-wide water balance model was also developed using GoldSim. At this project stage, estimated water quantities in both deterministic and stochastic models are based on the assumption of a 30% diversion rate from upstream catchments of the diversion ditches and recycling of 50% of the seepage through the TMF. These percentages would be adjusted to properly manage the water levels within the TMF to prevent water excess or deficiency scenarios. Based on the preliminary results forecasted in the deterministic and stochastic models, mining operations should not be impacted by a lack of water. During extreme conditions, when minimum recorded precipitation occurs every month through the year, local sources of water (up to 0.3 m^3/s) may be required to make up the difference. However, the water deficit can be alleviated with a proper seepage collection system and seepage recycling. Seepage will be minimized by proper seepage collection and recycle system and the water requirements will be addressed as necessary by varying the degree of diversion of catchment water.

1.9.5 Power Supply

The plan for the supply of power to the Turnagain Mine remains as a connection to BC Hydro's electrical system (as noted in the 2020 PEA). This connection comprises the design and construction of an approximately 160 km 287 kV transmission line from BC Hydro's existing Tatogga Substation (near Iskut, BC) to the Turnagain Mine, along with related substation expansion at Tatogga and a new substation at the Turnagain Mine. For the PFS study, bills of material were developed for tower designs and cabling similar to the existing Northwest Transmission Line (NTL) with tower counts and locations based on satellite and aerial imagery.

1.10 Environmental Studies and Permitting

Environmental studies have been initiated and include programs for climate/meteorology, terrain and soils, ecosystems and vegetation, wildlife, hydrology, hydrogeology, water quality, fisheries and aquatics and geochemistry. Climate change and Greenhouse Gas (GHG) management are also being incorporated into Project design. Social considerations are being evaluated including archaeology and heritage resources, traditional land uses and consultation and engagement with Indigenous groups. The Project is located within the traditional territories of the Tahltan First Nation and the Kaska Dena.

The Project, as currently proposed, will require an environmental assessment both provincially (per the Environmental Assessment Act, 2018) and federally (per the Impact Assessment Act, 2019), given the anticipated production capacity would be greater than both thresholds identified by legislation. The environmental and social data being collected will support the regulatory process, in addition to informing Project design and closure and reclamation planning. Closure objectives will be developed that aim to return disturbed areas to conditions consistent with an agreed upon end land use. Preliminary closure planning will be carried out concurrently with various stages of Project development and design to integrate closure objectives into the design, construction and operation of mine infrastructure and activities. The closure and reclamation plan will be developed in consultation with the Project team, Indigenous groups, interested parties and appropriate regulatory agencies.

The GHG footprint of the Project considering Scope 1 (direct site-based) and Scope 2 (related to imported hydroelectric power) emissions was estimated based on the diesel and electricity consumption for mining and processing activities. The carbon intensity calculated for the operations is estimated to be approximately 57,920 t CO_2e/y or 1.8 t CO_2e/t Ni in concentrate. This is not a life-cycle assessment value and does not include Scope 3 emissions related to the production or transportation of inputs to the Turnagain project or the transport of products from the Turnagain project, nor does it consider apportionment of the GHG footprint to by-products. Giga Metals continues to support research into mineral carbonation by the host rock of the Turnagain deposit, with a goal of better defining the quantity of CO_2 that can be sequestered and optimal tailings management strategies. Although the results are encouraging and the reactivity well-known, Giga Metals considers these results too preliminary to be relied upon at this time and is not using them to decrease stated project emissions. CO_2 sequestration by the TMF is expected to help achieve the goal of CO_2 neutrality in future years.

1.11 Capital and Operating Costs

1.11.1 Capital Cost Estimate

The total estimated initial capital cost for the design, construction, installation and commissioning of the Project is $1,893.5 million. This includes all direct costs, indirect costs, owner's costs and contingency. The capital cost estimate is consistent with an Association for the Advancement of Cost Engineering (AACE) Class 4 estimate with the expected accuracy of ±25%. A breakdown of the initial capital cost is provided in Table 1-4. The LOM sustaining capital cost is estimated at $1,643.0 million, including closure cost. A breakdown of the sustaining capital cost is provided in Table 1-5. All currencies are expressed in US dollars, unless otherwise stated.

Table 1-4: Initial Capital Cost Summary

Description	Cost (million $)
Site Preparation & Site Roads	29.6
Mining	132.4
Processing Plant	623.4
TMF and Water Management	177.3
Site Services and Utilities	74.4
On-site Infrastructure	48.5
Off-site Infrastructure	179.5
Total Direct Initial Capital Cost	**1,265.0**
Indirect Initial Capital Costs	374.2
Owner's Costs	38.5
Contingencies	177.4
Total Capital Cost	**1,855.0**
Capitalized Pre-production Costs	38.4
Total Initial Capital Cost	**1,893.5**

Note: Total may not add due to rounding.

Table 1-5: Sustaining Capital Cost Summary

Description	Cost (million $)
Mining	666.0
Onsite Infrastructure	55.0
TMF	617.1
Total Direct Sustaining Capital Costs	**1,338.1**
Indirect Sustaining Capital Costs	61.3
Contingencies	165.2
Total Sustaining Capital Cost	**1,564.6**
Closure & Reclamation	78.4
Total	**1,643.0**

Note: Total may not add due to rounding.

1.11.2 Operating Cost Estimate

The operating cost estimate for the Project consists of mining, processing, G&A and site services costs. The LOM operating costs are summarized in Table 1-6. The average operating cost (average of years 3 to 28) is estimated at $9.09/t ore processed, or $3.85/lb nickel recovered in the concentrate. The LOM average operating cost (average of years 1 to 30) is estimated to be $9.04/t ore processed or $3.89/lb nickel recovered in the concentrate. Unit cost data are expressed for a typical full operating year (average of years 3 to 28).

Table 1-6: Operating Cost Summary

Description	LOM Cost (million $)	Unit Cost ($/t processed)	Unit Cost ($/lb Ni Recovered to Concentrate)
Mining	2,739.6	3.02	1.28
Processing	4,935.5	5.29	2.24
G&A	533.9	0.57	0.24
Site Services	206.2	0.22	0.09
Total Operating Costs	**8,415.2**	**9.09**	**3.85**

Note: Total may not add due to rounding.

1.12 Financial Analysis

The Project has been evaluated using a constant nickel market price of $9.75/lb and cobalt market price of $26.54/lb. The LOM base case Project net cash flow before and after tax is presented in Table 1-7. Applying an annual discount rate of 7%, the Project base case post-tax cash flow evaluates to a Net Present Value (NPV) of $574 million and an Internal Rate of Return (IRR) of 11.4%. The post-tax payback period is 5.7 years when discounted at 7% per year. The post-tax IRR is higher than the pre-tax value due to the impact of the Canadian refundable Clean Technology Manufacturing Investment Tax Credit.

Table 1-7: Summary of Economic Analysis Results

Description	Unit	Pre-tax	Post-tax
Undiscounted Net Cash Flow	Million $	4,728	3,419
NPV @ 5% Discount Rate	Million $	1,333	1,026
NPV @ 7% Discount Rate	Million $	717	574
NPV @ 10% Discount Rate	Million $	143	139
IRR	%	11.1	11.4
Payback Period	years	6.9	5.7

1.13 Conclusions and Recommendations

The PFS result shows robust economics for the Turnagain Nickel Project at 90,000 t/d of mill feed with a 30-year mine life producing a nickel sulphide concentrate. Overall, the Project is considered to be technically and economically viable based on PFS parameters and results.

It is recommended that HCNC focuses on advancing development of the Turnagain Nickel Project as described in the PFS by completing the data collection required to conduct a Feasibility Study (FS). Furthermore, it is recommended to continue with the Project permitting process, planning and scheduling and sourcing financing. A list of recommendations and a summary of estimated costs for various areas to complete the recommended work is presented in Section 26.0.

2.0 INTRODUCTION

Giga Metals, the majority owner of HCNC, commissioned Tetra Tech to complete this PFS Technical Report for HCNC's Turnagain project (the Project), located in northern BC, Canada, following the NI 43-101 Standards of Disclosure for Mineral Projects. Giga Metals is a Canada-based resource company focused on metals critical to modern batteries, especially those used in electric vehicles (EVs) and energy storage.

The Turnagain project, located in northern BC, is one of the few significant undeveloped sulphide nickel and cobalt resources globally. In August 2022, Giga Metals formed a new joint venture company, HCNC, with Mitsubishi to jointly pursue the development of the Turnagain project. According to this announcement, HCNC holds the Turnagain Project and all its assets.

The QPs that authored this Technical Report are independent of HCNC and the Property. The list of consultants responsible for each report section is presented in Table 2-1.

Table 2-1: PFS Technical Report Sections, Consultants and QPs

No.	Section	Company	QP
1.0	Summary	All	Sign-off by Section
2.0	Introduction	Tetra Tech	Hassan Ghaffari, M.A.Sc., P.Eng.
3.0	Reliance on Other Experts		
4.0	Property Description and Location	Kirkham	Garth David Kirkham, P.Geo., FGC
5.0	Accessibility, Climate, Local Resources, Infrastructure and Physiography		
6.0	History		
7.0	Geological Setting and Mineralization		
8.0	Deposit Types		
9.0	Exploration		
10.0	Drilling		
11.0	Sample Preparation, Analyses and Security		
12.0	Data Verification		
13.0	Mineral Processing and Metallurgical Testing	Sacanus	Christopher John Martin, CEng. MIMMM
14.0	Mineral Resource Estimates	Kirkham	Garth David Kirkham, P.Geo., FGC
15.0	Mineral Reserve Estimates	Tetra Tech	Maureen E. Marks, P.Eng.
	Pit Slope Evaluation	BGC	Ian Stilwell, P.Eng.
	Hydrogeology		Matthew Cleary, P.Geo.
16.0	Mining Methods	Tetra Tech	Maureen E. Marks, P.Eng.
	Waste and Stockpile Geotechnical Design	BGC	Ian Stilwell, P.Eng.
17.0	Recovery Methods	Tetra Tech	Jianhui (John) Huang, Ph.D., P.Eng.

No.	Section	Company	QP
18.0	Project Infrastructure	-	-
	Overview	Tetra Tech	Hassan Ghaffari, M.A.Sc., P.Eng.
	Access Roads		
	Tailings Transport System		
	Reclaim Water System		
	TMF		Bereket Fisseha, Ph.D., P.Eng.
	Overall Site Water Management		David Moschini, P.Eng.
	Ancillary Buildings		Hassan Ghaffari, M.A.Sc., P.Eng.
	Power Supply (Transmission Line Design)	KWL	Ronald J. Monk, M.Eng., P.Eng., ICD.D
	Power Distribution	Tetra Tech	Hassan Ghaffari, M.A.Sc., P.Eng.
	Communication		
19.0	Market Studies and Contracts		
20.0	Environmental Studies, Permitting and Social or Community Impact		
21.0	Capital and Operating Costs		Hassan Ghaffari, M.A.Sc., P.Eng., Jianhui (John) Huang, Ph.D., P.Eng., Maureen E. Marks, P.Eng.
22.0	Economic Analysis		Jianhui (John) Huang, Ph.D., P.Eng.
23.0	Adjacent Properties	Kirkham	Garth David Kirkham, P.Geo., FGC
24.0	Other Relevant Data and Information	Tetra Tech	Hassan Ghaffari, M.A.Sc., P.Eng.
25.0	Interpretation and Conclusions	All	Sign-off by Section
26.0	Recommendations	All	Sign-off by Section
27.0	References	All	Sign-off by Section
28.0	Certificates of Qualified Persons	All	Sign-off by Section

Mineral Resource Estimate Update

The Mineral Resource estimate is current as of the effective date of this Technical Report and is presented in Section 14.0 of the Report.

Mineral Reserve Estimate Update

The Mineral Resource estimate is current as of the effective date of this Technical Report and is presented in Section 15.0 of the Report.

PFS News Release

The results of the PFS were disclosed in Giga Metals' press release dated September 22, 2023. This Technical Report is filed to support the disclosure of the PFS results.

2.1 Sources of Information

The key information sources for this Technical Report were:

- Documents referenced in Section 3.0 (Reliance on Other Experts) of this Technical Report,
- Documents referenced in Section 27.0 (References) of this Technical Report,
- Additional information provided by HCNC personnel where required.

2.2 Effective Dates

This Technical Report has the following effective dates:

- Mineral Resource estimate: September 22, 2023,
- Mineral Reserve estimate: September 22, 2023,
- This Technical Report: September 22, 2023.

2.3 QPs and Personal Inspections

The following QPs conducted personal inspections of the Property:

- Hassan Ghaffari (M.A.Sc., P.Eng.) of Tetra Tech conducted a personal inspection of the Property on July 13, 2022.
- Garth David Kirkham (P.Geo., FGC) of Kirkham conducted a personal inspection of the Property on October 9 to 10, 2018 and September 29 to 30, 2021.
- Christopher John Martin (CEng. MIMMM) of Sacanus conducted a personal inspection of the Property on October 19, 2010.
- Maureen E. Marks (P.Eng.) of Tetra Tech conducted a personal inspection of the Property on July 13, 2022.
- Ian Stilwell (P.Eng.) of BGC conducted a personal inspection of the Property on August 17 to 21, 2021.
- Matthew Cleary (P.Geo.) of BGC conducted a personal inspection of the Property on July 22 to 25, 2021.
- Bereket Fisseha (Ph.D., P.Eng.) of Tetra Tech conducted a personal inspection of the Property on July 13, 2022.

3.0 RELIANCE ON OTHER EXPERTS

This Technical Report has been prepared by Tetra Tech and other project consultants for Giga Metals. The information, conclusions, opinions and estimates contained herein are based on:

- The information available to Tetra Tech and other project consultants at the time of preparation of this Technical Report,
- Assumptions, conditions and qualifications as set forth in this Technical Report.

Jianhui (John) Huang, of Tetra Tech, has relied on inputs from tax consultants engaged by Giga Metals for applicable taxes and depreciation. He also relied on Giga Metals for applicable royalties for the Project and Benchmark Mineral Intelligence (Benchmark) (2023) for metal price and payability terms related information.

Hassan Ghaffari, of Tetra Tech, has relied on Benchmark (2023) for matters related to market studies, contracts and payability terms provided in Section 19.0.

Hassan Ghaffari, of Tetra Tech, has relied on Tania Perzoff, R.P.Bio., P.Ag., of Tetra Tech for matters relating to the environmental permitting plan and social or community impact provided in Section 20.0.

Except for the purposes legislated under provincial securities laws, any use of this Technical Report by any third party is at that party's sole risk.

4.0 PROPERTY DESCRIPTION AND LOCATION

4.1 Location

The Project is located approximately 65 km east of Dease Lake in the Liard Mining Division of northwest BC (Figure 4-1). The deposit is approximately centred at UTM NAD83 Zone 9 coordinates 508,000 m E and 6,481,000 m N (58°28'10"N latitude and 128°51'46"W longitude). In the central claims, elevations range from about 1,000 masl along the Turnagain River to 1,800 masl at an unnamed summit in the central Property area. The Property is accessible via a 900 m gravel airstrip and a seasonal exploration trail from Highway 37, which is suitable for off-highway vehicle use during summer months.

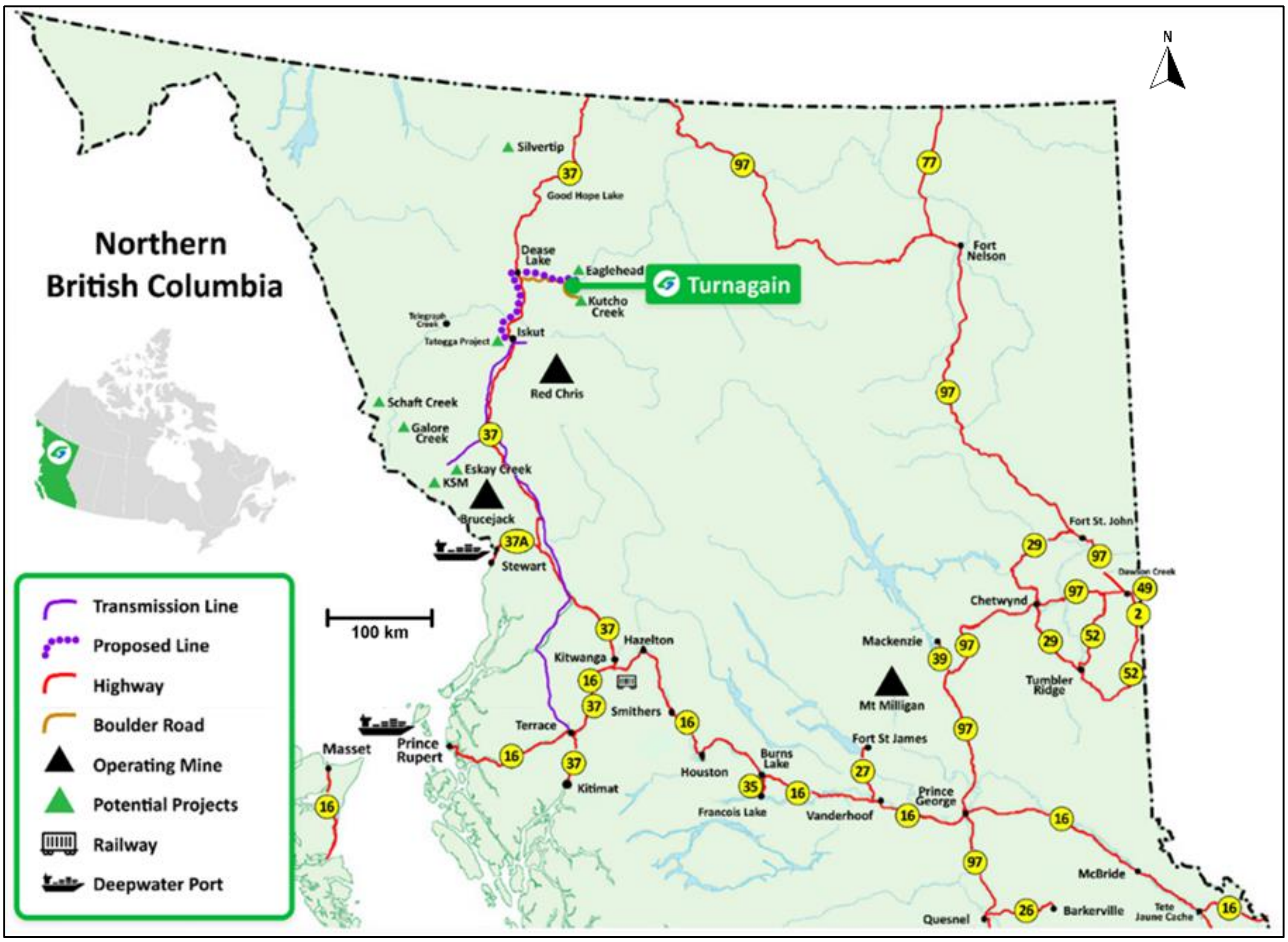


Figure 4-1: Turnagain Project Location Overview Map

(Source: Giga Metals, 2023)

The closest community to the Project is the community of Dease Lake (unincorporated), which is a town of approximately 229 people (BC Census Data, 2021) located on Highway 37 at the south end of Dease Lake. Other local communities include Telegraph Creek, Iskut and Good Hope Lake. There are no residences near the mine site. The Property lies within the traditional territorial claims of both the Tahltan Nation and Kaska Dena (Figure 4-2 and Figure 4-3).

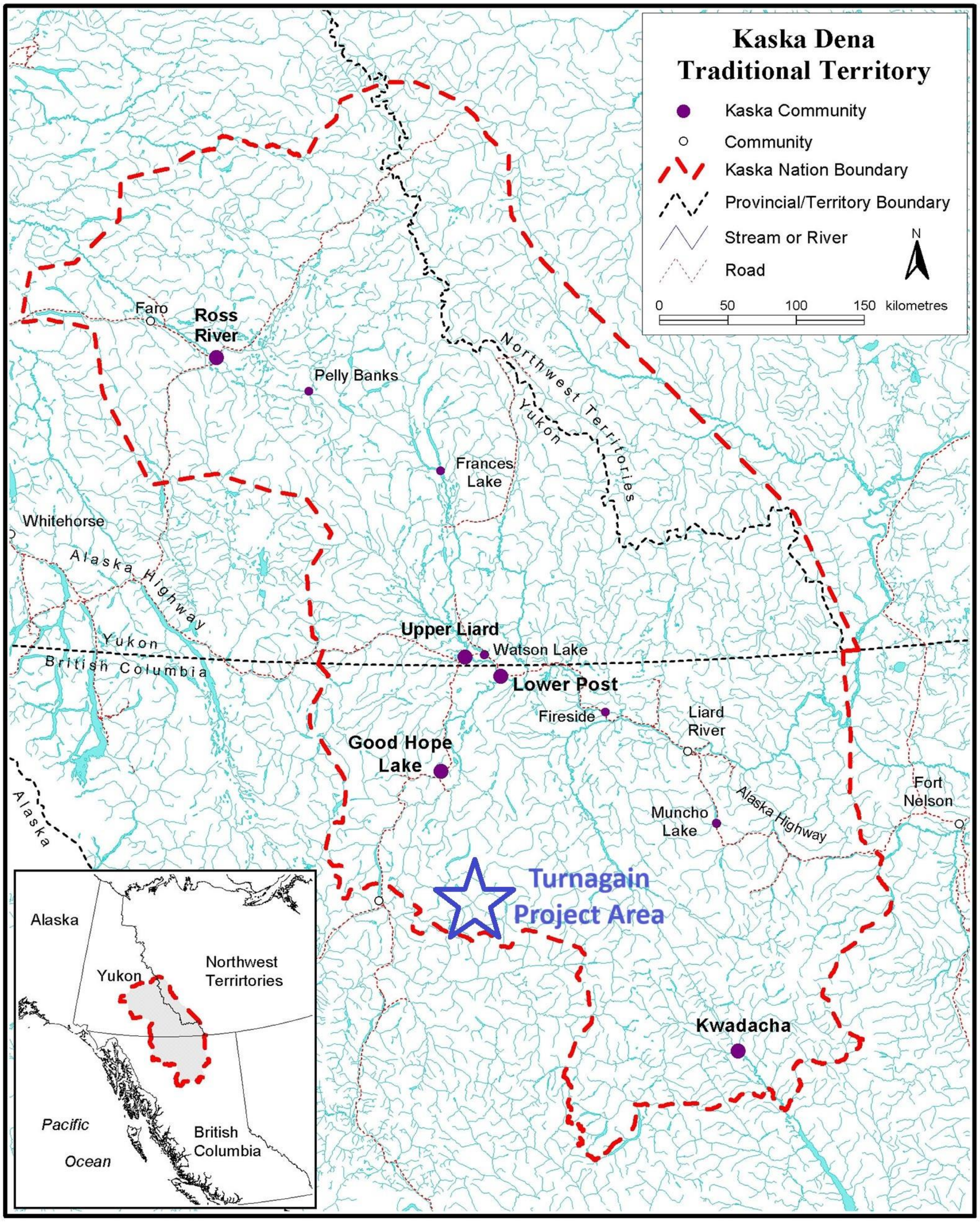


Figure 4-2: Turnagain Project Relative to Traditional Territories of Kaska Dena (Source: Hatch, 2020) [source maps from kaskadenacouncil.com])

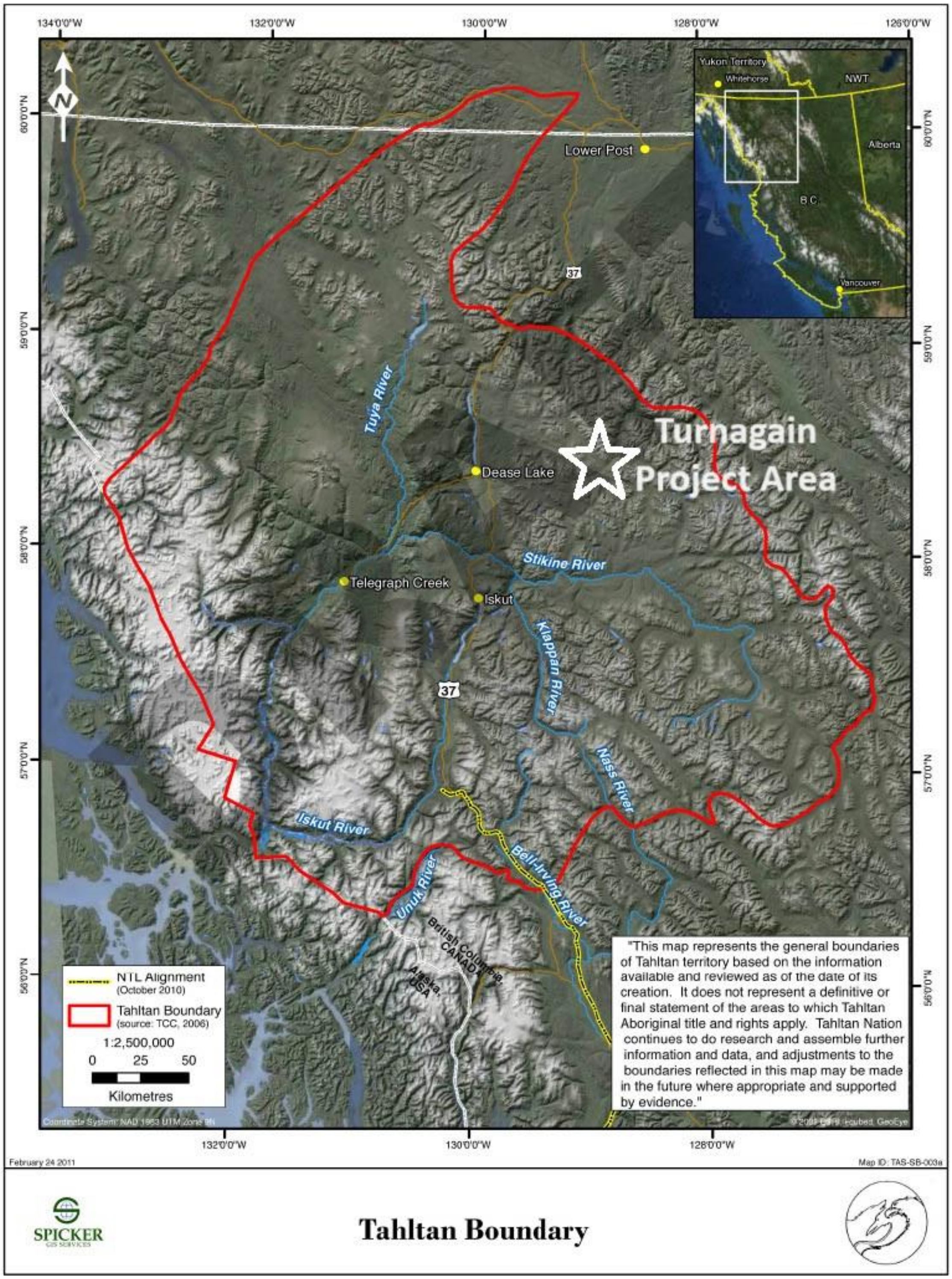


Figure 4-3: Turnagain Project Relative to Traditional Territories of Tahltan Nations (Source: Giga Metals, 2023 [source maps from tndc.ca])

The Project is located within the Liard River watershed on the Arctic side of the Pacific-Arctic continental divide (red line), as shown in Figure 4-4.

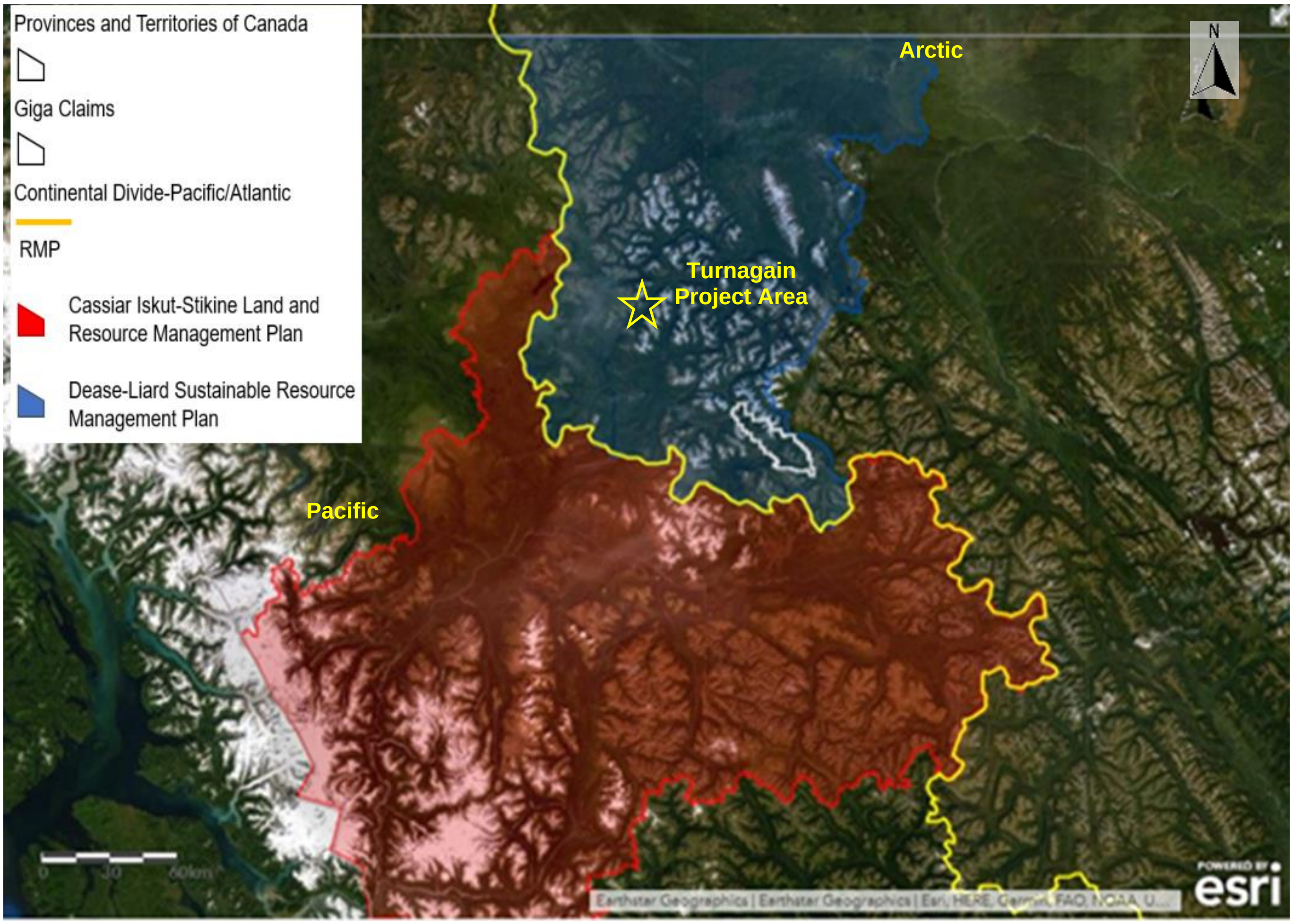


Figure 4-4: Turnagain Project Relative to Continental Divide and Resource Management Areas (Adapted from Hatch, 2020)

The Turnagain Property is found within the Dease-Liard Sustainable Resource Management Plan (BC MSRM 2004; 2012), while the access trail also passes through the Cassiar Iskut-Stikine Land and Resource Management Plan (LRMP) (BC MSRM 2000) as shown in Figure 4-4.

4.2 Mineral Tenures

The Turnagain Project is wholly owned by HCNC and consists of 75 mineral tenures covering an area of approximately 40,069 ha (Figure 4-5). Seventy-two of the tenures are contiguous while three are mutually separated from each other and the contiguous block. All 75 tenures occur within the BC Liard Mining Division in the Stikine region of northwest BC. The configuration of the various mineral tenures is illustrated in Figure 4-5, which incorporates information plotted on BC Mineral Titles Reference Maps M104I-032, -036 to -038, -042, -045 to -048, -053, -054 to -057 and 065. Details are listed in Table 4-1.

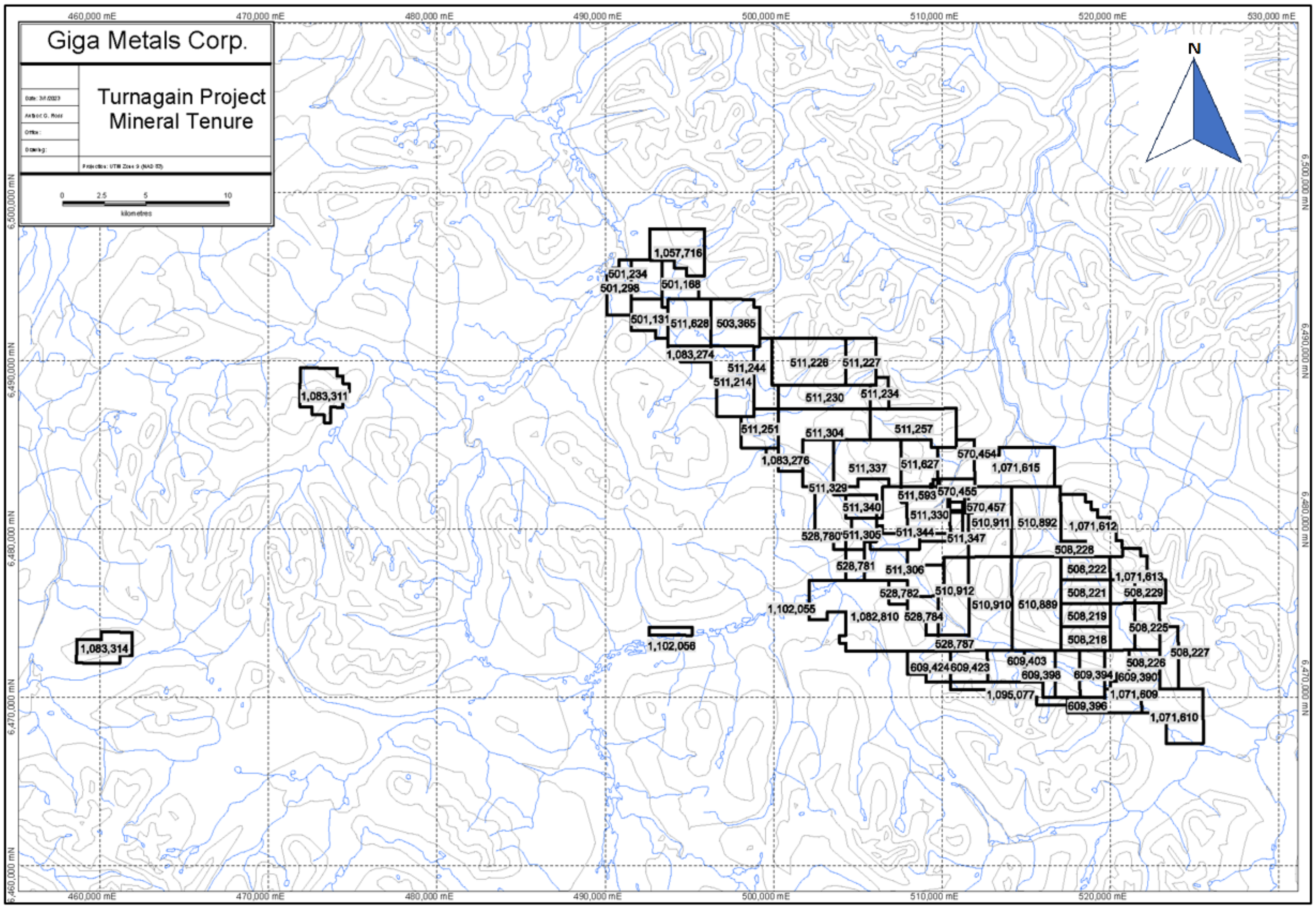


Figure 4-5: Turnagain Project Claims

(Source: Giga Metals, 2023)

Table 4-1: Turnagain Project Mineral Claim Details

Tenure Number	Claim Name	Original Legacy Name(s)	Title Type	Good To Date	Area (ha)
407627	PUP 4		Mineral	2033-DEC-01	500.0
501131	Drift 1		Mineral	2033-DEC-01	422.0
501168	Drift 2		Mineral	2033-DEC-01	421.8
501234	Drift 3		Mineral	2033-DEC-01	421.7
501298	Drift 4		Mineral	2033-DEC-01	421.8
503365		Hard 2	Mineral	2033-DEC-01	793.3
508218	Dinah 1		Mineral	2033-DEC-01	407.2
508219	Dinah 2		Mineral	2033-DEC-01	407.1
508221	Dinah 3		Mineral	2033-DEC-01	406.9

Tenure Number	Claim Name	Original Legacy Name(s)	Title Type	Good To Date	Area (ha)
508222	Dinah 4		Mineral	2033-DEC-01	406.7
508223	Dinah 5		Mineral	2033-DEC-01	407.1
508225	Dinah 6		Mineral	2033-DEC-01	407.1
508226	Dinah 7		Mineral	2033-DEC-01	254.6
508227	Dinah 8		Mineral	2033-DEC-01	407.3
508228	Dinah 9		Mineral	2033-DEC-01	135.5
508229	Dinah 10		Mineral	2033-DEC-01	203.4
510889		Flat 10, 13, 15	Mineral	2033-DEC-01	1627.9
510892		Flat 2, 6	Mineral	2033-DEC-01	1219.3
510910		Flat 9, 12, 14	Mineral	2033-DEC-01	1424.3
510911		Flat 1, 5	Mineral	2033-DEC-01	1066.9
510912		Flat 8, 11	Mineral	2033-DEC-01	779.9
511214		Hard 4, 6	Mineral	2033-DEC-01	979.9
511226		Hill 1, 2	Mineral	2033-DEC-01	1216.1
511227		Hill 3	Mineral	2033-DEC-01	506.7
511230		Hill 4, 5	Mineral	2033-DEC-01	760.5
511234		Hill 6	Mineral	2033-DEC-01	185.9
511244		Hard 5, 7	Mineral	2033-DEC-01	489.9
511251		Hard 8	Mineral	2033-DEC-01	473.4
511257		Hill 9, 10	Mineral	2033-DEC-01	1014.4
511304		Hill 7, 8	Mineral	2033-SEP-01	1149.7
511305		Hound 3	Mineral	2033-DEC-01	271.0
511306		Turn 2, Flat 7	Mineral	2033-DEC-01	881.2
511329		Hound 1, 2	Mineral	2033-DEC-01	1015.4
511330		Cub	Mineral	2033-OCT-01	592.6
511337		Cub 10, 18, Pup 1	Mineral	2033-OCT-01	1065.8
511340		Cub 17	Mineral	2033-DEC-01	253.9
511344		Turn 1, Bear 2	Mineral	2032-DEC-01	271.0
511347		Flat 3, 4	Mineral	2033-DEC-01	474.3
511348		Cub 2	Mineral	2033-OCT-01	389.4
511586		Pup 2	Mineral	2033-DEC-01	236.9
511593		Pup 3	Mineral	2033-OCT-01	101.5
511627		Cub 11	Mineral	2033-DEC-01	592.1
511628		Hard 1	Mineral	2033-DEC-01	709.0

Tenure Number	Claim Name	Original Legacy Name(s)	Title Type	Good To Date	Area (ha)
528780	T1		Mineral	2033-DEC-01	67.7
528781	T2		Mineral	2033-DEC-01	203.3
528782	T3		Mineral	2033-DEC-01	152.6
528784	T4		Mineral	2033-DEC-01	288.3
528787	T5		Mineral	2033-DEC-01	169.6
570454		Bear 1	Mineral	2033-DEC-01	456.8
570455		Bear 19, Bear 21 to 28	Mineral	2033-DEC-01	237.0
570456		Bear 3 to 18	Mineral	2033-DEC-01	220.2
570457		Bear 20	Mineral	2033-DEC-01	16.9
609390	FLAT 7		Mineral	2033-DEC-01	254.6
609394	FLAT 6		Mineral	2033-DEC-01	407.4
609396	FLAT 8		Mineral	2033-DEC-01	203.8
609397	FLAT 5		Mineral	2033-DEC-01	407.4
609398	FLAT 4		Mineral	2033-DEC-01	407.4
609403	FLAT 3		Mineral	2033-DEC-01	407.3
609423	FLAT 2		Mineral	2033-DEC-01	407.3
609424	FLAT 1		Mineral	2033-DEC-01	424.2
1057716	NWMAG		Mineral	2033-AUG-01	741.9
1071609	BLICK 1		Mineral	2033-OCT-04	560.3
1071610	BLICK 2		Mineral	2033-OCT-04	900.1
1071612	FAULKNER 1		Mineral	2033-OCT-04	897.5
1071613	FAULKNER 2		Mineral	2033-OCT-04	627.0
1071615	FAULKNER 3		Mineral	2033-OCT-04	1032.1
1077827	BULLION PML MINERAL		Mineral	2033-AUG-07	17.0
1082810	Turnagain		Mineral	2033-DEC-01	2153.4
1083274			Mineral	2033-DEC-01	202.7
1083276			Mineral	2033-DEC-01	203.0
1083311	LIME NORTH		Mineral	2024-OCT-02	659.0
1083314	DEASE LIME		Mineral	2025-JAN-29	508.9
1095077			Mineral	2033-OCT-01	441.4
1102055			Mineral	2024-FEB-07	101.7
1102056			Mineral	2024-FEB-07	118.7

Mineral claims staked in 1996 by J. Schussler and E. Hatzl were subsequently optioned to Bren-Mar, a predecessor company of CME, HNC and Giga Metals. The original option agreement gave Bren-Mar the right to earn a 100% interest in the mineral claims in exchange for 200,000 shares and incurring property expenditures of C$1 million within five years of acquisition. The 100% interest was earned subject to a 4% NSR on possible future production from the mineral claim 511330. Giga Metals retains the right to purchase all or part of this royalty for C$1 million for each 1% of the royalty.

On November 28, 2002, HNC entered into an agreement with Schussler and Hatzl to acquire an additional 34 mineral claims adjacent to the Turnagain Property in exchange for an aggregate of 100,000 common shares.

Between November 2003 and the present, additional claims were staked at various times, some of which were subsequently forfeited by way of the BC Ministry of Energy and Mines (BCMEM) online map selection process. In January 2022, Giga Metals announced the completion of a tenure swap with adjacent tenure-holder Northern Fox Copper in which 1,910 ha of Giga Metals' tenure were exchanged for 2,153 ha of Northern Fox Copper's tenure. At present, Turnagain Property consists of 75 claims covering approximately 40,069 ha.

Twenty-nine of the original four-post mineral claims (now termed legacy claims) northwest of the Turnagain River were converted to cell mineral claims in April 2006. This conversion process ensured greater security of mineral title by effectively eliminating the possibility of internal and external fractions within or adjacent to the various mineral claims. Accumulated assessment work credits were also retained under the conversion system.

One four-post claim and 27 two-post claims located adjacent to and partially within the central part of the Property holdings (but outside of the prospective ultramafic rocks) were the subject of a legal dispute between HNC and Mr. Weise. On July 10, 2006, the Supreme Court of BC ordered that these claims be transferred to HNC. The transfer has been completed and the claims have been included in the Turnagain Property. Mr. Weise subsequently filed a Notice of Appeal of the Order; the appeal was dismissed by the BC Court of Appeal on April 30, 2007. All subsequent claim acquisitions for various exploration and access considerations were made using BCMEM online map selection process.

4.3 Permits and Environmental Liabilities

Exploration work on mineral properties in BC requires a Notice of Work and Reclamation to be filed with the BCMEM. Obtaining a permit to facilitate such work may require a reclamation security to be posted. The value of Giga Metals' Turnagain Project reclamation security is C$424,000, although this could be amended.

The Project will require several permits, approvals and authorizations from provincial and federal agencies, which are summarized in Section 20.

Environmental studies within the Property area have been ongoing since 2003. These studies include hydrological measurements, water quality sampling from creeks and drill holes, wildlife observations and determination of fish presence and species and the collection of meteorological site data. Multi-element analyses of soil samples have provided useful information regarding background concentrations of major and trace elements. The meteorological station was moved and upgraded in 2009 and further upgraded in-place in 2018 and 2019.

There is no knowledge of any specific environmental liabilities to which the various mineral claims are subject. The Turnagain Property is situated in an area where mining-related activities have been underway for more than 75 years.

4.4 Royalties

A 4% NSR on possible future production from one mineral claim (511330) is held by the original Property vendors J. Schussler and E. Hatzl. Giga Metals retains the right to purchase all or part of this royalty for C$1 million per 1% of the royalty.

A 2% NSR on all future metal production is held by Conic Metals Corp. (Conic). Giga Metals has a one-time option to repurchase 0.5% of the 2% royalty for US$20 million prior to the fifth anniversary of the NSR Agreement (i.e., July 12, 2023), which would leave Conic with a 1.5% NSR. Conic will have a right of first refusal on any future sale by Giga Metals of a royalty or product stream or similar instrument.

5.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

5.1 Accessibility

The nearest airport to the Project is at Dease Lake (IATA: YDL), 65 km by air to the west of the Project. Dease Lake currently has no scheduled air service but serves as a charter hub for mining operations in the region with regular service by Central Mountain Air from Kelowna, Nanaimo (1,120 km SSE), Prince George (675 km SE), Smithers (438 km SSE) and Terrace (450 km SSE). Fixed-wing charter flights are also available from Whitehorse (380 km NW) and other locations.

A 900 m coarse gravel airstrip immediately adjacent to the Turnagain exploration camp, constructed by Falconbridge in 1967, was upgraded by HNC in 2007 and has been used regularly as recently as summer 2022.

An exploration trail, known as the Boulder Trail, extending east from Highway 37 has been used by large, articulated four- and six-wheel drive vehicles to convey equipment to mining and exploration operations in the region. The length of Boulder Trail plus the 7 km spur from Highway 37 to the Turnagain Camp is approximately 77 km (Figure 5-1, orange path). The access point, locally known as "The Landing", is 7 km south of Dease Lake.

The Boulder Trail has been studied extensively for upgrading to a mining road into the area for the Kutcho project (see Section 23.0). That study reflected some areas of re-orientation of the trail out of the most sensitive areas for permanent use. Use of that alignment could shorten the route by 1 to 3 km.

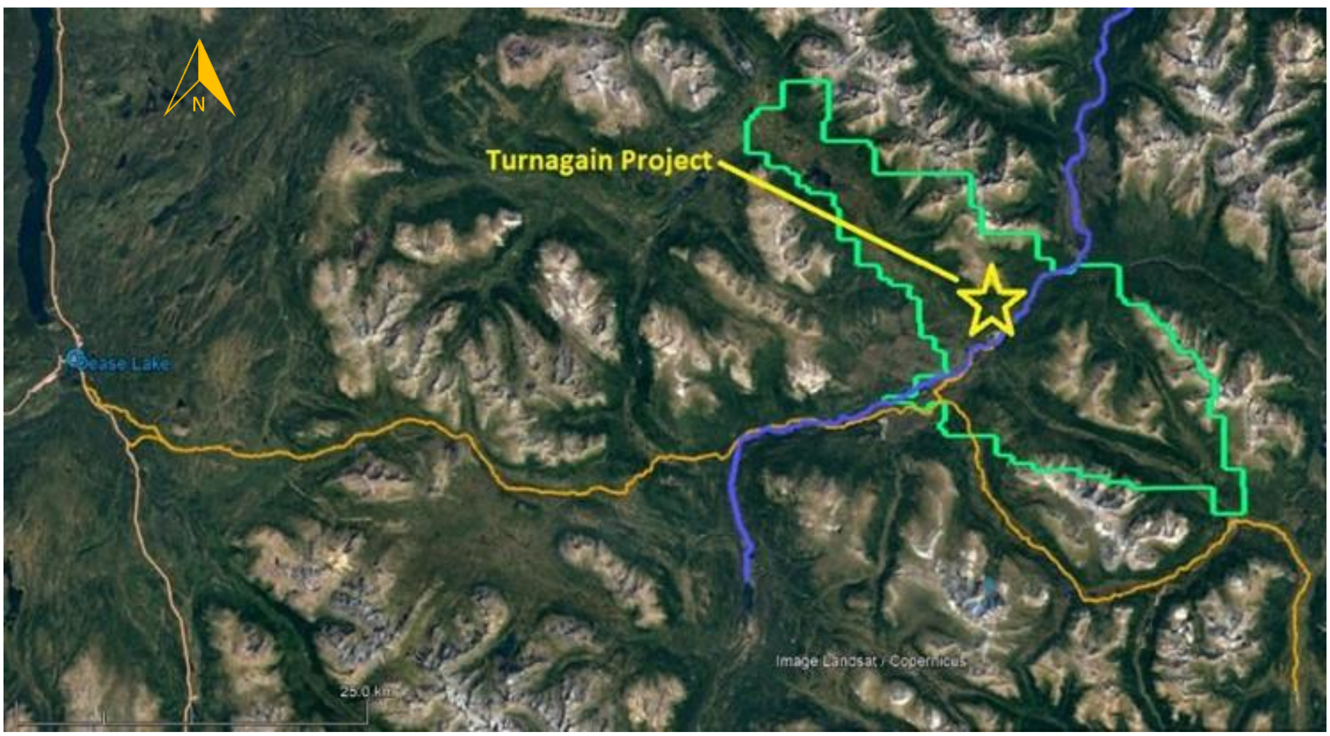


Figure 5-1: Turnagain Project Location and Access

(Source: Giga Metals, 2023)

Trail access is not suitable for regular vehicle traffic. The Boulder Trail is also the primary access trunk to the Boulder City placer camp (10 km southwest), Kutcho Copper (40 km southeast) and Eaglehead Copper (immediately west) properties, as well as several jade and placer gold operations in the vicinity. In 2020, the BC government encouraged the convention of a multi-stakeholder group to work together on Boulder Trail permitting, maintenance and upgrades. Giga Metals has been leading the Boulder Trail User Association since its inception, working to ensure that the conditions of the use permit are maintained.

5.2 Climate Information

The climate of the area is generally characterized by cold winters, warm summers and reasonably consistent precipitation throughout the year, although the summer months are the wettest. The nearest Government of Canada weather station is located at Dease Lake.

Climate monitoring commenced with the installation of the TURNMET climate station, a Campbell Scientific automated weather station installed at the east end of the site airstrip on August 11, 2004; climate data are available from that date until September 9, 2009. The station was then relocated several hundred metres west-southwest of the Hard Creek campsite and renamed TURNMET2. Several of the instruments were replaced and a new total precipitation gauge and solar radiation sensor were installed. TURNMET2 recorded average hourly and daily wind direction, wind speed, temperature, precipitation and relative humidity. The station functioned well, but approximately one year of temperature and relative humidity data were lost from June 20, 2005, to August 24, 2006, due to damage to the station caused by a moose. The climate station was overhauled in mid-2018 and renamed "BC400972". The installation utilized the existing 10 m tower, but included the addition of new instrumentation, including barometric pressure and snow depth. The upgraded station also included GOES satellite telemetry, with data accessible through a web-based portal and updated hourly. Finally, a Class A evaporation pan was installed in 2019 and integrated with the station instrumentation. The geographical coordinates of the meteorological station are shown in Table 5-1.

Table 5-1: Location of Meteorology Stations

Station Name	Year	Easting	Northing	Elevation (masl)
BC400972	2018–Present	508064	6480139	1,020
TURNMET2	2009–2011	5080644	6480139	1,020
TURNMET	2004–2009	508386	6480221	1,015
Dease Lake	1957–Present	440983	6476843	802

Notes: The geographical coordinates are approximate location based on the text from the reports reviewed. NAD 1983 UTM Zone 9N.

A hydrometeorological characterization report was issued in January 2023 (Swiftwater, 2023) and provides a summary of both the analytical techniques used and estimates of many climate and hydrology parameters for the project. Data collected from the project site from 2006 to 2021 were combined with long-term regional data to estimate project conditions. The long-term average annual temperature was estimated to be -2.3°C, with the hottest month being July and the coldest month being February. Long-term annual potential evapotranspiration (PET), which is roughly equivalent to lake evaporation, was estimated to be 445 mm, while sublimation was estimated to be 73 mm. Long-term annual precipitation is 548 mm, with 318 mm falling as rain and 230 mm falling as snow. An orographic effect of 9% increase per 100 m increase in elevation was used. The 100-year and 200-year 24-hour rainfall was 66.4 mm and 72.9 mm, respectively and the 24-Hour Probable Maximum Precipitation (PMP) is 127 mm. The average annual maximum snowpack depth and SWE is 0.76 m and 0.18 m, respectively. The average annual wind speed is 5.0 km/h, predominantly from the west-south-west. The average maximum annual wind speed was 16.3 km/h.

5.3 Hydrology

The Project is located near the headwaters of the Turnagain River, which flows generally east and north to join the Kechika River, a tributary of the Liard River, which itself is a tributary of the Mackenzie River, which empties into the Arctic Ocean. Several small creeks flow into the Turnagain River at or near the Project site, including Hard Creek and Flat Creek within the immediate Project area and Ferry Creek and Faulkner Creek which flow through Giga Metals' existing claims. Figure 5-2 and Figure 5-3 show Turnagain River near the existing airstrip and Hard Creek just before the confluence with the Turnagain River.

Annual flow patterns are typically characterized by a very pronounced period of high flows in the spring due to snowmelt and rainfall, followed by declining flows through the summer and fall and low flows throughout the winter.

Hydrometric (streamflow) monitoring stations have been operated in the Project area. Continuous monitoring has been done at these stations for the following periods:

- Lower Hard Creek – September 2005 to August 2008, July 2011 to July 2012 and 2018 to present (instantaneous manual flow measurements are ongoing for this site),
- Upper Hard Creek – August 2006 to October 2009 (but not ongoing),
- Farthest Hard Creek – September 2008 to August 2011 (but not ongoing),
- Faulkner Creek – August 2006 to August 2011 and June 2018 to present,
- Flat Creek – August 2006 to August 2011 and June 2018 to present,
- Turnagain River – September 2008 to August 2011 and June 2018 to present.

Figure 5-2: Turnagain River at Project Location (Looking Northeast)
(Source: Hatch, 2020)

Figure 5-3: Hard Creek Flowing into Turnagain River (Looking Northwest)
(Source: Hatch, 2020)

Note: Red dot represents Lower Hard Creek monitoring station.

Installed dataloggers and pressure transducers record water level and temperature at 15-minute intervals and environmental technicians complete monitoring activities that build the relationship between water level in the streams and flow. The most complete and continuous datasets are for the Faulkner Creek and Flat Creek stations, where over six complete years of data had been collected as of 2011. Unfortunately, periods of data were lost at both the Upper and Lower Hard Creek sites due to instrument failures.

Runoff in the various project tributaries was estimated to be 385 mm (Swiftwater, 2023), with the 50-Year wet and dry annual runoff being 502 mm and 267 mm, respectively. The return period annual and summer 10-Year, 7-Day low flow (7Q10) was 0.5 L/s/km^2 and 8.1 L/s/km^2. The average and 100-year peak instantaneous unit runoff was 107 L/s/km^2 and 291 L/s/km^2, respectively. By contrast, runoff in the Turnagain River was 428 mm, with the 50-Year wet and dry annual runoff being 516 mm and 315 mm, respectively. The return period annual and summer 10-Year 7-Day low flow (7Q10) was 1.9 L/s/km^2 and 9.8 L/s/km^2, respectively. The average and 100-year peak instantaneous unit runoff was 89 L/s/km^2 and 197 L/s/km^2, respectively.

5.4 Local Resources

An exploration camp built on the Property in April 2003 can accommodate approximately 35 people. The camp consists of 17 tents, two trailers and drill core logging and storage facilities. Power is provided by an on-site diesel generator and a backup generator (Figure 5-4).

In 2021, partly due to COVID-19 safety requirements, the Company contracted, on a rental basis, additional camp facilities, including additional kitchen and wash facilities and generators, bringing the accommodation potential to approximately 60 people. Currently, the camp consists of 37 tents, two trailers and drill core logging and storage facilities and additional generating capacity. In May of 2023 the Company purchased the rented camp infrastructure first installed in 2021.

On-site communications include satellite telephone and internet connections.

There are approximately 36 km of exploration trails on the Property, constructed from the late 1960s to the present, most of which have been reclaimed.

Figure 5-4: Aerial Image of Camp Infrastructure

(Source: Giga Metals, 2022)

5.5 Infrastructure

Dease Lake (population 229) offers access to some supplies and services. The cities of Terrace (population 12,017) and Smithers (population 5,378), 580 and 600 km to the south of Dease Lake, respectively, offer the best range of supplies and services which can be trucked to Dease Lake via Highway 37. The closest deep-water port is located at Stewart, BC. There is no rail link within the Cassiar district, although there is a rail bed between Dease Lake and Takla Landing to the south. The closest railhead for the Canadian National Railway is at Kitwanga, approximately 485 km south of Dease Lake.

The Cassiar district is serviced by the provincial grid to Tatogga (287 kV) and Iskut (25 kV) through NTL. This line provides service to mines and communities and interconnections to run-of-river hydro projects in western BC at Forest Kerr, McLymont Creek and Volcano Creek. The 3 MW Hluey Lakes Hydro Project, supplemented by diesel generators, produces electricity for Dease Lake.

5.6 Physiography

The data on physiography of the Stikine region are taken from the Integrated Land Management Bureau (2007). Between Dease Lake and the Property, topography comprises mountains and wide river valleys of the Stikine Ranges. Ridges, plateaus and summits lower than 1,800 m are rounded while higher summits are rugged. Valley bottoms are 1,000 to 1,350 m elevation, while the highest peak (King Mountain) is about 15 km south of the Turnagain Property at 2,425 m elevation. Plateau surfaces are at about 1,500 m.

The valley bottoms and lower elevation slopes are covered with glacial drift. Esker and drumlin formations are numerous and extensive. The ranges are characterized by the occurrence of flat-topped tuyas, which are steep-sided volcanoes that erupted on the plateau surface under the ice sheet during the Pleistocene glaciations.

Boreal white spruce and lodgepole pine forest occur on valley bottoms, where they are interspersed with wetlands. At higher elevations, the boreal forest gives way to sub-alpine fir and scrub birch in open forests and woodlands. In areas of cold-air ponding and in upper elevation exposed areas, the forest gives way to sub-alpine shrub and grassland and scrub vegetation. Alpine shrub-land, heath and tundra occur above the tree line. Bedrock is reasonably well exposed in the areas above the tree line and along drainage divides.

Several species of large mammal including grizzly bear, black bear, wolf, moose, caribou, mountain goat and sheep can be found in the Cassiar Mountains. Bird species noted in the mountains include gyrfalcon, golden eagle, willow ptarmigan, least sandpiper, red-necked phalarope, snow bunting and Smith’s longspur.

The Turnagain Project straddles the Turnagain River near its confluence with Hard Creek and Flat Creek. The Project area covers north-, south-, east- and west-facing slopes northwest and southeast of the Turnagain River and alpine terrain above the tree line. Elevations range from about 1,000 m along the Turnagain River in the central claims area to 1,800 m at an unnamed summit in the central Property area. The general site topography and environmental setting are shown in Figure 5-5 and Figure 5-6. The Project activities are expected to be limited to elevations below 1,400 m.

Figure 5-5: Turnagain Project Area and Access (Transport Trucks on Boulder Trail, Looking South)
(Source: Hatch, 2020)

Figure 5-6: Turnagain Project General Setting (Exploration Drill Hole, Looking Northwest)
(Source: Hatch, 2020)

6.0 HISTORY

The description of the Property exploration history is based on work by Nixon (1998) and Baldys et al. (2006), as reported in prior Turnagain studies.

Nickel and copper sulphides were first recognized in rusty weathering exposures at the Discovery zone on the Turnagain River in about 1956. Falconbridge acquired the Property in 1966 and, during the period 1966 to 1973, completed an airborne geophysical survey, ground geophysical surveys, geological mapping, geochemical surveys and 28 wide-spaced diamond holes (2,895 m). The work identified several sulphide “showings”. The exploration program tested many of the mineralized outcrops by “packsack” drilling; the Discovery outcrop was not successfully drilled.

During the early 1970s, adjacent claims were investigated with a geochemical survey by Union Miniere Exploration and Mining Corporation Ltd. (UMEX). Once the Falconbridge and UMEX claims expired, several of the showings were re-staked and tested with short, small diameter core holes by an unnamed party. Three EX-sized core holes, totalling 55.5 m, were drilled on the west bank of the Turnagain River in 1977. No significant intersections were reported, and the collars have not been located. In 1979, a single drill hole (17 m) near the east bank of the Turnagain River was drilled and intersected unmineralized quartz diorite.

The commodity focus for exploration shifted to PGEs in the mid-1980s. A geochemical survey for PGEs was conducted for Equinox Resources Ltd. in 1986 and Bridcut re-sampled the Falconbridge core in 1988.

In 1996, Bren-Mar optioned the Cub claims from Schussler and Hatzl. From 1996 to 1998, Bren-Mar completed an airborne magnetic survey over 45 km^2 (400 line-km of survey), 19 diamond drill holes (3,889 m), geological prospecting and sampling, down-hole pulse electromagnetic surveys in four of the 1997–1998 drill holes and preliminary metallurgical test work on drill core composite samples.

Bren-Mar changed its name to CME and resumed exploration in 2002 with an Induced Polarization (IP) and ground magnetic survey followed by 1,687 m of diamond drilling in seven holes. Drilling continued in 2003, with 23 holes (including deepening of one of the 2002 drill holes) completed for 8,769 m. Additional exploration included geological mapping and prospecting, as well as bedrock, stream sediment and soil sampling. In 2004, CME changed its name to HNC and recommenced work on the Property, including:

- Geological mapping,
- Bedrock, stream sediment and soil sampling,
- Surface, borehole and airborne geophysical surveys,
- Mineralogical, metallurgical and analytical studies,
- 86 diamond drill holes for 15,174 m of drilling in 2004 and 2005.

6.1 2006 to 2008

In 2006, HNC reported a Measured and Indicated resource estimate inside a 0.2% sulphide nickel grade shell. Only the sulphide minerals were considered recoverable into a saleable product; therefore, the 2006 resource estimate was reported in terms of sulphide nickel. Sulphide nickel was determined using an ammonium citrate hydrogen peroxide partial extraction procedure. The estimate was completed by Geosim of Vancouver (Simpson, 2006).

Later in 2006, HNC reported results of the first PEA on the Project. A key assumption of the PEA was that a 0.10% sulphide nickel analysis cut-off was economically reasonable for the Project. This cut-off was determined based on parameters selected for pit optimization. Resources in the PEA were reported in terms of sulphide and total nickel.

In 2007, HNC reported a new measured and indicated resource estimate in terms of sulphide and total nickel inside a 0.10% sulphide nickel grade shell. This estimate was completed by Geosim and resulted in a significant increase in the tonnes of the deposit (Simpson, 2007).

Resource estimates reported in 2006 and March 2007 were constrained using sulphide nickel grade shells. The restriction on grade shells was appropriate given that no geological domains had been defined at that time.

In January 2008, AMEC completed a second PEA, which included an updated resource estimate constrained by lithologic domains based on the nearest-neighbour interpolation of geology from drill logs. At the time the resource estimate was carried out, results from the 2007 drill program were not available.

In June 2008, AMEC released an interim resource estimate.

HNC drilled a total of 156 diamond drill holes for 47,316 m of drilling from 2006 to 2008.

6.2 2009 to 2011

In April 2010, Wardrop released another PEA, based on an updated resource that included the results of the 70 holes (21,099 m) drilled in late 2007 and 2008, as well as additional metallurgical work (production of a bulk flotation concentrate to feed a hydrometallurgical treatment plant). The Project scope at that time consisted of an 87,000 t/d flotation plant employing the Outotec nickel chloride leach process to produce 35,000 t/a London Metal Exchange (LME) grade nickel metal and 2,000 t/a cobalt as a hydroxide.

In 2010, HNC completed two core holes totalling 384 m to recover 3,530 kg of core for metallurgical testing.

In 2010 to 2011, a metallurgical test work program at SGS Vancouver led to a breakthrough in reagent selection, resulting in repeatable recovery of high-grade flotation concentrates, with concentrate grades over 18% nickel and recoveries of total nickel in the 50% to 65% range.

In 2011, AMC completed a PEA based on a two-phase facility culminating in an 87,000 t/d flotation plant producing high-grade nickel sulphide concentrate (>18% nickel).

6.3 2012 to 2022

In 2017, HNC changed its name to "Giga Metals Corporation" to reflect the company's intent to become a mineral firm providing nickel, cobalt and potentially other raw materials for use in EVs and battery energy storage markets. Giga Metals is a publicly traded company, headquartered in Vancouver, BC (a registered BC company) and listed on the TSX Venture Exchange.

In 2018, a diamond drilling program (40 holes, 10,835 m) was completed, along with a metallurgical test program and engineering studies (see Sections 10.0, 11.0, 12.0, 14.0).

The 2018 metallurgical program, overseen by Blue Coast Metallurgy, was focused on a master composite created from five lithology composites originating from Hole 10-266, which was a horizontal drill hole, drilled through the southwest portion of the Horsetrail resource, dissecting what is likely to be the heart of the early production resource. The comprehensive program included a suite of comminution tests, mineralogy and detailed flotation testing. Hole 10-266 was drilled in 2010; fresh drill core was not available for this study.

In 2018, Hatch completed a comparison study using more energy-efficient, HPGR and High-Intensity Grinding (HIG) vertical mills to replace the Semi-Autogenous Grinding (SAG) and secondary ball mill grinding steps of prior PEA studies and then completed a conceptual engineering study on a 45,000 t/d processing circuit using this flowsheet. Hatch also completed a conceptual level trade-off study on conventional tailings deposition vs filtered tailings deposition.

Engineering, resource evaluation and metallurgical works were continued in 2019. Hatch conducted a process plant site location trade-off study. BCR began a detailed flotation study, on fresh material, examining a wider range of variability samples and targeting the production of larger quantities of concentrate for marketing and/or downstream testing purposes.

In 2020, Hatch completed a comminution trade-off study looking at two flowsheet options to the HPGR base case being reviewed in the PEA studies and completed a PEA which was amended and refiled on February 18, 2021.

In 2021, the Technologies Division of Sherritt International Corporation completed a Conceptual Engineering Study on refining Turnagain concentrates via pressure oxidation to Mixed Hydroxide Precipitate (MHP). The study examined both low-temperature and high-temperature oxidation routes. In the same year, a Tailings Alternatives Analysis was completed by Tetra Tech Canada, considering a wide range of potential locations and technologies.

In 2021, a diamond drilling program (15 holes, 6,295 m) including both NQ holes for resource infill purposes and HQ holes for geotechnical purposes was completed in the mine area (see Sections 10.0, 11.0, 12.0, 14.0). A seismic refraction study in the area of the tailings dams was also completed by Frontier Geosciences.

In 2022, geotechnical investigations were conducted by sonic drilling and diamond drilling (five holes, 415 m) in the area of the tailings dams and by test pitting in the area of the rock storage area. Several optimization studies were completed by Tetra Tech Canada.

7.0 GEOLOGICAL SETTING AND MINERALIZATION

7.1 Regional Geology

The regional geology of the Turnagain Property has been described by Nixon (1997; 1998), Scheel et al. (2005) and in Technical Reports by Geosim (2006; 2007), AMEC (2006) and AMC (2011). The regional description provided here is based on work by Scheel et al. (2005), Scheel (2007) and Nixon (1998). The geological understanding of the region and the setting of the deposit continues to be refined with additional information from drilling and exploration programs.

The Property encompasses the Turnagain ultramafic complex, and its host rocks and the ultramafic rocks may be hosted within either the Yukon-Tanana terrane or the Quesnel terrane. The Turnagain complex is fault-bounded, has dimensions of about 3.5 km x 8 km and lies to the north of two major fault systems, the Kutcho and Thibert-Hottah Faults (Figure 7-1). Neither fault system is exposed on the Property.

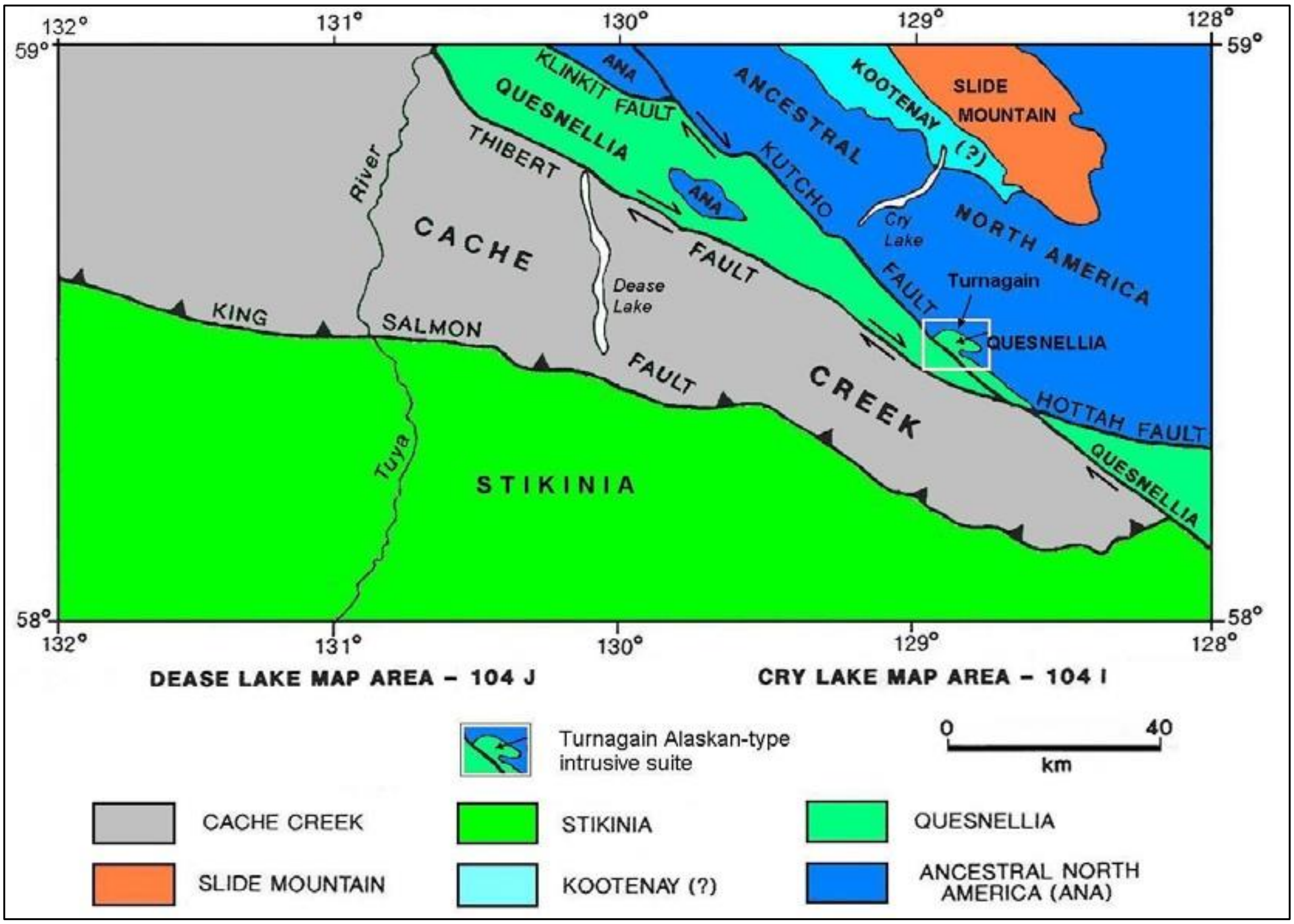


Figure 7-1: Regional Structural Setting – Turnagain Property

(Source: Modified from Scheel et al., 2005)

The western, northern and eastern margins of the complex abut rocks attributed to the Lower Ordovician Road River Formation and the Mississippian Earn Group (Figure 7-2). The Road River and Earn Group rocks comprise graphitic phyllite, which can be strongly pyritic and graphitic near the Turnagain complex intercalated with lesser quartz-rich and calc-silicate tuff layers. The graphitic phyllite in the vicinity of the Property remains directly and biostratigraphically undated. Metamorphism in the phyllites regionally reaches greenschist facies. No contact hornfelsing has been mapped adjacent to the northern or eastern contacts with the Turnagain complex.

A series of undated sedimentary rocks, possibly volcaniclastic, lies south of the Turnagain complex. This series may represent rocks of the Lay Range assemblage of the Quesnel terrane (Figure 7-2). On the south side of the Kutcho Fault, dioritic to granodioritic rocks from the early Jurassic Eaglehead Pluton crop out.

The regional setting and method of emplacement of the Turnagain complex is still being established. Gabrielse (1998) postulates that the Turnagain complex intrudes rocks of the miogeoclinal margin of ancestral North America, indicating that a supra-subduction setting was operational at the cratonic margin at the time of emplacement. An alternative view (Scheel et al., 2005; Nixon, 1998) places the Turnagain complex within an imbricated set of rocks that was thrust eastward onto the margin of the North American craton.

7.2 Property Geology

The Early Jurassic (190 ±1 million years ago [Scheel, 2007]) Turnagain complex comprises a central core of dunite with bounding units of wehrlite, olivine clinopyroxenite, clinopyroxenite, representing crystal cumulate sequences, hornblende clinopyroxenite and hornblendite (Figure 7-2). The complex is elongated and broadly conformable to the northwesterly trending regional structural grain.

The ultramafic rocks are generally fresh to mildly serpentinized; however, more intense serpentinization and talc-carbonate alteration occur along faults and restricted zones within the complex. The central part of the ultramafic body is intruded by granodiorite to diorite and hornblende-plagioclase porphyry dykes and sills.

Primary layering in clinopyroxene-rich cumulates, reflecting variations in the modal abundance of olivine and pyroxene, is visible in outcrop. The layering has variable dips and is truncated by the faulted eastern boundary of the complex. Despite localized zones of well-developed cumulate layering, way-up direction indicators are inconclusive and the internal structure of the Turnagain complex is poorly understood (Nixon, 1998).

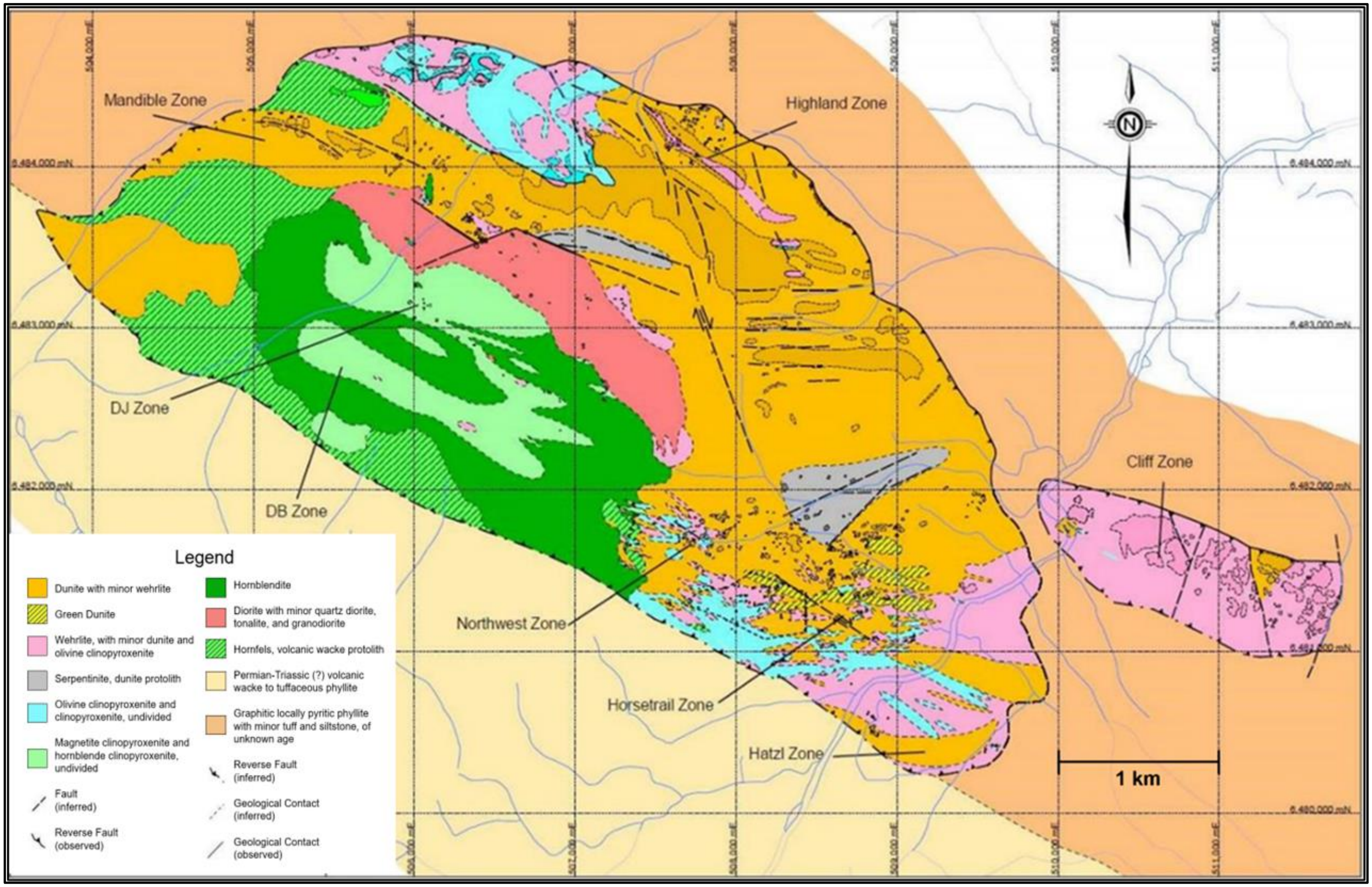


Figure 7-2: Property Geology

(Source: Scheel, 2007)

The descriptions of lithologies in the following subsections are modified from Scheel et al. (2005).

7.2.1 Dunite

Dunite is primarily found in the eastern and central portions of the complex. It is mainly composed of cumulus olivine, minor amounts of chromite and pyroxene and trace amounts of primary phlogopite. Dunite commonly hosts grains of poikilitic green diopside, either as discrete, centimetre-scale crystals or elongate aggregations. The latter are interpreted to be small dykes resulting from the escape of trapped liquid.

Millimetre-to centimetre-scale layering in the dunite core is evident locally where concentrations of chromite crystals have accumulated. These chromitite horizons are discontinuous and commonly remobilized and intruded by thin dunite dykes.

Serpentinization volumes are highly variable, but generally are no more than about 10% of the rock by volume. The degree of overall serpentinization is higher in the Horsetrail, Northwest and Hatzl zones. Secondary magnetite is abundant where serpentinization is pervasive. Some dunite that is proximal to massive sulphide mineralization commonly contains some alteration to grey tremolite.

Contacts between wehrlite and dunite are sharp to gradational over short distances, represented by a slight change in the size and modal abundance of clinopyroxene and may reflect magmatic layering.

7.2.2 Wehrlite

Two different wehrlite types have been identified. On the west side of the Turnagain River, the wehrlite is mainly composed of cumulus olivine with a sizable proportion of interstitial clinopyroxene and minor amounts of cumulus clinopyroxene. On the east side of the river and in the far northwest of the intrusion, cumulus clinopyroxene reaches approximately 40% by volume of the rock mass, cumulus clinopyroxene is typically prismatic and finer grained than coexisting olivine. Both types of wehrlite commonly contain abundant serpentine up to 85% of the rock by volume.

7.2.3 Olivine Clinopyroxenite and Clinopyroxenite

These rock types mostly crop out in the northwest part of the intrusion and commonly comprise around 85% cumulus clinopyroxene and smaller amounts of cumulus olivine. These rocks are also common along the southern margin of the Horsetrail and Northwest zones. Depending on location within the complex, the clinopyroxenites can be either an original magma differentiates or intrusive; in the northwest portion of the complex, they appear to be related to the original magma; further to the east, they are brecciated and intrusive in nature. Pegmatitic clinopyroxenite dykes are commonly found adjacent to the cumulate clinopyroxenite or intruding more olivine-rich lithologies in the Horsetrail and Northwest zones. These latter intrusions are interpreted to be late-stage injections of trapped liquid through olivine-rich cumulates.

7.2.4 Hornblende Clinopyroxenite and Clinopyroxenite

These rock types are generally restricted to the west-central portion of the Turnagain intrusion and coincide with a copper-platinum-palladium soil anomaly. They are very poorly exposed and their relationships to other units in the Turnagain complex are not well defined. Some of these rocks contain angular, altered clasts of former dunite and wehrlite.

7.2.5 Magmatic Hornblendite and Hornblende Clinopyroxenite

Generally found in the southwestern portion of the complex, these rock types contain amphibole crystals that typically range from less than 1 cm to up to 3 cm in length. The crystals appear to be cumulus, but in some cases, they replace pyroxene. Most hornblende-bearing ultramafic rocks in the Turnagain complex are associated with large amounts of magnetite that is interpreted to be cumulus in origin.

7.2.6 Hornblende Diorite

A 2 km x 300 m elongate hornblende diorite to granodiorite body, offset by an east-northeast striking fault, intrudes hornblendite and dunite in the central part of the intrusive suite. Narrow porphyritic granitic dykes, about 1 to 2 m wide and clearly post-mineral, have been noted cutting wehrlites and clinopyroxenites in drill core. Some dykes may be up to 20 m wide, and all dykes are spatially associated with the large hornblende diorite intrusion.

7.2.7 Metasediments

Numerous inliers, xenoliths and small inclusions of hornfelsed, calc-silicate metasedimentary rocks, like those seen marginal to the ultramafic intrusion, are present within the ultramafic intrusive rocks. These inclusions are thought to be the sulphur source responsible for the sulphide mineralization in the Turnagain intrusion and are sourced from the wall rocks.

7.3 Mineralization

Showings of semi-massive and massive sulphides have been identified by work to date. These semi-massive and massive zones, plus broad zones of disseminated sulphides, are generally hosted by dunite and wehrlite near the southern and eastern margins of the ultramafic body. The central and northern dunite is largely devoid of sulphide minerals although their highly magnesian olivine is more enriched in nickel (up to 0.20 to 0.30 weight percentage) than the olivine in the peridotites and pyroxenites of the Horsetrail and Northwest zones, which may be nickel-depleted in areas of sulphide mineralization. Nixon (1998) suggests that these features are further evidence of fractional crystallization of ultramafic magma.

Primary sulphide minerals consist of pyrrhotite with lesser pentlandite (iron-nickel sulphide) and minor chalcopyrite. Some bornite has been reported. Interstitial and blebby sulphides, with grain sizes ranging from 1 to 4 mm, are evident in widespread disseminated zones seen in drill cores. With increasing concentrations, these intercumulus sulphide grains coalesce to form net-textured sulphides. Semi-massive and massive sulphides and rare sulphide matrix breccias were also noted in drill cores over intervals not exceeding a few tens of centimetres.

Narrow fracture-filling sulphide lenses, commonly featuring chalcopyrite and minor pentlandite along with the more prevalent pyrrhotite, appear to be products of remobilization of primary sulphides adjacent to dykes, altered xenoliths and serpentinized areas.

Secondary nickel and copper sulphides, including violarite and valleriite, have been noted in serpentinized zones and both primary and secondary sulphides are associated with graphite (Nixon, 1998). Microscope and microprobe studies of drill core samples from the Horsetrail Zone (Kucha, 2005) have identified additional nickel sulphide minerals including mackinawite, heazlewoodite, godlevskite and millerite. PGE minerals identified to date include vysotskite, a palladium-iron-nickel sulphide and sperrylite, a platinum arsenide mineral.

The principal mineral zones identified to date on the Turnagain Property include the following:

- The Horsetrail Zone and surrounding area have been the focus of most of the historic and recent diamond drilling. Results to date suggest a northwest to west-northwest trend for these zones, which consist of broadly dispersed, disseminated to intercumulus sulphide mineralization in both dunite and wehrlite and serpentinized equivalents. Sulphide grains range in size from 0.5 to 5 mm and commonly occupy interstices between olivine grains. Drill core samples from the Horsetrail Zone have a median of 0.23% total nickel with grades ranging from 0.01% to 4.89% total nickel. Total cobalt grades range from 0.001% to 0.480% with a median of 0.013% Co. There appears to be a spatial relationship between graphitic xenoliths, increasing clinopyroxene content in the ultramafic host rocks and the incidence of sulphide mineralization. Where present, chalcopyrite occurs along the margins of pyrrhotite and in narrow veinlets. Relatively unaltered dunite adjacent to the Horsetrail Zone may contain total nickel values of 0.20% to 0.30%, virtually all of which is in the crystal lattices of the silicate mineral olivine and consequently is not of economic importance.

- The Northwest Zone is contiguous with and lies northwest of the Horsetrail Zone. This zone has mineralization styles and grades similar to the Horsetrail Zone but is intruded by several mafic and felsic dykes which dilute the overall grade. Drill core samples from the Northwest Zone have a median grade of 0.20% total nickel with grades ranging from 0.01% to 2.86%. Total cobalt grades range from 0.001% to 0.166%. The Horsetrail and the Northwest Zones form a zone approximately 2,000 m long in the northwest-southeast major axis and 550 m wide in a northeast-southwest minor axis and have been tested by 266 drill holes.

- The Hatzl Zone mineralization consists of disseminated and net textured pyrrhotite and pentlandite hosted by dunite and wehrlite. This mineralization is similar to and may be continuous with the Horsetrail Zone. The Turnagain River flows between the two zones. The Hatzl Zone is 1,150 m long in a northeast direction and 300 m wide in a northwest direction and has been tested by 17 drill holes.

- The Duffy Zone mineralization lies 500 m northeast of the Horsetrail Zone and consists of disseminated sulphides similar to those within the Horsetrail Zone. Grades range from 0.014% to 0.525% total nickel. The Duffy Zone is 300 m in diameter and does not crop out. It was discovered by exploration drilling in 2006. The zone has been tested by six drill holes.

Other mineralized zones that are exploration targets include:

- Bench, DJ and DB prospects, which host PGE mineralization,

- Mandible, Davis, Highland and Discovery prospects, which host Ni-Co mineralization,

- Cliff and Central area prospects, which host Ni-Co and PGE mineralization.

8.0 DEPOSIT TYPES

The Turnagain deposit is a magmatic sulphide resource hosted by an Alaskan-type intrusion. Alaskan-type intrusions are a recognized class of ultramafic intrusion that occurs along convergent plate-margin settings. The principal minerals in these ultramafic rocks are olivine, clinopyroxene, magnetite and hornblende. Orthopyroxene and plagioclase are extremely rare. Assemblages of these minerals generally form the crudely zoned rock types dunite, wehrlite, olivine clinopyroxenite, clinopyroxenite and hornblendite.

While Turnagain exhibits these Alaskan-type characteristics, it is unusual in that it hosts magmatic sulphide mineralization in appreciable abundance. Nixon (1998) concluded that the iron-nickel-copper (Fe-Ni-Cu) sulphides in the Turnagain complex are primary and magmatic (as opposed to having resulted from a post-emplacement process) and that wall rock inclusions which have been observed in drill core may have provided a mechanism for sulphur saturation and precipitation of Fe-Ni-Cu sulphides. This has been confirmed by sulphur and lead isotope results reported by Scheel (2007).

Disseminated and rare net-textured mineralization at Turnagain is hosted in dunite, wehrlite, olivine clinopyroxenite and clinopyroxenite and serpentinized equivalents. Sulphides include pyrrhotite, pentlandite, chalcopyrite and trace bornite. Valleriite is sometimes present where serpentinization is intense.

9.0 EXPLORATION

Section 6 of this report summarizes the early exploration work carried out between 1957 and 1995 and presents an overview of work completed by Giga Metals and its predecessor companies since acquisition of the Project in 1996. This section presents more detail on exploration since 1996.

9.1 Geological Mapping

Sulphide-bearing outcrops of the Davis, Horsetrail, Discovery and Cliff zones were relocated and then prospected and mapped in 1996.

In 1998, a Global Positioning Survey (GPS) was undertaken by Bren-Mar personnel using a Trimble Geoexplore 2 instrument to locate drill holes, claim posts and other geographical positions.

Detailed geological mapping was undertaken by Clark (1976) at various scales from 1:50 (inches to feet) to 1:1,000 as part of his Ph.D. thesis work. Additional mapping, as shown in Figure 9-1, was completed by Giga Metals' geologists and Scheel (2007) at metric scales ranging from 1:1,000 to 1:10,000.

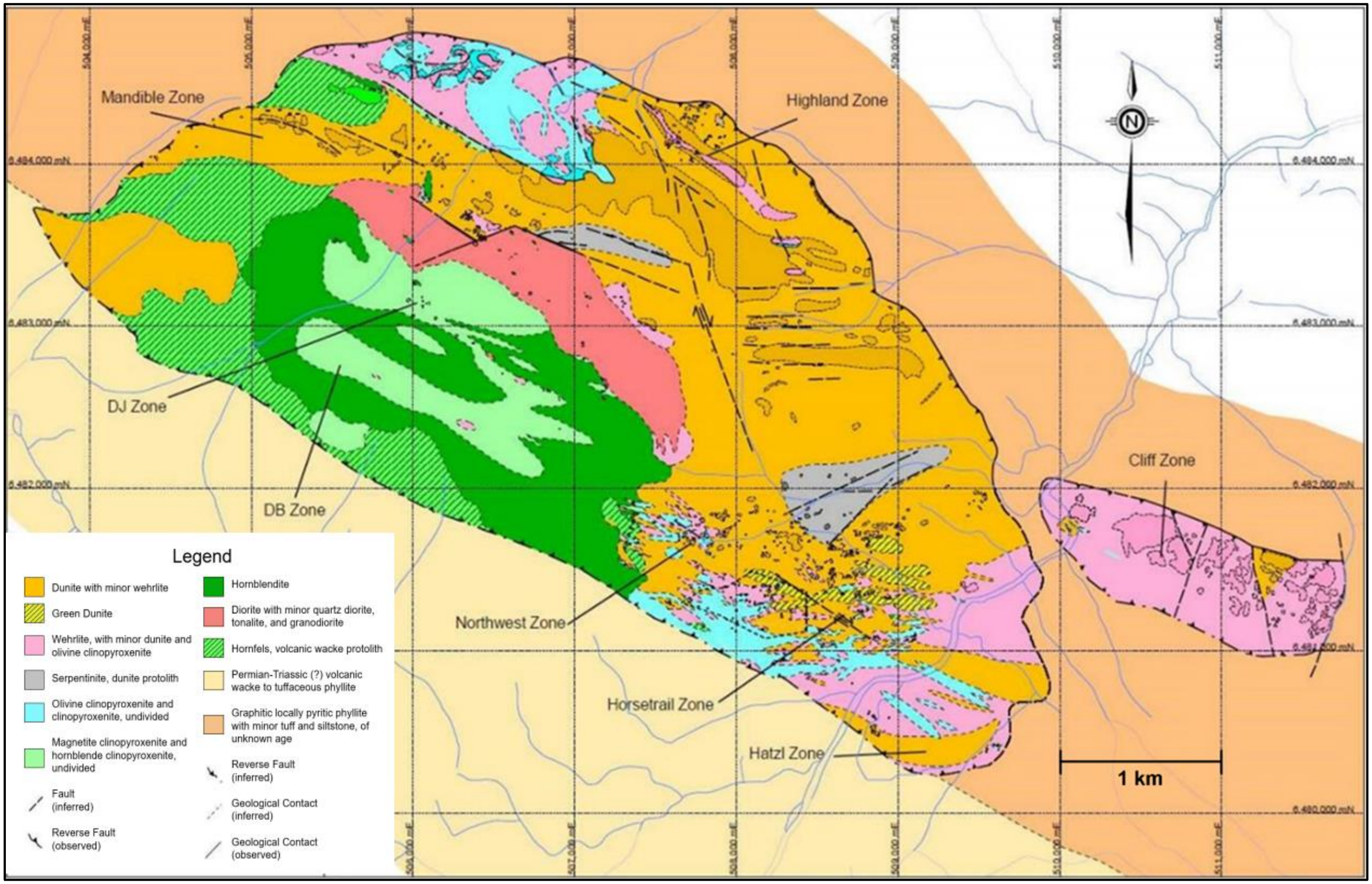


Figure 9-1: 2007 Geological Mapping

(Source: Scheel, 2007)

9.2 Geochemical Surveys

The following discussion, modified from Carter (2005), is considered thorough. It is believed to reasonably represent the surface geochemical soil sampling programs completed on the Property.

Of importance are the results of a 1971 soil geochemical survey conducted by UMEX over mineral claims contiguous with Falconbridge claims and covering the northeastern margin of the ultramafic complex and the Cliff Zone east of Turnagain River. More than 800 samples were collected from B and C soil horizons at 200 ft. (61 m) intervals along grid lines spaced 400 ft. (122 m) apart. The samples were analyzed for nickel, copper and cobalt. Values greater than 650 ppm nickel and 300 ppm copper were considered anomalous; cobalt values were erratic. The best results were obtained from a 900 m x 450 m area west of the Discovery Zone where anomalous nickel values ranged from 800 ppm to 2,000 ppm.

A geochemical sampling program carried out in 2003 consisted of the collection and analysis of 250 soil samples at a 100 m spacing along four topographic contour lines between 1,300 m and 1,460 m elevation, northwest and upslope of the principal mineralized zones. An analysis and interpretation of the results obtained from these samples was undertaken by Dr. Colin E. Dunn, P. Geo., on behalf of Giga Metals in early 2004 (Carter, 2005).

Results for copper, nickel, cobalt and platinum + palladium were kriged and contoured at 90th, 80th, 70th and 50th percentiles. Coincident high copper, cobalt and platinum + palladium values are concentrated within a poorly explored area between 3 km and 4 km west-northwest of the Horsetrail Zone. Elevated nickel values in soils are more widespread and are coincident with the Horsetrail Zone and immediately northwest of the copper, cobalt and platinum + palladium anomalies.

More than 2,000 soil samples during the 2004 and 2005 programs were collected at 50 m intervals along survey lines spaced 200 m apart within an area of 15 km^2. More detailed sampling at 25 m intervals on lines spaced 50 m apart was undertaken in areas yielding anomalous base and precious metals results. Results of this survey highlighted two strong copper-in-soil anomalies 2.5 km northwest of the Horsetrail Zone with values exceeding 430 ppm copper with peaks to 3,219 ppm copper over areas of 1,500 m x 1,100 m and 900 m x 600 m. These anomalous areas flank the hornblende diorite-granodiorite intrusion within ultramafic rocks in this area. Anomalous platinum + palladium values in soils, in part coincident with the DJ zone, extend from the northern part of the larger copper-in-soils anomaly. Anomalous nickel values in soils are widespread over the northern part of the Turnagain ultramafic intrusion and within and adjacent to the Horsetrail Zone. The geochemical interpretation requires that anomalous nickel values in soils are paired with copper so that the highly mobile nickel originating from olivine can be screened. Copper occurs only in sulphide minerals and when present in ultramafic rocks with nickel can be used successfully to indicate nickel anomalies of exploration significance.

The 2004 geochemical program also included the collection and analysis of 330 rock float and 243 bedrock samples from within and adjacent to the soil geochemical grid. Results for total nickel and platinum + palladium indicated significant total nickel results (>0.20% to a maximum of 1.9%) in both float and bedrock samples, which are mainly clustered in the area of the Horsetrail Zone and in a smaller area north of the DJ zone.

A map of the combined geochemical samples is shown in Figure 9-2.

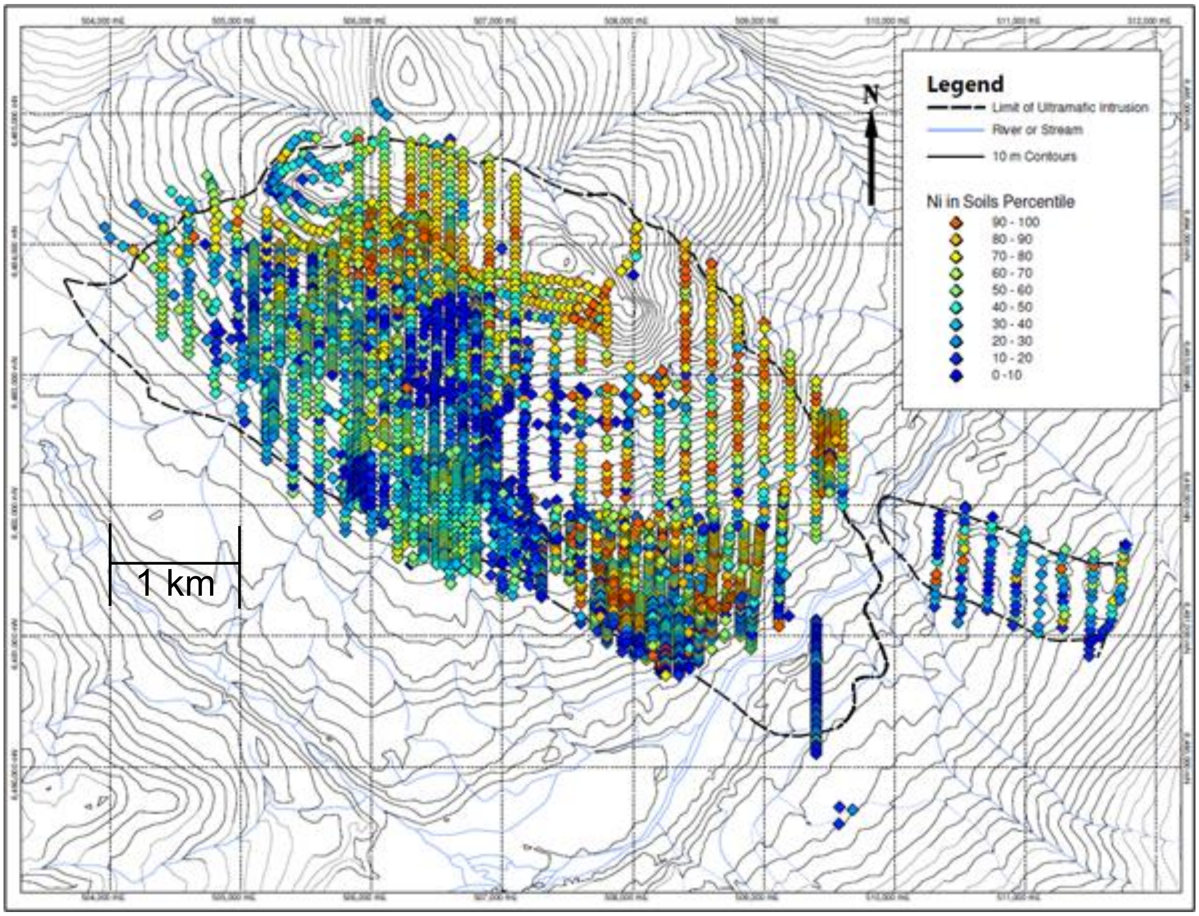


Figure 9-2: Map of Geochemical Sampling

(Source: Hatch, 2020)

9.3 Geophysical Surveys

The following discussion, modified from Carter (2005), is considered thorough and reasonably representative of the geophysical survey programs completed on the Property.

9.3.1 Airborne Surveys

An airborne geophysical survey was completed over the Turnagain Property by AeroQuest Ltd. (AeroQuest) in late September 2004. The AeroQuest survey utilized a helicopter-borne AeroTEMII time-domain electromagnetic system and a high-sensitivity cesium vapour magnetometer. Continuous readings on both instruments were obtained from northeast-southwest oriented survey lines at 100 to 200 m spacing. Precise locations were established using a GPS.

Two geophysically anomalous areas within the ultramafic rocks were surveyed along lines on 50 m spacings (Figure 9-3). Terrain clearance was 30 m and the survey totalled 1,866 line-km. The AeroQuest magnetic response confirmed the results of earlier surveys, accurately outlining the limits of the Turnagain ultramafic intrusion. Magnetic data ranged from lows of 55,000 nT to highs of 63,000 nT; the average background was 57,800 nT. The AeroQuest survey also highlighted electromagnetic anomalies within the ultramafic intrusion.

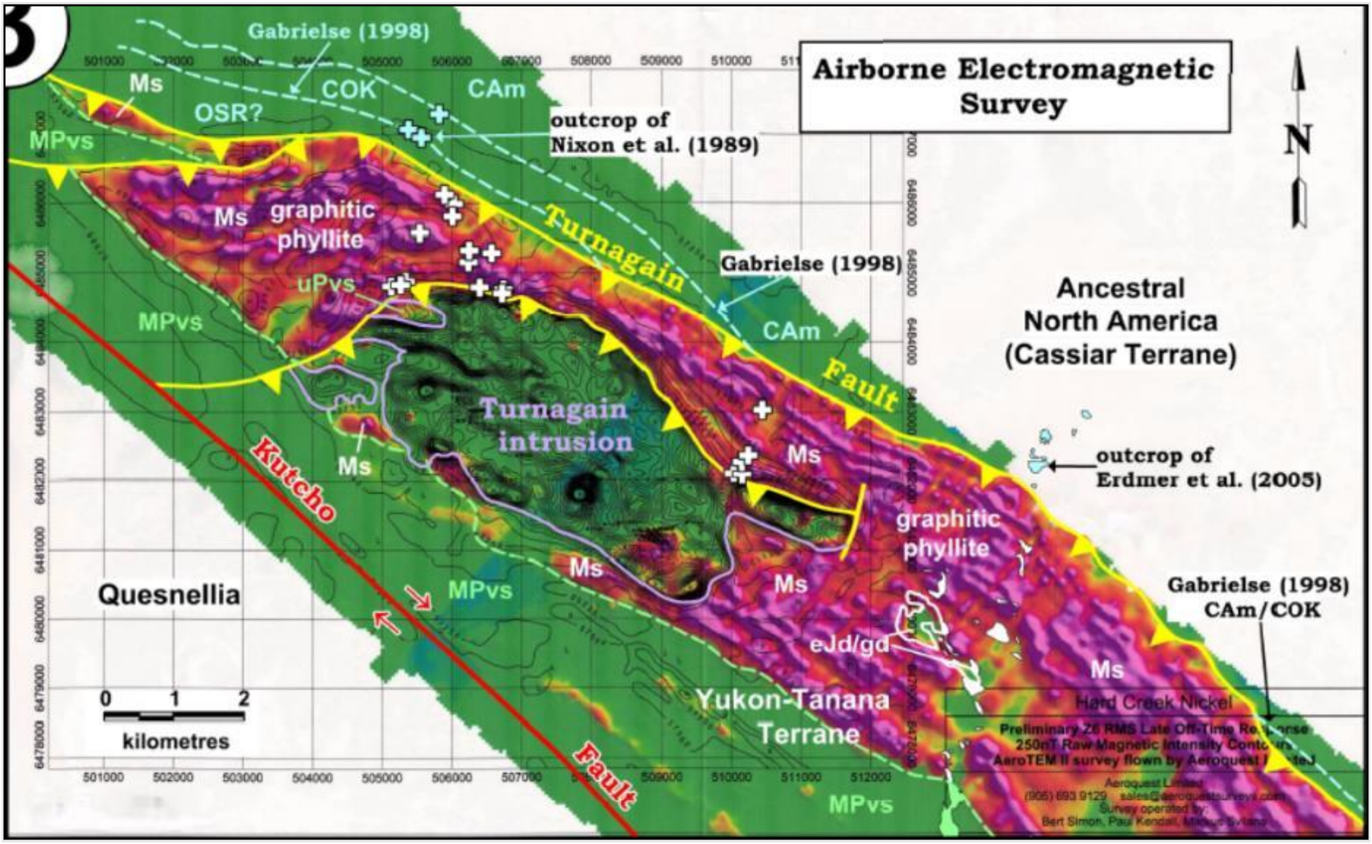


Figure 9-3: Map of 2004 Airborne Electromagnetic Survey

(Source: Nixon et al., 2017)

10.0 DRILLING

The Turnagain drill hole database contains 382 drill holes totalling 97,345 m of drilling. The previous technical report (Hatch, 2021) reported on all drilling completed up to and including 2018. No drilling took place in 2019 or 2020. In 2021, Giga Metals completed 15 drill holes totalling 6,295 m and in 2022 completed five drill holes totalling 415 m. Of the 382 drill holes, 326 have assay data and 254 are within the resource estimation study area which is the subject of Section 14.0 of this report. Four holes were collared but were abandoned prior to producing core and are kept in the database for completeness but are not counted in drill hole count or metreage. Table 10-1 summarizes the drill holes completed by year and operator. Hole locations within the defined resource are shown in Figure 10-1.

Table 10-1: Summary of Drill Programs

Year*	Operator	No. of Holes	Metres**
1967	Falconbridge	13	1,310
1970	Falconbridge	15	1,457
1996	Bren-Mar	5	793
1997	Bren-Mar	9	1,855
1998	Bren-Mar	5	1,264
2002	Canadian Metals	7	1,938
2003	Canadian Metals	22	8,419
2004	Hard Creek Nickel	49	7,633
2005	Hard Creek Nickel	37	7,541
2006	Hard Creek Nickel	68	19,173
2007	Hard Creek Nickel	73	24,038
2008	Hard Creek Nickel	15	4,105
2010	Hard Creek Nickel	2	384
2018	Giga Metals	40	10,835
2021	Giga Metals	15	6,295
2022	Giga Metals	5	415
Total* **		**382**	**97,345**

*Five holes were extended in subsequent years. Extension metres in this table listed under the year of holes' original collaring.
** Rounding to nearest metre may occur.
***Total may not add due to rounding.

Most of the holes drilled to date have been moderately to steeply inclined. Since 2004, all drilling has recovered at minimum NQ (47.6 mm) core. Part of the 2007 drill program included PQ (85 mm) core collected for metallurgical purposes. Core recoveries are excellent, averaging 95%. Prior to 2006, most drill core sample intervals were 2 m. Since 2006, core sampling has been completed predominantly on 4 m intervals. The 2018 drilling was performed using NQ (47.6 mm) core. 2021 drilling was performed using a mix of NQ for resource drilling and HQ (63.5 mm) for geotechnical and resource drilling. 2022 drilling was performed with a combination sonic/diamond drill. Overburden was collected with a 4" sonic implement and rock was collected with HQ diamond implement.

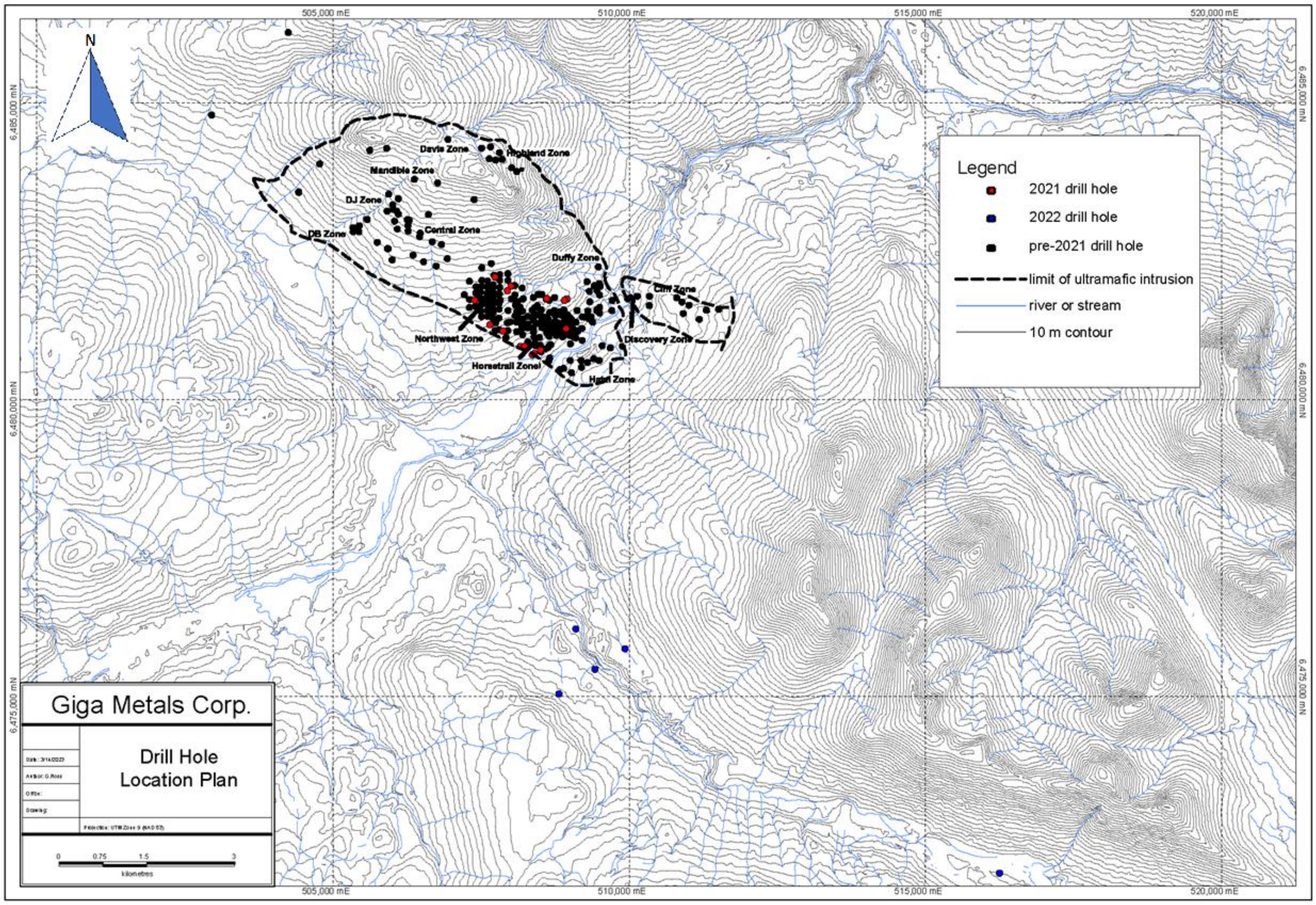


Figure 10-1: Drill Hole Location Plan

(Source: Giga Metals, 2023)

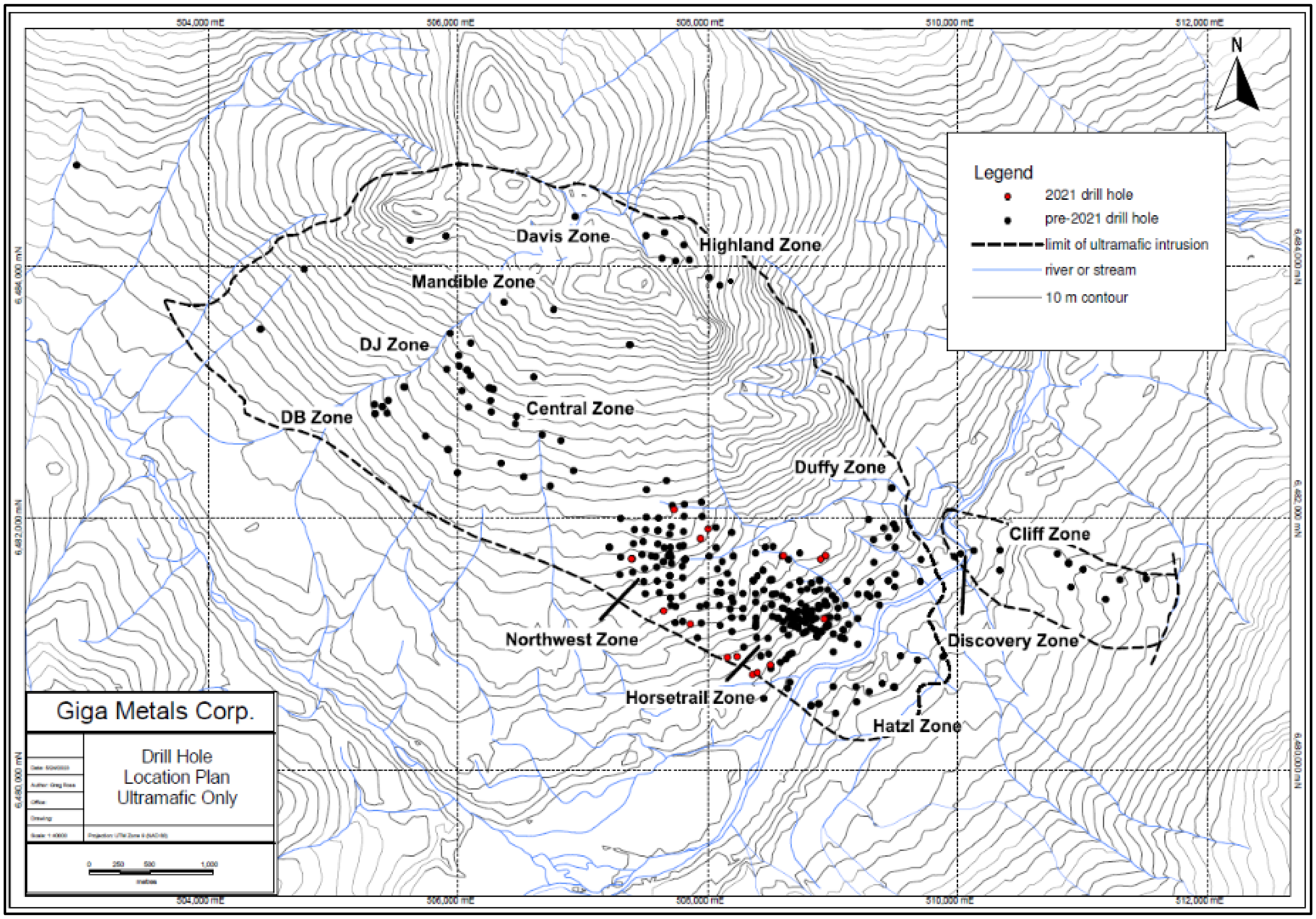


Figure 10-2: Drill Hole Location Plan Showing Ultramafic Intrusion Only

(Source: Giga Metals, 2023)

Table 10-2 lists the drill holes along with location and orientation.

Table 10-2: Drill Hole Collars, Location and Orientation (NAD83 Zone 9)

Hole*	UTM East	UTM North	UTM Elevation	Length (m)	Azimuth (°)	Dip (°)
DDH67-01	509065.0	6481052.0	1015.0	152.4	25.0	-35.0
DDH67-02	509065.0	6481052.0	1015.0	124.1	25.0	-60.0
DDH67-03	509065.0	6481052.0	1015.0	123.4	205.0	-35.0
DDH67-04	509084.0	6481112.0	1021.5	14.3	205.0	-40.0
DDH67-05	509084.0	6481112.0	1021.5	21.0	205.0	-55.0
DDH67-06	509084.0	6481112.0	1021.5	114.3	25.0	-35.0
DDH67-07	508948.0	6481203.0	1063.3	157.0	25.0	-35.0
DDH67-08	508948.0	6481203.0	1063.3	136.7	25.0	-60.0
DDH67-09	508798.0	6481220.0	1085.0	154.5	25.0	-35.0

Hole*	UTM East	UTM North	UTM Elevation	Length (m)	Azimuth (°)	Dip (°)
DDH67-10	508798.0	6481220.0	1085.0	152.4	25.0	-60.0
DDH67-11	508774.0	6481253.0	1090.0	110.6	25.0	-40.0
DDH67-12	508774.0	6481253.0	1090.0	38.4	25.0	-35.0
DDH67-13	508774.0	6481253.0	1090.0	10.7	295.0	-35.0
DDH70-14	508828.0	6480514.0	1015.0	139.0	25.0	-40.0
DDH70-15	508828.0	6480514.0	1015.0	87.8	215.0	-60.0
DDH70-16	508450.0	6480570.0	1032.0	122.8	19.0	-40.0
DDH70-17	508425.0	6480905.0	1074.1	123.4	212.0	-60.0
DDH70-18	508425.0	6480905.0	1074.1	15.8	212.0	-30.0
DDH70-19	508627.0	6480881.0	1035.0	118.9	34.0	-40.0
DDH70-20	508649.0	6480915.0	1039.3	106.1	22.0	-41.0
DDH70-21	507918.0	6481049.0	1132.9	201.5	25.0	-40.0
DDH70-22	507738.0	6481169.0	1176.1	109.7	25.0	-40.0
DDH70-23	507297.0	6481553.0	1250.0	122.8	25.0	-40.0
DDH70-24	507646.0	6481655.0	1260.0	60.7	25.0	-34.0
DDH70-25	507646.0	6481655.0	1260.0	16.2	25.0	-65.0
DDH70-26	507683.0	6481700.0	1270.0	77.1	25.0	-38.0
DDH70-27	507705.0	6481692.0	1270.0	61.9	25.0	-38.0
DDH70-28	507550.0	6481700.0	1270.7	93.3	25.0	-38.0
DDH96-01	509375.0	6481308.0	1010.6	184.4	22.0	-45.0
DDH96-02	508638.0	6480652.0	1016.3	178.6	290.0	-60.0
DDH96-03	508889.0	6480528.0	1019.4	137.5	20.0	-60.0
DDH96-04	508889.0	6480528.0	1019.4	137.5	200.0	-60.0
DDH96-05	508889.0	6480528.0	1019.4	154.6	290.0	-60.0
DDH97-01	511509.0	6481520.0	1210.0	160.0	45.0	-60.0
DDH97-02	507098.0	6484190.0	1690.0	190.5	0.0	-60.0
DDH97-03	507094.0	6484219.0	1685.0	133.2	0.0	-50.0
DDH97-04	507694.0	6481716.0	1270.0	163.7	210.0	-50.0
DDH97-05	507694.0	6481716.0	1270.0	130.1	210.0	-65.0
DDH97-06	510022.0	6481718.0	1014.3	197.2	45.0	-65.0
DDH97-07	510132.0	6481743.0	1005.7	166.7	5.0	-60.0
DDH97-08	508657.0	6480699.0	1015.5	220.7	290.0	-60.0
DDH97-09	509094.7	6481042.5	1010.3	493.2	345.0	-45.1
DDH98-01	508791.9	6481213.8	1083.7	288.0	340.7	-57.1
DDH98-02	508793.1	6481215.0	1085.0	184.7	170.0	-56.0

Hole*	UTM East	UTM North	UTM Elevation	Length (m)	Azimuth (°)	Dip (°)
DDH98-03	508887.1	6481305.0	1085.0	203.0	355.0	-56.0
DDH98-04	508965.1	6481154.5	1047.3	292.6	344.6	-56.4
DDH98-05	508673.3	6480928.8	1036.3	295.7	324.8	-57.8
DDH02-01	509329.3	6481650.0	1070.0	203.3	0.0	-90.0
DDH02-02	508737.5	6481501.0	1130.0	213.1	0.0	-85.0
DDH02-03	508737.5	6481501.0	1130.0	318.2	180.0	-50.0
DDH02-04	508737.5	6481501.0	1130.0	149.0	0.0	-50.0
DDH02-05	508512.0	6481514.0	1160.0	152.4	0.0	-90.0
DDH02-06	508512.3	6481513.4	1162.7	485.2	181.8	-50.4
DDH02-07	508507.0	6481510.0	1160.0	416.4	225.0	-50.0
DDH03-01	508515.0	6481510.0	1160.0	501.7	240.0	-50.0
DDH03-02	508117.1	6481656.0	1230.0	532.2	225.0	-45.0
DDH03-03	507601.7	6481902.0	1302.0	462.1	180.0	-50.0
DDH03-04	507601.6	6481902.0	1302.0	334.4	180.0	-70.0
DDH03-05	508654.8	6481467.3	1138.3	590.7	168.9	-47.5
DDH03-06	508563.8	6481206.6	1104.7	523.0	180.0	-50.0
DDH03-07	508583.3	6480856.3	1036.1	434.4	169.5	-47.1
DDH03-08	509447.1	6481504.0	1027.5	477.3	206.1	-56.4
DDH03-09	509447.4	6481504.6	1027.5	252.1	200.0	-85.0
DDH03-10	508503.9	6481506.8	1162.7	577.9	197.0	-51.7
DDH03-11	508502.8	6481508.0	1160.0	249.9	0.0	-55.0
DDH03-12	508730.0	6481199.1	1086.8	349.6	350.6	-76.1
DDH03-13	508560.6	6481206.3	1104.3	322.0	6.8	-49.8
DDH03-14	508560.6	6481205.1	1104.2	261.6	6.8	-84.2
DDH03-15	508484.4	6481045.7	1090.2	508.1	21.8	-65.0
DDH03-16	508690.9	6481140.7	1079.9	369.1	34.5	-49.3
DDH03-17	508833.0	6481251.5	1083.4	296.6	41.4	-51.1
DDH03-18	508891.0	6481301.4	1082.8	243.0	50.8	-50.3
DDH03-19	508862.3	6481114.0	1058.1	303.3	43.6	-49.7
DDH03-20	508975.3	6481214.5	1061.6	214.6	45.7	-46.8
DDH03-21	508606.0	6481280.8	1117.2	333.8	32.2	-46.8
DDH03-22	508382.5	6481398.5	1167.9	281.9	53.2	-48.6
DDH04-23	508744.6	6481183.8	1085.0	413.3	46.2	-49.8
DDH04-24	508789.6	6481215.5	1083.7	370.7	46.4	-46.9
DDH04-25	508954.6	6481309.4	1081.6	221.3	40.7	-49.5

Hole*	UTM East	UTM North	UTM Elevation	Length (m)	Azimuth (°)	Dip (°)
DDH04-26	508951.0	6481308.4	1081.9	178.6	28.8	-49.2
DDH04-27	508888.3	6481299.6	1083.0	264.0	29.7	-48.0
DDH04-28	508727.7	6481198.2	1086.8	233.2	5.0	-43.4
DDH04-29	508824.2	6481133.0	1063.6	245.7	45.3	-46.4
DDH04-30	508908.0	6481098.3	1044.3	215.2	39.5	-45.1
DDH04-31	508784.4	6481168.5	1077.4	113.7	52.9	-50.2
DDH04-32	508841.5	6481206.0	1078.8	115.8	51.7	-50.4
DDH04-33	508948.0	6481141.0	1048.2	136.0	43.2	-48.1
DDH04-34	508646.2	6481208.5	1095.0	120.4	349.3	-47.6
DDH04-35	508789.4	6481281.0	1090.4	166.4	355.8	-49.3
DDH04-36	508722.9	6481259.9	1098.5	120.7	354.4	-50.0
DDH04-37	508722.4	6481259.2	1098.1	117.7	176.7	-49.4
DDH04-38	508192.2	6481363.8	1189.5	120.7	45.3	-49.4
DDH04-39	507938.0	6481297.1	1178.7	148.2	49.0	-49.3
DDH04-40	508546.4	6481397.7	1145.3	118.9	48.3	-53.7
DDH04-41	509359.4	6481391.6	1028.1	96.3	22.0	-50.0
DDH04-42	506927.6	6482375.0	1371.5	76.5	0.0	-90.0
DDH04-43	506826.2	6482617.1	1401.6	158.8	0.0	-90.0
DDH04-44	506674.1	6482662.7	1411.1	124.1	0.0	-90.0
DDH04-45	506461.0	6482749.7	1423.8	186.3	0.0	-90.0
DDH04-46	506468.9	6482806.9	1436.3	145.4	0.0	-90.0
DDH04-47	506267.6	6482843.4	1425.7	184.4	0.0	-90.0
DDH04-48	506254.4	6483031.6	1459.4	166.8	0.0	-90.0
DDH04-49	506254.4	6483032.5	1459.6	75.3	180.0	-50.0
DDH04-50	506254.2	6483030.5	1459.8	169.2	0.0	-60.0
DDH04-51	506284.2	6483023.2	1462.8	153.9	0.0	-60.0
DDH04-52	506073.3	6483173.3	1456.8	112.2	0.0	-90.0
DDH04-53	506073.4	6483174.5	1456.4	114.3	0.0	-50.0
DDH04-54	506100.2	6483128.0	1453.2	150.0	180.0	-50.0
DDH04-55	506280.8	6483021.7	1462.4	60.1	0.0	-90.0
DDH04-56	506084.0	6482880.6	1414.5	100.0	0.0	-90.0
DDH04-57	506263.3	6482932.6	1440.9	111.9	0.0	-90.0
DDH04-58	506010.3	6483207.2	1454.9	111.3	35.0	-80.0
DDH04-59	506006.9	6483289.5	1462.9	111.0	0.0	-80.0
DDH04-60	507822.7	6481676.7	1252.4	201.8	44.3	-48.7

Hole*	UTM East	UTM North	UTM Elevation	Length (m)	Azimuth (°)	Dip (°)
DDH04-61	507816.4	6481669.7	1252.8	114.3	226.6	-47.0
DDH04-62	507817.3	6481670.6	1252.7	68.0	231.8	-85.9
DDH04-63	508398.4	6481542.9	1181.6	181.4	43.7	-47.9
DDH04-64	508444.7	6481587.2	1175.8	138.7	43.6	-47.3
DDH04-65	508363.2	6481504.4	1185.2	136.0	41.8	-43.5
DDH04-66	508684.0	6481176.5	1087.8	179.2	7.6	-48.1
DDH04-67	508686.7	6481232.1	1099.8	145.1	1.9	-48.8
DDH04-68	508787.2	6481096.4	1062.7	90.2	45.1	-50.2
DDH04-69	509003.7	6481082.0	1025.1	196.9	45.5	-50.2
DDH04-70	509275.0	6481395.0	1043.0	132.9	22.0	-50.0
DDH04-71	508724.7	6481123.5	1073.9	221.3	48.2	-48.0
DDH05-72	508721.9	6481143.6	1076.7	186.4	181.0	-63.4
DDH05-73	508288.2	6480976.9	1100.2	152.4	218.6	-48.3
DDH05-74	508829.1	6481127.4	1063.5	223.7	171.4	-48.2
DDH05-75	508938.4	6481338.9	1087.4	217.7	48.8	-49.6
DDH05-76	508513.1	6481312.2	1128.2	223.7	183.9	-47.6
DDH05-77	508382.7	6481333.2	1162.4	223.7	182.4	-47.7
DDH05-78	508099.2	6481147.2	1148.5	147.5	220.0	-49.1
DDH05-79	507989.6	6481312.9	1180.2	211.3	228.7	-50.5
DDH05-80	507741.7	6481296.0	1192.7	199.4	32.1	-50.2
DDH05-81	507213.5	6481770.5	1284.0	181.4	44.9	-50.0
DDH05-82	507213.5	6481770.5	1284.0	62.2	224.9	-50.0
DDH05-83	506528.9	6482326.0	1352.8	172.0	224.5	-52.0
DDH05-84	505995.7	6482358.2	1350.1	189.6	46.7	-52.0
DDH05-85	507741.1	6484040.1	1676.2	140.2	232.2	-52.5
DDH05-86	507508.7	6484239.9	1656.9	129.0	225.5	-53.3
DDH05-87	506938.1	6484389.5	1665.3	143.3	48.4	-49.8
DDH05-88	505395.5	6482884.3	1336.4	172.2	40.6	-50.5
DDH05-89	505925.5	6482544.4	1356.6	166.1	40.8	-50.8
DDH05-90	508363.1	6481504.9	1185.4	193.6	224.3	-49.4
DDH05-91	509023.2	6481351.4	1081.6	218.0	49.7	-49.6
DDH05-92	508995.4	6481385.6	1082.8	205.8	51.2	-47.5
DDH05-93	508910.2	6481099.1	1044.9	202.7	182.0	-51.1
DDH05-94	508910.2	6481099.8	1044.8	245.7	191.9	-80.0
DDH05-95	508763.7	6481087.3	1062.9	240.5	182.5	-50.0

Hole*	UTM East	UTM North	UTM Elevation	Length (m)	Azimuth (°)	Dip (°)
DDH05-96	508659.5	6481150.2	1088.3	211.9	174.8	-49.0
DDH05-97	508382.5	6481141.5	1136.6	185.3	180.6	-49.2
DDH05-98	508383.5	6481207.3	1144.0	199.7	187.0	-48.3
DDH05-99	508383.8	6481171.7	1140.0	187.2	183.2	-49.6
DDH05-100	508276.8	6481207.6	1153.9	190.8	180.2	-50.0
DDH05-101	505395.5	6482884.3	1336.7	184.7	40.8	-65.0
DDH05-102	506346.0	6482434.5	1366.2	337.4	219.3	-51.4
DDH05-103	508192.1	6481210.7	1163.3	400.8	180.7	-49.2
DDH05-104	508181.1	6481277.0	1178.4	233.2	175.5	-46.8
DDH05-105	508281.9	6481280.6	1174.2	288.1	189.4	-47.7
DDH05-106	508648.7	6481259.3	1110.7	257.3	184.7	-49.5
DDH05-107	508519.5	6481219.6	1112.2	199.4	179.5	-47.3
DDH05-108	508963.0	6481146.3	1047.3	217.7	192.5	-50.2
DDH06-109	509301.8	6481495.9	1049.7	324.9	180.0	-84.1
DDH06-110	509117.8	6481501.7	1078.3	285.0	180.0	-84.0
DDH06-111	508897.7	6481503.7	1115.6	297.2	180.0	-84.1
DDH06-112	508596.4	6481697.9	1175.1	260.9	180.0	-85.2
DDH06-113	508095.2	6481307.3	1176.6	276.2	195.4	-50.1
DDH06-114	508109.6	6481408.4	1197.4	193.6	193.2	-49.4
DDH06-115	508281.4	6481401.0	1190.3	243.0	168.5	-50.4
DDH06-116	508195.3	6481491.6	1202.5	202.7	183.9	-48.2
DDH06-117	508204.4	6481699.7	1224.3	202.7	176.1	-47.6
DDH06-118	508205.1	6481698.7	1224.3	218.0	358.7	-50.2
DDH06-119	508506.3	6480807.9	1041.3	187.5	180.8	-48.1
DDH06-120	508011.5	6481697.8	1239.1	175.3	179.5	-50.1
DDH06-121	507504.0	6481907.6	1304.8	297.7	183.8	-49.8
DDH06-122	507694.3	6481870.7	1306.4	301.0	177.1	-49.9
DDH06-123	508489.7	6480922.8	1065.8	265.2	177.8	-48.4
DDH06-124	507606.1	6482000.1	1313.5	230.2	181.5	-48.9
DDH06-125	507812.4	6482013.8	1312.6	381.9	180.4	-50.0
DDH06-126	507593.5	6481612.7	1259.1	501.4	178.2	-48.7
DDH06-127	507476.5	6481712.7	1276.8	367.3	180.5	-50.0
DDH06-128	507695.6	6481544.7	1242.8	93.0	176.9	-47.8
DDH06-128A	507695.6	6481544.6	1242.1	297.2	177.8	-58.8
DDH06-129	509474.7	6482238.9	1094.8	227.1	40.3	-60.7

Hole*	UTM East	UTM North	UTM Elevation	Length (m)	Azimuth (°)	Dip (°)
DDH06-130	509475.4	6482237.4	1096.4	214.9	85.7	-49.9
DDH06-131	509448.9	6481848.0	1093.0	388.6	39.8	-50.5
DDH06-132	509504.4	6481915.1	1088.6	266.9	39.3	-49.9
DDH06-133	509507.6	6481917.0	1088.7	208.8	156.8	-49.2
DDH06-134	509407.4	6481921.6	1101.5	343.5	34.4	-85.8
DDH06-135	507635.7	6484061.0	1676.9	197.2	221.2	-49.9
DDH06-136	507654.3	6484263.9	1652.7	196.9	43.1	-48.6
DDH06-137	507811.3	6484165.4	1647.2	219.7	38.2	-48.5
DDH06-138	507853.1	6484049.3	1651.7	224.7	217.8	-48.2
DDH06-139	508009.6	6483910.5	1607.4	212.5	220.0	-48.5
DDH06-140	508097.7	6483845.6	1573.1	233.7	220.0	-48.9
DDH06-141	504420.8	6483501.1	1276.5	255.1	30.6	-50.0
DDH06-142	504419.6	6483496.9	1275.6	246.0	210.6	-50.0
DDH06-143	504769.6	6483975.4	1402.3	340.5	32.0	-50.0
DDH06-144	507511.9	6482223.7	1343.7	194.4	40.0	-83.9
DDH06-145	507668.8	6482297.0	1355.3	161.6	40.0	-85.2
DDH06-146	506738.6	6482253.6	1341.3	251.5	179.7	-49.3
DDH06-147	505938.0	6483466.0	1475.4	377.1	40.0	-50.9
DDH06-148	506101.5	6483388.7	1483.5	139.3	40.0	-50.0
DDH06-149	505912.0	6483180.1	1435.8	315.5	41.9	-49.5
DDH06-150	506032.3	6483009.6	1428.6	257.6	44.7	-49.8
DDH06-151	509493.5	6480658.8	1058.7	292.6	166.6	-50.2
DDH06-152	509492.2	6480661.7	1058.8	324.6	347.8	-50.3
DDH06-153	509492.3	6480661.0	1058.6	233.8	347.8	-85.7
DDH06-154	509193.0	6480544.3	1070.9	298.1	190.5	-63.5
DDH06-155	509543.0	6480907.8	1040.7	303.9	174.0	-50.2
DDH06-156	509884.5	6480901.4	1081.4	298.1	178.0	-61.5
DDH06-157	509677.4	6480873.1	1059.1	260.6	178.2	-63.8
DDH06-158	509023.1	6480453.7	1037.0	161.4	175.6	-57.3
DDH06-159	509186.9	6480661.9	1040.9	330.9	172.0	-58.6
DDH06-160	505442.8	6482934.1	1349.2	309.4	41.5	-49.1
DDH06-161	505431.8	6482833.6	1338.2	285.0	41.4	-48.5
DDH06-162	507395.1	6481677.5	1267.2	358.2	178.5	-50.5
DDH06-163	507497.0	6481599.8	1255.2	339.9	187.7	-49.5
DDH06-164	507596.8	6481501.8	1235.2	349.0	178.7	-48.8

Hole*	UTM East	UTM North	UTM Elevation	Length (m)	Azimuth (°)	Dip (°)
DDH06-165	507801.4	6481529.4	1232.8	379.5	164.2	-50.0
DDH06-166	507412.8	6481908.2	1300.7	305.7	176.6	-49.2
DDH06-167	507699.7	6481768.5	1277.9	352.7	175.5	-47.9
DDH06-168	509326.3	6481829.4	1090.0	520.0	184.4	-84.6
DDH06-169	509288.1	6481988.0	1118.6	200.0	177.7	-85.6
DDH06-170	509202.1	6481395.4	1052.1	434.5	175.6	-51.5
DDH06-171	507583.8	6481695.2	1269.4	333.8	175.4	-50.0
DDH06-172	509100.8	6481308.1	1052.1	410.0	179.0	-50.3
DDH06-173	509292.0	6480624.9	1049.6	330.7	183.3	-59.0
DDH06-174	509398.0	6480688.4	1045.3	349.0	173.4	-58.2
DDH06-175	509003.1	6480663.9	1020.0	337.4	181.5	-62.0
GT07-01	503733.0	6482125.0	1140.0	16.5	0.0	-90
GT07-02	498269.0	6488186.0	1120.0	94.0	0.0	-90
DDH07-176	508837.2	6481189.1	1076.7	337.1	175.1	-47.8
DDH07-177	508513.7	6481311.0	1128.3	361.8	353.6	-59.3
DDH07-178	508888.8	6481280.3	1083.6	483.1	180.3	-57.6
DDH07-179	508518.3	6481389.8	1145.2	423.0	179.1	-49.8
DDH07-180	509022.6	6481354.0	1081.5	419.1	181.4	-48.4
DDH07-181	508634.2	6481354.8	1125.1	394.7	178.9	-48.6
DDH07-182	509299.6	6481374.0	1031.0	336.5	182.2	-50.7
DDH07-183	509200.9	6481201.5	1018.8	365.5	170.1	-60.4
DDH07-184	508362.3	6481506.9	1185.2	538.0	178.4	-48.3
DDH07-185	509005.1	6480939.7	1011.7	468.8	175.7	-50.7
DDH07-186	508072.8	6481413.2	1196.5	366.1	180.7	-50.5
DDH07-187	509202.1	6480998.0	1008.0	492.6	180.4	-58.8
DDH07-189	509500.3	6481557.0	1029.6	379.5	176.6	-58.5
DDH07-190	508077.0	6481596.8	1222.8	364.0	174.3	-48.2
DDH07-191	509498.1	6481455.1	1026.9	420.3	175.1	-59.3
DDH07-192	507798.5	6481620.5	1249.7	400.8	178.3	-49.0
DDH07-194	509489.2	6481953.4	1092.9	382.9	38.6	-49.7
DDH07-195	507707.6	6481640.6	1260.1	458.7	177.8	-54.8
DDH07-196	507613.3	6481406.9	1220.5	218.9	180.2	-49.3
DDH07-197	507397.6	6481573.0	1256.3	240.2	177.6	-47.4
DDH07-198	507302.8	6481997.3	1312.3	166.1	177.3	-47.4
DDH07-199	507509.3	6482006.9	1315.4	366.7	179.0	-47.7

Hole*	UTM East	UTM North	UTM Elevation	Length (m)	Azimuth (°)	Dip (°)
DDH07-200	509500.1	6481767.6	1066.5	312.8	179.6	-59.4
DDH07-201	508735.6	6481504.2	1132.2	666.6	185.9	-67.2
DDH07-202	507405.1	6481798.8	1283.9	341.7	172.4	-48.6
DDH07-203	509707.6	6481672.6	1025.8	453.3	177.6	-59.9
DDH07-204	507484.2	6481813.0	1287.9	499.3	180.6	-48.4
DDH07-205	507601.5	6481795.6	1285.1	438.4	180.0	-50.4
DDH07-206	509974.1	6481695.0	1017.4	358.8	69.8	-57.4
DDH07-207	505919.1	6482546.3	1357.2	311.8	189.3	-49.9
DDH07-208	508945.3	6481308.0	1083.1	58.5	180.0	-75.0
DDH07-209	505740.9	6482652.6	1354.6	394.1	40.0	-49.8
DDH07-210	505337.9	6482829.6	1323.2	413.0	45.8	-50.1
DDH07-211	505337.4	6482829.4	1323.4	276.2	45.8	-68.3
DDH07-212	508671.1	6481246.8	1105.4	137.2	177.3	-70.9
DDH07-213	508865.5	6481203.7	1080.0	56.7	168.3	-60.0
DDH07-214	505331.9	6482901.2	1325.9	348.7	44.7	-49.1
DDH07-215	508835.8	6481265.9	1084.1	413.3	180.1	-50.1
DDH07-216	506607.8	6483119.0	1506.1	245.1	180.0	-49.0
DDH07-217	507955.3	6482011.7	1295.3	403.6	178.6	-49.4
DDH07-218	508605.0	6481119.6	1088.8	400.5	181.1	-44.8
DDH07-219	507808.2	6481894.0	1313.3	424.9	180.6	-48.6
DDH07-220	508787.1	6481293.1	1091.5	119.2	180.0	-59.3
DDH07-221	508787.4	6481293.0	1092.1	410.9	177.0	-50.7
DDH07-222	508450.5	6481429.5	1154.0	412.4	179.5	-50.4
DDH07-223	507706.6	6481932.8	1311.1	403.6	177.8	-49.4
DDH07-224	508832.0	6481487.0	1121.7	42.7	180.5	-85.0
DDH07-225	508832.0	6481486.3	1122.0	675.2	178.8	-58.8
DDH07-226	507303.0	6481691.0	1267.6	330.1	180.1	-48.7
DDH07-227	508597.8	6481283.9	1117.5	358.8	184.1	-48.8
DDH07-228	507696.4	6481465.5	1225.9	330.1	177.7	-46.4
DDH07-229	508602.3	6481177.3	1095.0	266.4	182.8	-50.1
DDH07-230	505618.0	6484204.0	1630.0	239.6	180.0	-60.0
DDH07-231	505905.2	6484236.2	1633.7	245.1	180.0	-60.0
DDH07-232	506369.0	6483714.0	1586.9	223.4	180.0	-60.0
DDH07-233	507376.0	6483374.0	1575.0	225.0	225.0	-60.0
DDH07-234	506765.0	6483656.0	1627.7	246.3	180.0	-70.0

Hole*	UTM East	UTM North	UTM Elevation	Length (m)	Azimuth (°)	Dip (°)
DDH07-235	507376.0	6483374.0	1575.0	207.5	45.0	-60.0
DDH07-236	511185.0	6481355.0	1170.0	230.9	180.0	-85.0
DDH07-237	510889.0	6481643.0	1125.2	305.1	180.0	-58.8
DDH07-238	510889.0	6481643.0	1125.2	26.5	180.0	-70.0
DDH07-239	510889.0	6481643.0	1125.2	167.1	180.0	-85.0
DDH07-240	510337.0	6481587.0	1050.0	308.5	180.0	-60.0
DDH07-241	507806.4	6481783.2	1284.8	398.4	174.7	-48.6
DDH07-242	508391.1	6481051.4	1101.9	300.9	177.8	-48.6
DDH07-243	508942.8	6481698.2	1147.6	416.1	355.2	-49.8
DDH07-244	508455.4	6481281.9	1137.7	355.1	179.6	-47.9
DDH07-245	508645.0	6481071.2	1078.2	286.4	184.4	-45.8
DDH07-246	509042.2	6481284.8	1062.9	351.5	181.8	-52.1
DDH07-247	508895.2	6481509.6	1116.4	355.1	359.2	-49.9
DDH07-248	509036.9	6481211.6	1047.9	352.7	182.3	-48.4
DDH08-249	511004.6	6481593.4	1149.6	370.4	180.0	-50.0
DDH08-250	510798.4	6481719.0	1130.7	182.0	181.4	-50.0
DDH08-252	511299.0	6481511.3	1165.0	254.8	178.6	-50.0
DDH08-253	510907.4	6481452.0	1137.4	273.7	180.5	-50.0
DDH08-254	508860.4	6481419.5	1103.7	318.5	181.5	-47.9
DDH08-255	508797.2	6481439.3	1114.7	358.2	181.4	-50.7
DDH08-256	508745.6	6481424.7	1122.8	327.7	180.9	-49.7
DDH08-257	508901.4	6481435.9	1103.2	273.4	181.3	-49.5
DDH08-258	508959.7	6481431.4	1092.0	275.9	180.5	-51.6
DDH08-259	508941.6	6481309.7	1082.6	300.9	180.9	-47.3
DDH08-260	508745.5	6481322.5	1104.9	333.8	178.6	-50.2
DDH08-261	508595.3	6481381.7	1130.5	419.1	179.7	-50.7
DDH08-262	507844.9	6479426.5	1018.9	20.1	177.2	-90.0
DDH08-263	509128.7	6481155.4	1022.6	152.1	179.4	-89.0
DDH08-264	508876.0	6481060.9	1038.5	245.1	358.3	-4.5
DDH10-265	508877.0	6481060.9	1038.5	179.9	358.3	-4.5
DDH10-266	508875.0	6481060.9	1038.5	204.2	358.3	-4.5
DDH18-267	508192.6	6481886.3	1237.5	126.2	180.3	-50.0
DDH18-268	508065.3	6481766.4	1242.2	449.9	179.8	-50.0
DDH18-269	508202.3	6481330.3	1186.8	221.6	173.6	-75.0
DDH18-270	507801.6	6481177.7	1169.5	251.8	359.9	-50.0

Hole*	UTM East	UTM North	UTM Elevation	Length (m)	Azimuth (°)	Dip (°)
DDH18-271	508158.4	6481561.2	1211.9	374.6	179.8	-80.0
DDH18-272	508100.9	6481485.6	1208.6	289.3	0.2	-80.0
DDH18-273	507948.8	6481166.6	1157.9	102.4	181.2	-60.0
DDH18-274	507952.7	6481504.3	1214.1	317.6	179.7	-55.0
DDH18-275	507704.5	6481306.8	1200.0	71.6	180.0	-50.0
DDH18-276	507701.7	6481364.6	1211.3	404.5	359.7	-55.0
DDH18-277	508523.5	6481775.3	1189.9	99.7	179.9	-50.0
DDH18-278	508461.4	6481769.4	1192.5	100.0	179.5	-60.0
DDH18-279	508645.6	6481672.4	1173.8	151.5	179.8	-50.0
DDH18-280	508736.5	6481724.7	1174.8	151.5	179.8	-50.0
DDH18-281	507951.0	6482125.1	1308.5	200.3	179.8	-50.0
DDH18-282	507798.2	6481378.9	1207.9	468.2	0.3	-60.0
DDH18-283	507814.1	6482107.9	1314.8	224.6	180.2	-50.0
DDH18-284	507714.7	6482098.9	1320.2	215.5	180.0	-50.0
DDH18-285	508064.4	6481926.1	1273.0	450.2	180.2	-60.0
DDH18-286	508380.2	6481723.5	1193.1	333.8	179.8	-50.0
DDH18-287	507942.1	6481837.6	1284.8	599.0	180.0	-50.0
DDH18-289	507502.4	6481398.9	1226.1	114.9	180.2	-50.0
DDH18-290	507489.7	6481497.5	1238.9	148.4	179.7	-50.0
DDH18-291	502950.0	6484800.0	1295.0	456.0	40.0	-67.0
DDH18-292	508890.0	6481285.3	1084.0	249.0	180.3	-67.0
DDH18-293	508862.4	6481111.9	1058.8	196.6	19.9	-70.0
DDH18-294	508722.7	6481201.8	1087.9	197.5	359.9	-60.0
DDH18-295	508683.5	6481228.3	1100.8	236.8	30.4	-60.0
DDH18-296	508646.4	6481204.4	1095.6	188.7	0.2	-83.0
DDH18-297	508562.8	6481209.4	1105.4	185.6	50.2	-80.0
DDH18-298	508380.4	6481141.0	1136.8	252.1	0.3	-77.0
DDH18-299	508604.7	6481117.5	1089.6	322.8	0.2	-85.0
DDH18-300	508948.0	6481139.4	1048.6	160.6	42.8	-60.0
DDH18-301	505568.1	6483040.2	1375.2	584.3	223.8	-55.0
DDH18-302	508872.7	6481060.6	1038.2	391.1	329.9	-4.0
DDH18-303	505575.7	6483039.5	1375.3	535.5	313.6	-60.0
DDH18-304	507773.8	6481776.8	1285.3	242.9	179.7	-55.0
DDH18-305	507694.7	6481469.6	1225.8	249.3	180.0	-85.0
DDH18-306	507652.9	6481765.9	1277.7	200.0	180.3	-75.0

Hole*	UTM East	UTM North	UTM Elevation	Length (m)	Azimuth (°)	Dip (°)
DDH21-307	508943.0	6481703.0	1147.8	358.8	170.0	-52.0
DDH21-308	508904.0	6481674.0	1147.2	477.6	190.0	-52.0
DDH21-309	507730.0	6482068.0	1317.6	726.4	180.0	-45.0
DDH21-310	508002.0	6481914.0	1279.1	400.5	185.0	-70.0
DDH21-311	507387.0	6481678.0	1267.8	300.0	315.0	-85.0
DDH21-312	507943.0	6481838.0	1284.1	570.1	185.0	-58.0
DDH21-313	508606.0	6481704.0	1174.9	398.9	180.0	-70.0
DDH21-314	507647.0	6481263.0	1195.6	300.1	210.0	-70.0
DDH21-315	508359.0	6480759.0	1063.5	465.4	350.0	-45.0
DDH21-316	508158.0	6480895.0	1093.7	330.4	0.0	-70.0
DDH21-317	508502.0	6480836.0	1047.9	331.8	350.0	-60.0
DDH21-318	508397.0	6480775.0	1059.9	370.9	350.0	-50.0
DDH21-319	508932.0	6481199.0	1063.4	351.8	350.0	-80.0
DDH21-320	508235.0	6480902.0	1090.4	401.4	0.0	-52.0
DDH21-321	507862.0	6481158.0	1161.5	511.2	0.0	-46.0
DDH21-320	508235.0	6480902.0	1090.4	401.4	0.0	-52.0
DDH21-321	507862.0	6481158.0	1161.5	511.2	0.0	-46.0
GT22-322	508812.0	6475037.0	1266.0	80.2	0.0	-90.0
GT22-323	509421.0	6475452.0	1206.0	112.8	0.0	-90.0
GT22-324	509926.0	6475801.0	1245.0	58.3	0.0	-90.0
GT22-325	509098.0	6476135.0	1170.0	98.6	0.0	-90.0
GT22-326	516248.0	6472016.0	1296.0	64.9	0.0	-90.0

*Four holes are intentionally missing from this table as they were abandoned before producing core and are recorded in the database as having length of 0 metres.

10.1 Collar and Downhole Surveying

HNC planned drill holes in advance and then spotted the collar in the field using a backpack-mounted Trimble Differential Global Positioning System (DGPS). Because of the high magnetic background, HNC set the direction of drilling using foresights and backsights, which were also spotted by HNC staff using a backpack portable DGPS. After completion of the hole, the collar location was resurveyed using the same backpack Trimble DGPS.

A Reflex Maxibor® II unit was used for most downhole surveying from 2004 to 2010. Where casing was intact, 2002 and 2003 holes were re-entered and surveyed with the Maxibor II instrument. Several holes were not surveyed either because they were initial exploration holes drilled outside of the Horsetrail and Northwest zones, damaged or missing casing prevented re-entry, or the survey tool was not available. Where Maxibor II surveys were not conducted, acid dip tests provided limited control on hole orientation.

Giga Metals planned drill holes in advance and then spotted the collar in the field using a DGPS. Because of the high magnetic background resulting in magnetic compass inaccuracy, Giga Metals set the direction of drilling using either foresights and backsights spotted by staff using a DGPS or using a north-seeking Reflex TN14 GyroCompass. After completion of the hole, the collar location was resurveyed using a DGPS; the collar dip measurement was taken from the down-hole survey measurement nearest to the top of the hole. Most casings remain intact with semi-permanent markers. Many pre-2018 collars have had their location, azimuth and dip surveyed by Gabriel Aucoin (Commissioned Land Surveyor [CLS]) of Aucoin Surveys Limited. Data in the collar table for holes used in the resource estimate are the best available method for each attribute of each hole.

10.2 Significant Assay Intervals

Table 10-3 provides a selection of significant drill hole intervals from the Turnagain drill hole database. Drill hole intervals are reported as actual core lengths and do not represent the true thickness.

The 2021 drill program was focused on geotechnical and infill drill holes for the purposes of pit design and resource upgrade purposes as follows:

- Six geotechnical holes totalling 2,082 m sited in the perimeter the Horsetrail and Northwest zones of the Turnagain deposit (Table 10-4),
- Nine resource infill holes totalling 4,214 m sited between the Horsetrail and Northwest zones of the Turnagain deposit (Table 10-5).

The geotechnical drilling program was conducted with one skid-mounted drill rig in the Horsetrail and Northwest zones. Although these drill holes provide valuable additional geological and resource modelling information, their primary purpose was to investigate the geotechnical characteristics of the proposed pit wall areas with oriented core and optical televiewer and to conduct hydraulic conductivity packer tests and install vibrating wire piezometers to guide engineering design. Where ultramafic rocks intersected drill core samples from this program were one-half HQ core.

The infill drilling program was conducted with one skid-mounted drill rig in the Horsetrail and Northwest zones in areas of Inferred resources. The drill core samples were one-half NQ core.

The 2022 drill program was conducted in the non-mineral-prospective geology of the area of the proposed TMF. The primary objectives were overburden characterization and bedrock geotechnical investigation. A small number of bedrock samples were analyzed for metals for condemnation purposes and returned no significant results.

Table 10-3: Summary of Significant Assay Results for Pre-2021 Drill Holes

Hole		From (m)	To (m)	Interval (m)	Ni (%)	Co (%)	Pd (ppb)	Pt (ppb)
DDH02-06		230	485.2	255.2	0.32	0.015	56	54
DDH02-06	including	426	428	2	1.03	0.020	463	429
DDH03-16		9.1	369.1	360	0.28	0.017	31	37
DDH03-16	including	196	198	2	1.51	0.080	99	129
DDH03-18		5	242.95	237.95	0.30	0.015	38	38
DDH03-18	including	113	114	1	2.59	0.060	108	128
DDH03-18	and	118	119	1	1.49	0.040	221	175
DDH03-18	and	119	120	1	2.51	0.060	487	409
DDH03-18	and	120	121.2	1.2	2.46	0.060	464	260
DDH03-18	and	121.2	122	0.8	3.93	0.090	1052	833
DDH03-18	and	122	123.2	1.2	5.15	0.130	1067	964
DDH04-23		3.35	413.3	409.95	0.26	0.016	19	20
DDH04-23	including	75.3	76.36	1.06	1.57	0.120	63	59
DDH04-23	and	381.4	382.4	1	1.30	0.110	124	196
DDH04-23	and	382.4	383.4	1	1.27	0.110	132	213
DDH04-23	and	383.4	384.4	1	1.65	0.140	122	148
DDH04-28		123.65	233.15	109.5	0.29	0.020	5	6
DDH04-28	including	135.5	137.2	1.7	0.60	0.050	28	66
DDH04-28	and	137.2	138.15	0.95	1.38	0.110	125	131
DDH04-28	and	138.15	139.15	1	1.25	0.100	53	73
DDH04-28	and	139.15	140.15	1	0.88	0.070	59	58
DDH04-28	and	140.15	141.2	1.05	1.00	0.080	81	60
DDH04-28	and	141.2	142.15	0.95	0.66	0.050	35	65
DDH04-28	and	142.15	145.15	3	0.26	0.020	0	0
DDH04-28	and	145.15	146.6	1.45	1.65	0.100	0	0
DDH04-36		4	120.7	116.7	0.26	0.013	0	0
DDH04-36	including	107.9	109.5	1.6	1.04	0.020	0	0
DDH04-66		6.65	179.2	172.55	0.33	0.020	0	0
DDH04-66	including	154.55	156	1.45	1.63	0.070	0	0
DDH04-67		6.1	145.1	139	0.22	0.019	7	7
DDH04-67	including	115.8	117.65	1.85	1.05	0.050	149	173
DDH06-174		12.4	340	327.6	0.23	0.012	20	23
DDH06-174	including	236	236.3	0.3	1.53	0.150	21	131

Hole		From (m)	To (m)	Interval (m)	Ni (%)	Co (%)	Pd (ppb)	Pt (ppb)
DDH07-180		17.9	419.1	401.2	0.24	0.013	25	29
DDH07-180	including	316	316.5	0.5	1.99	0.150	40	54
DDH07-204		7.85	499.25	491.4	0.22	0.014	24	26
DDH07-204	including	488	492	4	1.16	0.030	108	132
DDH08-256		5.3	327.65	322.35	0.24	0.014	26	29
DDH08-256	including	196	200	4	1.12	0.070	28	82
DDH08-258		5.45	275.85	270.4	0.24	0.013	20	22
DDH08-258	including	128	132	4	1.08	0.030	224	231
DDH18-292		3.82	249.02	245.2	0.273	0.017	39	43
DDH18-292	including	110	164	54	0.339	0.02	50	44
DDH18-292	and	176	244	68	0.336	0.02	40	40
DDH18-293		8	196.6	188.6	0.27	0.016	24	18
DDH18-293	including	73.47	114	40.53	0.47	0.023	50	39
DDH18-294		6	197.51	191.51	0.374	0.022	69	51
DDH18-294		48	134	86	0.49	0.027	92	66
DDH18-295		52	236.83	184.83	0.32	0.018	35	31
DDH18-296		8	188.67	180.67	0.344	0.021	28	20
DDH18-296	including	44	152	108	0.392	0.022	33	24
DDH18-297		8	185.62	177.62	0.339	0.017	43	38
DDH18-297	including	5.79	63.2	57.41	0.322	0.017	44	41
DDH18-297	and	124	185.62	61.62	0.45	0.016	67	59
DDH18-298		8	252.07	244.07	0.226	0.015	15	13
DDH18-299		8	322.78	314.78	0.214	0.016	17	13
DDH18-300		10	160.63	150.63	0.297	0.019	31	27
DDH18-300	including	32	67.56	35.56	0.381	0.019	45	40
DDH18-300	and	120	160.63	40.63	0.365	0.02	42	36
DDH18-302		3	391.06	388.06	0.257	0.015	41	35
DDH18-304		6	212	206	0.248	0.012	78	72
DDH18-304	including	90	118	28	0.471	0.13	417	367
DDH18-305		8	249.33	241.33	0.213	0.013	17	15
DDH18-306		8	199.95	191.95	0.221	0.013	18	15

Table 10-4: Drill Intercepts from the Geotechnical Drilling Program

Hole		From (m)	To (m)	Interval (m)	Ni (%)	Co (%)	Pd (ppb)	Pt (ppb)
DDH21-310		3	400.53	397.53	0.218	0.012	18	22
DDH21-310	including	76	144	68	0.265	0.013	9	11
DDH21-311		4.34	300	295.66	0.204	0.010	6	8
DDH21-313		44	398.89	354.89	0.173	0.013	6	7
DDH21-314		No significant intervals						
DDH21-316		112	235.98	123.98	0.147	0.012	18	13
DDH21-319		6	351.79	345.79	0.244	0.015	31	26
DDH21-319	including	36	96	60	0.367	0.015	47	34

Table 10-5: Drill Intercepts from the Resource Infill Program

Hole		From (m)	To (m)	Interval (m)		Ni (%)	Co (%)	Pd (ppb)	Pt (ppb)
DDH21-307		84	358.75	354.75	0.221	0.014		26	35
DDH21-307	including	20	98	78	0.232	0.015		54	90
DDH21-308		6.95	477.62	470.67	0.214	0.013		23	24
DDH21-308	including	6.95	54	47.05	0.250	0.014		18	24
DDH21-308	and	408	440	36	0.252	0.013		28	26
DDH21-309		20.50	726.41	703.87	0.211	0.013		23	24
DDH21-312		0.99	570.09	569.10	0.230	0.012		20	22
DDH21-315		284	465.43	181.43	0.197	0.012		24	26
DDH21-317		5.18	331.82	326.64	0.211	0.013		19	15
DDH21-317	including	184	264	80	0.255	0.014		28	24
DDH21-318		7.87	370.94	363.07	0.116	0.009		13	11
DDH21-320		16	401.42	385.42	0.173	0.010		18	17
DDH21-321		132	511.15	379.15	0.151	0.010		10	10

11.0 SAMPLE PREPARATION, ANALYSES AND SECURITY

This section provides an overview of the sample preparation, analysis and security procedures used by Giga Metals. Where available, similar information is also provided for Giga Metals' predecessor companies.

Sample preparation and analysis programs have been undertaken by a variety of operators during various drill campaigns. This section summarizes the verification work and practices employed by each of the operators. The independent QP responsible for Section 11 of this report, Garth Kirkham, P. Geo., believes that the sample collection, preparation, analysis and security procedures for all Giga Metals' drilling are consistent with industry standards and best practices. This supports their use in Mineral Resource and Mineral Reserve estimation, as detailed in this study.

11.1 Security and Chain of Custody

The drill contractor transported drill core from the drill site to the exploration camp for processing. Split core samples were numbered, bagged and sealed and transported from site by helicopter or fixed-wing airplane to Dease Lake (or similarly by plane to Smithers) in 300 to 350 kg lots. The samples were then shipped by commercial transport to a primary preparation facility as follows:

- ACME Laboratories in Vancouver (2003 to 2005) or Smithers (2006 to 2010),
- ALS in Terrace, Vancouver, or Kamloops (2018),
- SGS in Burnaby (2021 and 2022).

Requisition forms were transmitted to the Giga Metals Vancouver office with the date and number of samples shipped and the laboratory notified Giga Metals upon receipt of the samples.

Drill core from holes drilled between 1996 and 2002 is stored in racks at the Boulder camp on Wheaton Creek, 15 km west of the Property. Core recovered from the 2003 to 2022 programs is stored in sturdy racks, stacked either in neat rows or cross-stacked near the camp on the Turnagain Property. Sample security and core storage conform to industry standards.

11.2 Sampling Methods

Since 1967, multiple drilling and sampling methods have been used by prior operators and Giga Metals and its predecessors. Sampling and logging methods, as well as QC measures, have varied over this time.

11.2.1 Geotechnical Data

In 2007, Giga Metals contracted Piteau and Associates Engineering Ltd. (Piteau) to provide geotechnical core logging guidance. Piteau provided Giga Metals' geologists with instructions for recording core Rock Quality Designation (RQD), recovery, joint frequency, joint condition, fracture density and orientation, hardness and weathering. In addition, Giga Metals' geologists collected over 7,000 point-load tests on core, following the instructions set out by Piteau. During the 2005 and 2008 drill programs, the geotechnical core logging protocol was designed by KP. 2010 to 2022 programs have had various protocols in place, depending on drill hole location and availability of geotechnical engineering consultants. Geotechnical logging between 2002 and 2004 included RQD and recovery only.

11.2.2 Geological Data

In 2006, Giga Metals established a core logging and sampling protocol that is posted as a flowsheet in the core shack. Prior to any geological logging, the core is realigned and, if necessary, driller block measurements are converted to metres. Drill core was sampled at 2 m intervals or less during the 2004 and 2005 programs and predominantly on 4 m intervals since 2006, although sample breaks are often inserted at significant changes in lithology or mineralization. Following core logging, sample intervals are marked with a red, yellow, or white marker and sample numbers are assigned from a pre-printed analytical laboratory sample tag book. Core is digitally photographed three boxes at a time on the logging rack in the core shack. Core samples are halved by a hydraulic core splitter and/or diamond saw. In most cases, half the core is stored in boxes on site and half is sent for analysis. In the case of 2018, however, 13 core samples from 40 holes were halved and then one half was again split into quarters. One quarter was sent for analysis, one quarter was stored in the box and the remaining half of the core was stored for future metallurgical testing.

11.2.3 Sample Preparation and Analyses

No information is available regarding sample preparation, analytical procedures, or Quality Assurance (QA)/QC measures in place during the 1967 to 1998 exploration programs. As none of this data was used in resource estimation, this is not considered significant.

Drill core samples from the 2002 to 2010 programs, received by ACME in Smithers and Vancouver, BC, were checked against requisition documents prior to being dried, weighed, crushed, split and pulverized. They were then subjected to a variety of analytical techniques. ACME is a certified ISO:9000 facility. Drill core samples from the 2018 program were similarly processed almost entirely by ALS Laboratories facilities in Terrace, Kamloops and Vancouver, BC; and two batches by TSL Laboratories in Saskatoon, SK. ALS Laboratories is a certified ISO:17025 facility; however, TSL Laboratories is no longer accredited. Drill core samples from 2021 and 2022 programs were processed by SGS in Burnaby, BC. SGS is a certified ISO:9000 facility.

Prior to 2004, samples were analyzed for nickel, copper, cobalt and approximately 20 major and minor elements by aqua regia digestion followed by an Inductively Coupled Plasma Emission Spectroscopy (ICP-ES) finish. Samples collected from the 2004 to 2022 programs were subjected to a four-acid (HNO_3-$HClO_4$-HF and HCl) digestion followed by ICP-ES analyses to determine values for total nickel, copper, cobalt and 22 other elements, including sulphur.

In 2004 and 2005, sulphur content was analyzed by the Leco furnace method. In 2006, sulphur content was analyzed by ICP-ES after a four-acid digestion. Since 2007, sulphur content has been analyzed by both ICP-ES after a four-acid digestion and Leco furnace.

Some exploration drill holes prior to 2004 and all drill holes since 2004, were analyzed for platinum, palladium and gold by lead-collection fire-assay fusion followed by ICP-ES.

11.2.4 Specific Gravity (SG) Measurement

Giga Metals collects bulk SG measurements by water immersion method every 20 samples, using up to 50 cm of unsplit core. A protocol for SG measurements is posted in the logging facility.

SG is calculated as follows:

SG = weight in air / (weight in air – weight in water)

Prior to 2018, data were recorded manually on paper and later transferred to a digital file. Data entry errors due to transposition of numbers or poor written records were possible. AMEC (2007) recommended double data entry for any manual entry of data into a database and suggested that Giga Metals create a density standard to use periodically to ensure the scale is working properly. Since 2008, mass standards have been used to calibrate the scale at least once each day and immersion water replaced periodically to ensure accuracy of measurements. Since 2018, data were entered directly upon measurement into an Access database.

11.3 QA/QC

Laboratory QC since 2004 has been maintained by routinely inserting and analyzing internal standards, sample blanks and duplicate samples. Giga Metals geologists also insert reference sample pulps in the field approximately every 20 samples and blank samples are inserted approximately every 30 samples. Laboratories are instructed to create and analyze duplicate pulps from crushed core approximately every 30th sample. Pulps from approximately every 10th sample are sent to a check laboratory. From 2021 to 2022, SRC Laboratories (SRC) (formerly TSL Laboratories) in Saskatoon, SK, was used as a check laboratory. In 2018, SGS Laboratories in Burnaby was used as a check laboratory to analyze pulps for total nickel, sulphur, platinum, palladium and gold, among other elements. From 2007 to 2010, International Plasma Laboratories Ltd. (IPL) in Richmond was used as the check laboratory. Prior to 2007, ALS Chemex in Vancouver was used as a check laboratory. At the time of these check analyses, SGS was ISO:17025 certified, IPL was ISO:9001 certified and ALS Chemex was ISO:9001 certified.

Giga Metals' standard reference materials used from 2004 to 2010 for Ni, Cu and Co include two Canada Centre for Mineral and Energy Technology (CANMET) reference samples labelled UM-2 and UM-4 (Cameron, 1975). Both were derived from small, lenticular masses of peridotite that occur along a major east-west fault zone in the Werner Lake District of northwest Ontario. CANMET analyzed the material for ascorbic acid-hydrogen peroxide soluble nickel and, by use of four-acid digestion, for total Ni content. The CANMET certification of these materials was completed in 1974; however, it is not supported by current industry standards, requiring a round-robin approach using several laboratories.

Giga Metals has two reference materials (05-94 and 05-103) prepared from mineralized drill core from the resource area. These standards were initially certified by Smee & Associates Consulting Ltd. through a round-robin process for total digestion nickel, iron, copper and sulphur. In 2009, AGORATEK supervised a standard recertification program for all four reference materials.

Additionally, five other standard reference materials—PGMS-1, ME-1309 and ME-1310 from CDN Laboratories and WGB-1 and WMG-1 from Natural Resources Canada—have been used for monitoring platinum and palladium concentrations.

For the 2021 and 2022 drilling campaigns, Giga Metals systematically inserted certified reference materials (standards) and blanks into each batch of samples at regular intervals. Samples were placed in sealed bags and shipped directly to the SGS in Burnaby, BC. The 2021 and 2022 samples reported herein were analyzed by SGS in Burnaby, BC.

Samples prepared by SGS were by crushing the entire sample to 75% passing 2 mm, riffle splitting of 250 g and pulverizing the split to 85% passing 75 µm. Samples prepared by SRC were by crushing the entire sample to 70% passing 1.70 mm, riffle splitting 250 grams and pulverizing the split to 95% passing 106 µm. The core samples also underwent a duplicate assay program that tests rejects and pulps for reproducibility. Base metal analyses were determined using four-acid digestion method with Inductively Coupled Plasma Atomic Emission Spectroscopy (ICP-AES) finish. Precious metal analyses were determined by fire assay method with ICP-AES or Inductively Coupled

Plasma Atomic Absorption Spectroscopy (ICP-AAS) finish. Analytical results are verified with the application of industry standard QA/QC procedures.

The performance of the nickel and cobalt standards cumulatively shown for all years is summarized in Figure 11-1 and Figure 11-3, respectively.

Figure 11-1 shows that early performance of the UM-2 and UM-4 appear to show a high bias that was investigated and resulted in the creation and use of the STD05-94 and STD05-103 standards (which are now the predominant standard). Although there appears to be a high bias, the check laboratory results during the same period show a correlation of 0.96, which illustrates that the results are repeatable and verifiable. AGORATEK recommended that the 2004, 2005 and 2006 data be adjusted to account for this relatively minor high bias; however, the author believes that this is not warranted and has not applied this arbitrary adjustment to the raw data. Figure 11-2 shows the later post-2018 performance which shows improved outcomes in comparison however there were still 10 failures which continues to warrant monitoring. Overall, duplicate performance is very good as shown in Figure 11-5.

The cobalt standards performance shown in Figure 11-3 shows good results, although it is difficult to attain precision due to the very low values that are being measured and the sensitivity of the instrumentation in and around the non-detect ranges. In addition, the post-2018 results also show performance as illustrated Figure 11-4. Overall, duplicate performance is very good as shown in Figure 11-6.

Figure 11-1 and Figure 11-9 shows that early performance of the WMB-1 standard illustrates a high bias for both platinum and palladium while WGB-1 shows a poor results and marginal low bias. However, Figure 11-1 and Figure 11-10 illustrate the later, post-2018 performance showing improved outcomes in comparison however there were still 7 failures which also continue to warrant monitoring. Overall, duplicate performance for platinum and palladium is very good as shown in Figure 11-11 and Figure 11-12.

The source of the field blank used up to and including 2005 is not known. The field blank material used from 2006 to 2010 was crushed granite gneiss obtained from Squamish and crushed silica glass. During 2018 to 2022, a crushed glass blank was used.

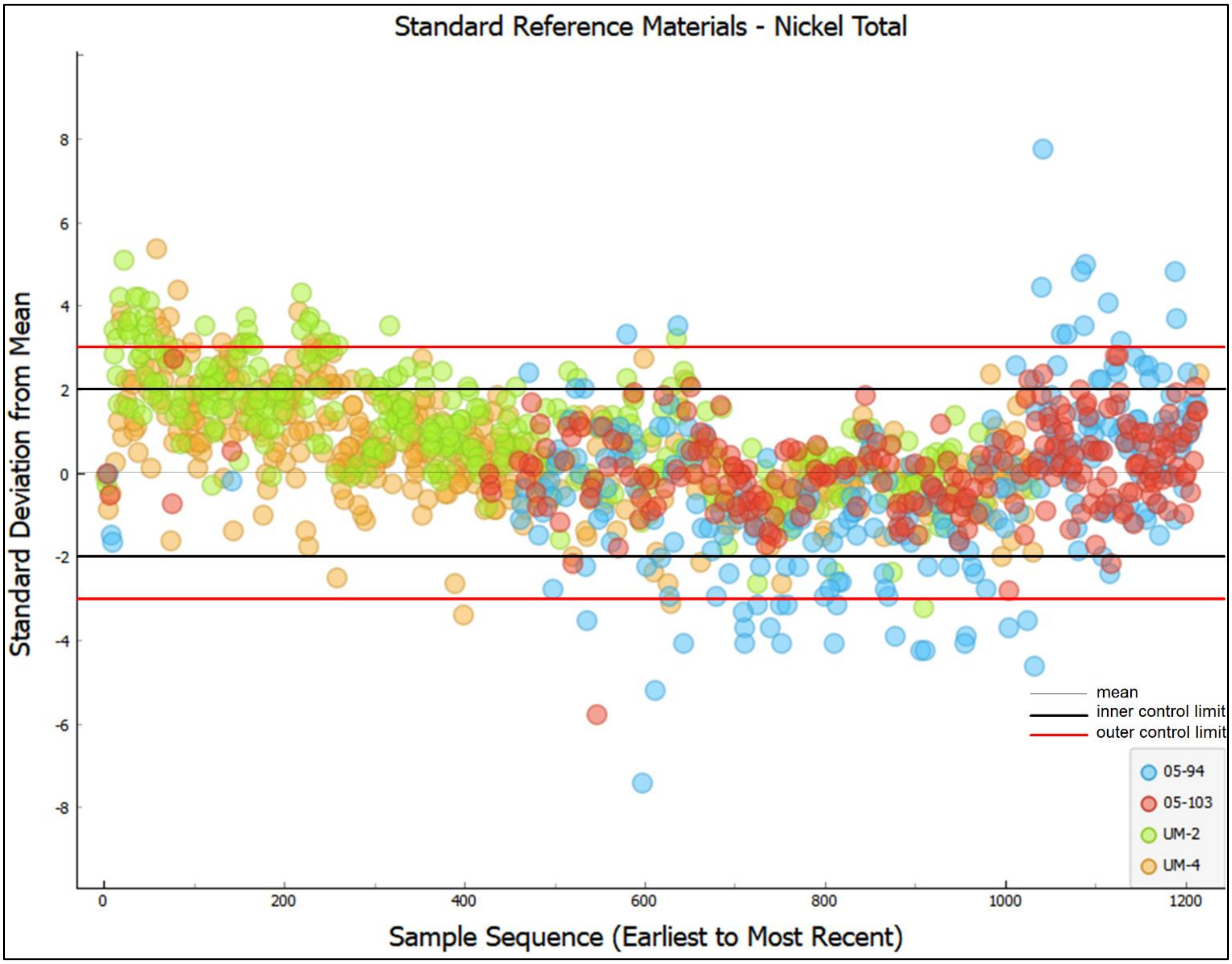


Figure 11-1: Nickel Performance of Standard Reference Materials

(Source: Giga Metals, 2023)

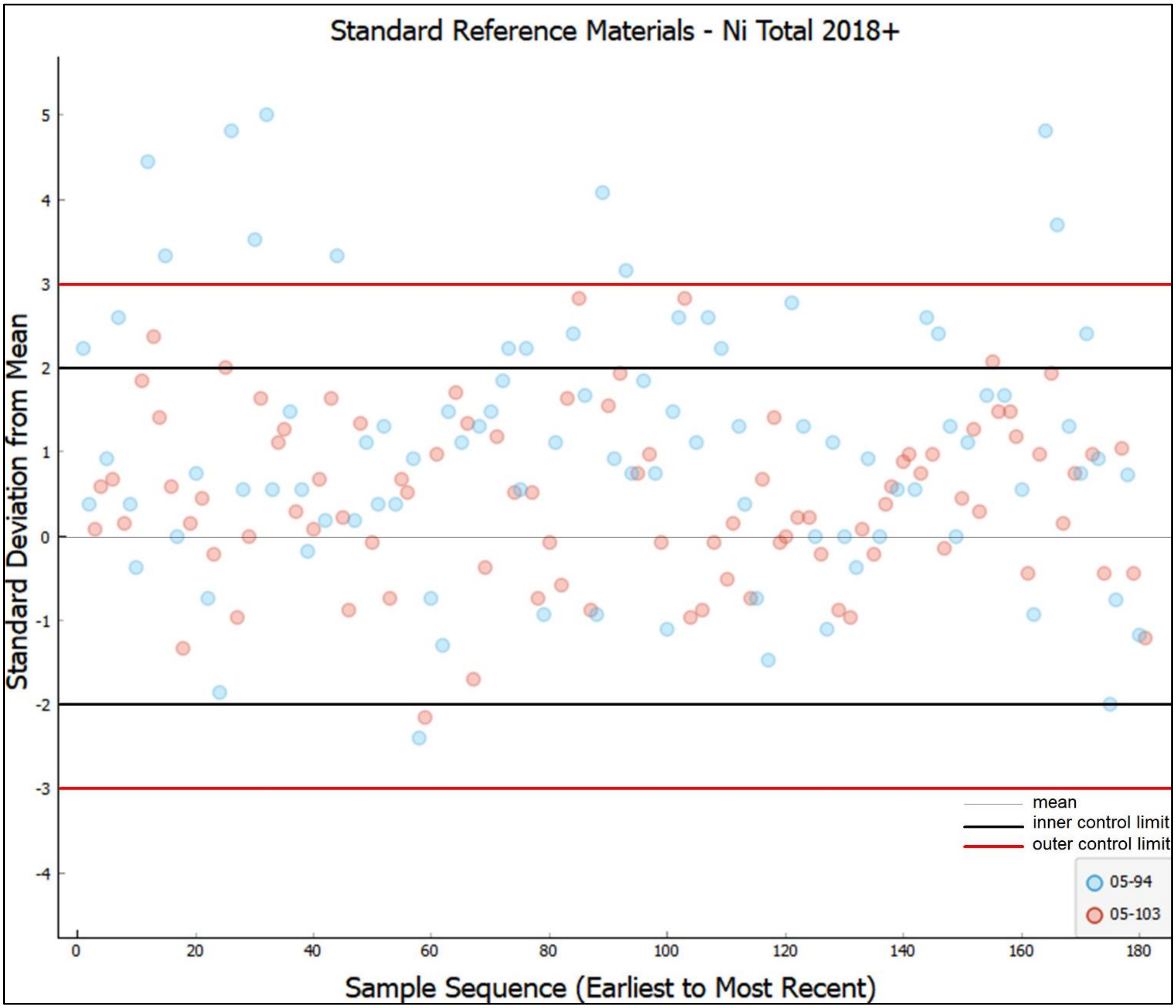


Figure 11-2: Nickel Performance of Standard Reference Materials from 2018 to Present

(Source: Giga Metals, 2023)

Figure 11-3: Cobalt Performance of Standard Reference Materials

(Source: Giga Metals, 2023)

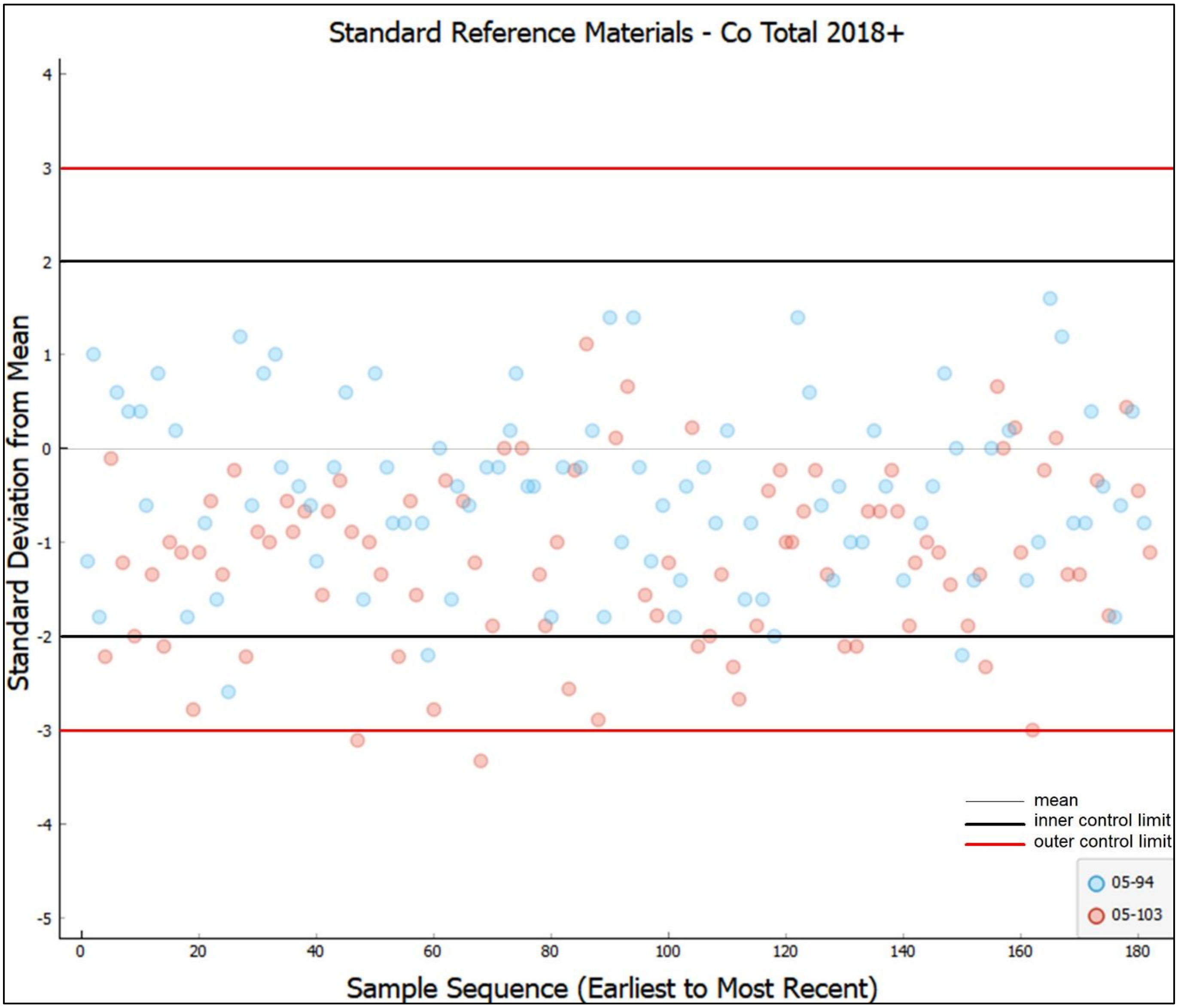


Figure 11-4: Cobalt Performance of Standard Reference Materials from 2018 to Present

(Source: Giga Metals, 2023)

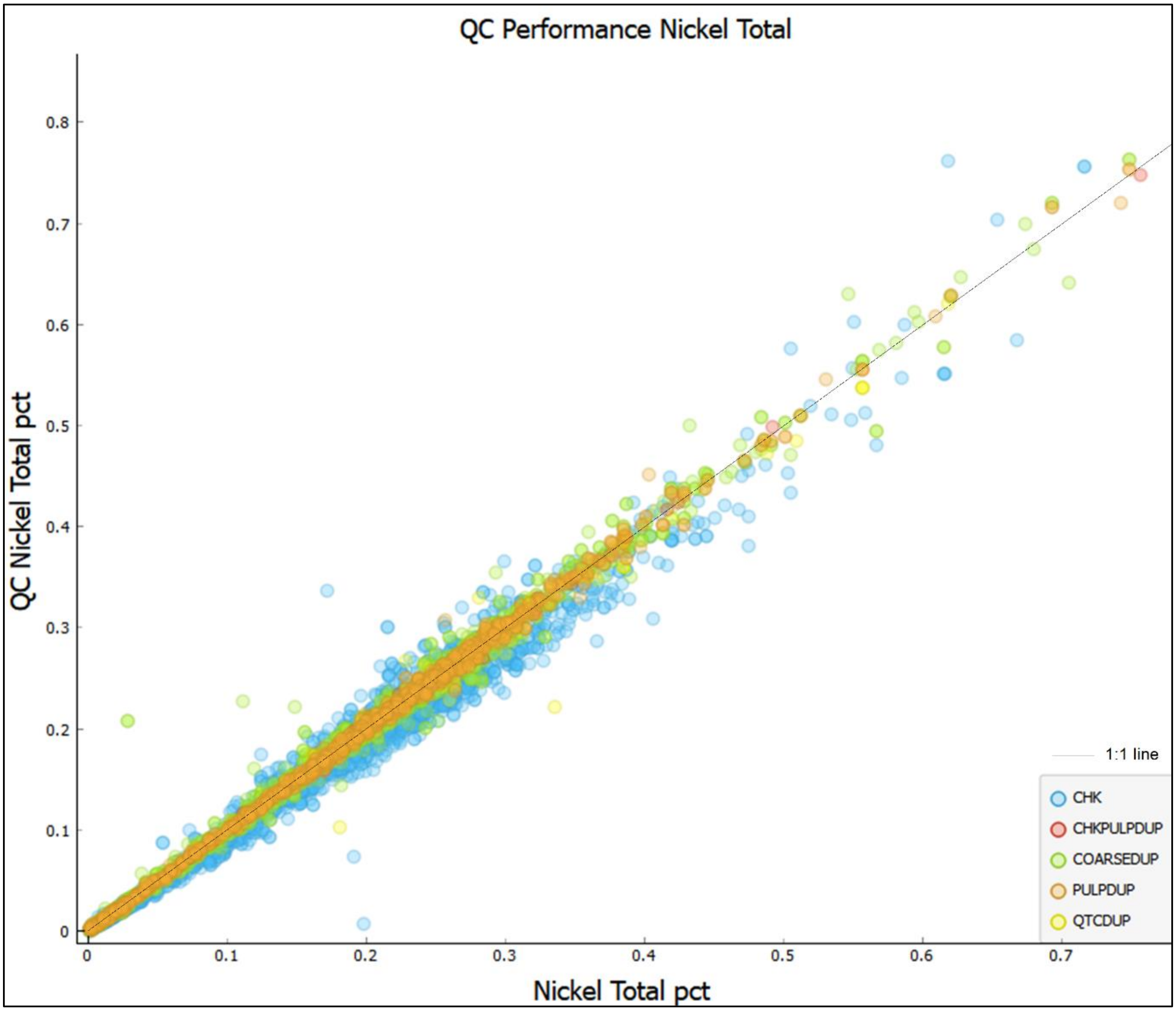


Figure 11-5: Nickel Performance of QC Samples

(Source: Giga Metals, 2023)

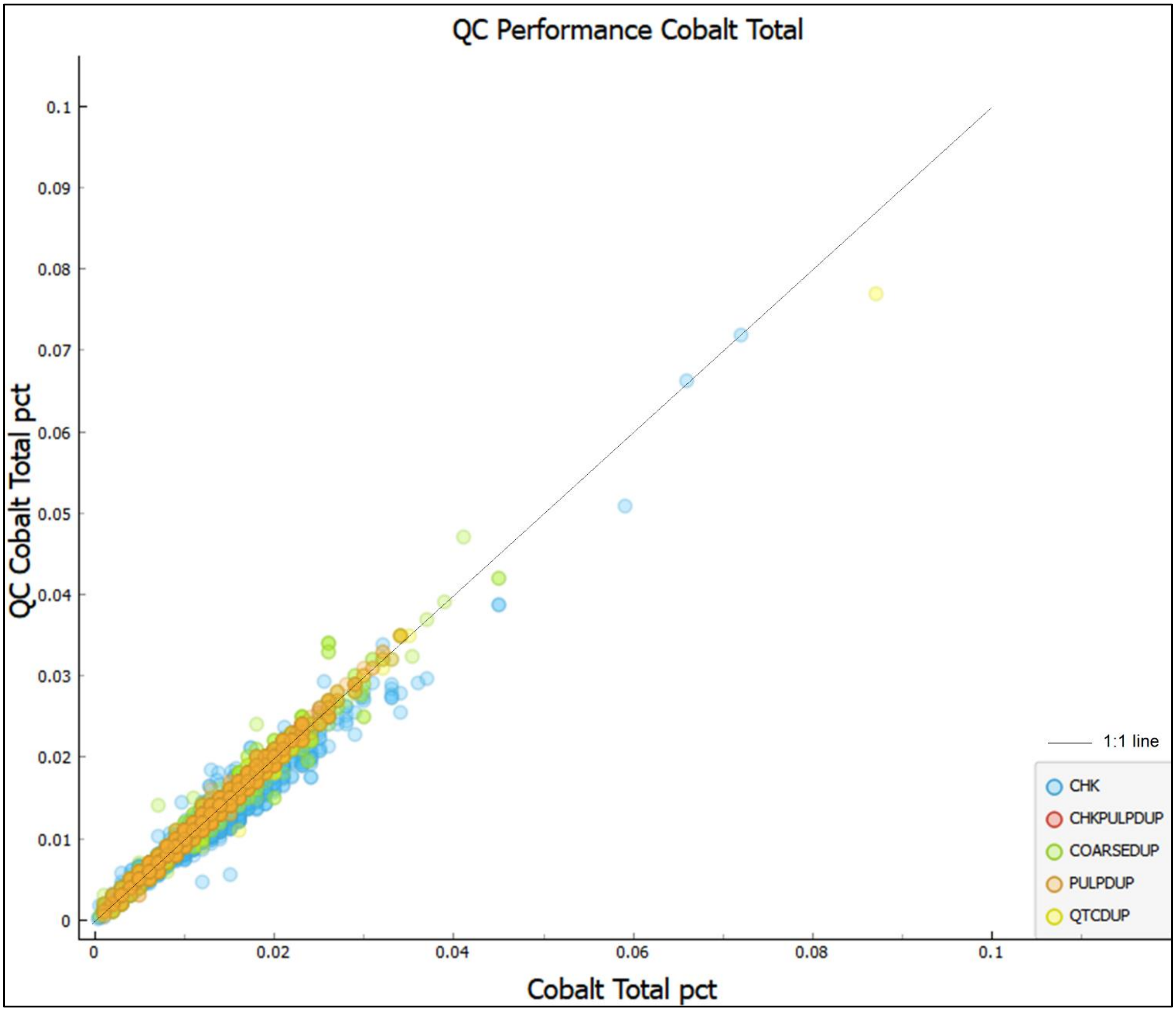


Figure 11-6: Cobalt Performance of QC Samples

(Source: Giga Metals, 2023)

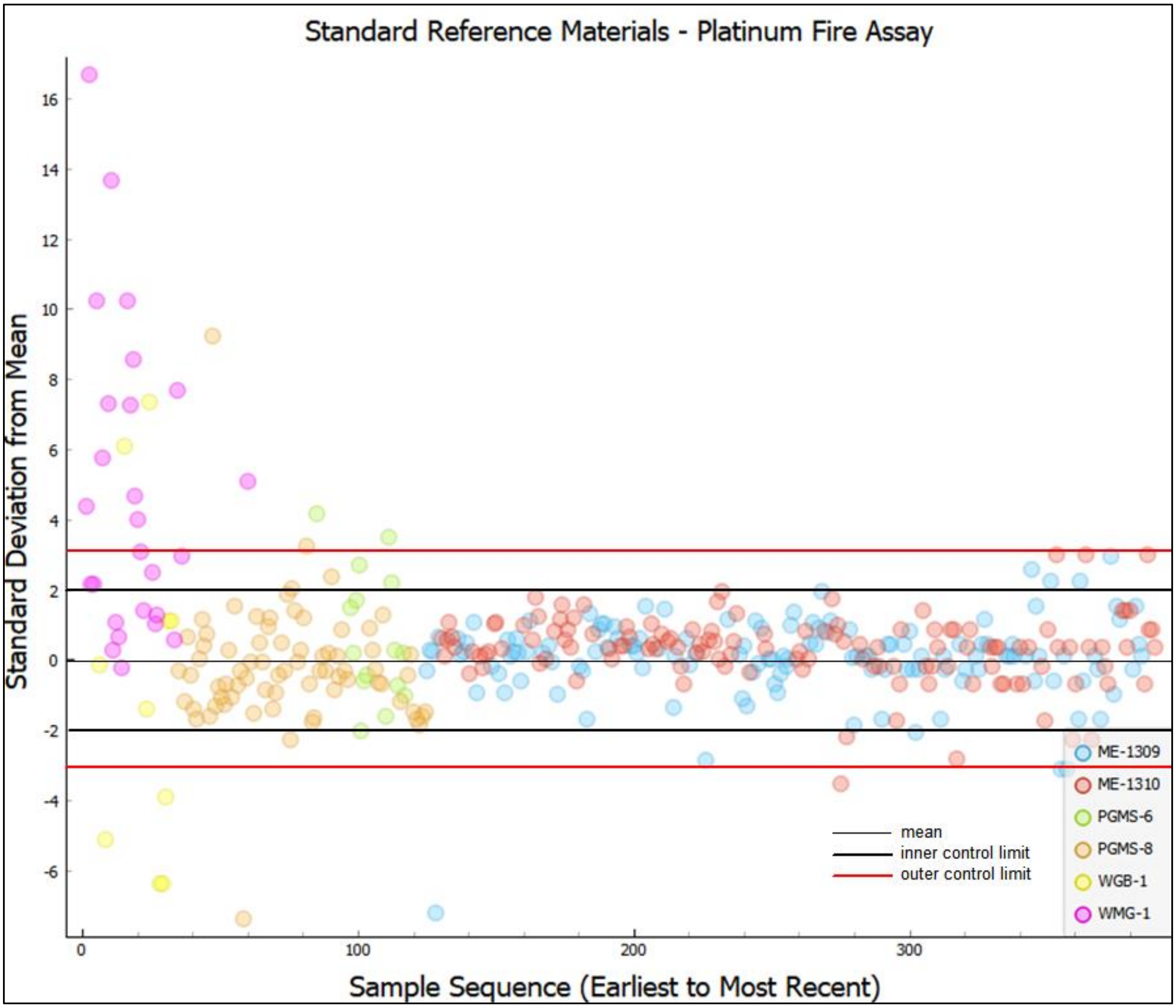


Figure 11-7: Platinum Performance of Standard Reference Materials

(Source: Giga Metals, 2023)

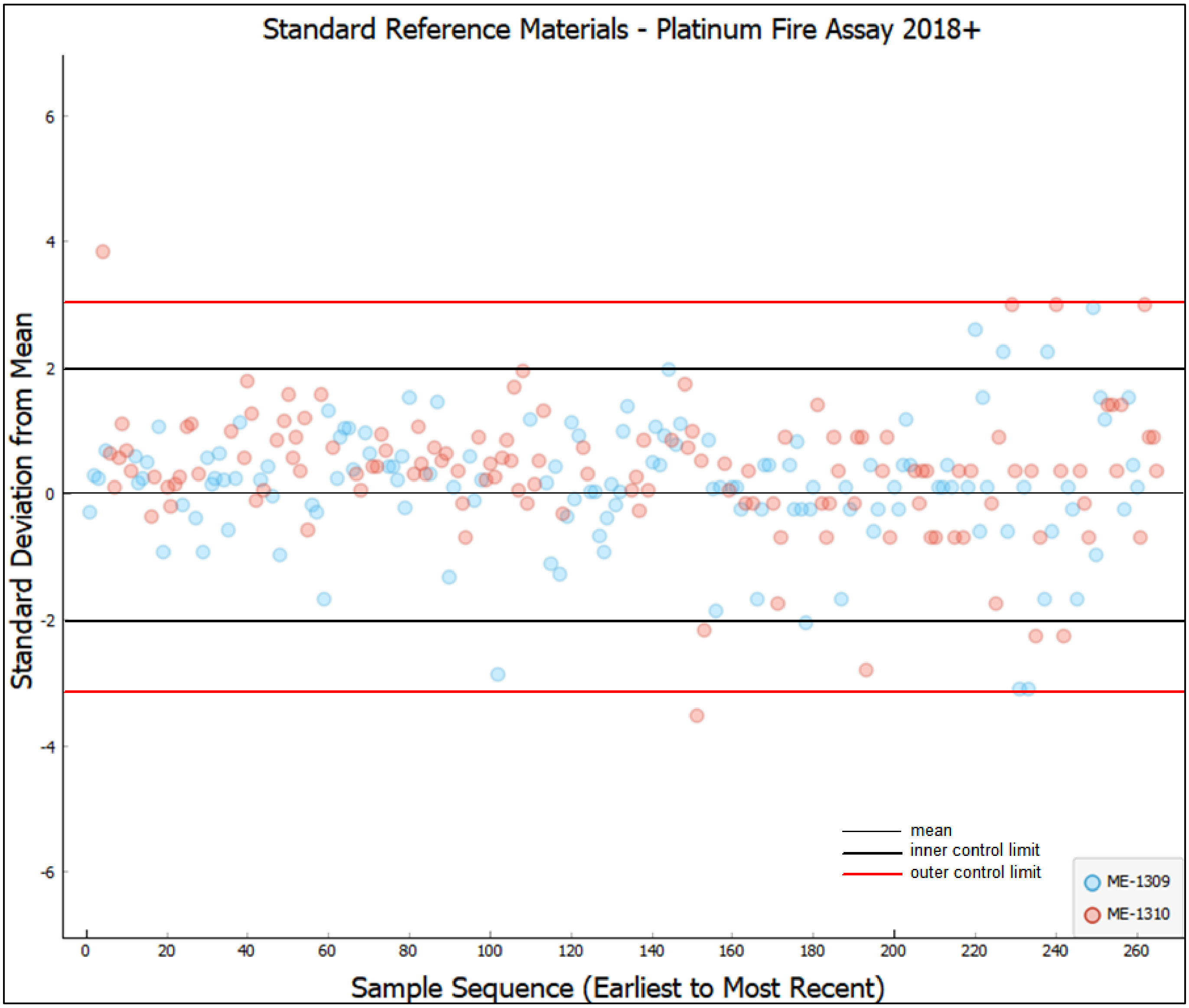


Figure 11-8: Platinum Performance of Standard Reference Materials from 2018 to Present

(Source: Giga Metals, 2023)

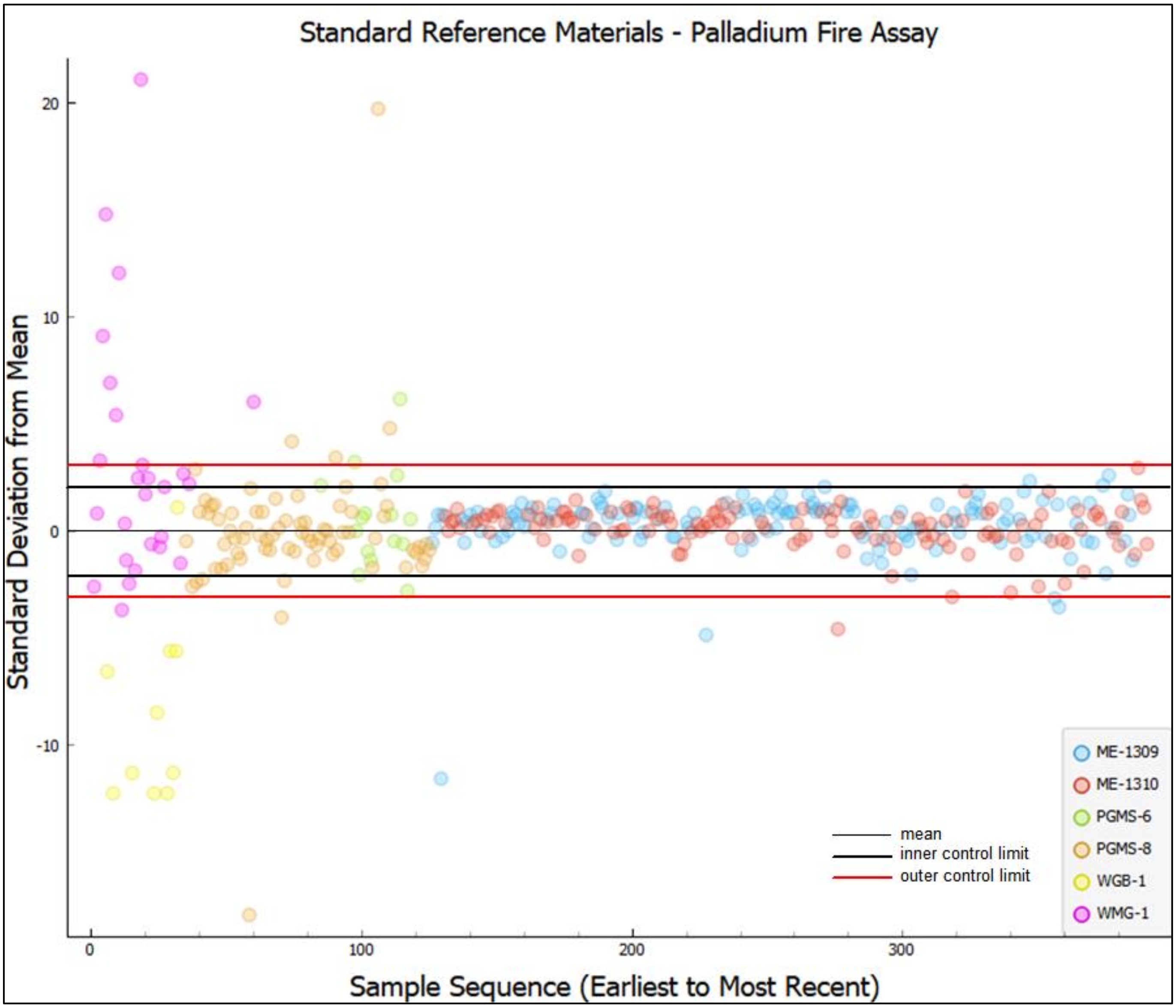


Figure 11-9: Palladium Performance of Standard Reference Materials

(Source: Giga Metals, 2023)

Figure 11-10: Palladium Performance of Standard Reference Materials from 2018 to Present
(Source: Giga Metals, 2023)

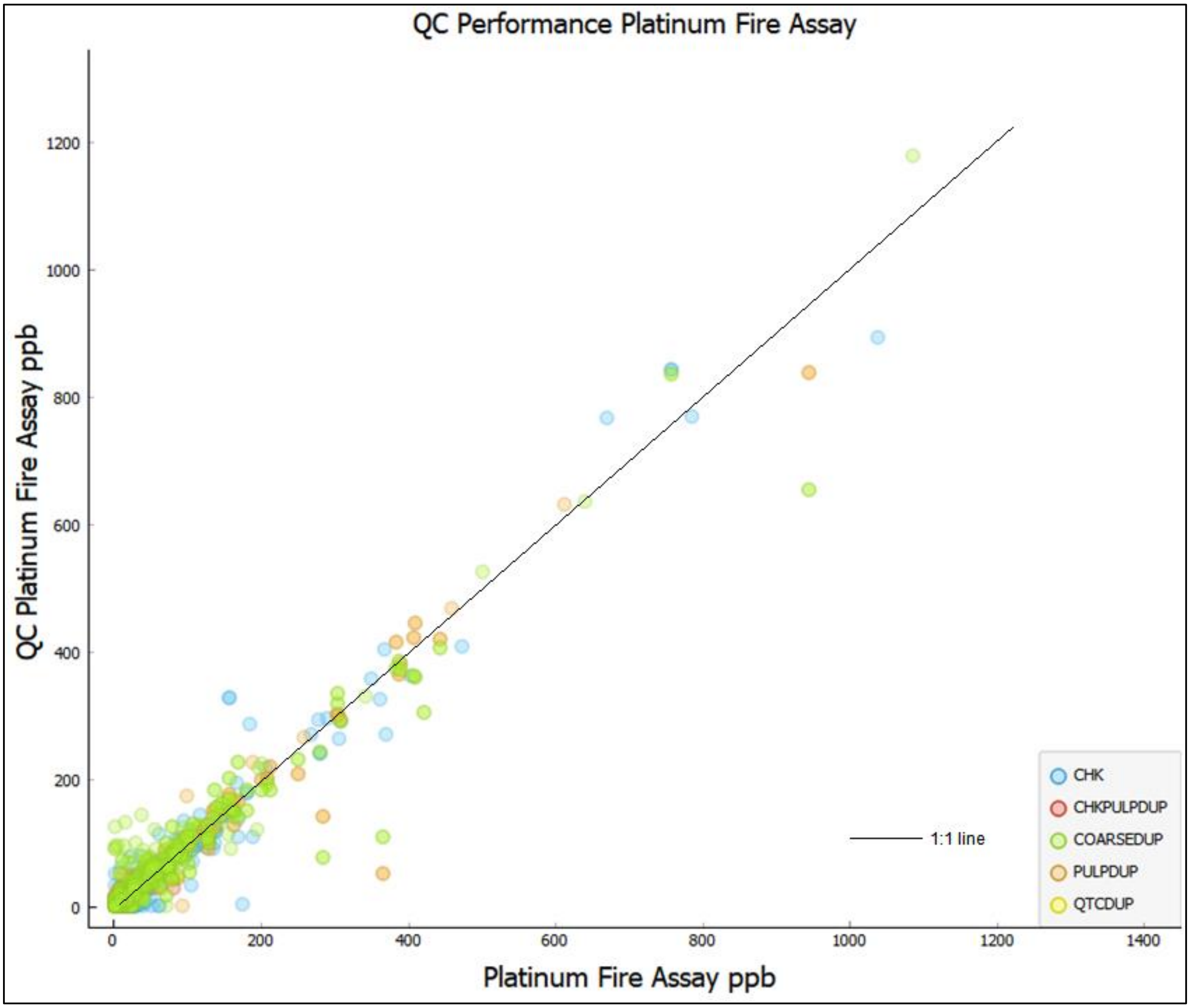


Figure 11-11: Platinum Performance of QC Samples

(Source: Giga Metals, 2023)

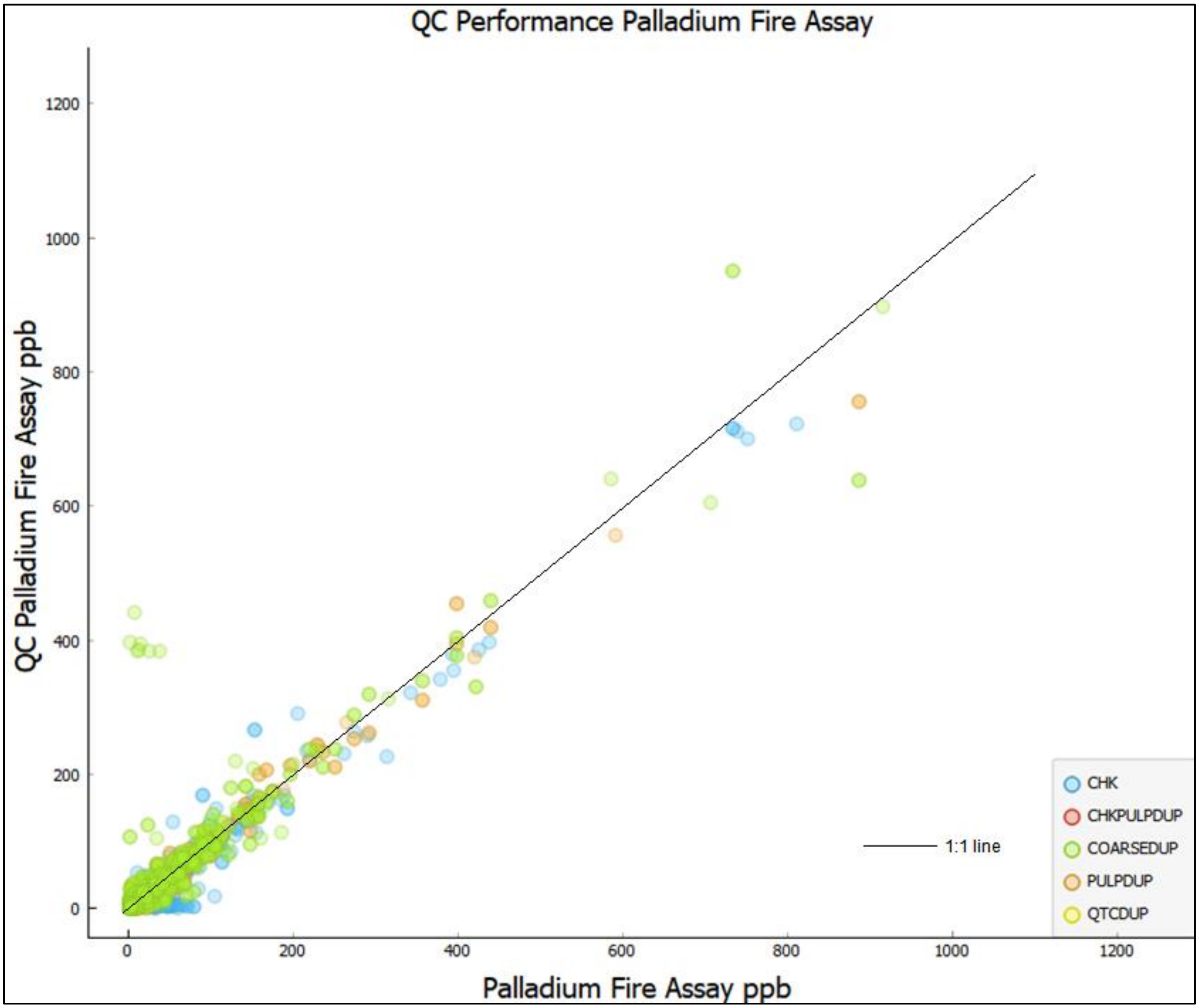


Figure 11-12: Palladium Performance of QC Samples

(Source: Giga Metals, 2023)

11.4 Adequacy Statement

It is the opinion of the QP, Garth Kirkham, P.Geo., that the sampling preparation, security, analytical procedures and QC protocols used are consistent with generally accepted industry best practices and therefore reliable for the purpose of resource estimation.

12.0 DATA VERIFICATION

12.1 Site Visit and Verification

Prior to the site visit, the author reviewed all collected data sources and reports. The primary sources of data for inspection were the drillhole data, related assay data, QA/QC data and analyses and assay certificates along with previous technical reports and studies.

The author reviewed historic verification practices and procedures along with validating data analysis and results through data import and statistical analysis.

The QP visited the site, facilities and surrounding areas on October 9 to 10, 2018 and September 29 to 30, 2021.

The 2018 site visit included a tour of the offices, core logging and storage facilities and showed a clean, well-organized, professional environment. Giga Metals' geological staff and on-site personnel led Kirkham through the chain of custody and methods used at each stage of the logging and sampling process. All methods and processes are to industry standards and best practices and no issues were identified.

Several complete drill holes were selected by Kirkham and laid out at the core storage area. Site staff supplied the logs and assay sheets for verification against the core and the logged intervals. The data correlated with the physical core and no issues were identified. In addition, Kirkham toured the complete core storage facilities. No issues were identified, and core recoveries appeared to be very good.

The 2018 site visit also entailed inspection of the workshops, offices, reclaimed drill sites, the Northwest and Horsetrail Mineral Resource areas along with the outcrops, historic drill collars and areas of potential disturbance for potential future mining operations. In addition, the site visit included a tour of the most likely populated area to be affected by any potential mining operation along with surrounding environs. The drilling, logging and sample handling operations were conducted in a professional manner to industry standards and the on-site facilities were clean, well-organized and of professional norms.

Kirkham reviewed the geological information from various programs and other relevant data available in the Giga Metals offices and is of the opinion that the programs were conducted, and the data gathered in a professional and ethical manner.

In 2021, Kirkham performed a follow-up visit to the site to review the current drilling program, inspect drill locations and procedures and to review logged core obtained from the ongoing resource expansion and geotechnical drilling program.

Data validation and verification programs have been undertaken by numerous independent consultants as well as Giga Metals personnel, as discussed in previous NI 43-101 technical reports (AMC, 2011; AMEC, 2007; AGORATEK, 2011) and performed subsequently including a database review by Kirkham. The independent QP, Garth Kirkham, P. Geo., believes that the datasets are validated and verified sufficiently to support their use in Mineral Resource and Mineral Reserve estimation.

Kirkham is confident that the data and results are valid based on the site visits and inspection of all aspects of the Project, including the methods and procedures used. It is the opinion of Kirkham that all work, procedures and results have adhered to best practices and industry standards as required by NI 43-101. No duplicate samples were taken to verify assay results, but Kirkham is of the opinion that the work is being performed by a well-respected company that employs competent professionals that adhere to best practices and standards. Kirkham also notes that authors of prior technical reports (AMC, 2011) collected duplicate samples and had no issues.

It is the opinion of Kirkham that the data used for estimating the current Mineral Resources is adequate for this PFS and may be relied upon to report the Mineral Resources and Mineral Reserves contained in this report.

13.0 MINERAL PROCESSING AND METALLURGICAL TESTING

13.1 Introduction

The Turnagain deposit is a large, low-grade ultramafic deposit containing nickel- and cobalt-bearing pentlandite and pyrrhotite, as well as minor amounts of chalcopyrite and pyrite. It also hosts anomalous levels of platinum and palladium as well as trace amounts of silver, gold and native copper. The main economic value is in the nickel with some modest cobalt and potentially platinum and palladium by-product credits.

The two main lithological domains are wehrlite/dunite/green dunite with various degrees of serpentinization and pyroxenite. The pyroxenite lithotype component accounts for less than 10% of the overall deposit tonnage.

A history of the metallurgical test work conducted up until 2010 was summarized in the AMEC 2007 NI 43-101 Technical report, the Wardrop 2010 PEA NI 43-101 and the 2011 PEA prepared by AMC. Work pertinent to the current study is referred to in this report.

Following a seven-year hiatus in testing, work started again at BCR in 2018 initially on legacy core from 2010 drilling, then in 2019 on core drilled in the summer 2018 program. This work led to the flowsheet employed in this study and is summarized in this section. In 2021, a geometallurgical program was initiated with the aim of building a far better deposit-wide understanding of metallurgical response. This work has led to the metallurgical forecast used in this study, so will also be described in more detail in this report.

13.2 Sources of Information for this Study

The key sources of metallurgical information referred to in this study have included:

1. G&T Study KM2181, Report issued October 31, 2008: This program included rougher flotation of 23 samples, including 21 variability samples and 2 composites,
2. Xstrata Process Support (XPS) Study 09001823-09010824, Issued June 17, 2008: This variability study of 17 samples included rougher flotation only,
3. SGS Study 17124-001, Report issued March 6, 2019: This program was executed in 2010 and 2011 but was reported in 2019. It included two separate variability studies:
    a. Rougher flotation on 16 variability samples using a soda ash-based flowsheet,
    b. Cleaner flotation on 38 variability samples and 2 composites.
4. BCR Study PJ5252, Report issued November 29, 2018: Study of a master composite including seven LCTs, plus a variability program using 11 samples,
5. BCR Study PJ5280: Report issued July 30, 2020: Turnagain PFS Metallurgical Test work,
6. BCR Study PJ5413: Report in preparation at the time of writing.

13.2.1 Grindability

Turnagain material is characterized as being hard, with an average SAG grindability (Axb) of 27.2 from 18 tests. In his review of the comminution data, Alex J. Doll described the ore as "normal but very hard" and suggested it equated somewhat to the Mount Milligan Copper/Gold project, where fine crushing, autogenous milling and ball milling are practiced (Doll, 2022). The Bond Ball Mill Work Index averaged 19.6 kWh/t, from 131 tests, the vast majority of which were closed using a 106-micron screen and yielded a product P_{80} of close to 80 µm.

Table 13-1: Grindability Data from the Turnagain Project

Description	Relative	JK Parameters			Work Indices (kWh/t)			AI (g)
	Density	A x b	t_a	SCSE	Crusher Work Index	Bond Rod Work Index	Bond Ball Work Index	
# of Samples	17	18	15	15	5	10	131	9
Average	3.00	27.2	0.26	13.0	14.2	19.0	19.6	0.23
Std. Dev.	0.09	4.9	0.08	1.2	4.2	3.7	3	0.13
Coeff. of Var., %	3.05	17.9	30.6	9.4	30	19.2	15	54
Minimum	2.88	20.0	0.15	11.0	9.1	13.6	12.5	0.08
15th Percentile	2.92	22.1	0.19	11.8	10.0	14.8	16.4	0.10
25th Percentile	2.93	24.0	0.20	11.9	10.6	16.0	17.3	0.13
30th Percentile	2.94	24.1	0.21	12.1	11.4	17.3	17.8	0.14
Median	2.98	26.5	0.24	13.4	14.8	19.5	19.5	0.24
70th Percentile	3.07	28.9	0.28	13.8	17.4	20.9	21.5	0.31
75th Percentile	3.07	31.8	0.29	13.8	18.0	21.4	22.0	0.33
85th Percentile	3.11	32.9	0.35	14.3	18.2	22.1	22.7	0.38
Maximum	3.16	35.1	0.42	14.8	18.4	24.9	27.5	0.40

Ten tests run at a closing size of 150 µm yielded an average of 19.5 kWh/t, suggesting the grindability is reasonably constant within the product size range of interest for the project. In his QC review of the Bond Ball Mill data, Doll described facets of the data as somewhat unusual though he did not expand on the implications of this.

Prior to the PFS, HPGR test work was conducted at the NBK Institute of Mining Engineering, UBC on five samples, conducted at four different pressing forces. The results were then modelled to predict the reduction ratio, the specific energy consumption and the product size distribution and yielding the mean and variance data shown Table 13-2 below. The results suggest some variability in response to HPGR between the five tested samples.

Table 13-2: HPGR Data from Piston Die Press Test

Specific Pressure	1 N/mm^2	2 N/mm^2	3 N/mm^2	4 N/mm^2
Reduction Ratio (F_{50}/P_{50})				
Mean	4.13	5.59	7.05	8.53
Std. dev.	1.46	2.13	2.81	3.50
Maximum	6.50	9.16	11.83	14.49
Minimum	2.70	3.77	4.83	5.90
Specific Energy Consumption (Open Circuit) (kWh/t)				
Mean	1.41	1.87	2.33	2.80
Std. dev.	0.20	0.26	0.33	0.39
Maximum	1.61	2.15	2.65	3.22
Minimum	1.11	1.47	1.84	2.21
Specific Energy Consumption (Closed-Circuit with 6 mm Screen) (kWh/t)				
Mean	2.76	3.22	3.62	4.01
Std. dev.	0.65	0.74	0.79	0.85
Maximum	3.56	4.11	4.51	4.91
Minimum	1.82	2.14	2.45	2.75

During the PFS, pilot scale HPGR testing was conducted using a Köppern Pilot HPGR at UBC. This machine is equipped with 750 mm diameter and 220 mm wide rollers capable of a maximum specific pressing force of 8.5 N/mm^2. The purpose of the work was to confirm the applicability of HPGR to Turnagain material, to establish the machine size and operating conditions of the machine and to generate data for the design of the entire HPGR circuit.

Four tests were run, each on a 250 kg sample of Turnagain material crushed to -32 mm (80% passing 24 mm). Three were run at different compressive forces (2.5, 3.5 and 4.5 N/mm^2) on a feed at 4–5% moisture. The impact of moisture level on HPGR performance could not be confidently interpreted from the data, while the centre product ranged from 80% passing 9.2 mm at 2.5 N/mm^2, to 7.3 mm at 4.5 N/mm^2. The HPGR used 1.7 to 3.1 kWh/t from the lowest to highest compressive force.

Bond Ball Mill Work Index tests were run on both the feed and product from the HPGR to establish any difference in ball mill grindability. The results showed the HPGR product was slightly softer than the feed, at 22.1 kWh/t vs 22.6 kWh/t for the feed, though some feed size distributions to these tests suggest the difference in work index as a consequence of HPGR may be under-represented.

13.2.2 Mineralogy

Prior to initiation of the geometallurgical program, the mineralogy of the Turnagain deposit was already quite well-understood. Numerous studies were conducted from 2003 to 2018. Initially these were petrographic in nature, however from 2007 onwards the focus was on quantitative mineralogy. For details on earlier work, the reader is referred to the technical reports previously issued on the project.

The geometallurgical work supporting this PFS included the development of quantitative mineralogical data on 70 samples using Quantitative Evaluation of Materials by Scanning Electron Microscopy (QEMSCAN)™ automated scanning electron microscope technology. This was supported with microprobe analysis to allow for better quality assessments of the deportment of key elements (such as nickel and cobalt) in the different samples. The data is described later in this section.

13.2.3 Flotation Testing

Prior to 2010, the focus of mineral processing work was to create a concentrate suitable for on-site hydrometallurgical processing. In this early work, little test data showed the potential to make a high-grade saleable concentrate, while the sheer tonnage of the deposit and the attendant potentially high nickel production rate enhanced the prospect of including on-site high-capital hydrometallurgical processing.

In 2010, testing at SGS in Vancouver started to expose the potential to produce high-grade nickel sulphide concentrates for direct sale to third parties. Using samples obtained from drill hole 10-265, drilled through the heart of the Horsetrail deposit, this test work was the first to routinely produce nickel sulphide concentrates that would be attractive to nickel smelters. The program never settled on a single flowsheet, and variability work done at the time yielded a variety of responses that, due to the somewhat ad-hoc nature of the applied flowsheet, proved hard to interpret.

After a seven-year hiatus in metallurgical testing, work was re-started at BCR in 2018. Initial work was conducted on samples drilled prior to and during 2010 (and stored as drill core under ambient conditions). This work was aimed at replicating some of the work done in 2010 on what was now an eight-year-old core, drilled as hole 10-266. This was essentially a twin of the hole 10-265. Once the baseline flowsheet used in 2010 had been replicated, a structured optimization study was undertaken to better define the ultimate flowsheet. This established the baseline flowsheet now used for this PFS.

The baseline PFS flowsheet observed the following principles:

- Pyrrhotite has proven to be poorly floatable with recoveries to final concentrates usually in the range of 3–7%, so pH manipulation is not needed to assist in pyrrhotite rejection. Consequently, flotation is conducted at natural (mildly alkaline) pH.
- The silicate mix usually contains little or no talc, so, for most of the mineralization, gangue floatability is weak. This usually eliminates the need for large doses of gangue depressants, although some samples have responded quite well to modest doses of polymeric guar gum and/or Carboxymethyl Cellulose (CMC) based depressants in testing of Turnagain samples from time to time.
- However, the silicates can interfere with pentlandite flotation, presumably by interacting with the pentlandite surfaces. Hexametaphosphate dispersants, such as Calgon, are widely used to address this in the industry and have been adopted for this flowsheet. Calgon enhances pentlandite floatability but too much also increases the challenge of gangue rejection in cleaning, so they are used sparingly, especially in cleaner flotation.
- Xanthate is highly effective as a baseline collector reagent for Turnagain flotation. Isopropyl or isobutyl xanthate work well, though isopropyl xanthate was adopted for the flowsheet.
- MIBC is used as a frother. The silicate-dominant froths have some degree of inherent stability so strong frothers are not needed, while MIBC volatilizes in the process, so reducing the risk of frother buildup in latter stages of cleaning – which can significantly retard cleaning action.

Primary grind size has a strong influence on nickel recovery. A series of four LCTs were run at different grind sizes in 2018. They pointed to an optimal recovery at about 80 mic µm (Figure 13-1). Grinding finer than 80 µm had a tendency of over-sliming the soft pentlandite, adversely affecting recovery.

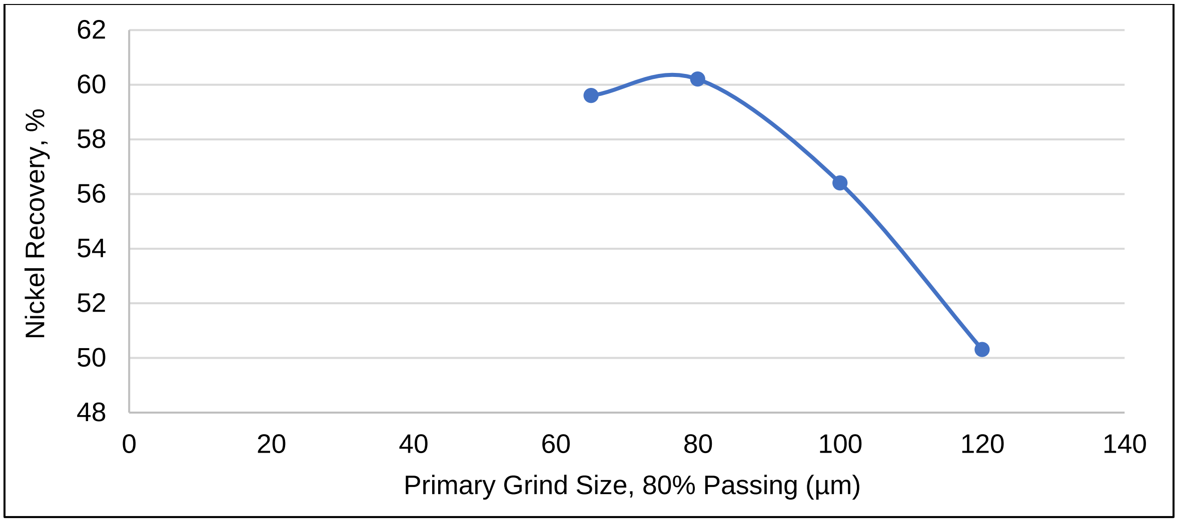


Figure 13-1: Primary Grind Size vs. Nickel Recovery to Final Concentrate from LCT

While other test work has suggested that finer primary grinding may sometimes enhance nickel recovery, grinding finer than 80 µm has never been demonstrated to be economic.

Test work employing concentrate regrinding failed to yield improved metallurgy, so the flowsheet excludes any concentrate regrinding. Table 13-3 shows a typical treatment scheme used since 2018 for 6-cycle LCTs and Super Cycle Tests (SCTs). The latter were 10 kg production runs, run in closed circuit and aimed at producing concentrate for marketing purposes. They comprised up to 22 cycles of closed-circuit operation and were run on composites created to reflect geologist visual estimates of talc grade. In reality talc was not an issue in the processing of any of them.

Table 13-3: Typical Conditions Used in Closed Circuit Flotation Testing at BCR

Stage	Reagents (g/t)			Grind (µm)	Time, minutes	
	Calgon	SIPX	MIBC		Cond.	Froth
Primary Grind	33	--	--	80	--	--
Ni Rougher 1	--	10	16	--	1	3
Ni Rougher 2	7	10	8	--	1	3
Ni Rougher 3	7	10	16	--	1	8
Ni Rougher 4	13	20	32	--	1	21
Rougher Total	**60**	**50**	**73**	**80**	**4**	**35**
Ni Cleaner 1	--	18	5	--	2	15
Ni Cleaner 1 Scavenger	--	--	--	--	--	5
Ni Cleaner 2	--	6	3	--	1	10
Ni Cleaner 3	--	3.5	--	--	1	9
Ni Cleaner 4	--	1	--	--	1	4
Cleaner Total	**--**	**29**	**8**	**--**	**5**	**43**

Metallurgical projections from 11 LCTs and SCTs completed prior to the 2020 PEA and run using small variations of this optimal flowsheet are shown below. All test work was conducted on samples assaying 1.1–1.6% sulphur and 0.26–0.32% nickel.

Table 13-4: Summary of LCT Data using Optimized Treatment Schemes

Lab	LCT	Feed Grade		Conc Grade			Ni Recovery
		Ni (%)	S (%)	Ni (%)	Fe (%)	MgO (%)	
SGS	08-264 LCT 4	0.31	1.15	21.4	34.4	6.6	50.8
SGS	08-264 LCT 5	0.31	1.15	19.4	28.9	9.6	51.0
SGS	10-265 LCT3	0.32	1.15	20.9	32.3	7.1	61.7
SGS	10-265 LCT6	0.32	1.15	20.3	32.9	8.3	63.6
SGS	10-265 Bulk LCT	0.32	1.15	19.7	n/a	n/a	57.9
BCR	10-266 LCT1	0.30	1.26	19.2	37.5	5.9	57.4
BCR	10-266 LCT2	0.30	1.26	15.3	38.5	7.4	59.8
BCR	10-266 LCT3	0.30	1.26	18.3	37.6	6.1	60.2
BCR	Litho comp LCT1	0.26	1.14	19.2	30.3	8.4	57.0
BCR	Talc 0, SCT	0.31	1.57	17.2	n/a	n/a	50.2
BCR	Talc 1, SCT	0.30	1.48	16.4	n/a	n/a	60.5
BCR	Talc 2-3, SCT	0.30	1.44	19.0	n/a	n/a	58.6
Average	**--**	**--**	**--**	**19.1**	**--**	**--**	**57.1**

No locked cycle work was done on low nickel or sulphur samples using the current flowsheet[1] and while it was known that nickel recovery was linked to sulphur grade in the feed, the nature of this relationship was poorly understood. This was identified in the PEA as a potential gap in the understanding of Turnagain metallurgy and was a reason for the initialization of a geometallurgical program executed as part of this PFS. Summarizing the above, at the time of the 2020 PEA update, the following had been achieved:

- Development of baseline flowsheet capable of creating a saleable product from many feed materials from the project,
- Fine tuning of the primary grind size and the flotation residence times,
- Some initial information on the variability in response to the flowsheet from samples obtained from around the deposit and containing different nickel and sulphur grades.

However, despite the initial variability work done in 2019, relatively little was understood about how the deposit as a whole would respond to the flowsheet. The Blue Coast program in 2019, for example, was limited in scope and very much focused on Pit Phases 1 and 2.

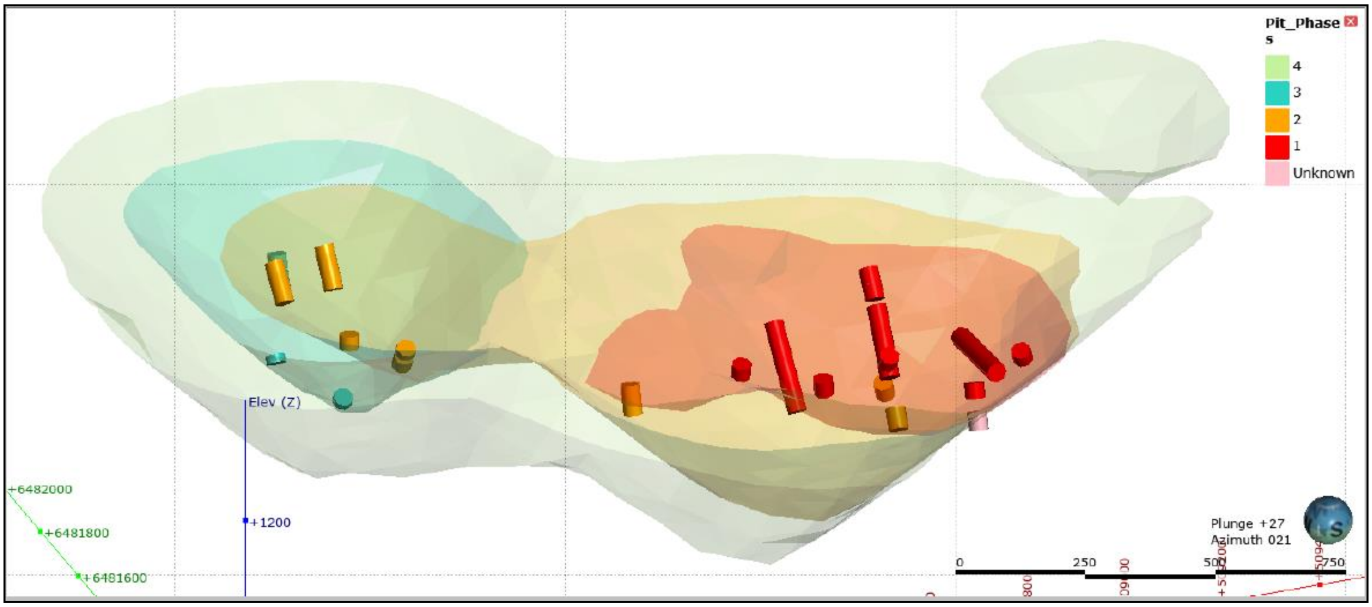


Figure 13-2: Source Location of Samples Used in 2018 Studies

Accordingly, a formal geometallurgical program was initiated in 2022 to support the PFS, aimed at building a more robust and detailed picture of how the entire deposit would respond to the metallurgical flowsheet. It was also aimed at connecting, geologically, geochemically and spatially, metallurgy to the resource model.

[1] Earlier work at SGS on samples of much lower sulphur grades yielded less than 40% recovery, but these used a different treatment scheme.

13.3 2022 Geometallurgical Program

13.3.1 Sample Selection (McKay, 2023)

13.3.1.1 Grindability

Spatial coverage of the deposit for grindability was already good prior to commencement of the geometallurgical study. The following Leapfrog 3D model shows, by location and pit phase, the grindability samples on which data already existed at the start of the program.

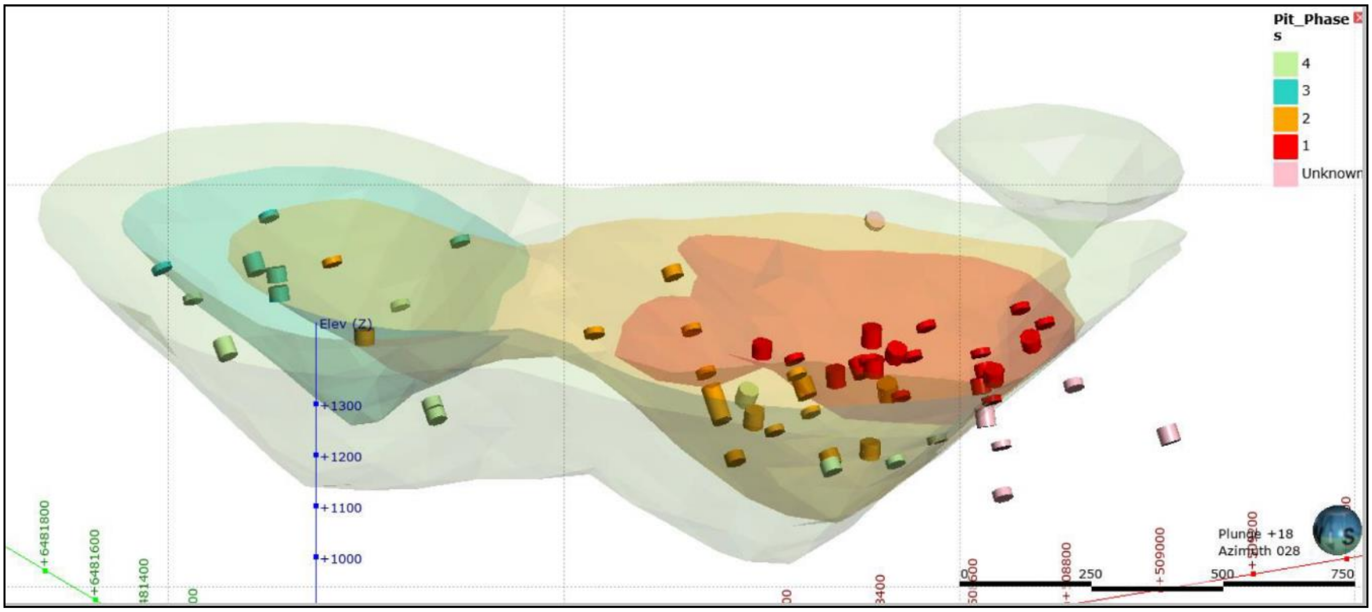


Figure 13-3: Source Location of Samples Used for Comminution Studies Prior to the PFS

Coverage was deemed acceptable for the PFS, so no further grindability work was conducted.

13.3.2 Mineralogy and Flotation

Samples were selected for mineralogy and flotation work from drilled ½ or ¼ core obtained in 2018 and 2021. Each sample comprised a continuous core over a mean sample length of 10 m (all but two samples ranged in interval length from 8 to 12 m). A total of 81 samples were selected, this was viewed as a reasonable starter suite of samples suitable for a PFS of a project the size of Turnagain. In fact, 11 of these samples were shelved as excess to project needs and the remaining 70 tested.

The samples were selected to satisfy three key criteria:

- Blend of lithologies
- Ni, S, Mg, Fe grades
- Mine plan (pit phase)

Lithologically, the PEA stage geological model, on which sample selection was based, described a relatively homogenous deposit. The resource was described as comprising 94% serpentinized dunite-wehrlite and 6% pyroxenite. Accordingly, the vast majority of the samples as selected were serpentinized dunite-wehrlite (64) and the other 6 were pyroxenite.

The samples were selected to, within reason, match the variability in Ni, S, Mg and Fe grades seen in the resource. Figure 13-4 below includes cumulative frequency plots of the grades of these key elements in the geochemical database (black) and the geometallurgical sample suite (red).

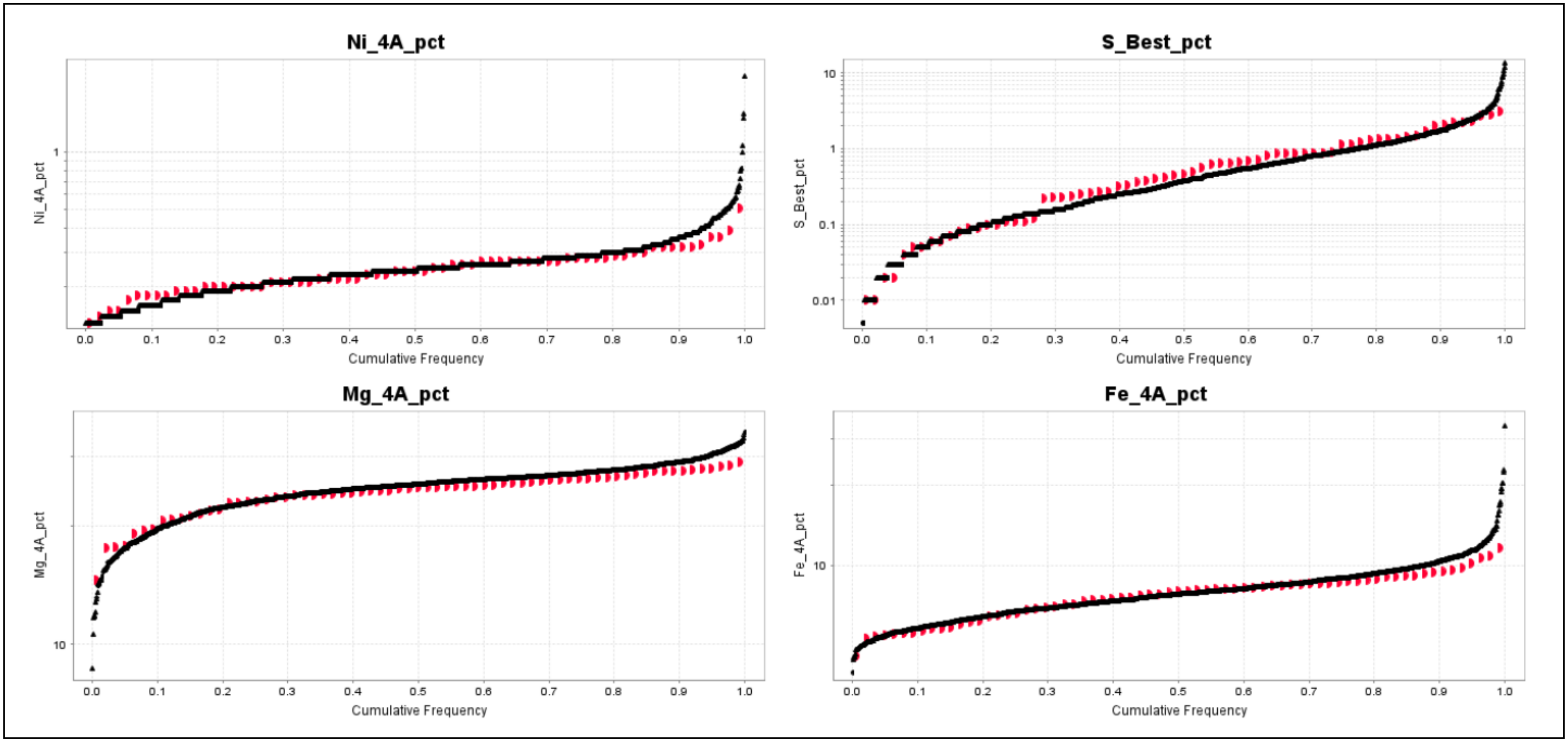


Figure 13-4: Grade Distribution of Geometallurgical Samples (Black) and Geochemical Assay (Red)

They were also designed to focus mostly on the early production years, though still to span the entire life of the mine. As such, the sample density was greatest in the early years.

Table 13-5: Samples Sorted by Expected Phase of Mining (From 2020 PEA)

Pit Phase	Tonnage	# Samples	MT/Sample	Ni (%)	S (%)
1	102	19	5.4	0.27	1.2
2	155	19	8.2	0.23	0.77
3	237	14	17.0	0.25	0.63
4	597	18	33.1	0.23	0.37
Total	**1,091**	**70**	**15.6**	**0.25**	**0.76**

The following 3-D Leapfrog depiction of the Turnagain deposit shows where, spatially and by pit phase, the 70 samples were located:

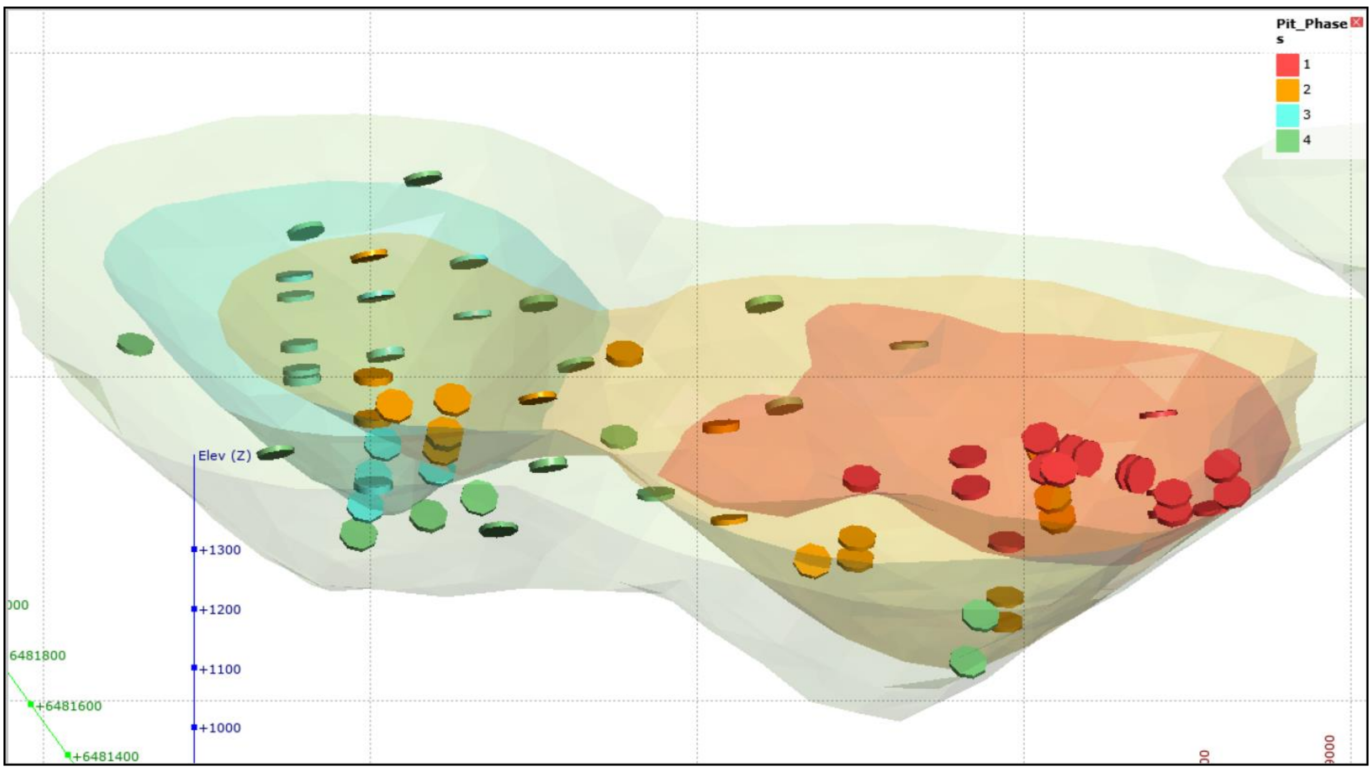


Figure 13-5: Source Location of Samples Used in PFS Mineralogy and Flotation Studies

13.3.3 Mineralogy

Each of the 70 samples was submitted to mineralogical analysis using QEMSCAN^{TM} automated scanning electron microscopy (Gordon, 2023). On average, 36,000 mineral grains were analyzed from each sample, including 592 grains of nickel sulphides.

The mean whole ore modal mineralogy is summarized below. The 70 samples averaged 3% sulphide minerals. The non-sulphide gangue was dominated by serpentine (53%) and olivine (31%). Pyroxenes (4.1%) and amphibole (3.6%) dominate the remaining mineralization. Talc averages just 0.3% of the mineralization (Figure 13-6).

Trends in whole ore mineralization are shown as a function of nickel recovery (ranging from low to high recovery in the five bars on the left) and mass pull (right) in the figure below (Figure 13-7). On average, higher recoveries coincide with an increase in sulphide, pyroxene and amphibole content and a drop in olivine content. However, averages mask the considerable variability in the data, so should be interpreted with an abundance of caution (Figure 13-8).

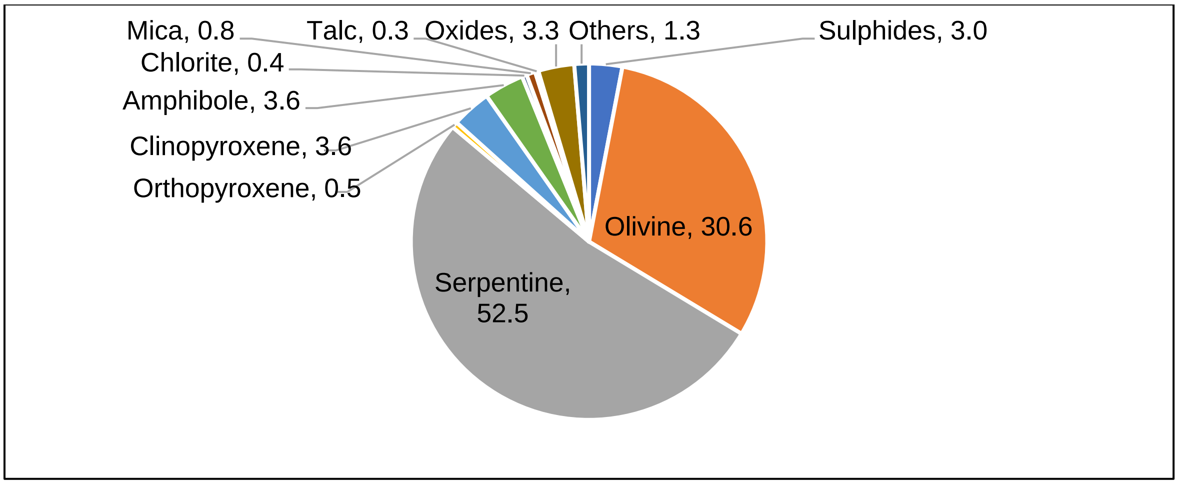


Figure 13-6: Mean Modal Mineralogy of the 70 Geometallurgical Samples

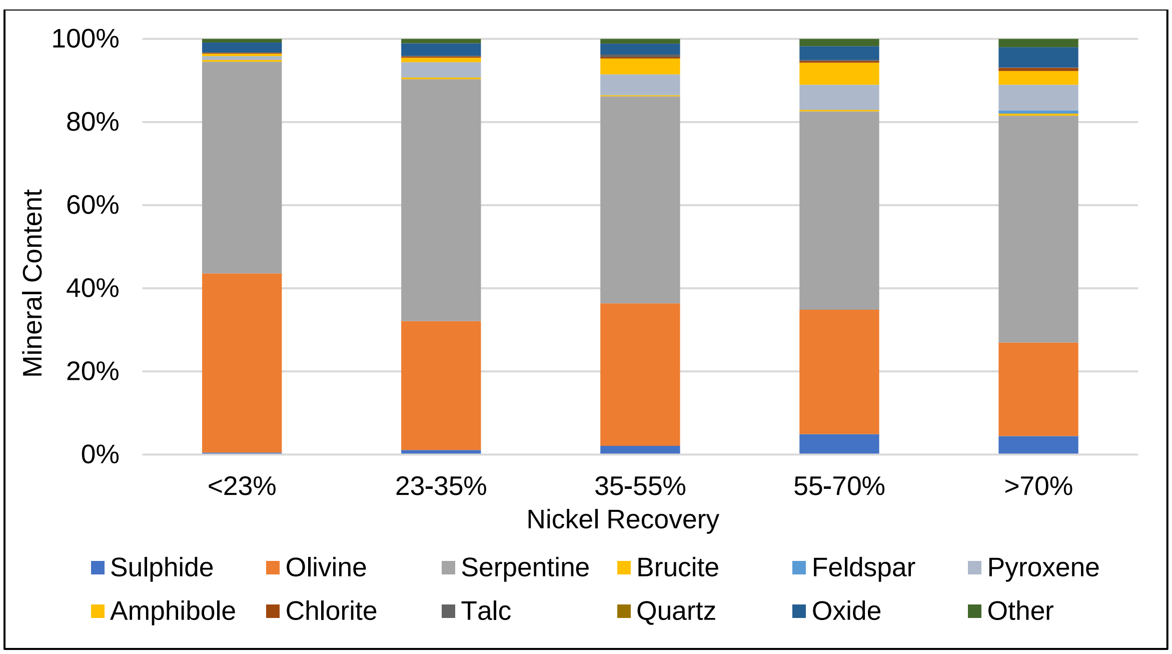
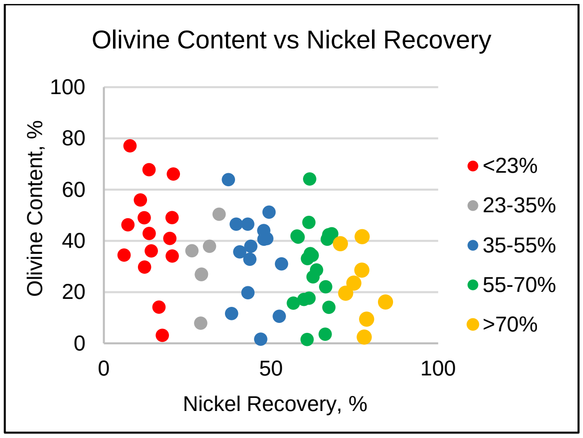


Figure 13-7: Trends in Modal Mineralogy by Nickel Recovery (%)



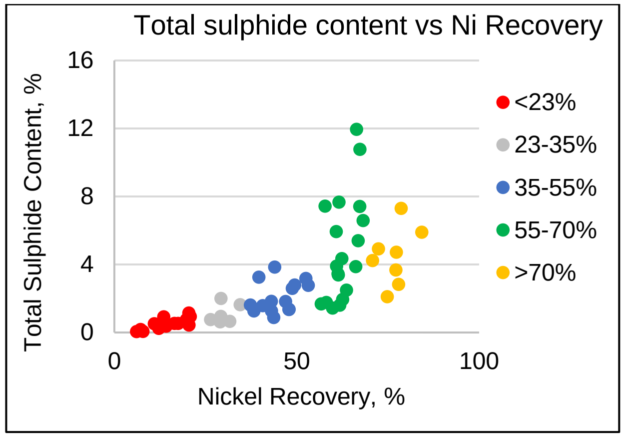


Figure 13-8: Plots of Olivine and Sulphide Contents against Nickel Recovery

Nickel occurs in various forms. Deposit-wide, on average, 42% of nickel occurs as coarser, discrete pentlandite and another 3% as millerite and heazlewoodite (Table 13-6). A further 20% occurs as fine nickel sulphide inclusions in serpentine (see Figure 13-9 below). The remaining 35% of the nickel is held in non-sulphides, mostly olivine and serpentine. The reader should note that 20% of the samples included in this database yielded sub-economic recoveries due to deliberate inclusion of expected waste-grade materials. Excluding these, the mean content of discrete pentlandite rises to about 53%.

Table 13-6: Mean Deposit-wide Speciation of Nickel

Mineral	Distribution (%)
Pentlandite	42.4
Pyrrhotite	0.9
Other NiS	2.7
Fine NiS textures	19.9
Olivine	17.4
Serpentine	13.9
Pyroxene	0.1
Chlorite	0.2
Mica	0.2
Talc	0.1
Oxides	2.2
Other	0.04
Total	**100.0**

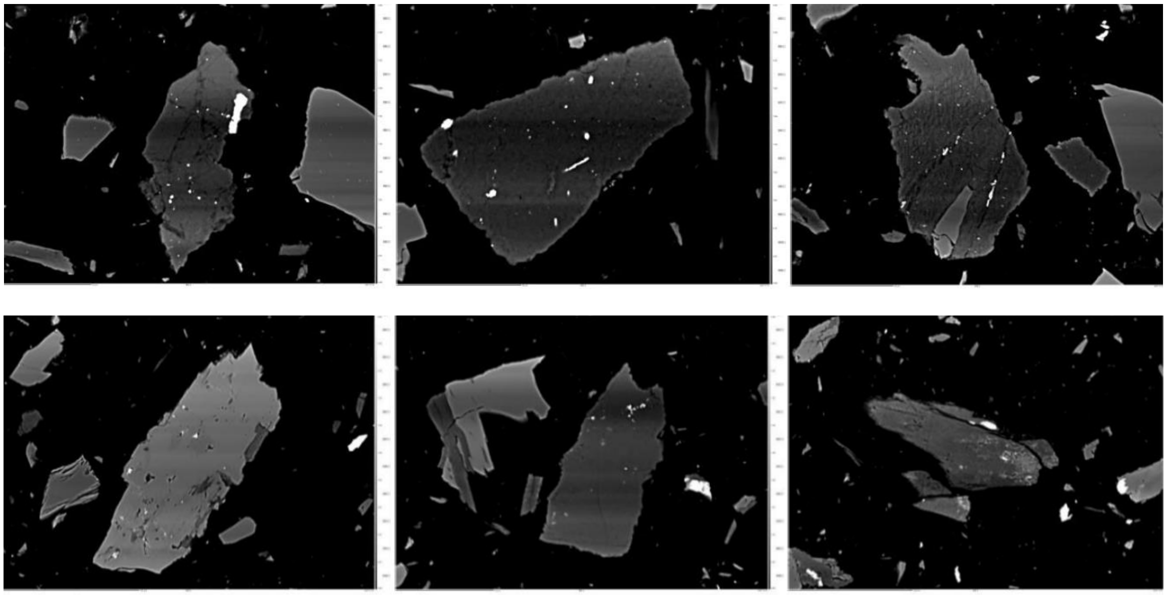


Figure 13-9: Ultrafine Nickel Sulphide Inclusions in Serpentine

Note: larger particles are approximately 200 µm in length.

Sulphur mostly occurs as pyrrhotite. Pyrrhotite dominates the sulphide mineral suite for samples above 0.5% S in grade but becomes depleted for samples of less than 0.1% S.

The mineralogical deportment diagram below is based on a combination of QEMSCAN™ and Electron Probe Micro-Analyzer (EMPA) analyses of the 70 samples, the data being smoothed using three-point moving averages. Nickel deportment is also linked to the sulphur content of the host rock. High sulphur samples mostly contain nickel as coarser pentlandite. There is little change in nickel deportment in samples from 0.5–2% sulphur. Below 0.5% sulphur the deportment of nickel as pentlandite steadily drops, with more nickel being deported to silicates. At below 0.5% sulphur, the fine nickel sulphide textures also grow in importance as a host of nickel. At below 0.06% sulphur, millerite and heazlewoodite emerge as the main host of sulphide nickel, though most nickel is now present in non-sulphide form.

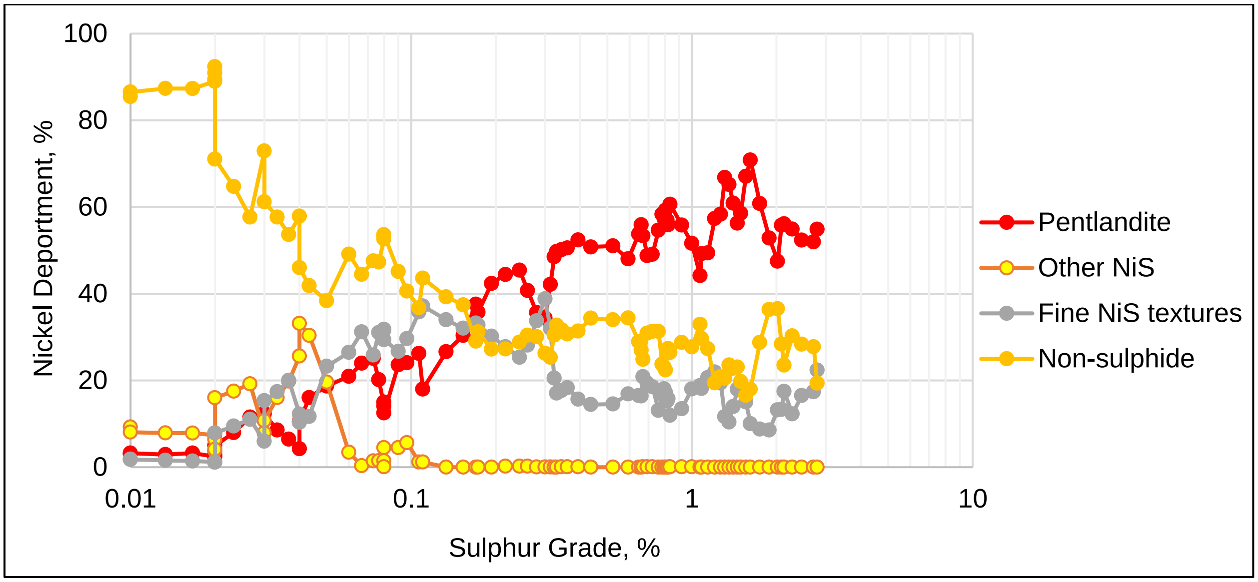


Figure 13-10: Change in Nickel Deportment with Sulphur Grade

The sulphide mineral balance also changes with sulphur grade, with pyrrhotite being the dominant sulphide mineral above 0.4% sulphur.

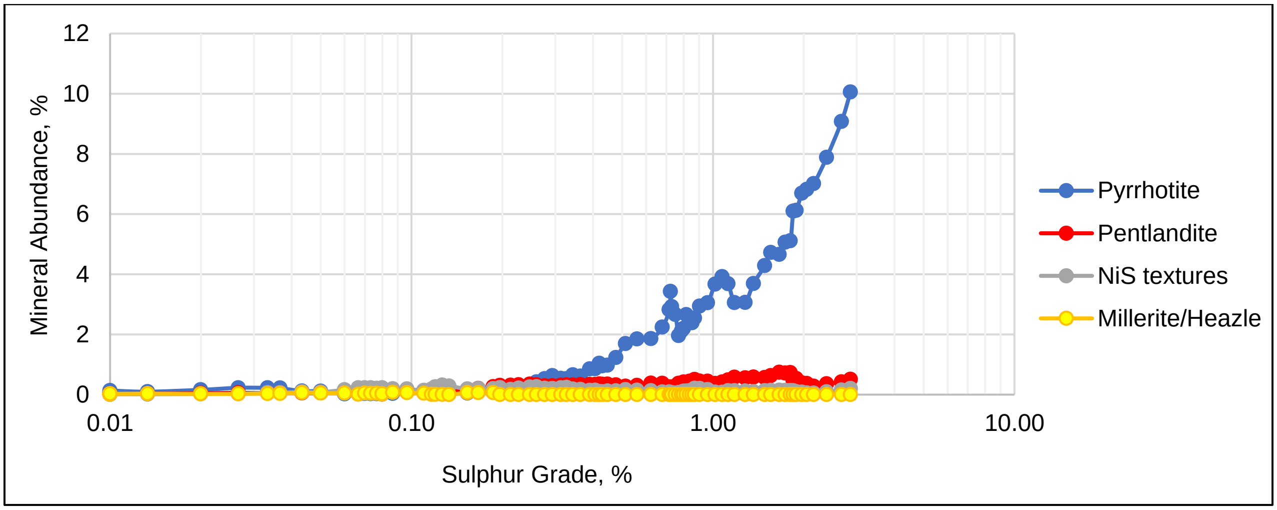


Figure 13-11: Change in Sulphide Mineral Balance with Sulphur Grade

The samples yielding the highest recoveries contain the most nickel as pentlandite. Nickel recoveries track the presence of coarser pentlandite quite well, except for the high recovery samples. It is likely that the nickel balance is biased in favour of silicate-hosted nickel for the higher recovery samples. The balance assumes a constant nickel content in the silicates irrespective of sample type and it seems that this overstates the nickel content in silicates for the higher nickel recovery samples, where perhaps ore genesis has led to a greater depletion of nickel from the silicates.

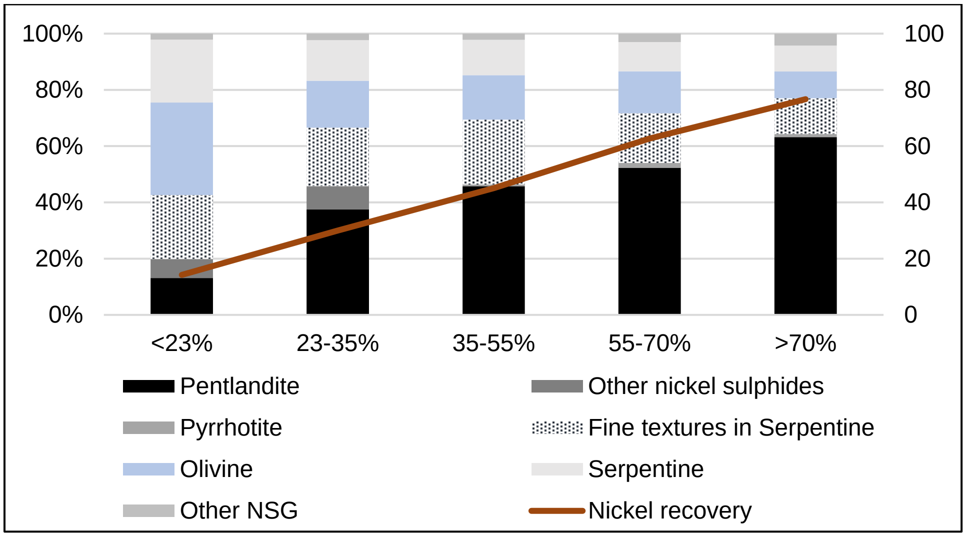


Figure 13-12: Change in Nickel Deportment with Rougher Flotation Recovery

Actual electron microprobe data on olivine and serpentine show weak trends to support this, though the scatter in the data is significant and the statistics inadequate to directly confirm the existence of such trends.

13.3.4 Flotation Testing

13.3.4.1 Test Procedure

The following test procedure was used for all flotation tests.

Table 13-7: Standard Procedure for Geometallurgical Rougher Flotation Tests

Stage	Reagents (g/t)			Grind (µm)	Time, minutes		pH
	Calgon	SIPX	MIBC		Cond.	Froth	Start
Primary Grind	50	--	--	80	--	--	Natural
Rougher 1	--	10	20	--	1	3	Natural
Rougher 2	10	10	8	--	1	3	Natural
Rougher 3	10	10	20	--	1	8	Natural
Rougher 4	20	20	33	--	1	21	Natural
Rougher Total	**90**	**50**	**85**	**80**	**4**	**35**	

13.3.4.2 Test Reproducibility

Demonstrating good test reproducibility was an important component of the program. To this end, one sample in ten was subjected to a repeat float. Also, to test for any long-term drift in the procedure through the program, the two tests were usually conducted several weeks apart. Nickel recoveries as a function of flotation time are shown below. The mean error between tests was 0.005% in nickel head grade, 2.5 µm in primary grind 80% passing size and 2% in nickel recovery.

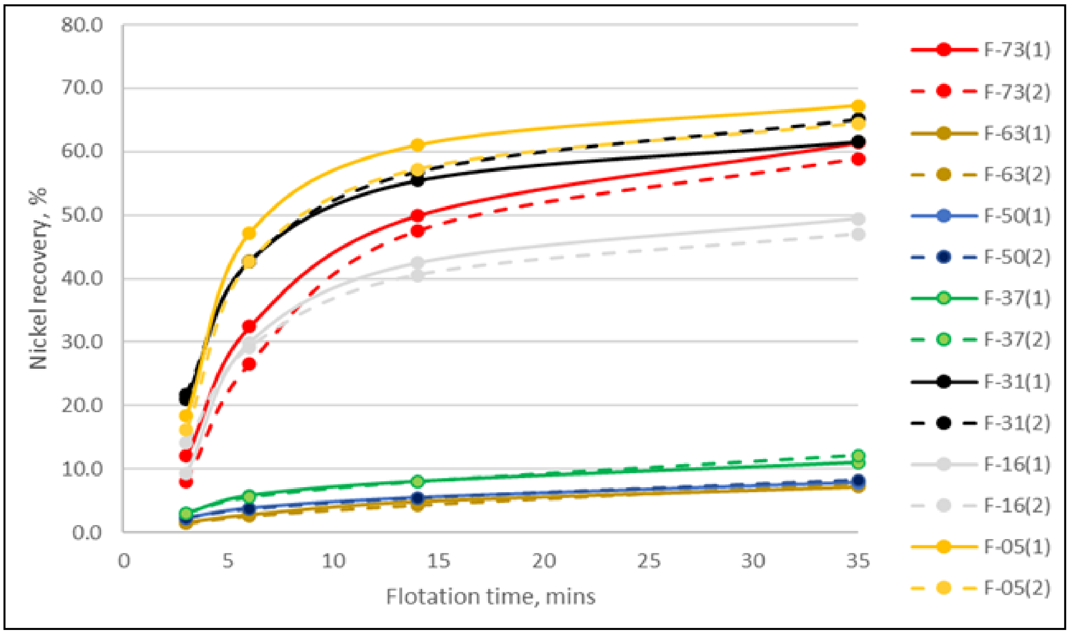


Figure 13-13: Nickel Flotation Kinetics of Replicate Samples

Nickel recoveries for all 70 samples as a function of flotation time are shown below. Considerable variability in recovery was evident. This was as expected (designed) as it was important that the geometallurgical models arising from this work spanned sample responsiveness from the very best to the very worst. In fact, while the effective cut-off nickel recovery from the PFS was about 23-25%, several samples yielding recoveries poorer than this were included to ensure the interpolation of data to build algorithms that would span the entire spectrum of ore metallurgical response.

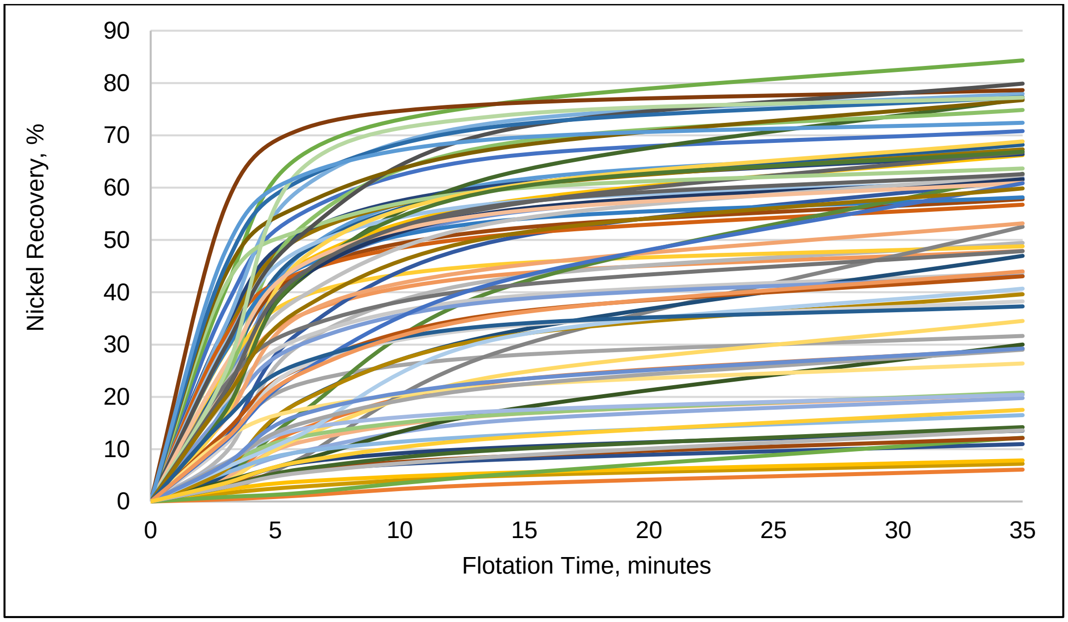


Figure 13-14: Nickel Flotation Kinetics of All Samples

13.3.4.3 Prediction of Rougher Flotation Recovery

In past reports the use of sulphur assays has been chosen over any other criterion as a predictor of nickel rougher recovery. In this study, however, several alternative approaches to predicting nickel recovery have been developed:

AC-Ni/4A-Ni Ratio Approach

Logically, the ratio of sulphide nickel assay (AC-Ni - obtained through an ammonium citrate digestion technique) to total nickel assay (NiT or 4A-Ni) would be the preferred criterion, but past correlations with available metallurgical data have yielded R-squared values inferior to sulphur.

This is not the case with the current data, perhaps because of the size of the dataset, the geometallurgical parameters used in sample selection, or the use of a highly standardized flotation test with strict QC criteria. In this case, nickel recovery is most closely linked to the ratio of sulphide nickel assay (as determined at BCR by ammonium citrate assay, or AC-Ni) to total nickel assay (4A-Ni) (Figure 13-15). The off-set described by the regression fit, where zero nickel recovery intercepts with the AC-Ni/4A-Ni ratio at 8.6%, reflecting the release of some non-sulphide nickel in the AC-Ni digestion process. Therefore, the AC-Ni assay will detect some nominally "sulphide" nickel when in reality it is not there.

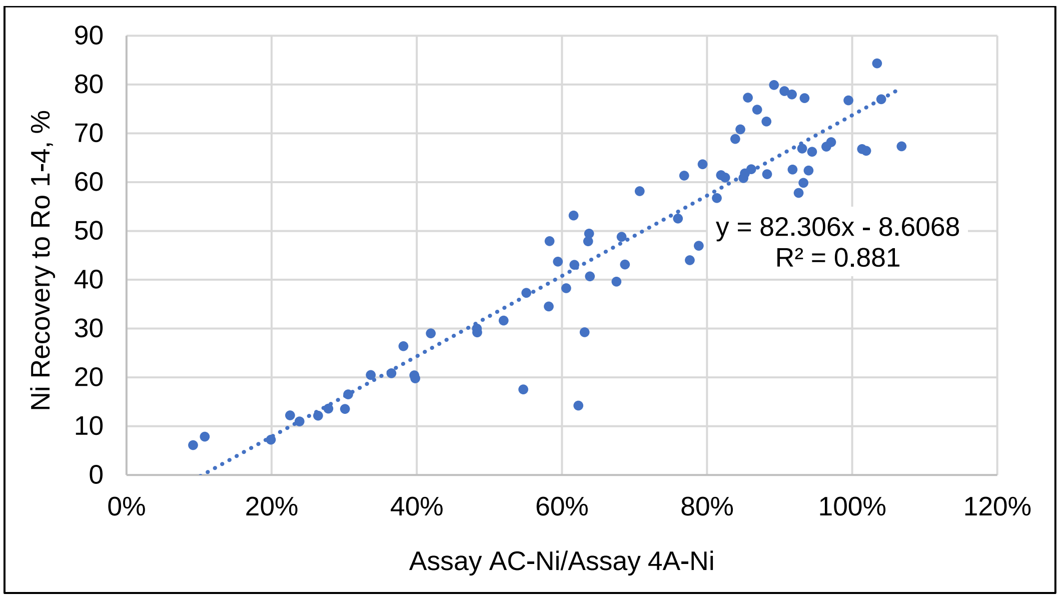


Figure 13-15: Link Between Nickel Recovery and Ratio of AC-Ni/4A-Ni

There is no question that the AC-Ni/4A-Ni ratio (AC-Ni ratio) is the closest driver of nickel recovery. It is the most logical parameter and most closely tracks actual nickel recovery in the geometallurgical database. Concerns have existed over whether the AC-Ni assays done at BCR in this study link to those done through most of the exploration phase of the project by ACME Laboratories – however a side-by-side study of 100 randomly selected samples has shown that the BCR and ACME assays agree well.

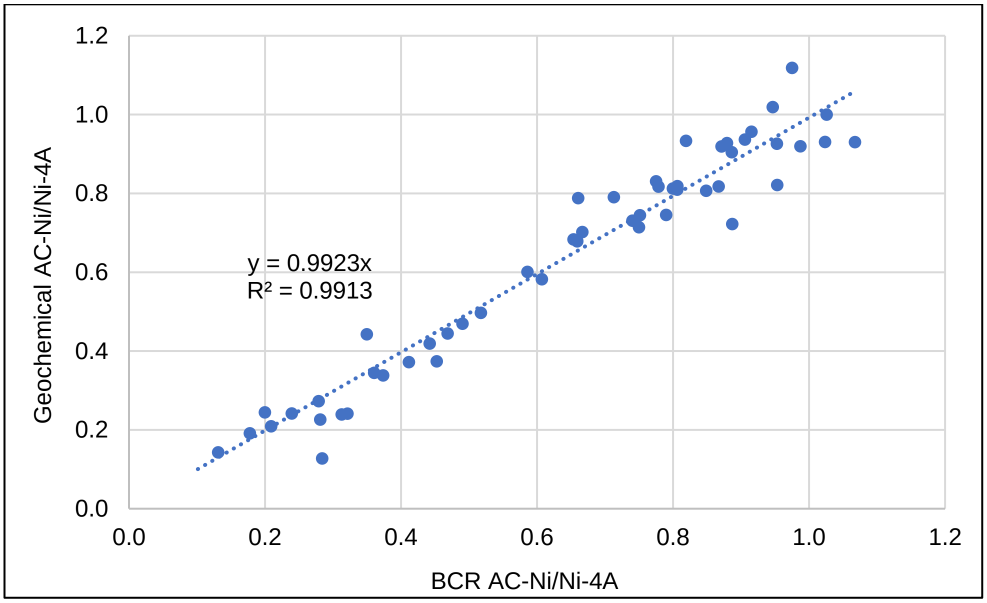


Figure 13-16: Comparative AC-Ni/4A-Ni Assay Ratios from ACME and BCR on 100 Samples

While more work is needed to confirm this connection, current data appear to validate the historical data generated by ACME.

In due course, the AC-Ni ratio should become the predictor of choice for nickel rougher recovery. However, the AC-Ni assays have not been conducted on exploration samples drilled since 2018, so roughly 20% of the current drill hole assay database do not have these assays. While application of the rougher recovery algorithm works well on those intervals with AC-Ni assays, creating a reliable block model without the additional data proved problematic. For this reason, use of the AC-Ni assay was dropped for this PFS, meaning another algorithm was needed.

Approach using Sulphur Grade Alone

The link with sulphur grade, used as the metallurgical forecasting algorithm for the PEA and commonly used in other projects for predicting the recovery of nickel from ultra-mafic nickel ores, remained fair although it drops away for samples above about 0.75% sulphur. This finding agrees with the mineralogical work which showed that the proportion of nickel in sulphide form plateaus at a point below 1% sulphur (Figure 13-11). It also never matches the quality of the relationship with the AC-Ni/4A-Ni ratio for low sulphur samples, showing considerable error at the lower end of the sulphur assay spectrum. This is in part because at its lowest levels, sulphur is present entirely as sulphide nickel and in part because at low S contents, that sulphide nickel is a mix of nickel-rich sulphides such as heazlewoodite and millerite as well as pentlandite, so the ratio of sulphur to nickel varies widely. The error in the S assay/Ni recovery ratio is somewhat obscured by the steepness of the relationship for low S assays:

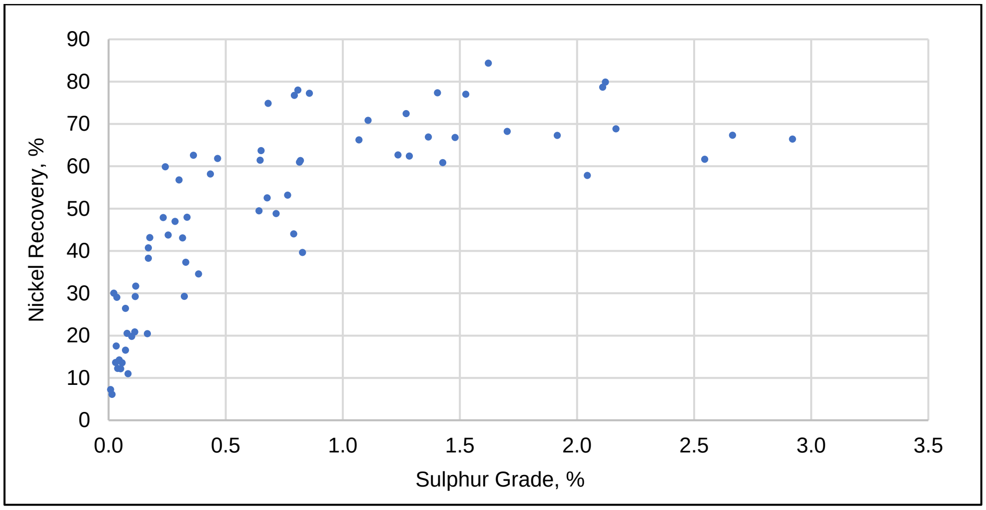


Figure 13-17: Link Between Sample Sulphur Assay and Nickel Recovery to Rougher Concentrate

Magnesium, Iron, Nickel and Sulphur (MINS) Approach

As the economics of this project are so closely linked to nickel recovery, a better algorithm was needed, one that could employ attributes available in the block model. These included Ni(T), Co, S, Mg and Fe. Of the elements available in the drill hole data, three showed some connection with recovery, namely Mg, Fe and S (see below).

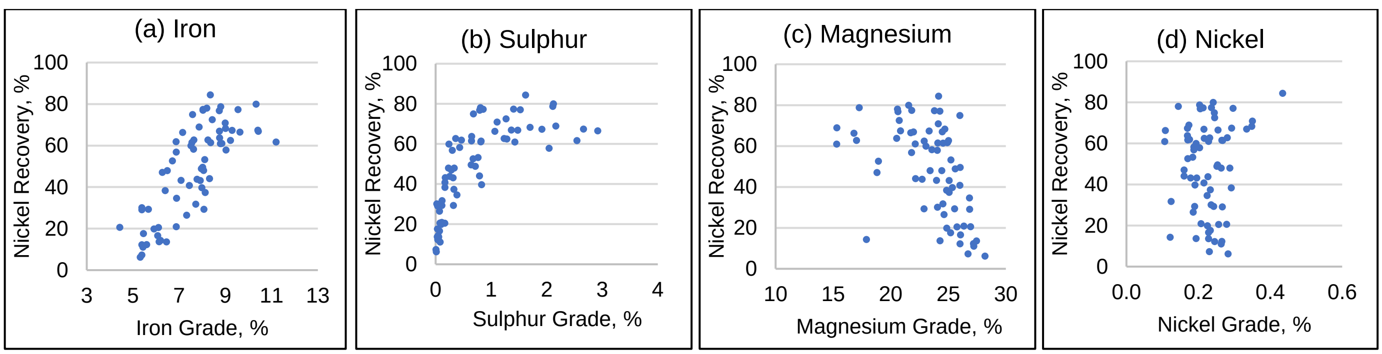


Figure 13-18: Links Between Iron, Sulphur, Magnesium and Nickel Grades with Ni Recovery

The connections between Fe, S and Mg with nickel recovery each have a logical basis:

- Iron is a key component in the dominant sulphide minerals but is present in both silicates and sulphides so while it should be linked with the abundance of sulphide nickel, the relationship is complex.
- Sulphur is a necessary component of sulphide minerals, but the link with nickel recovery is also complex. To a point its presence drives the creation of nickel sulphides, but excess sulphur does not necessarily create a higher proportion of nickel sulphides. Furthermore, excess sulphur creates pyrrhotite which competes with pentlandite in flotation. This can adversely affect nickel recovery. At low levels, sulphur clearly drives the presence of nickel sulphides, but the relationship drops away at above 0.75%S.
- Magnesium occurs only in silicate minerals but is enriched in nickel-bearing olivine. Hydrothermal alteration to magnesium-poorer serpentine releases nickel and is a factor behind the creation of nickel sulphides, so

magnesium content is inversely related to sulphide nickel content. The mineralogical work has shown that olivine content is inversely related to nickel recovery.

An algorithm has been developed using iron, sulphur, magnesium and nickel assays. The latter, though not directly linked to nickel recovery, enhanced the overall regression so was included. Furthermore, reflecting the link between sulphur assay and nickel recovery for samples with assays below 0.75% S and the lack of any link for samples assaying above 0.75% S, the regression uses two parameters.

These included Magnesium, Iron, Nickel and Sulphur (hence MINS) for low S samples and magnesium, iron and nickel for high sulphur samples:

*S below 0.75%: MINS = 10*Ni - 0.5*Mg + 0.3*Fe + 11*S*

*S above 0.75%: MINS = 13*Ni – 0.26*Mg + 0.3*Fe*

These MINS parameters were plotted against nickel rougher recovery giving a near-linear regression with an R-squared fit of 0.85.

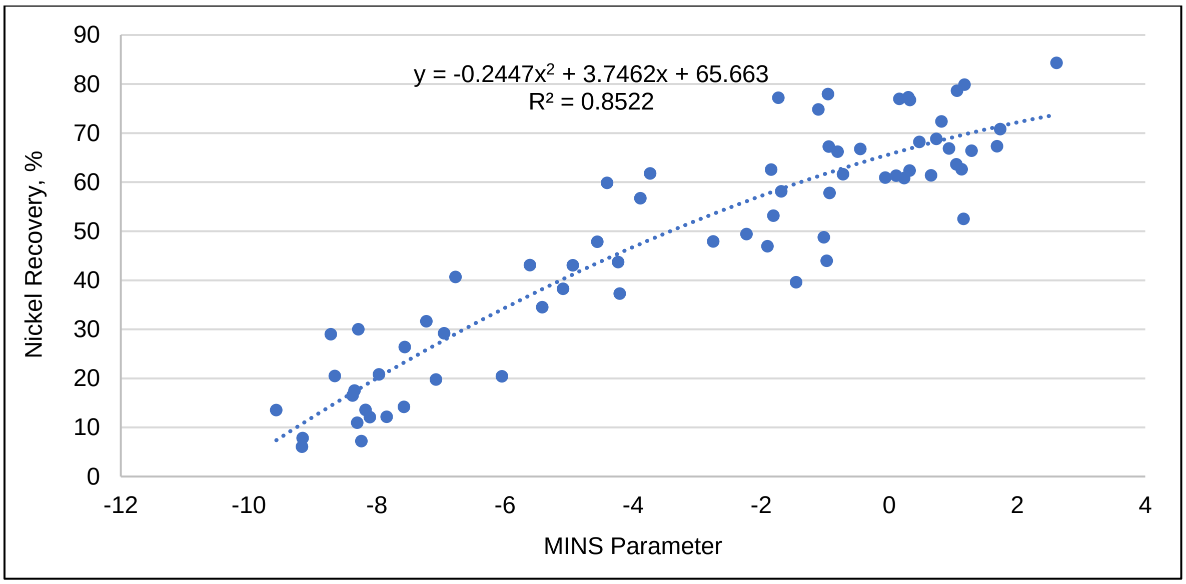


Figure 13-19: MINS Parameter vs Nickel Recovery

As a reality check, this alternative MINS-based modelling approach was applied to assays from the drill hole database. A nominal cut-off nickel recovery of 24% was applied. Sorting and averaging the data into 2300 x 10-point averages to help smooth the data, the trends in recovery using the AC-Ni and MINS approaches agree quite well, so helping to validate the MINS approach as a substitute for AC-Ni. A few outliers exist which tend to lead to higher recovery projections from the MINS approach. These have been traced to sulphur assays of close to 0.75% where the error between the twin approaches is highest. On average across the database, the MINS approach yielded 55.8% nickel rougher recovery and the AC-Ni approach 54.6% nickel rougher recovery.

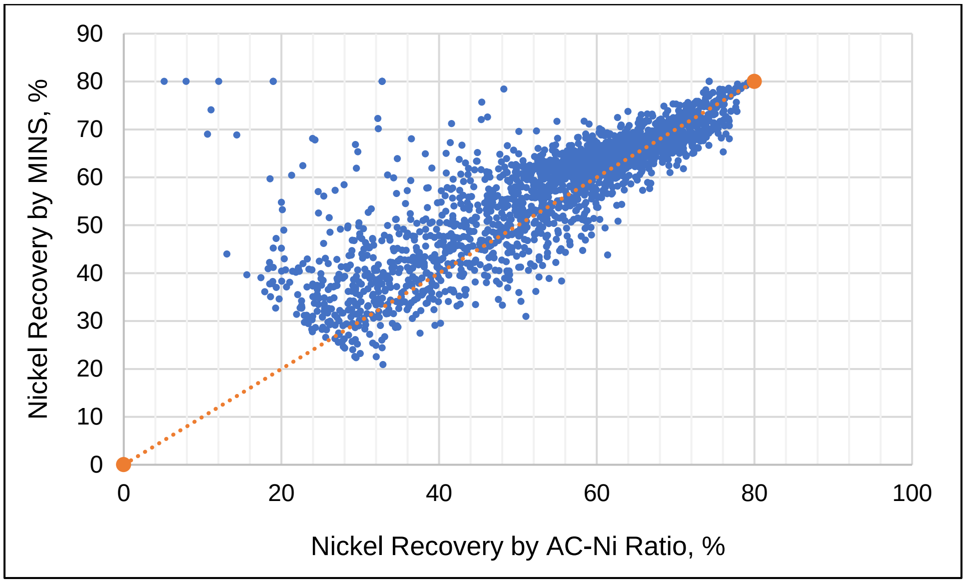
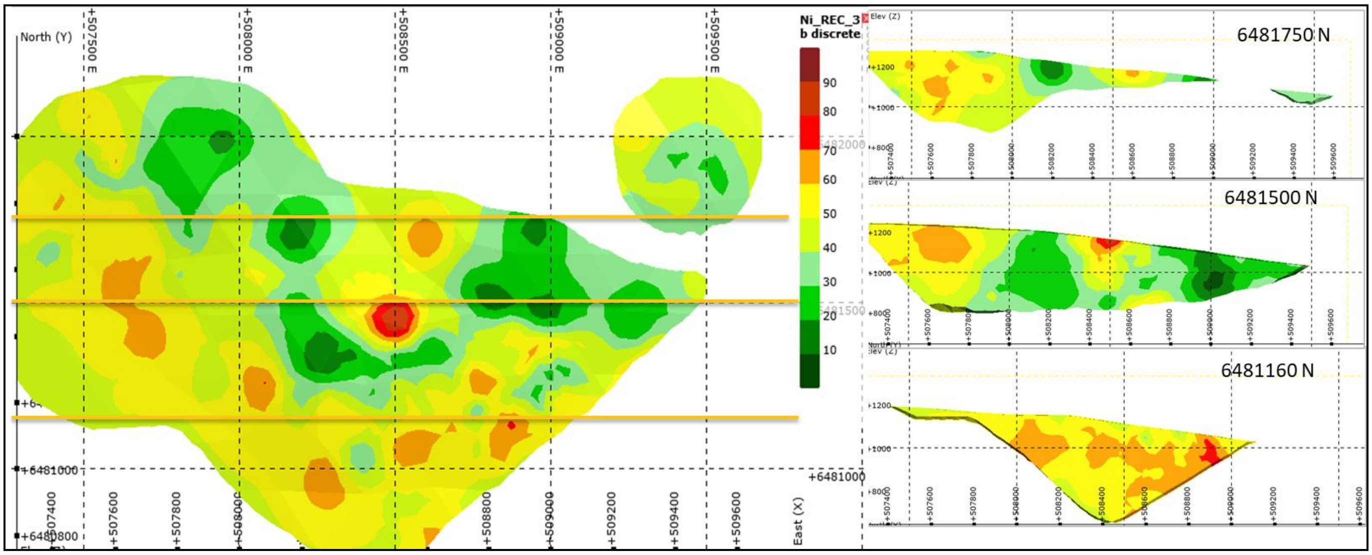
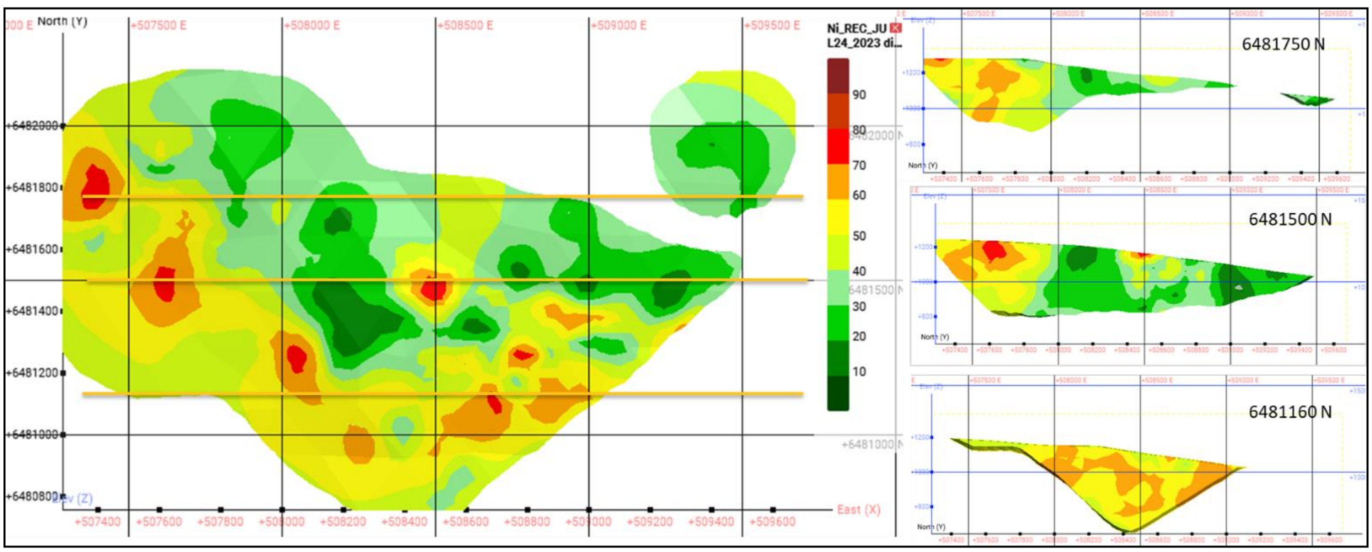


Figure 13-20: Projected Nickel Recovery by AC-Ni and MINS algorithms

When modelled using Leapfrog, the figures below compare the deposit-wide spatial variability in nickel recovery based on (a) the AC-Ni/4A-Ni assay ratio and (b) MINS parameters. They show that despite the independence of the source data used, similar spatial patterns in nickel recovery are revealed.



(a) AC-Ni/4A-Ni based Algorithm



(b) MINS-based Algorithm

Figure 13-21: Spatial Variability in Ni Recovery Based on AC-Ni/4A-Ni Ratio and MINS Algorithms

Future work needs to be done to allow for the AC-Ni assay to be used in the block model for the projection of nickel recoveries. The MINS approach is a reasonable substitute for the PFS, but metal recovery is so important to the economics of the project that for the F, the AC-Ni assay needs to be used.

13.3.4.4 Prediction of Cleaner Flotation Recovery

The 2020 PEA employed a simple approach to link nickel rougher recoveries to final concentrate. Multiply by 91.8%. This number arose from the mean cleaner stage recovery from a number of LCTs run on different composites tested in the years prior to issuance of the report. While defendable at a PEA level, it had the issue of being focused entirely on relatively high nickel recovery samples, or typically samples assaying 1% sulphur or higher. At the time, no data existed on the cleaner recovery of nickel from the poorer-responding material in the resource, or indeed whether such poor actors could in fact be processed to yield a saleable grade concentrate.

An objective of this study was to address the question of how the poorer-acting materials would respond to cleaner flotation and what these concentrates would look like. The converse also applied. As the samples tested to locked cycle level so far had been global composites, little was also known of the cleaner response of the best-acting material.

The third question to be answered was associated with the material that yielded unusually high mass pull rates to the rougher concentrates. Such materials had been seen from time to time through the years of testing Turnagain samples. These (somewhat rare) samples had a free-floating component in the non-sulphide mineral suite that was significantly diluting the concentrate and it was unknown whether they could be cleaned to make saleable grade concentrates.

So, for the cleaner flotation work, the samples were grouped into six metallurgical types as shown below. One of those, the red group, is below the economic cut-off for nickel recovery, so was not tested further. This left five metallurgical types, four characterized by different nickel recoveries and a fifth characterized by high mass pull rates.

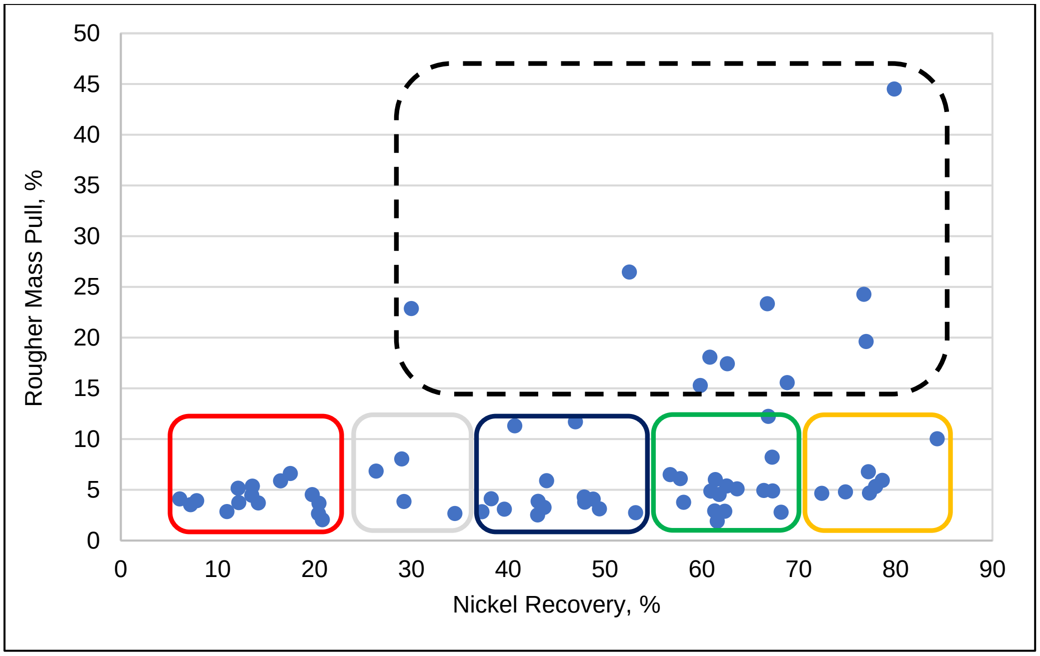


Figure 13-22: Geometallurgical Samples Grouped by Nickel Recovery and Rougher Mass Pull for Cleaner Flotation Optimization

These samples showed very limited spatial zoning, though the trend was for the more amenable samples to have come from the Horsetrail zone.

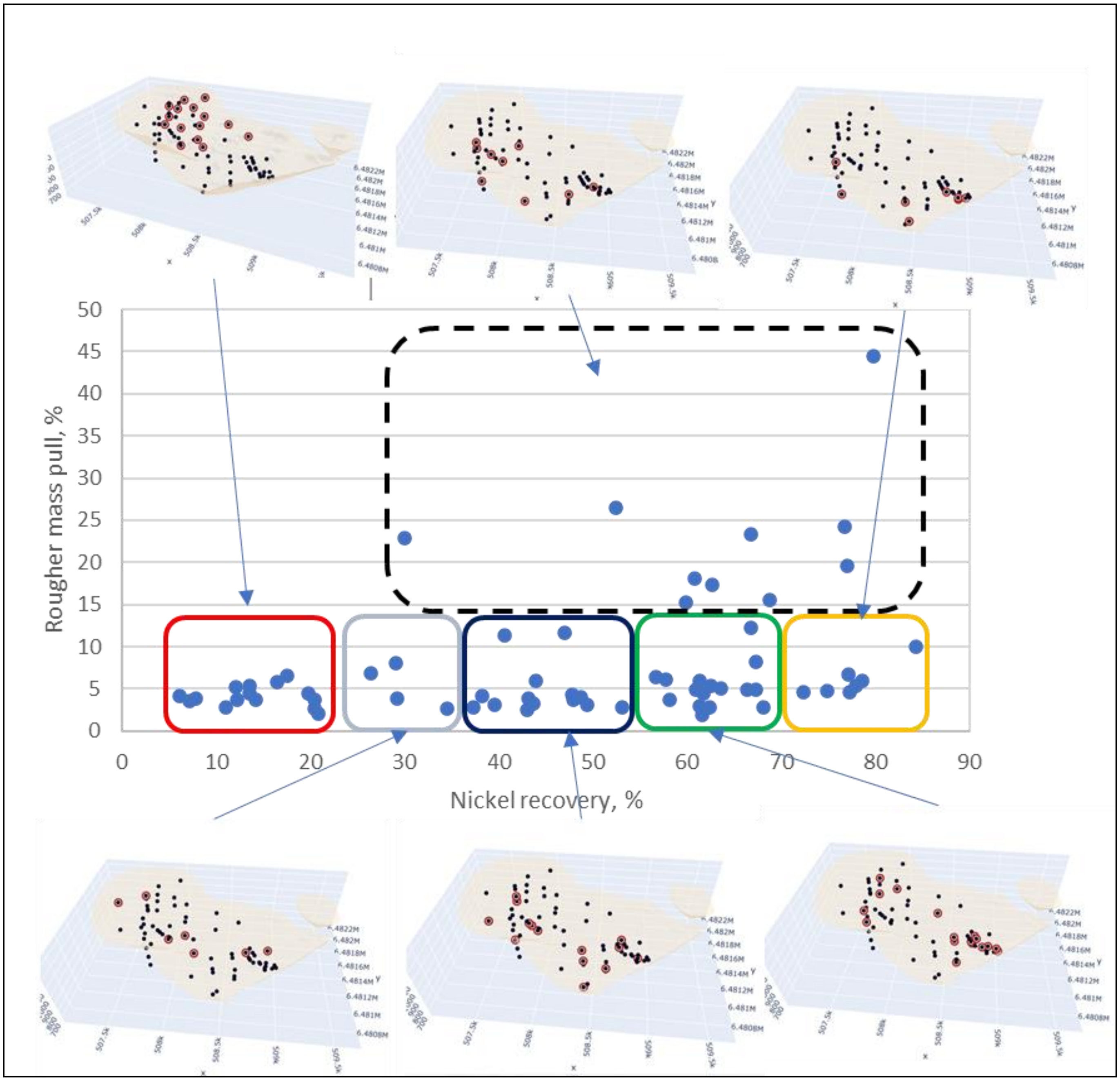


Figure 13-23: Source Location of Samples Grouped for Cleaner Testing

Initially, composites were made of each metallurgical type keeping the Northwest and Horsetrail zone samples separate, but cleaner flotation response was quite similar irrespective of zone, so the samples were combined to form the four recovery ranges and the one high mass pull range. Each was submitted to cleaner optimization (where needed). Process optimization was mostly through variations in reagent dose, with guar gum used to help depress silicates in cleaning, while Calgon (sodium hexametaphosphate) continued to be used to disperse silicates from the pentlandite surfaces, so limiting pentlandite losses due to serpentine rejection. In a brief study of polymeric depressants in Turnagain cleaner flotation, guar gum was shown to be preferable to carboxy methyl cellulose

(Depramin) type reagents. The combination of the guar gum and Calgon allowed for even the highest mass pull samples to be cleaned to concentrate grades in the range of 15% nickel.

All but the high mass pull composite were ultimately subjected to locked cycle confirmation testing. These tests employed a flowsheet that was similar to LCTs done in 2019 and reported in Blue Coast's report PJ5252. In some cases, up to 5 cleaner stages were used, instead of the baseline 3 stages used in the 2019 work, but residence times were similar. Reagent consumptions were slightly higher (for example, 96 g/t SIPX vs 78 g/t in 2019 and 120 g/t Calgon vs 95 g/t in 2019), however exact doses were not optimized and could have been excessive.

In all cases, respectable concentrates could be made, but with the poorer recovery composites, a combination of the finer-grained pentlandite and lower sulphur contents led to somewhat poorer cleaner stage recoveries and increased challenges with MgO grades in the concentrates (where for the blue and grey composites, to achieve target 10% MgO [~6% Mg], much higher nickel grades were required). To a degree, some of the challenges were associated with the nature of the testing and the tiny amounts of concentrate needed to make target MgO grade. This likely adversely affected recoveries and is a quirk of small-scale testing. Better performance should be seen in practice.

There is also potential for development of a hydrometallurgical concentrate treatment route that is more tolerant of magnesium and given the extended life of the project and timing later in the life of the project to produce such concentrates, the time to develop such a solution. This is not considered as part of the base case for this PFS but certainly exists as upside potential.

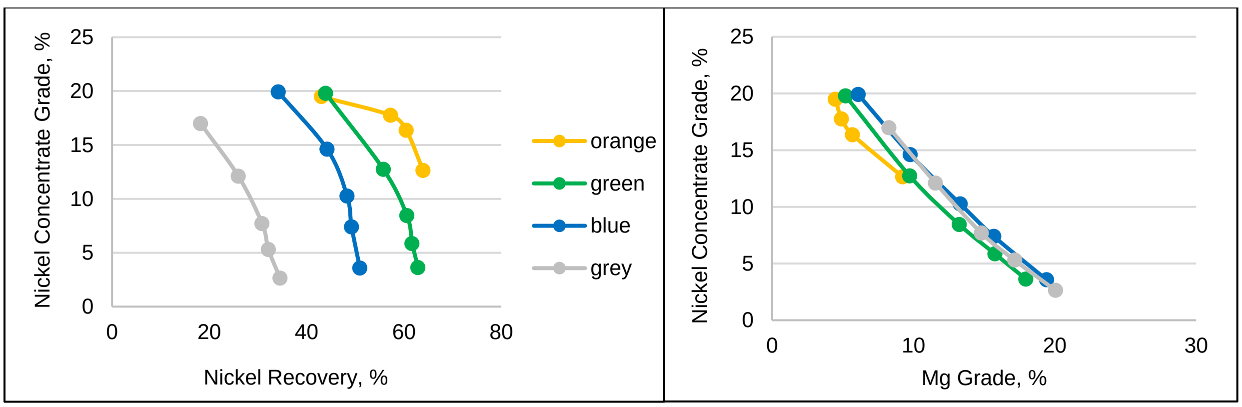


Figure 13-24: Cleaner Flotation of Different Ni Rougher Recovery Composites

The high mass pull composite was viewed as an end-member or worst-case scenario. It was deemed necessary to demonstrate that the free-floating gangue material could be rejected in cleaning as a risk reduction exercise, although there is no evidence that this high mass pull material would ever, for any extended period, constitute the majority of the mill feed. Accordingly, no LCT on this material was conducted. Limited batch testing showed that guar gum could be used to control gangue flotation, yielding concentrate grades over 10%. If further geometallurgical analysis reveals the presence of more of this material than currently envisioned, more work should be done on this material to boost concentrate grades further.

The cleaner stage recovery has been calculated from locked cycle data as shown below. This is a combination of the PFS composite test data (coloured composites) and previous LCT data using essentially the same flowsheet.

Table 13-8: LCT Data Used in Developing Cleaner Recovery Component of the Metallurgical Forecast

Sample ID	Feed Grade (%)		Nickel Recoveries (%)			Concentrate Grades (%)	
	Nickel	Sulphur	Rougher	LCT	Cleaner	Ni Grade	Mg Grade
Orange Composite	0.25	1.2	73.6	69.5	94.4	14.3	4.1
Green Composite	0.22	1.3	64.2	55.1	85.8	17.3	5.4
Talc 1, PJ5280 SCT	0.30	1.4	66.2	60.9	92.0	17.4	n/a
Talc 2-3, PJ5280 SCT	0.30	1.5	64.2	58.5	91.1	18.9	n/a
Litho, PJ5280 LCT-1	0.23	1.1	58.5	55.8	95.4	18.5	5.6
Blue Composite*	0.21	0.7	57.4	52.0	90.6	15.8	9.7
Grey Composite*	0.19	0.3	34.8	32.1	92.2	10.6	13.1
10-266 LCT1 PJ5280	0.23	1.1	59.3	57.0	96.1	19.2	5.0
10-266 LCT3 PJ5252	0.30	1.2	65.2	60.2	92.3	18.3	6.0
10-266 LCT5 PJ 5252	0.28	1.2	61.4	56.4	91.9	13.7	8.1

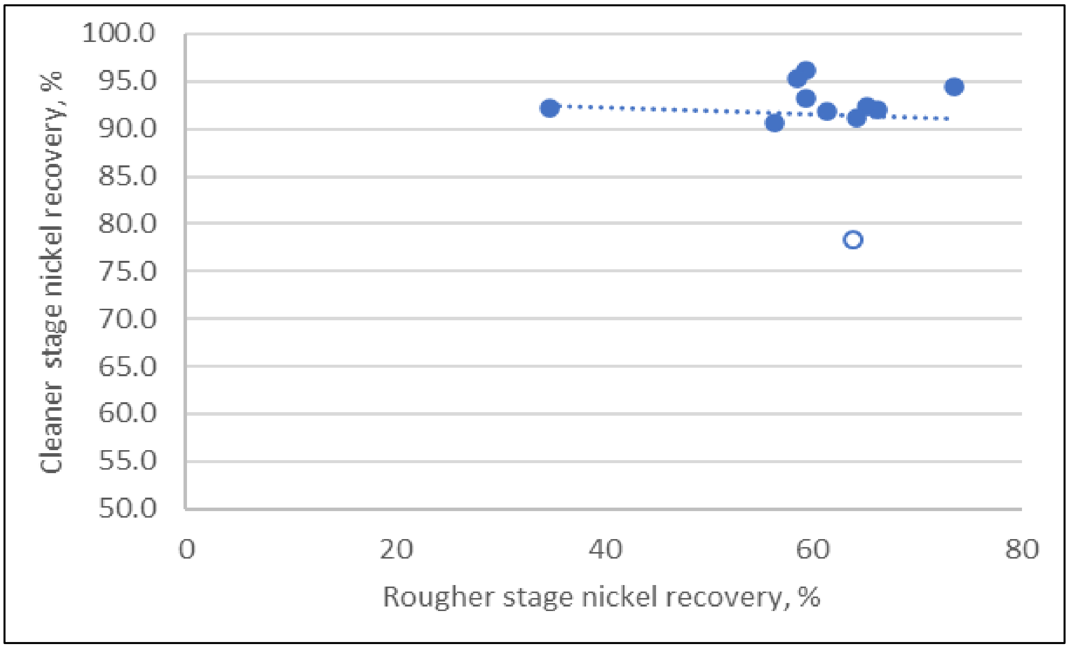
* Note tests missed concentrate MgO targets

13.3.4.5 Impact of Mg Grade Control on Cleaner Recovery

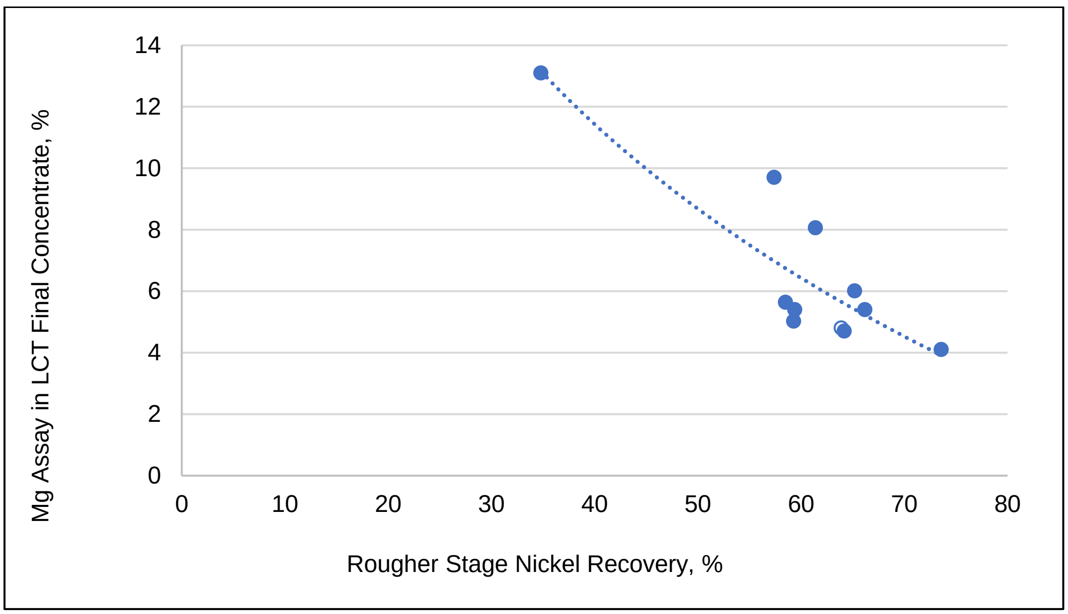
The rougher and cleaner recoveries, as achieved in LCT, are plotted below. They show relatively consistent cleaner stage recovery averaging 92.1%, so very close to the 91.8% used in the 2020 PEA.

However, the Mg grades in the concentrates are also plotted. The target Mg grade is 6%, above which smelters may reject the concentrate and it can be seen that the concentrates floated from the low rougher recovery composites exceeded this criterion.

This rise in Mg content in the final concentrates from the poorer floating composites are a consequence of both the poorer-floating pentlandite and the lower total sulphur content in the feed, so more of the diluents in the concentrate are Mg-rich silicates and not pyrrhotite. Accordingly, to make a concentrate within saleable specifications from these poorer floating composites, more selective cleaning is needed than was practiced in the LCTs (the nickel grade would need to be ~22% for the Mg grade to drop to 6%).



(a) Rougher Stage Recovery vs Cleaner Stage Recovery from LCT using the PFS Flowsheet



(b) Mg in the Final Concentrate vs Rougher Stage Recovery from LCT using the PFS Flowsheet

Figure 13-25: Cleaner Response to Flotation of Samples of Differing Rougher Recoveries

Note: Open point is SCT test on Talc 0: This test yielded an outlying result, is considered an outlier and is excluded below

No LCTs have been run on the lower recovery samples aiming for such nickel grades, but batch cleaner work has shown such grades to be possible, although pull rates of around 800mg of concentrate per minute are reaching the limit of what is feasible in a conventional batch flotation test.

To account for circulating load effects, the mean improvement in closed circuit cleaner stage recovery vs the equivalent batch test to the identical grade was calculated for all previous LCTs at 37%. So, on average in closed circuit operation, 37% of the nickel in the batch test cleaner tails (excluding the 1st cleaner tails) is recovered to concentrate.

So, the batch test data was used, and cleaner losses reduced by 37% to simulate closed circuit performance. Despite this, projected cleaner recoveries for the poorest floating sample dropped from 92% to 76%. This is plotted below in a graph which shows the projected impact on cleaner performance of maintaining a magnesium grade in the concentrate to a maximum of 6%:

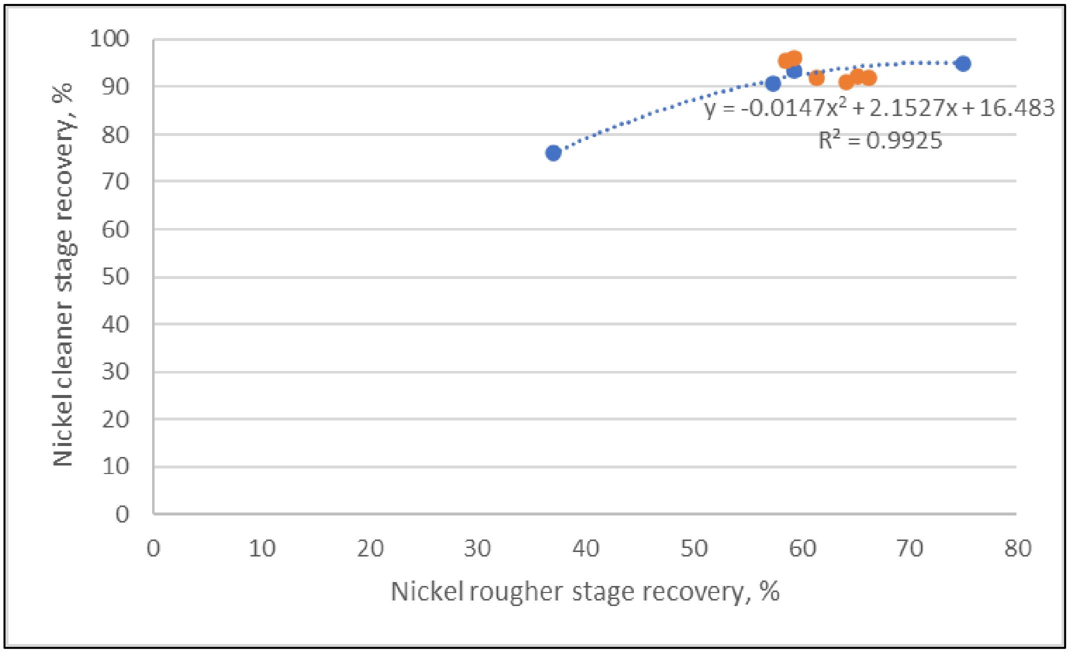


Figure 13-26: Link Between Rougher and Cleaner Flotation Recovery to <6% Mg Concentrates in LCT (red: LCT data from before geometallurgical program)

13.3.4.6 Overall Nickel Recovery Algorithms

The resulting procedure employing the MINS based algorithm to predict rougher recovery, then applying the above cleaner stage recovery formula, has been used in this study for mine planning and financial modelling purposes:

For blocks below or equal to 0.75% sulphur:

MINS = 10*Ni assay (%)- 0.5*Mg assay (%) + 0.3*Fe assay (%) +11*S assay (%)

For blocks above 0.75% sulphur:

MINS = 13*Ni assay (%) – 0.26*Mg assay (%) + 0.3*Fe assay (%)

Ni rougher recovery (R)= -0.2447* $MINS^2$ + 3.7462* *MINS* + 65.663

This recovery is multiplied by the cleaner stage recovery algorithm to establish the overall nickel recovery:

Overall Ni recovery (%) = (-0.0147*R^2 + 2.1527*R +16.483) * R/100

Note recoveries are capped at 75% nickel recovery at the high end and 0% at the low end (due to the behaviour of the polynomials in logically unimportant regions).

13.3.4.7 Cobalt Recovery

Cobalt mostly co-exists with nickel, so is generally present in pentlandite when most of the nickel is in sulphide form, or elsewhere when nickel is present as a silicate. Accordingly, cobalt recoveries track nickel recoveries, averaging 93.8% of nickel recoveries. The assay ratio of cobalt in the concentrate is quite consistently 0.6% Co for every 10% Ni.

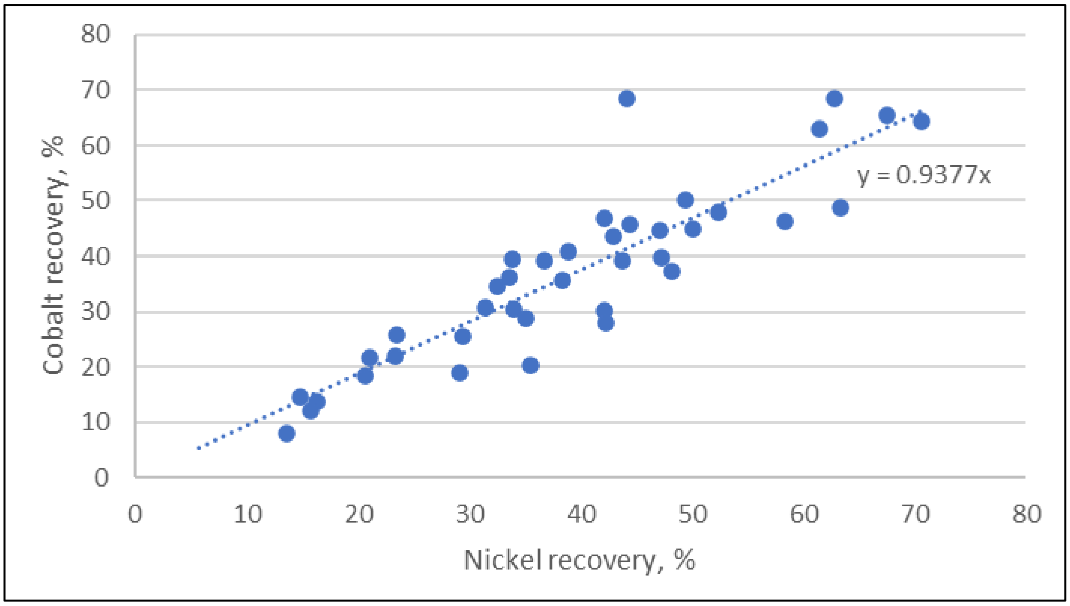
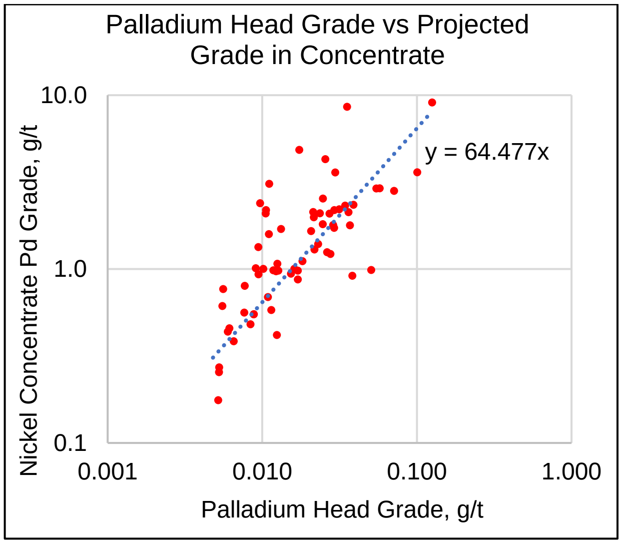


Figure 13-27: Link between Nickel and Cobalt Flotation Recovery

13.3.4.8 Platinum Group Metal (PGM) Metallurgy

Algorithms to predict PGM recoveries have been difficult to develop owing to the very low tails assays reaching the assay detection limits. Instead, palladium and platinum grades in final concentrates have been estimated as a function of their head grades:



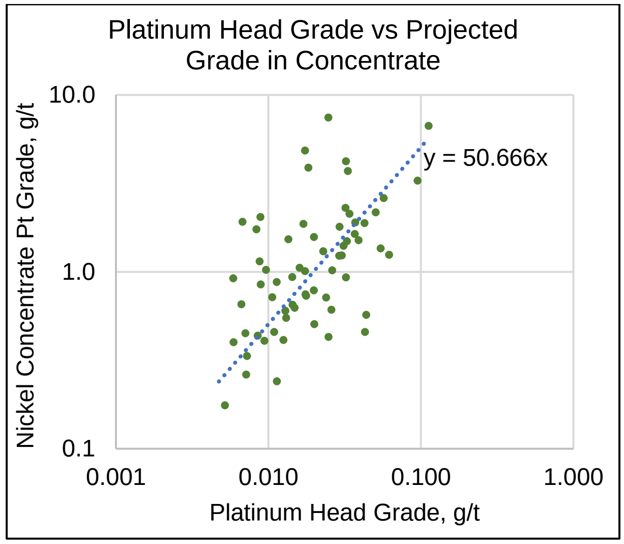


Figure 13-28: Link between Pt and Pd Head and Projected Final Concentrate Grades

The upgrading ratios of 64x for palladium and 51x for platinum compares with 88x for nickel. Assuming a mean recovery of 52% for nickel, this suggests a mean recovery of 40% for palladium and 32% for platinum to final concentrate. Palladium occurs in the lattice of the pentlandite so is not amenable to further upgrading by gravity, however platinum has shown a limited amenability to gravity concentration, with a recovery of 45% achieved in limited superpanner testing. This has not been incorporated into the PFS design.

13.3.4.9 Final Concentrate Specifications

Multi-element scans have been conducted on saleable nickel sulphide concentrates with grades close to the expected LOM product, from 11 different LCTs on different samples and composites. The average for each element from the dataset is shown below.

Table 13-9: Average Assay of 39 Elements in Eleven LCT Concentrates

Element	Content	Element	Content	Element	Content	Element	Content
Ni %	16.9	As, ppm	47	F %	<0.01	Se g/t	91
Co %	1.1	Ag g/t	22.1	Hg g/t	0.7	Sn g/t	9
Cu %	0.34	Al %	0.13	K %	0.03	Sr g/t	11
Fe %	31.5	Ba g/t	37	Li g/t	4	Te g/t	28
S %	19.5	Be g/t	<0.2	Mn g/t	280	Ti g/t	80
SiO_2 %	6.4	Bi g/t	6	Mo g/t	61	Tl g/t	17
Mg %	5.7	Ca %	0.27	Na g/t	710	U %	<0.005
Pt g/t	1.1	Cd g/t	14	P g/t	150	V g/t	29
Pd g/t	2	Cl g/t	67	Pb g/t	134	Y g/t	2.1
--	--	Cr %	0.1	Sb %	0.002	Zn g/t	736

Note: some analyses were from a smaller number of tests

The relationship between nickel grade and Fe:MgO ratio is shown below. The assay ratio of Fe:MgO is a key criterion in the marketability of many nickel flotation concentrates as it impacts metallurgy in nickel smelting.

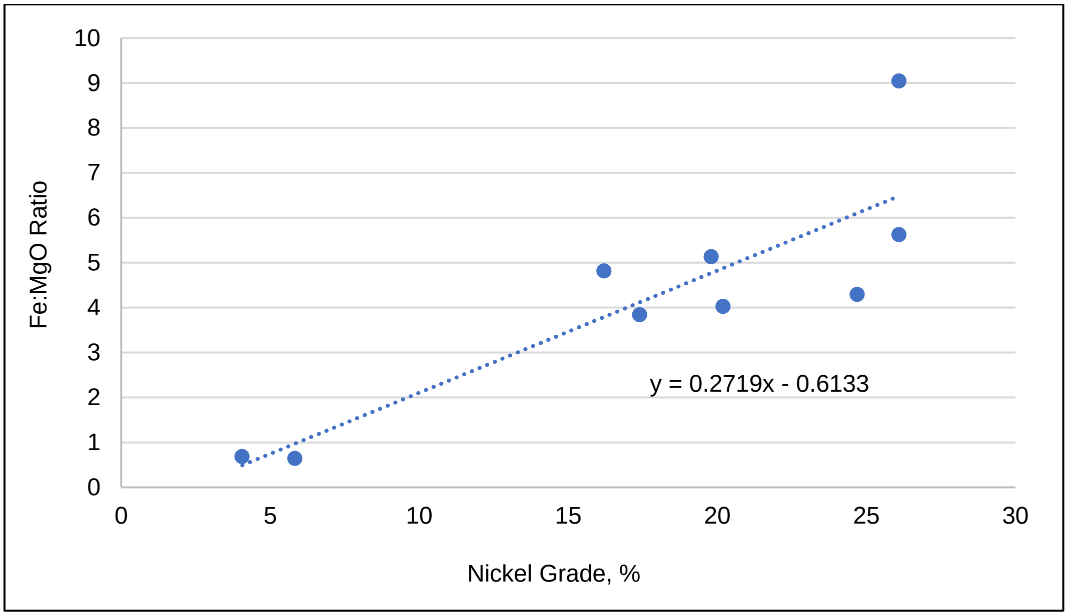


Figure 13-29: Relationship Between Ni Grade and Fe/MgO Ratio

14.0 MINERAL RESOURCE ESTIMATES

14.1 Introduction

The purpose of this report is to document the resource estimations for the Turnagain deposit. This section describes the work undertaken by Garth Kirkham, P.Geo., of Kirkham. and includes key assumptions and parameters used to prepare the mineral resource models for Northwest and Horsetrail zones in addition to extensions of the Duffy and Hatzl zones, together with appropriate commentary regarding the merits and possible limitations of such assumptions.

The Mineral Resource Statement presented herein represents an updated mineral resource evaluation prepared for Giga Metals in accordance with the Canadian Securities Administrators' NI 43 101.

This section describes the mineral resource estimation methodology and summarizes the key assumptions. In the opinion of QP Garth Kirkham, P.Geo., the mineral resource estimates reported herein are a reasonable representation of the mineral resources found within the project at the current level of sampling. The mineral resources were estimated in conformity with generally accepted CIM guidelines ("Estimation of Mineral Resources and Mineral Reserves Best Practices Guidelines", December 2019) and are reported in accordance with NI 43 101 guidelines. It is important to note that mineral resources that are not mineral reserves do not have demonstrated economic viability. Mineral resource estimates do not account for mineability, selectivity, mining loss and dilution. These mineral resource estimates include inferred mineral resources that are considered too speculative geologically to have economic considerations applied to them that would enable them to be categorized as mineral reserves. It is reasonably expected that the majority of inferred mineral resources could be upgraded to indicated.

The Turnagain resource model includes the southern portions of the Horsetrail zone which abut and underlie the Turnagain River, along with the Hatzl zone south of the river. These zones are potentially exploitable with a diversion of a relatively short section of the Turnagain River, which Giga Metals is advised is technically viable and for which there is permitting precedent. These zones are not included in the current resources statements nor within the mine plan, as the diversion of the river is not currently contemplated.

The mineral resource evaluation reported herein for Turnagain is current and supersedes earlier mineral resource estimates completed for Hard Creek Nickel Corp. including:

- Preliminary Economic Assessment Technical Report for the Turnagain Project, December 2011 (AMC, 2011),
- Preliminary Economic Assessment Technical Report for the Turnagain Project, December 2020 (Hatch, 2020),
- 2022 Mineral Resource Update (Giga Metals Press Release dated October 27, 2022).

The mineral resource estimates were prepared, reviewed and verified by Garth Kirkham, P.Geo., the independent QP for the mineral resource estimates included in this report. Giga Metals' field work on the Project from 2018, including drilling, was carried out under the supervision of Greg Ross, P.Geo., who is Giga Metals' senior geologist.

The general mineral resource estimation methodology for the deposit involved the following procedures:

- Database verification and validation,
- Data exploration, compositing and evaluation of outliers,

- Construction of estimation domains,
- Spatial statistics,
- Block modelling and grade interpolation,
- Mineral resource classification and validation,
- Assessment of "reasonable prospects for eventual economic extraction",
- Preparation of the mineral resource statement.

14.2 Drill Hole Data

The 382 drill holes in the database were supplied in electronic format by Giga Metals, 326 of which had assay values. However, for the purpose of the resource estimation, 254 drill holes which includes 15 holes drilled in 2021, are used as they lie within the study area and are supported by QA/QC data, validation and verification. This drillhole subset forms the basis for the resource estimation, herein. This included collars, downhole surveys, lithology data and assay data of varying vintages and analysis types.

Prior to 2004, samples were analyzed for nickel, copper, cobalt and approximately 20 major and minor elements by aqua regia digestion followed by an ICP-ES finish. Samples collected from the 2004 to 2021 programs were subjected to a four-acid (HNO_3-$HClO_4$-HF and HCl) digestion followed by ICP-ES analyses to determine values for total nickel, copper, cobalt and 22 other elements, including sulphur. Drill holes drilled prior to 2018 were also analyzed by a 'sulphide-specific, partial leach' ammonium citrate-hydrogen peroxide method, followed by ICP-ES finish for Ni, Co, Cu, Mg and S (the AC method).

In 2004 and 2005, sulphur content was analyzed by the Leco furnace method. In 2006, sulphur content was analyzed by ICP-ES after a four-acid digestion. Since 2007, sulphur content has been analyzed by both ICP-ES after a four-acid digestion and Leco furnace. Some exploration drill holes prior to 2004 and all drill holes since 2004, were analyzed for platinum, palladium and gold by lead-collection fire-assay (FA) fusion followed by ICP-ES.

Validation and verification checks were performed during importation of data to ensure there were no overlapping intervals, typographic errors, or anomalous entries. None were found. Figure 14-1 shows a plan view of the supplied drill holes.

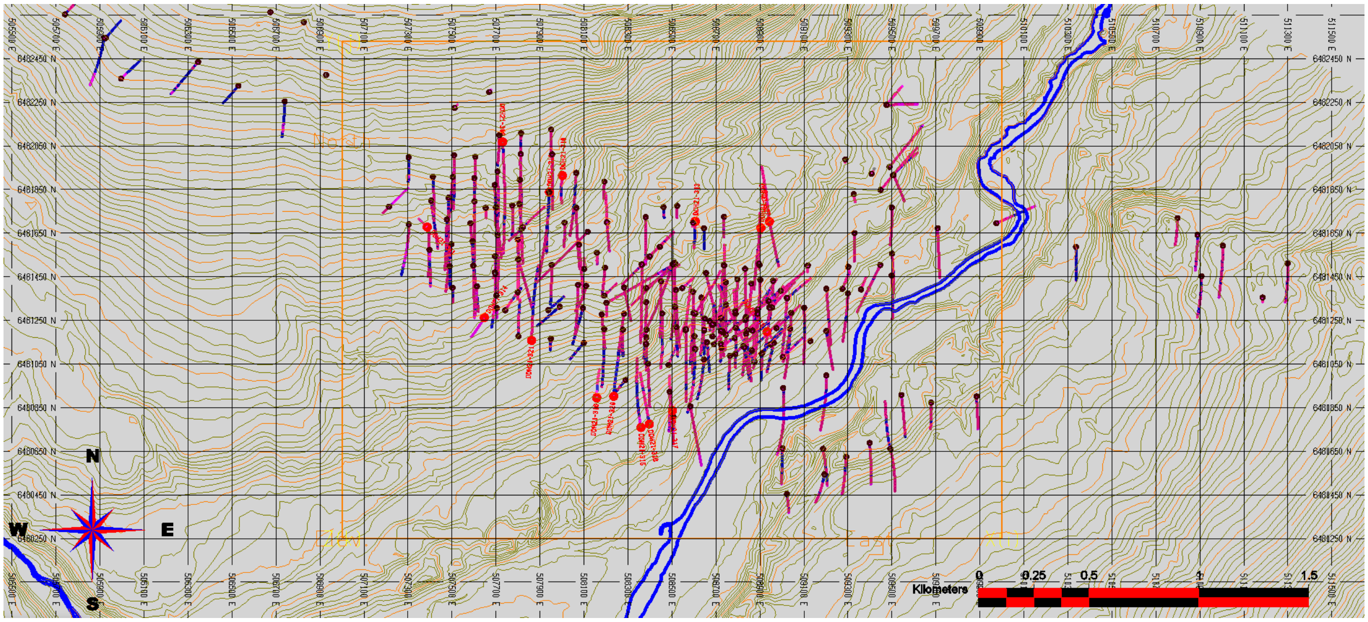


Figure 14-1: Plan View of Turnagain Drill Holes & Model Limits

(Source: Kirkham, 2023)

14.3 Data Analysis

Statistics were run to evaluate the elements of primary potential economic and geometallurgical interest namely Ni%, NiAC%, Co%, CoAC%, Cu%, CuAC%, Mg, MgAC%, Fe%, Pt ppb, Pd ppb, S%, S% (Leco), Au and Ag. The primary economic contributor is shown to be nickel content whilst the secondary is cobalt. In addition, platinum and palladium also offers enough economic benefit such that they warrant quantification and are thereby estimated as co-product metals. However, in the case of copper, it was decided that at the concentrations present, estimation is not warranted at this point for inclusion but may be considered in the future.

Furthermore, gold and silver are very low and considered not to be economic at this time and although not the subject of this resource estimate and not reported, they have been estimated. However, they may be payable depending upon mineral processing and concentrate treatment methods and terms. The NiAC%, Mg, MgAC%, Cu, CuAC%, CoAC%, Fe%, S% and S%(Leco) have similarly been analyzed which are useful from a geometallurgical standpoint. However, they are not reported within the resource statement. The statistical analyses were grouped by lithology as logged by the site geologists and supplied in the database. The lithology codes and descriptions are listed in Table 14-1.

Table 14-2 to Table 14-6 details the statistical analyses for Ni%, Co%, S%, Pd ppb and Pt ppb for each of the individual lithologic units, respectively. Note that a large percentage of the data is associated with the wehrlite, dunite, serpentinite and green dunite lithologies which range in mean grades between 0.22 and 0.25% nickel followed by the pyroxenites which are lower grade at approximately 0.02% - 0.16% nickel. The mean cobalt grades are consistently in the 0.0130% - 0.039% range within the wehrlite, dunite, serpentinite and green dunite and 0.0069% - 0.012% for the pyroxenites.

In addition, the coefficients of variability for nickel, cobalt and sulphur are all very low for all lithology units which indicates very low variability and risk. The coefficient of variation is defined as CV=σ/m (standard deviation/mean) and represents a measure of variability that is unit independent. This variability index can be used to compare different and unrelated distributions.

Table 14-1: Lithology Codes & Descriptions for Statistical Grouping

Lithology Code	Lithology	Description
1	Am	Amphibolite
2	Basalt	Basalt
3	bx	Brecciated
4	Qtz	Quartzite
7	flt	Fault
8	Inc	Inclusion
10	Ovb	Overburden
17	MV	Metavolcanics
20	Dk	Dyke
30	GS	Graphite-Sulphide
31	MGS	Magnetite-Graphite-Sulphide
32	MS	Massive Sulphide
33	SMS	Semi Massive Sulphide
50	CS	Calc-Silicate
51	Hfs	Hornfels
52	MSD	Metasediment
53	Phy	Phyllite
56	Tl	Talc
90	Di	Diorite
91	gDi	Granodiorite
91	qDi	Quartz Diorite
91	qgDi	Quartz Granodiorite
100	cPx	Clinopyroxenite
101	mtcPx	Magnetite Clinopyroxenite
102	ocPx	olivine Clinopyroxenite
108	hbcPx	Hornblende Clinopyroxenite
109	Hb	Hornblendite
110	Du	Dunite
111	Wh	Wehrlite
115	Sp	Serpentinite
120	gDu	Green Dunite
130	Um	Undifferentiated Ultramafic

Table 14-2: Statistics for Nickel
(Source: Kirkham, 2023)

Lith Code	Lithology	#	Length (m)	% Length	Min	Max	Mean	% width*grade	SD	CV
1	Am	3	1.9	0.002%	0.007	0.218	0.029	0.0003%	0.065	2.2
2	Basalt	2	3.2	0.004%	0.005	0.005	0.005	0.0001%	0.000	0.0
3	bx	23	43.8	0.051%	0.003	0.021	0.014	0.0037%	0.005	0.3
4	Qtz	15	45.45	0.053%	0.0005	0.094	0.013	0.0036%	0.025	2.0
7	flt	586	1,057.85	1.242%	0.005	0.581	0.163	1.0560%	0.079	0.5
8	Inc	33	46.25	0.054%	0.01	0.122	0.052	0.0148%	0.038	0.7
10	Ovb	16	20.95	0.025%	0.08	0.303	0.204	0.0262%	0.073	0.4
17	MV	9	21.35	0.025%	0.002	0.074	0.024	0.0031%	0.025	1.1
20	Dk	540	941.85	1.106%	0.0005	0.604	0.074	0.4292%	0.075	1.0
30	GS	45	67.75	0.080%	0.038	0.546	0.228	0.0949%	0.124	0.5
31	MGS	5	7.4	0.009%	0.275	0.599	0.497	0.0226%	0.135	0.3
32	MS	7	11	0.013%	0.038	1.987	0.286	0.0193%	0.425	1.5
33	SMS	1	2.01	0.002%	0.534	0.534	0.534	0.0066%	0.000	0.0
50	CS	134	220.47	0.259%	0.003	0.355	0.082	0.1112%	0.068	0.8
51	Hfs	312	596.93	0.701%	0.001	0.276	0.024	0.0868%	0.044	1.9
52	MSD	270	537.19	0.631%	0.0006	0.287	0.044	0.1454%	0.050	1.1
53	Phy	88	232.14	0.273%	0.002	0.184	0.018	0.0263%	0.032	1.8
90	Di	455	1,060.00	1.244%	0.0003	0.313	0.034	0.2218%	0.048	1.4
91	gDi	20	35.15	0.041%	0.001	0.024	0.005	0.0011%	0.006	1.1
100	cPx	2,190	3,718.39	4.365%	0.0005	1.051	0.074	1.6789%	0.086	1.2
101	mtcPx	1,726	2,683.19	3.150%	0.001	0.14	0.024	0.3899%	0.014	0.6
102	ocPx	3,913	7,258.70	8.521%	0.003	5.148	0.159	7.0604%	0.134	0.8
108	hbcPx	805	1,608.18	1.888%	0.002	0.188	0.020	0.1974%	0.021	1.0
109	Hb	1,004	1,761.82	2.068%	0.001	0.21	0.019	0.2048%	0.026	1.4
110	Du	17,396	31,860.84	37.402%	0.0005	2.861	0.229	44.6761%	0.088	0.4
111	Wh	13,046	24,931.51	29.268%	0	2.587	0.223	34.1170%	0.097	0.4
115	Sp	1,243	2,053.45	2.411%	0.004	1.646	0.226	2.8467%	0.097	0.4
120	gDu	2,405	4,225.95	4.961%	0.001	0.75	0.250	6.4786%	0.054	0.2
130	Um	60	129.25	0.152%	0.036	0.192	0.097	0.0769%	0.035	0.4
Total		**46,352**	**85,183.92**	**100%**	**0**	**5.148**	**0.191**	**100%**	**0.114**	**0.6**
All		**46,618**	**85,771.82**		**0**	**5.148**	**0.191**		**0.114**	**0.6**

Note: Total may not add due to rounding.

Table 14-3: Statistics for Cobalt
(Source: Kirkham, 2023)

Lith Code	Lithology	#	Length (m)	% Length	Min	Max	Mean	% width*grade	SD	CV
1	Am	3	1.9	0.002%	0.006	0.015	0.0070	0.0012%	0.0028	0.4
2	Basalt	2	3.2	0.004%	0.003	0.003	0.0030	0.0009%	0.0000	0.0
3	bx	23	43.8	0.051%	0.001	0.007	0.0049	0.0201%	0.0015	0.3
4	Qtz	15	45.45	0.053%	0.0005	0.007	0.0024	0.0101%	0.0019	0.8
7	flt	586	1,057.85	1.242%	0.001	0.026	0.0111	1.0999%	0.0040	0.4
8	Inc	33	46.25	0.054%	0.006	0.02	0.0106	0.0462%	0.0041	0.4
10	Ovb	16	20.95	0.025%	0.01	0.021	0.0148	0.0290%	0.0035	0.2
17	MV	9	21.35	0.025%	0.001	0.005	0.0025	0.0050%	0.0014	0.5
20	Dk	540	941.85	1.106%	0.0005	0.032	0.0058	0.5144%	0.0039	0.7
30	GS	45	67.75	0.080%	0.008	0.041	0.0186	0.1184%	0.0075	0.4
31	MGS	5	7.4	0.009%	0.025	0.052	0.0443	0.0308%	0.0118	0.3
32	MS	7	11	0.013%	0.003	0.149	0.0259	0.0267%	0.0325	1.3
33	SMS	1	2.01	0.002%	0.0574	0.0574	0.0574	0.0108%	0.0000	0.0
50	CS	134	220.47	0.259%	0.0005	0.027	0.0079	0.1632%	0.0045	0.6
51	Hfs	312	596.93	0.701%	0.001	0.0298	0.0040	0.2224%	0.0033	0.8
52	MSD	270	537.19	0.631%	0.0007	0.0165	0.0048	0.2430%	0.0032	0.7
53	Phy	88	232.14	0.273%	0.0005	0.011	0.0022	0.0484%	0.0019	0.9
90	Di	455	1,060.00	1.244%	0.0004	0.0155	0.0046	0.4595%	0.0025	0.5
91	gDi	20	35.15	0.041%	0.001	0.005	0.0024	0.0078%	0.0013	0.5
100	cPx	2,190	3,718.39	4.365%	0.001	0.077	0.0096	3.3566%	0.0053	0.5
101	mtcPx	1,726	2,683.19	3.150%	0.0005	0.024	0.0073	1.8305%	0.0032	0.4
102	ocPx	3,913	7,258.70	8.521%	0.003	0.146	0.0120	8.1736%	0.0056	0.5
108	hbcPx	805	1,608.18	1.888%	0.0028	0.033	0.0070	1.0609%	0.0027	0.4
109	Hb	1,004	1,761.82	2.068%	0.002	0.033	0.0069	1.1407%	0.0026	0.4
110	Du	17,396	31,860.84	37.402%	0.0005	0.166	0.0139	41.4975%	0.0045	0.3
111	Wh	13,048	24,933.44	29.269%	0	0.141	0.0137	32.0303%	0.0048	0.3
115	Sp	1,243	2,053.45	2.411%	0.001	0.097	0.0130	2.4973%	0.0049	0.4
120	gDu	2,405	4,225.95	4.961%	0.0005	0.03	0.0132	5.2464%	0.0022	0.2
130	Um	60	129.25	0.152%	0.005	0.013	0.0087	0.1052%	0.0023	0.3
Total		**46,354**	**85,185.85**	**100%**	**0**	**0.166**	**0.0125**	**100%**	**0.0052**	**0.4**
All		**46,620**	**85,773.75**		**0**	**0.166**	**0.0125**		**0.0052**	**0.4**

Note: Total may not add due to rounding.

Table 14-4: Statistics for Sulphur
(Source: Kirkham, 2023)

Lith Code	Lithology	#	Length (m)	% Length	Min	Max	Mean	% width*grade	SD	CV
1	Am	3	1.9	0.002%	0.15	3.56	3.20	0.0101%	1.05	0.3
2	Basalt	2	3.2	0.004%	0.35	0.35	0.35	0.0019%	0.00	0.0
3	bx	23	43.8	0.051%	0.04	1.22	0.42	0.0303%	0.34	0.8
4	Qtz	15	45.45	0.053%	0.01	1.93	1.02	0.0774%	0.52	0.5
7	flt	586	1,057.85	1.242%	0.01	6.73	0.69	1.2242%	0.71	1.0
8	Inc	33	46.25	0.054%	0.01	6.69	2.44	0.1885%	2.06	0.8
10	Ovb	16	20.95	0.025%	0.36	2.2	0.87	0.0304%	0.51	0.6
17	MV	9	21.35	0.025%	0.33	0.79	0.55	0.0195%	0.16	0.3
20	Dk	540	941.85	1.106%	0.01	3.37	0.43	0.6785%	0.46	1.1
30	GS	45	67.75	0.080%	1.84	11.91	5.47	0.6184%	2.81	0.5
31	MGS	5	7.4	0.009%	1.73	8.83	6.29	0.0776%	3.17	0.5
32	MS	7	11	0.013%	0.69	24.86	3.93	0.0720%	5.24	1.3
33	SMS	1	2.01	0.002%	10.3	10.3	10.30	0.0345%	0.00	0.0
50	CS	134	220.47	0.259%	0.01	5.35	1.16	0.4261%	1.30	1.1
51	Hfs	312	596.93	0.701%	0.05	6.85	1.55	1.5378%	1.24	0.8
52	MSD	270	537.19	0.631%	0.03	9.5	1.25	1.1206%	1.68	1.3
53	Phy	88	232.14	0.273%	0.13	3.24	1.26	0.4866%	0.90	0.7
90	Di	455	1,060.00	1.244%	0.01	5.18	0.65	1.1489%	0.62	1.0
91	gDi	20	35.15	0.041%	0.02	1.62	0.51	0.0300%	0.38	0.7
100	cPx	2,190	3,718.39	4.365%	0.01	16.6	1.38	8.5255%	1.50	1.1
101	mtcPx	1,726	2,683.19	3.150%	0.01	7.59	0.57	2.5279%	0.94	1.7
102	ocPx	3,913	7,258.70	8.521%	0.01	21.9	1.13	13.7135%	1.24	1.1
108	hbcPx	805	1,608.18	1.888%	0.01	9.02	0.67	1.8047%	0.71	1.1
109	Hb	1,004	1,761.82	2.068%	0.01	7.65	0.93	2.7233%	1.03	1.1
110	Du	17,396	31,860.84	37.402%	0.01	12.04	0.57	30.2825%	0.74	1.3
111	Wh	13,048	24,933.44	29.269%	0.01	16.05	0.71	29.4773%	0.89	1.3
115	Sp	1,243	2,053.45	2.411%	0.01	12.74	0.60	2.0510%	0.86	1.4
120	gDu	2,405	4,225.95	4.961%	0.01	4.25	0.12	0.8667%	0.28	2.3
130	Um	60	129.25	0.152%	0.01	3.59	0.97	0.2080%	0.75	0.8
Total		**46,354**	**85,185.85**	**100%**	**0.01**	**24.86**	**0.70**	**100%**	**0.95**	**1.3**
All		**46,620**	**85,773.75**		**0.01**	**24.86**	**0.70**		**0.95**	**1.3**

Note: Total may not add due to rounding.

Table 14-5: Statistics for Palladium
(Source: Kirkham, 2023)

Lith Code	Lithology	#	Length (m)	% Length	Min	Max	Mean	% width*grade	SD	CV
1	Am	3	1.9	0.002%	4	37	8	0.001%	10	1.4
2	Basalt	2	3.2	0.004%	1	1	1	0.000%	0	0.0
3	bx	23	43.8	0.055%	1	89	21	0.044%	20	1.0
4	Qtz	15	45.5	0.057%	1	117	5	0.012%	19	3.5
7	flt	540	983.3	1.231%	1	1602	26	1.255%	105	4.0
8	Inc	31	43.6	0.055%	1	852	92	0.195%	190	2.1
10	Ovb	6	5.8	0.007%	2	62	27	0.008%	22	0.8
17	MV	9	21.4	0.027%	1	8	3	0.003%	3	0.8
20	Dk	502	898.6	1.125%	1	245	12	0.514%	19	1.6
30	GS	35	57.8	0.072%	3	62	24	0.067%	15	0.6
31	MGS	5	7.4	0.009%	21	46	37	0.014%	11	0.3
32	MS	6	10	0.013%	16	54	28	0.013%	12	0.5
33	SMS	1	2	0.003%	62	62	62	0.006%	0	0.0
50	CS	81	156.6	0.196%	1	57	12	0.093%	13	1.0
51	Hfs	312	596.9	0.747%	1	255	9	0.263%	21	2.3
52	MSD	263	520.7	0.652%	1	115	12	0.313%	16	1.3
53	Phy	88	232.1	0.291%	1	28	5	0.059%	5	1.0
90	Di	446	1,033.80	1.294%	1	66	8	0.399%	8	1.0
91	gDi	20	35.2	0.044%	1	21	5	0.009%	6	1.1
100	cPx	1,968	3,362.10	4.209%	1	2320	29	4.720%	69	2.4
101	mtcPx	1,726	2,683.20	3.359%	1	2318	63	8.242%	115	1.8
102	oxPx	3,659	6,831.90	8.554%	1	964	22	7.218%	44	2.0
108	hbcPx	805	1,608.20	2.013%	1	756	42	3.264%	67	1.6
109	Hb	995	1,748.40	2.189%	1	916	28	2.420%	55	1.9
110	Du	16,017	29,777.20	37.281%	1	744	23	33.208%	33	1.4
111	Wh	12,026	23,166.90	29.005%	1	1455	24	27.422%	42	1.7
115	Sp	1,065	1,773.20	2.220%	1	178	22	1.891%	27	1.2
120	gDu	2,333	4,092.00	5.123%	1	457	17	3.403%	29	1.7
130	Um	60	129.3	0.162%	2	65	8	0.052%	10	1.2
Total		**43,042**	**79,871.50**	**100.000%**	**1**	**2320**	**24**	**95.324%**	**47**	**1.9**
All		**43,308**	**80,459.40**		**1**	**2320**	**24**		**47**	**1.9**

Note: Total may not add due to rounding.

Table 14-6: Statistics for Platinum
(Source: Kirkham, 2023)

Lith Code	Lithology	#	Length (m)	% Length	Min	Max	Mean	% width*grade	SD	CV
1	Am	3	1.9	0.003%	4	34	7	0.001%	9	1.3
2	Basalt	2	3.2	0.004%	2	2	2	0.000%	0	0.0
3	bx	23	43.8	0.058%	1	71	20	0.041%	19	0.9
4	Qtz	15	45.5	0.061%	2	98	6	0.012%	15	2.8
7	flt	540	983.3	1.309%	1	1974	27	1.261%	129	4.7
8	Inc	31	43.6	0.058%	2	551	86	0.175%	166	1.9
10	Ovb	6	5.8	0.008%	4	61	25	0.007%	21	0.8
17	MV	9	21.4	0.028%	2	6	3	0.003%	2	0.5
20	Dk	476	843.9	1.123%	1	137	11	0.448%	17	1.5
30	GS	35	57.8	0.077%	1	72	20	0.053%	17	0.9
31	MGS	5	7.4	0.010%	19	62	42	0.015%	15	0.4
32	MS	6	10	0.013%	9	73	16	0.008%	16	1.0
33	SMS	1	2	0.003%	20	20	20	0.002%	0	0.0
50	CS	78	151.1	0.201%	1	88	12	0.087%	15	1.2
51	Hfs	311	595.4	0.792%	1	196	8	0.224%	20	2.5
52	MSD	214	408.9	0.544%	1	170	13	0.246%	23	1.8
53	Phy	88	232.1	0.309%	1	27	4	0.043%	5	1.3
90	Di	374	856.3	1.140%	1	63	8	0.338%	8	1.0
91	gDi	20	35.2	0.047%	1	22	5	0.009%	6	1.2
100	cPx	1,946	3,292.90	4.382%	1	2561	29	4.438%	75	2.6
101	mtcPx	1,726	2,683.20	3.571%	1	2666	63	7.963%	122	1.9
102	oxPx	3,186	5,729.80	7.625%	1	1067	24	6.323%	50	2.1
108	hbcPx	788	1,556.90	2.072%	1	1231	44	3.224%	76	1.7
109	Hb	984	1,717.20	2.285%	1	1086	29	2.355%	65	2.2
110	Du	15,645	28,895.00	38.452%	1	726	22	30.122%	33	1.5
111	Wh	11,159	21,002.00	27.949%	1	1290	25	24.458%	44	1.8
115	Sp	1,065	1,773.20	2.360%	1	203	20	1.665%	25	1.3
120	gDu	2,306	4,017.00	5.346%	1	489	18	3.320%	32	1.8
130	Um	60	129.3	0.172%	1	50	7	0.041%	9	1.3
Total		**41,102**	**75,144.90**	**100.000%**	**1**	**2666**	**25**	**86.803%**	**50**	**2.0**
All		**41,368**	**75,732.80**		**1**	**2666**	**25**		**50**	**2.0**

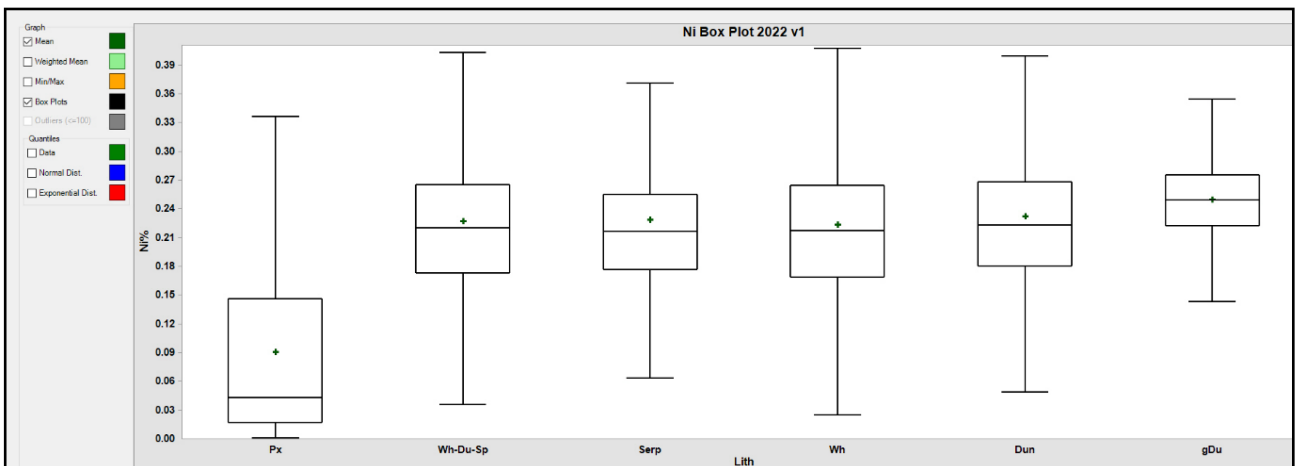
Note: Total may not add due to rounding.

The box plots illustrate the various lithologic units along with their statistical relationship to each other, showing that there are grade similarities that justify the grouping of particular lithologic units. Therefore, it is acceptable to treat them in a similar manner both geologically and statistically. Box plots for all lithologic units are shown in Figure 14-2 through Figure 14-6 for nickel, cobalt, sulphur, palladium and platinum, respectively. The lithology units displayed represent greater than 92% of the samples and do not list all units as shown in Table 14-2 to Table 14-6 for the sake of brevity and significance. These include dunite, wehrlite, green dunite, serpentinite and pyroxenites such as clinopyroxenite, olivine clinopyroxenite, magnetite clinopyroxenite, hornblende clinopyroxenite.

In order to evaluate lithologies for the purpose of determining if the grouping of dunite, green dunite, wehrlite and serpentinite are logical and justifiable, Figure 14-7 through Figure 14-11 are shown for nickel, cobalt, sulphur, palladium and platinum, respectively. Nickel, cobalt, platinum and palladium box plots show a very good correlation and support for grouping although the sulphur results appear to justify that the green dunite might be estimated separately however further statistical analysis is required.

To further support the possible statistical groupings during estimation of nickel and sulphur, a useful analysis is the comparison of the nickel-to-sulphur ratio against the nickel grades by lithologic unit as shown in the plot in Figure 14-12. It is clear that dunite, wehrlite and serpentinite are very similar. It also appears that the green dunite is statistically different from all other zones and understandable that it may make sense to estimate separately. However, upon manual inspection this differentiation is merely statistical and global whereas locally, there is essentially no difference in nickel, cobalt and sulphur values at the transitions between the two units. Figure 14-13 illustrates an example of drill holes that point to the fact that the green dunite does not differ from the dunite or wehrlite locally and therefore should not be estimated separately as has been thought up to current.

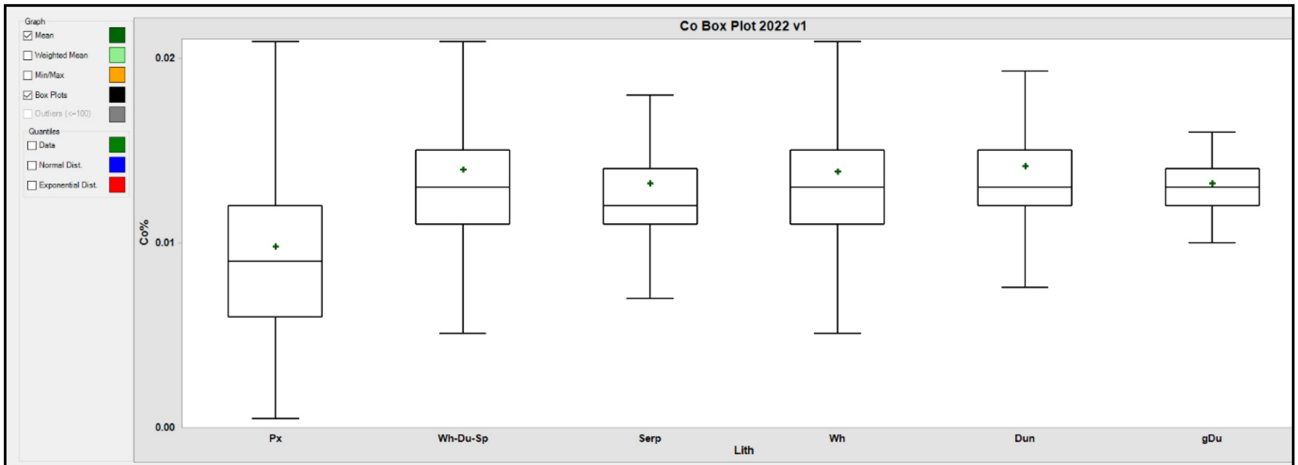
In addition, the clinopyroxenite, olivine clinopyroxenite, magnetite clinopyroxenite and hornblende clinopyroxenite were also statistically evaluated to determine if there are logical, justifiable groupings. It appears that there is no justification to separate the sub-groups during estimation.



	Px	Wh-Du-Sp	Serp	Wh	Dun	gDu
Num Samples	9638	32422	1243	13046	17396	2405
Num Missing Samples	32	101	28	26	40	0
Min	0.0005	0.0000	0.0040	0.0000	0.0005	0.0010
Max	5.1480	2.8610	1.6460	2.5870	2.8610	0.7500
Mean	0.09053	0.22712	0.22872	0.22341	0.23244	0.24994
First quartile	0.01704	0.17302	0.17601	0.16803	0.18003	0.22203
Median	0.04301	0.22000	0.21598	0.21701	0.22299	0.24898
Third quartile	0.14600	0.26497	0.25498	0.26399	0.26795	0.27495
SD	0.12873	0.09831	0.10723	0.10359	0.09134	0.05361
Variance	0.01657	0.00967	0.01150	0.01073	0.00834	0.00287
CV	1.42196	0.43288	0.46882	0.46368	0.39296	0.21451

Figure 14-2: Box Plot of Nickel Composites by Lithology

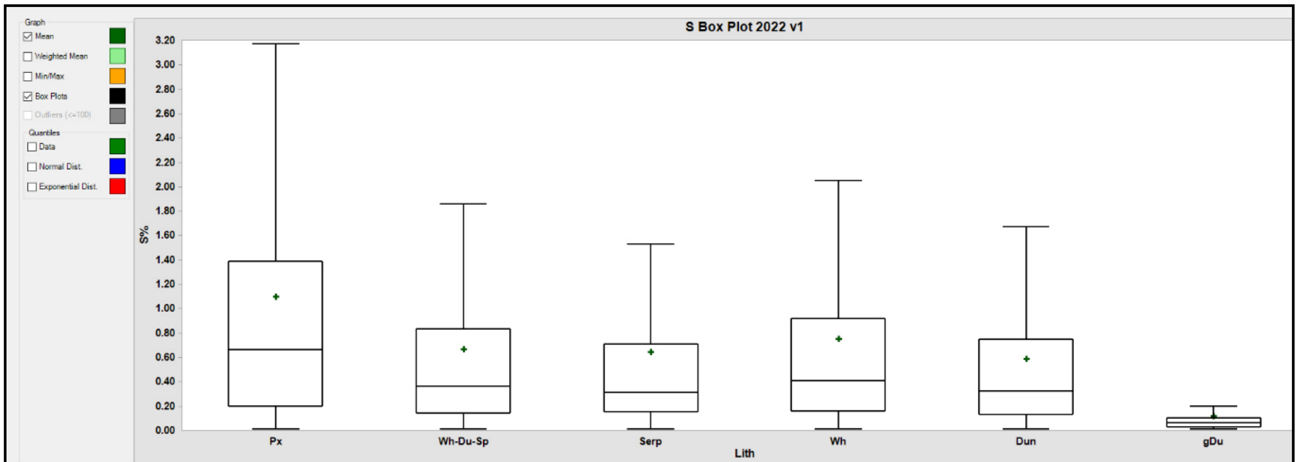
(Source: Kirkham, 2023)



	Px	Wh-Du-Sp	Serp	Wh	Dun	gDu
Num Samples	9638	32424	1243	13048	17396	2405
Num Missing Samples	32	99	28	24	40	0
Min	0.0005	0.0000	0.0010	0.0000	0.0005	0.0005
Max	0.1460	0.1660	0.0970	0.1410	0.1660	0.0300
Mean	0.00980	0.01397	0.01323	0.01387	0.01417	0.01321
First quartile	0.00600	0.01100	0.01100	0.01100	0.01200	0.01200
Median	0.00900	0.01300	0.01200	0.01300	0.01300	0.01300
Third quartile	0.01200	0.01500	0.01400	0.01500	0.01500	0.01400
SD	0.00555	0.00521	0.00568	0.00538	0.00485	0.00222
Variance	0.00003	0.00003	0.00003	0.00003	0.00002	0.00000
CV	0.56620	0.37291	0.42917	0.38819	0.34251	0.16771

Figure 14-3: Box Plot of Cobalt Composites by Lithology

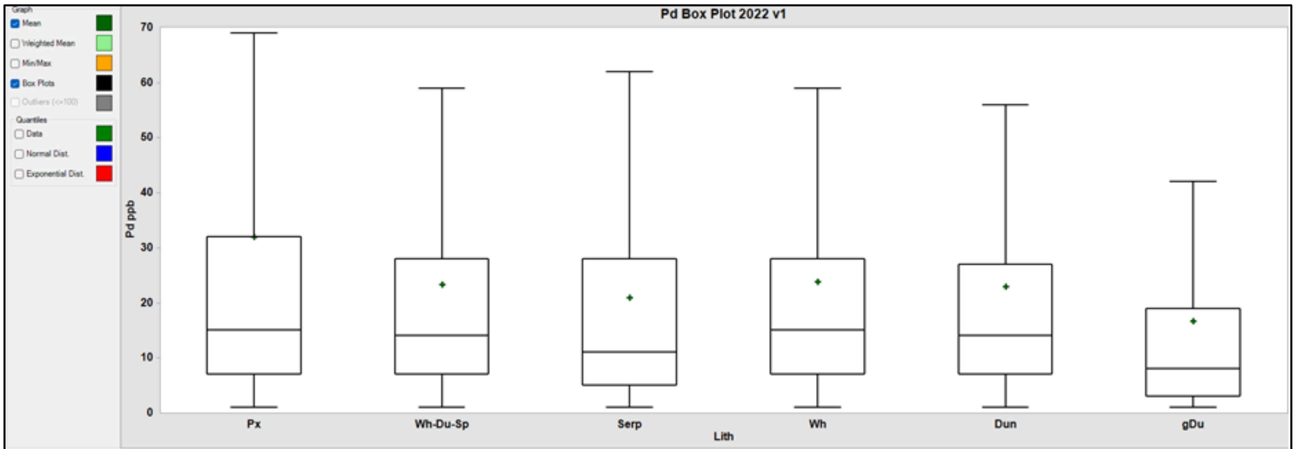
(Source: Kirkham, 2023)



	Px	Wh-Du-Sp	Serp	Wh	Dun	gDu
Num Samples	9638	32424	1243	13048	17396	2405
Num Missing Samples	32	99	28	24	40	0
Min	0.01	0.01	0.01	0.01	0.01	0.01
Max	21.90	24.86	12.74	16.05	12.04	4.25
Mean	1.097	0.671	0.645	0.752	0.588	0.119
First quartile	0.200	0.140	0.150	0.160	0.130	0.030
Median	0.660	0.360	0.310	0.410	0.320	0.060
Third quartile	1.390	0.830	0.710	0.920	0.750	0.100
SD	1.358	0.913	0.961	0.977	0.761	0.252
Variance	1.843	0.834	0.924	0.955	0.578	0.063
CV	1.237	1.361	1.490	1.299	1.294	2.121

Figure 14-4: Box Plot of Sulphur Composites by Lithology

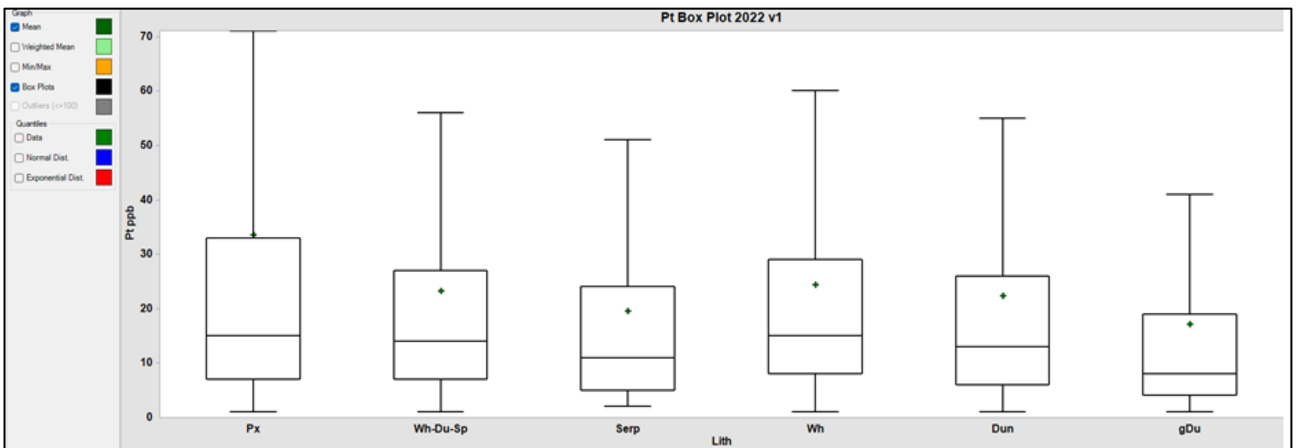
(Source: Kirkham, 2023)



	Px	Wh-Du-Sp	Serp	Wh	Dun	gDu
Num Samples	4247	13547	375	5661	7296	958
Num Missing Samples	221	899	57	349	474	25
Min	1	1	1	1	1	1
Max	833	1,602	157	1,192	625	229
Mean	32.0	23.3	21.0	23.8	22.9	16.7
First quartile	7.0	7.0	5.0	7.0	7.0	3.0
Median	15.0	14.0	11.0	15.0	14.0	8.0
Third quartile	32.0	28.0	28.0	28.0	27.0	19.0
SD	59.8	36.2	25.1	36.4	31.2	24.6
Variance	3,577.4	1,308.5	630.2	1,326.0	973.8	604.2
CV	1.9	1.6	1.2	1.5	1.4	1.5
Skewness	6.1	13.0	2.3	11.2	5.2	3.7

Figure 14-5: Box Plot of Palladium Composites by Lithology

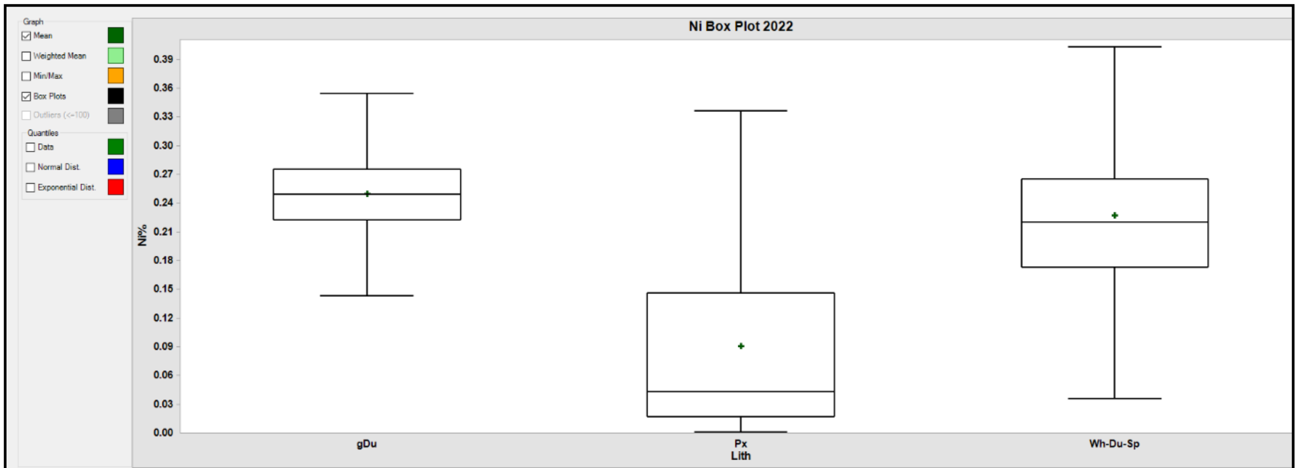
(Source: Kirkham, 2023)



	Px	Wh-Du-Sp	Serp	Wh	Dun	gDu
Num Samples	3962	12918	373	5217	7113	941
Num Missing Samples	506	1528	59	793	657	42
Min	1	1	2	1	1	1
Max	1,102	1,974	143	1,054	536	243
Mean	33.6	23.2	19.6	24.5	22.4	17.2
First quartile	7.0	7.0	5.0	8.0	6.0	4.0
Median	15.0	14.0	11.0	15.0	13.0	8.0
Third quartile	33.0	27.0	24.0	29.0	26.0	19.0
SD	64.9	37.7	23.0	37.0	30.9	26.0
Variance	4,210.7	1,422.4	528.9	1,367.1	954.0	675.4
CV	1.9	1.6	1.2	1.5	1.4	1.5
Skewness	6.3	16.1	2.4	9.7	4.9	3.7

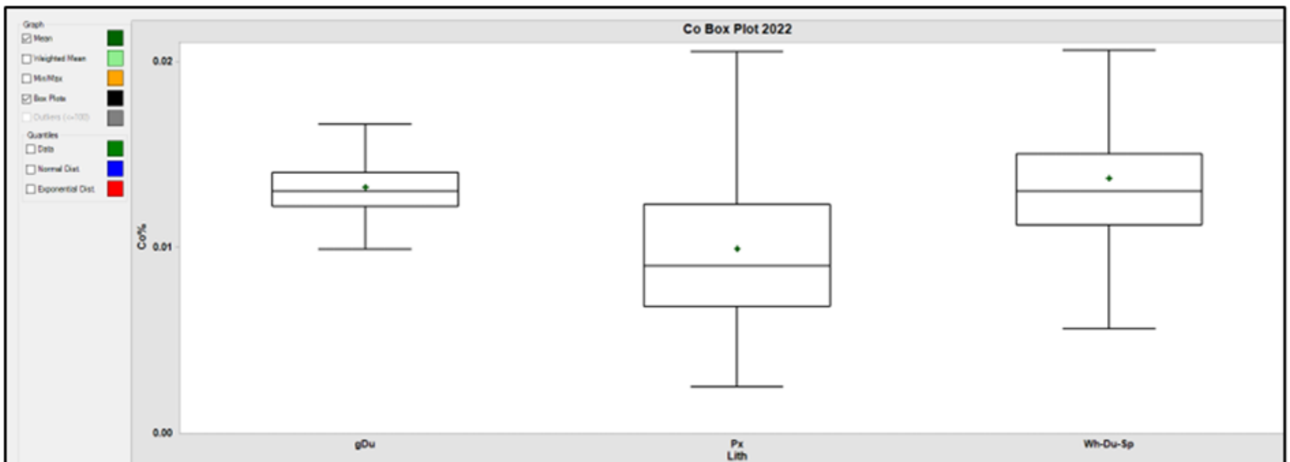
Figure 14-6: Box Plot of Platinum Composites by Lithology

(Source: Kirkham, 2023)



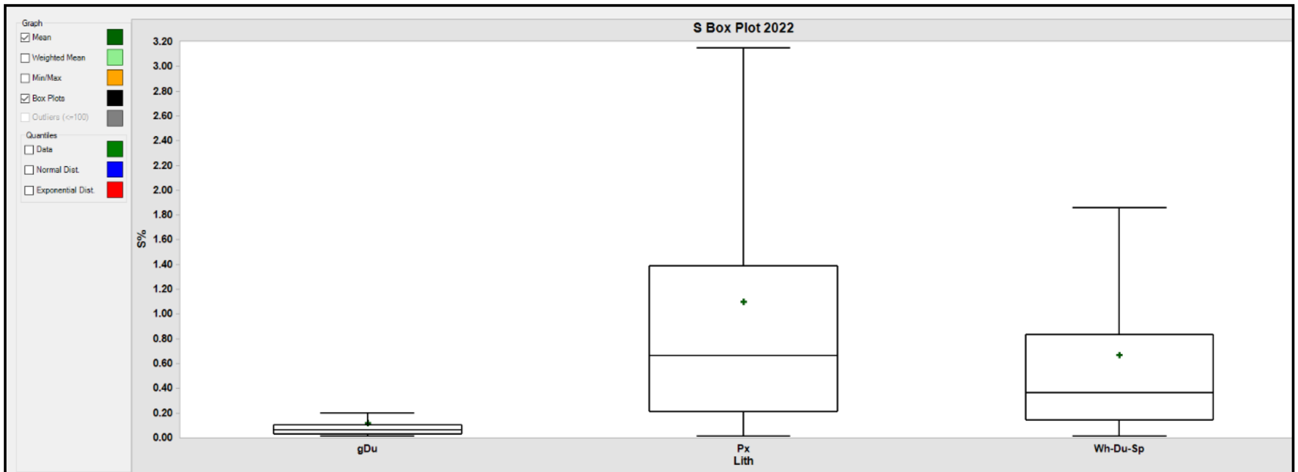
	gDu	Px	Wh-Du-Sp
Num Samples	2405	9641	32427
Num Missing Samples	0	32	102
Min	0.0010	0.0005	0.0000
Max	0.7500	5.1480	2.8610
Mean	0.24994	0.09053	0.22712
First quartile	0.22203	0.01704	0.17302
Median	0.24898	0.04301	0.22000
Third quartile	0.27495	0.14600	0.26497
SD	0.05361	0.12872	0.09831
Variance	0.00287	0.01657	0.00966
CV	0.21451	1.42182	0.43285

Figure 14-7: Box Plot of Nickel Composites for Dunite, Green Dunite, Wehrlite, Serpentinite (Source: Kirkham, 2023)



	gDu	Px	Wh-Du-Sp
Num Samples	982	4455	14402
Num Missing Samples	1	13	44
Min	0.0050	0.0025	0.0005
Max	0.0235	0.0851	0.0856
Mean	0.01322	0.00994	0.01373
First quartile	0.01220	0.00680	0.01120
Median	0.01300	0.00900	0.01300
Third quartile	0.01400	0.01230	0.01500
SD	0.00193	0.00490	0.00426
Variance	0.00000	0.00002	0.00002
CV	0.14577	0.49353	0.31027

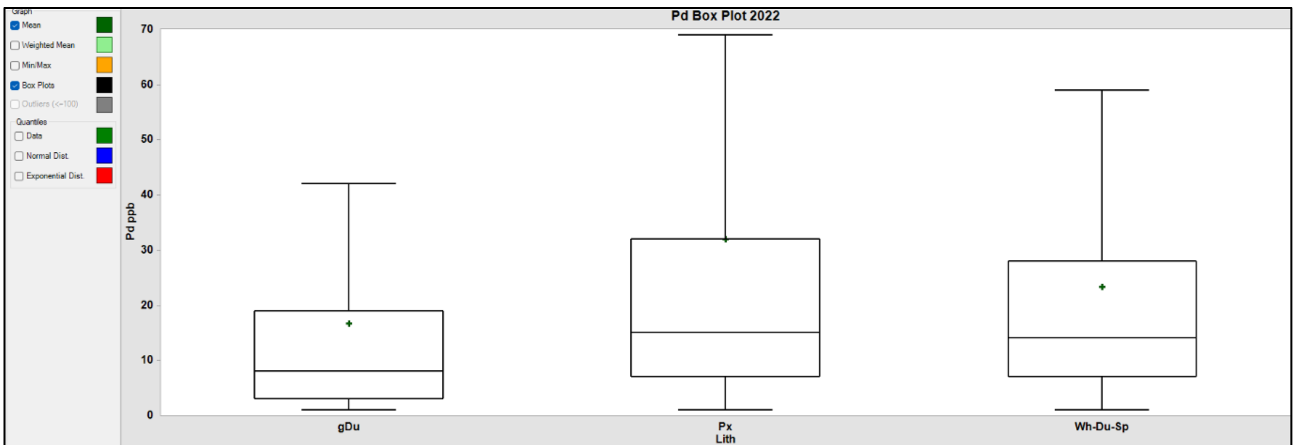
Figure 14-8: Box Plot of Cobalt Composites for Dunite, Green Dunite, Wehrlite, Serpentinite (Source: Kirkham, 2023)



	gDu	Px	Wh-Du-Sp
Num Samples	2405	9641	32429
Num Missing Samples	0	32	100
Min	0.01	0.01	0.01
Max	4.25	21.90	24.86
Mean	0.119	1.097	0.671
First quartile	0.030	0.210	0.140
Median	0.060	0.660	0.360
Third quartile	0.100	1.390	0.830
SD	0.252	1.357	0.913
Variance	0.063	1.842	0.834
CV	2.121	1.237	1.361

Figure 14-9: Box Plot of Sulphur Composites by Lithology

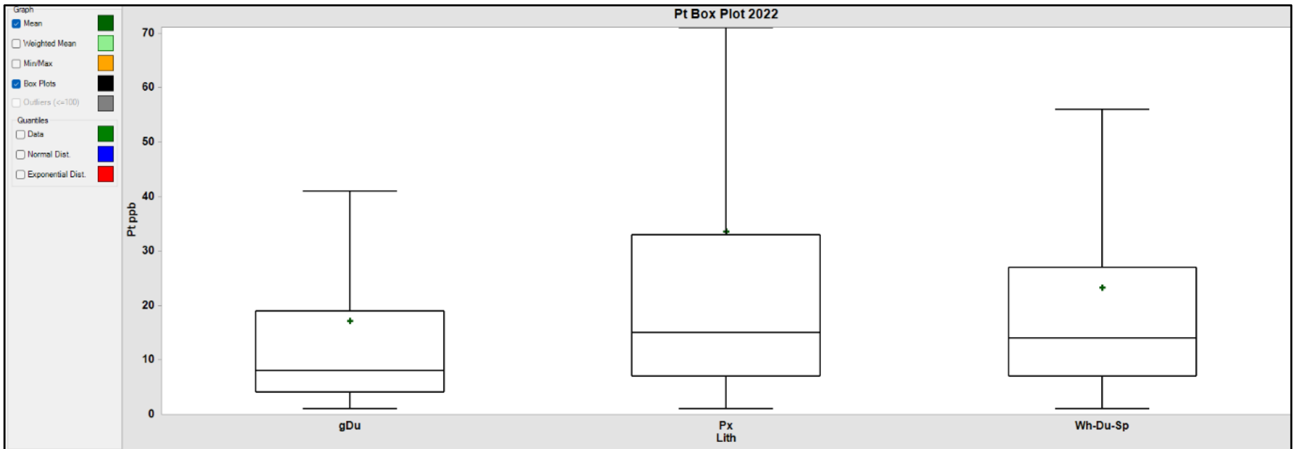
(Source: Kirkham, 2023)



	gDu	Px	Wh-Du-Sp
Num Samples	958	4247	13547
Num Missing Samples	25	221	899
Min	1	1	1
Max	229	833	1,602
Mean	16.7	32.0	23.3
First quartile	3.0	7.0	7.0
Median	8.0	15.0	14.0
Third quartile	19.0	32.0	28.0
SD	24.6	59.8	36.2
Variance	604.2	3,577.4	1,308.5
CV	1.5	1.9	1.6
Skewness	3.7	6.1	13.0

Figure 14-10: Box Plot of Palladium Composites for Dunite, Green Dunite, Wehrlite, Serpentinite

(Source: Kirkham, 2023)



	gDu	Px	Wh-Du-Sp
Num Samples	941	3962	12918
Num Missing Samples	42	506	1528
Min	1	1	1
Max	243	1,102	1,974
Mean	17.2	33.6	23.2
First quartile	4.0	7.0	7.0
Median	8.0	15.0	14.0
Third quartile	19.0	33.0	27.0
SD	26.0	64.9	37.7
Variance	675.4	4,210.7	1,422.4
CV	1.5	1.9	1.6
Skewness	3.7	6.3	16.1

Figure 14-11: Box Plot of Platinum Composites for Dunite, Green Dunite, Wehrlite, Serpentinite
(Source: Kirkham, 2023)

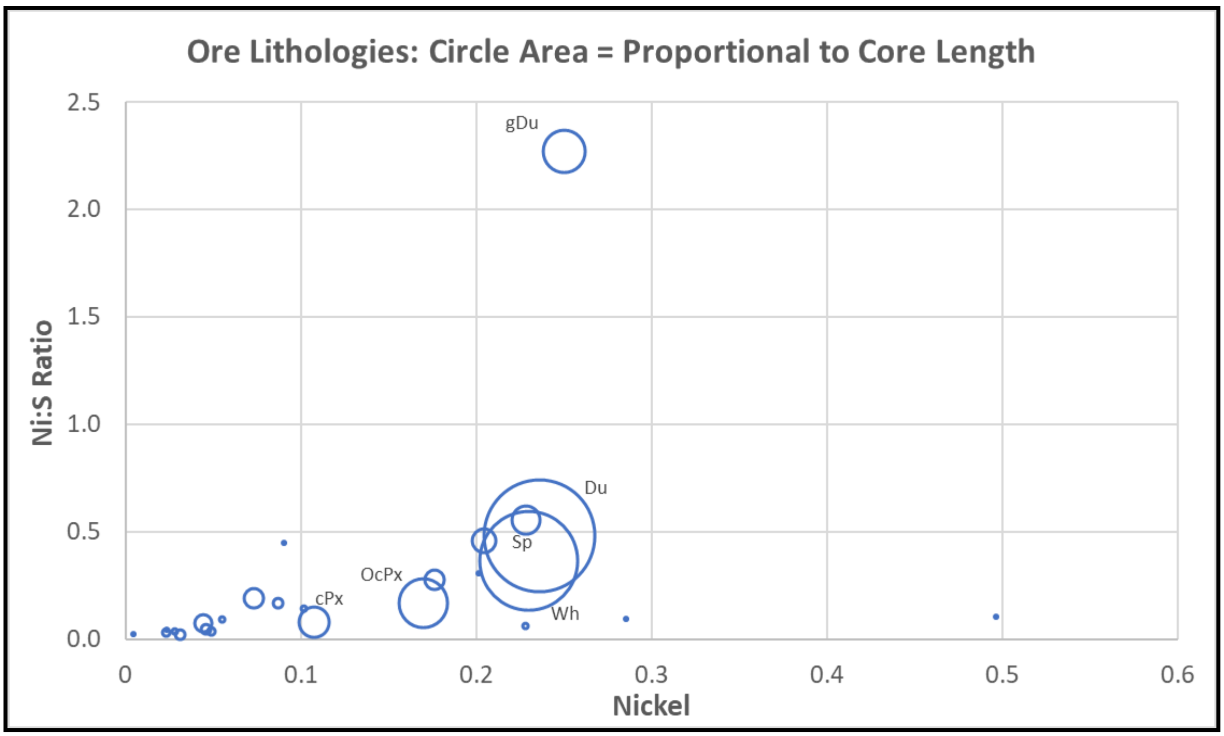


Figure 14-12: Plot of Nickel-to-Sulphur Ratio vs. Nickel Grade by Lithology Unit
(Source: Kirkham, 2023)

Query Drillhole View Drill View1 22s (1) / Drillhole DDH06-110

File View

	FROM	-TO-	-AI-	NI	CO	S	LITH1	LITH5	LITH6	LITH8	CODE	ZONE
57	100.00	100.50	0.50	0.2520	0.0120	0.06	gDu	120	2	1	1	13
58	100.50	103.50	3.00	0.2520	0.0120	0.06	gDu	120	2	1	1	13
59	103.50	104.00	0.50	0.2520	0.0120	0.06	gDu	120	2	1	1	13
60	104.00	106.50	2.50	0.2540	0.0130	0.02	gDu	120	2	1	1	13
61	106.50	108.00	1.50	0.2540	0.0130	0.02	gDu	120	2	1	1	13
62	108.00	109.50	1.50	0.2570	0.0130	0.02	gDu	120	2	1	1	13
63	109.50	112.00	2.50	0.2570	0.0130	0.02	gDu	120	2	1	1	13
64	112.00	112.50	0.50	0.2410	0.0130	0.02	gDu	120	2	1	1	13
65	112.50	115.50	3.00	0.2410	0.0130	0.02	gDu	120	2	1	1	13
66	115.50	116.00	0.50	0.2410	0.0130	0.02	gDu	120	2	1	1	13
67	116.00	118.50	2.50	0.2330	0.0130	0.06	gDu	120	2	1	1	13
68	118.50	120.00	1.50	0.2330	0.0130	0.06	gDu	120	2	1	1	13
69	120.00	121.50	1.50	0.2280	0.0130	0.04	gDu	120	2	1	1	13
70	121.50	124.00	2.50	0.2280	0.0130	0.04	gDu	120	2	1	1	13
71	124.00	124.50	0.50	0.2350	0.0130	0.04	Du	110	2	1	1	13
72	124.50	127.50	3.00	0.2350	0.0130	0.04	Du	110	2	1	1	13
73	127.50	128.00	0.50	0.2350	0.0130	0.04	Du	110	2	1	1	13
74	128.00	130.50	2.50	0.2490	0.0140	0.05	Du	110	2	1	1	13
75	130.50	132.00	1.50	0.2490	0.0140	0.05	Du	110	2	1	1	13
76	132.00	133.50	1.50	0.2150	0.0150	0.04	Du	110	2	1	1	13
77	133.50	136.00	2.50	0.2150	0.0150	0.04	Du	110	2	1	1	13
78	136.00	136.50	0.50	0.2150	0.0150	0.05	Du	110	2	1	1	13
79	136.50	139.50	3.00	0.2150	0.0150	0.05	Du	110	2	1	1	13
80	139.50	140.00	0.50	0.2150	0.0150	0.05	Du	110	2	1	1	13
81	140.00	142.50	2.50	0.2110	0.0140	0.05	Du	110	2	1	1	13

Figure 14-13: Drill Hole Logs Showing Local Grade Changes from gDu to Du

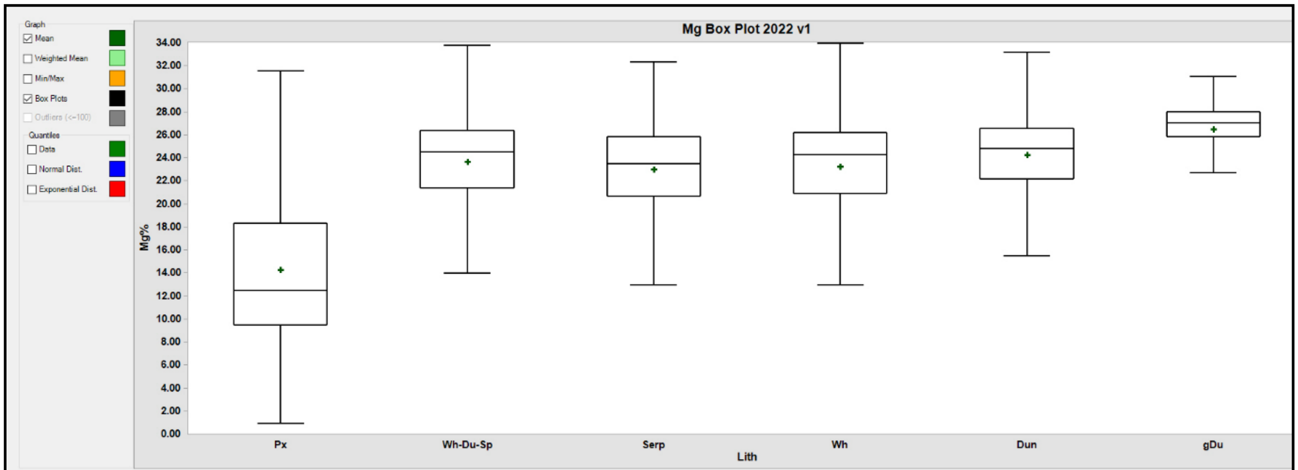
(Source: Kirkham, 2023)

In an effort to better understand the mineralogy of the various lithologies, as an aid to refining the logging of the data and to assist with domaining for analysis and estimation, a preliminary study was performed that breaks down the mineralogical compositions to compare the different rock types. This approach may be helpful in assisting with relogging of historic data by providing a more quantitative measure as opposed to the strictly qualitative methodology traditionally employed which tends to be subjective and can be influenced by biases depending on vintage and operator. A preliminary study (Broda, 2022) utilizing Microprobe data as shown in Table 14-7, illustrates potential thresholds that might be expected of various rock types based on relative element content namely, Mg%, Ca%, Fe%, Al%. Realignment of rock code logging was attempted preliminarily and shows promise. Although relatively difficult to be precise, this approach serves as a guide and/or a confirmation of the logged intervals. However, the box plots for Mg%, Ca%, Fe%, Al% as shown in Figure 14-14 through Figure 14-17 appear to confirm, from a global perspective, that the qualitative (logging) and the quantitative (ICP assays) are in broad agreement with the Broda (2022) assumptions and conclusions.

Table 14-7: Thresholds for Rock Compositions

(Source: Broda, 2022)

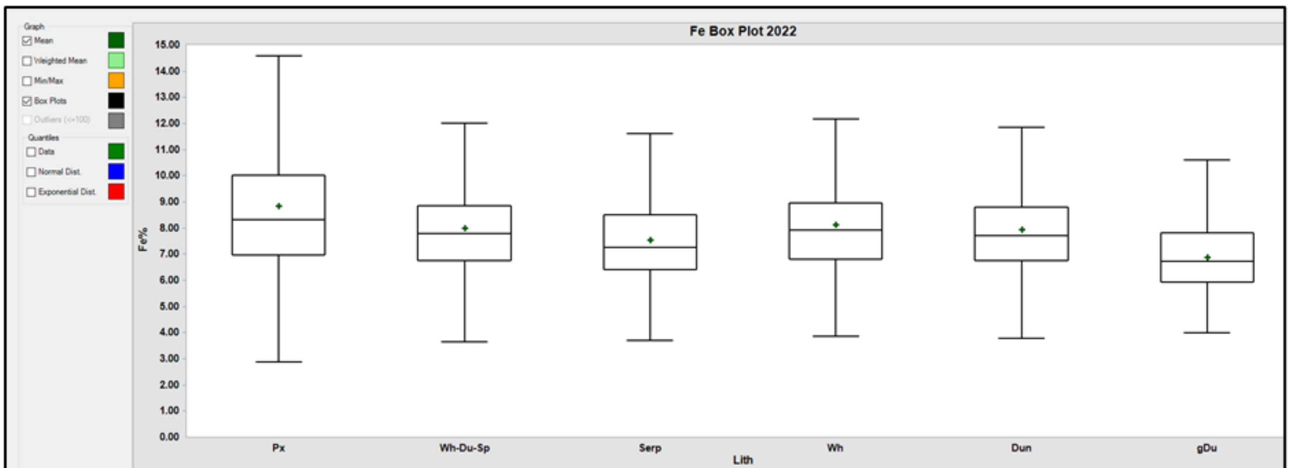
Lith	Mg% max	Mg% Min	Ca% Max	Ca% Min	Fe% Max	Fe% Min	Al% Max	Al% Min	Comment
Du	33.4	12.1	1.7	0.0	28.5	1.8	0	0	Calculates composition for dunite with varying % of antigorite and magnetite and various Fayalite/Forsterite and pyroxene compositions from Microprobe data
Wh	28.8	9.0	9.6	3.2	35.1	2.6	0	0	Calculates composition for Wh with varying % of antigorite and magnetite and various Fayalite/Forsterite and pyroxene compositions from Microprobe data
ocPx	18.5	9.3	14.2	7.0	24.7	2.5	0	0	Calculates composition for ocPx with varying % of antigorite and magnetite and various Fayalite/Forsterite and pyroxene compositions from Microprobe data
cPx	12.7	9.4	15.5	11.6	17.8	2.5	0	0	Calculates composition for cPx with varying % of antigorite and magnetite and various Fayalite/Forsterite and pyroxene compositions from Microprobe data
hbcPx	12.7	10.6	14.9	10.6	9.9	2.2	2.6	0.6	Calculates composition for hbcPx with varying % magnetite
Hb	12.7	11.2	10.3	9.3	5.3	1.7	5.8	5.2	Calculates composition for Hb with varying % magnetite
cpxHb	12.7	10.6	12.6	8.6	9.5	1.8	4.9	2.9	Calculates composition for cpxHb with varying % magnetite



	Px	Wh-Du-Sp	Serp	Wh	Dun	gDu
Num Samples	9638	32418	1243	13048	17390	2405
Num Missing Samples	32	105	28	24	46	0
Min	0.89	0.01	0.77	0.64	0.01	0.68
Max	32.77	36.05	32.32	35.00	36.05	34.51
Mean	14.236	23.640	23.000	23.220	24.254	26.481
First quartile	9.430	21.380	20.670	20.880	22.130	25.840
Median	12.450	24.470	23.480	24.260	24.790	26.990
Third quartile	18.300	26.340	25.840	26.200	26.560	28.000
SD	6.005	4.352	4.543	4.318	4.063	3.466
Variance	36.063	18.940	20.639	18.647	16.504	12.016
CV	0.422	0.184	0.198	0.186	0.167	0.131

Figure 14-14: Box Plot of Magnesium Composites by Lithology

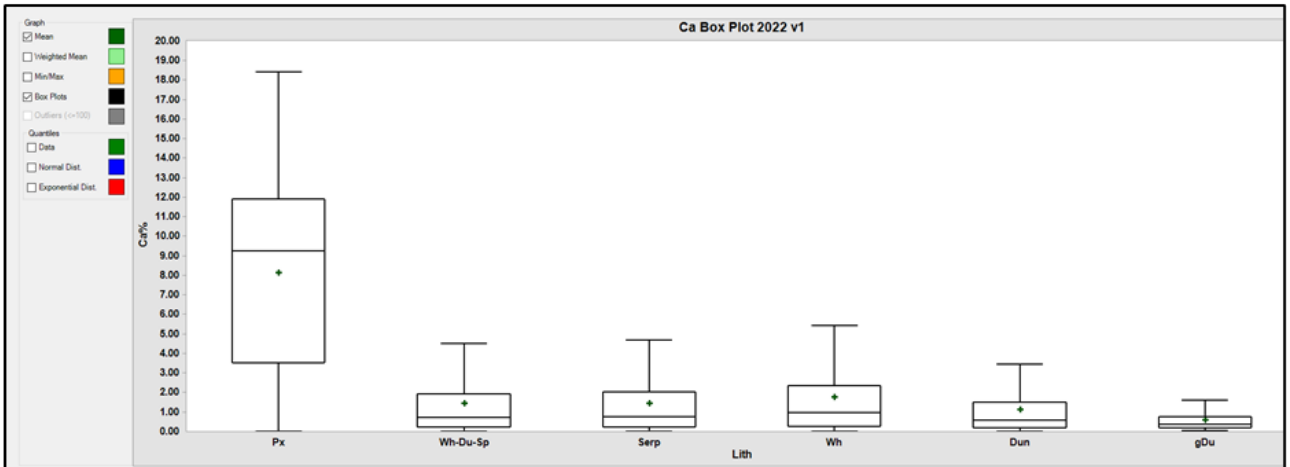
(Source: Kirkham, 2023)



	Px	Wh-Du-Sp	Serp	Wh	Dun	gDu
Num Samples	9638	32424	1243	13048	17396	2405
Num Missing Samples	32	99	28	24	40	0
Min	0.74	0.01	0.42	0.33	0.01	0.46
Max	44.19	48.65	29.34	48.65	35.61	12.63
Mean	8.851	7.999	7.544	8.124	7.929	6.873
First quartile	6.950	6.740	6.390	6.800	6.750	5.930
Median	8.320	7.770	7.250	7.920	7.710	6.720
Third quartile	10.000	8.850	8.500	8.950	8.790	7.810
SD	2.827	1.912	2.110	1.987	1.744	1.406
Variance	7.991	3.657	4.452	3.948	3.042	1.977
CV	0.319	0.239	0.280	0.245	0.220	0.205

Figure 14-15: Box Plot of Iron Composites by Lithology

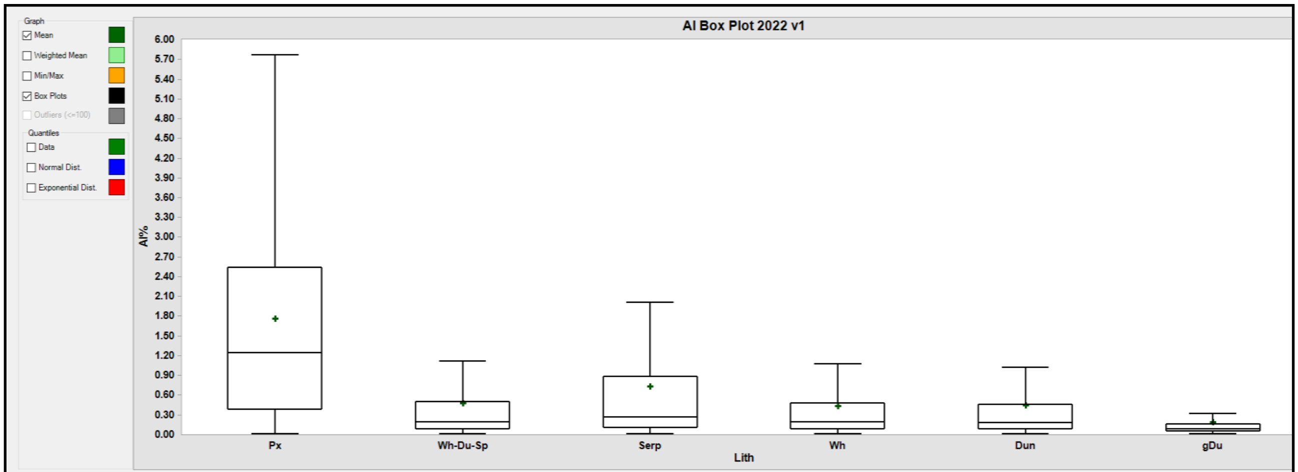
(Source: Kirkham, 2023)



	Px	Wh-Du-Sp	Serp	Wh	Dun	gDu
Num Samples	9638	32417	1243	13047	17390	2405
Num Missing Samples	32	106	28	25	46	0
Min	0.01	0.01	0.01	0.01	0.01	0.02
Max	18.42	21.60	13.35	14.42	12.91	9.60
Mean	8.157	1.449	1.460	1.768	1.122	0.604
First quartile	3.490	0.210	0.220	0.260	0.170	0.160
Median	9.240	0.710	0.750	0.950	0.550	0.350
Third quartile	11.900	1.920	2.020	2.320	1.480	0.730
SD	4.614	1.899	1.872	2.075	1.556	0.788
Variance	21.291	3.606	3.506	4.307	2.423	0.621
CV	0.566	1.311	1.282	1.174	1.387	1.304

Figure 14-16: Box Plot of Calcium Composites by Lithology

(Source: Kirkham, 2023)



	Px	Wh-Du-Sp	Serp	Wh	Dun	gDu
Num Samples	9633	32403	1243	13038	17385	2405
Num Missing Samples	37	120	28	34	51	0
Min	0.01	0.01	0.01	0.01	0.01	0.01
Max	9.65	10.08	9.09	10.07	10.08	7.75
Mean	1.765	0.475	0.733	0.436	0.442	0.195
First quartile	0.380	0.080	0.110	0.080	0.080	0.050
Median	1.240	0.190	0.270	0.190	0.180	0.080
Third quartile	2.540	0.500	0.880	0.480	0.460	0.160
SD	1.782	0.844	1.164	0.736	0.817	0.474
Variance	3.174	0.712	1.355	0.541	0.668	0.225
CV	1.009	1.778	1.588	1.686	1.848	2.432

Figure 14-17: Box Plot of Aluminum Composites by Lithology

(Source: Kirkham, 2023)

14.4 Geology Model

The mineral resource estimate is based on the validated drill hole database, interpreted three-dimensional geological model and topographic data. The geologic modelling was completed using the commercially available software Seequent Leapfrog Geo 4.3. The estimation of mineral resources was completed using commercial three-dimensional block modelling and mine planning software Hexagon Minesight™ MS3D Version 15.50.

Solid models (Figure 14-18) were created from coded drill hole intersections based primarily on lithology and site knowledge. It is important to note that the understanding and interpretation has evolved to be that of relatively flat lying units intruded by late dykes and bounding volcanics. The intruding dykes as interpreted within the lithological logs are isolated and discontinuous. Previous models attempted to segregate with limited success. Currently, these units are not modelled however, they may potentially be identified and segregated so that they may be assigned to waste. However, at this time they are considered internal waste to the model and included as internal dilution.

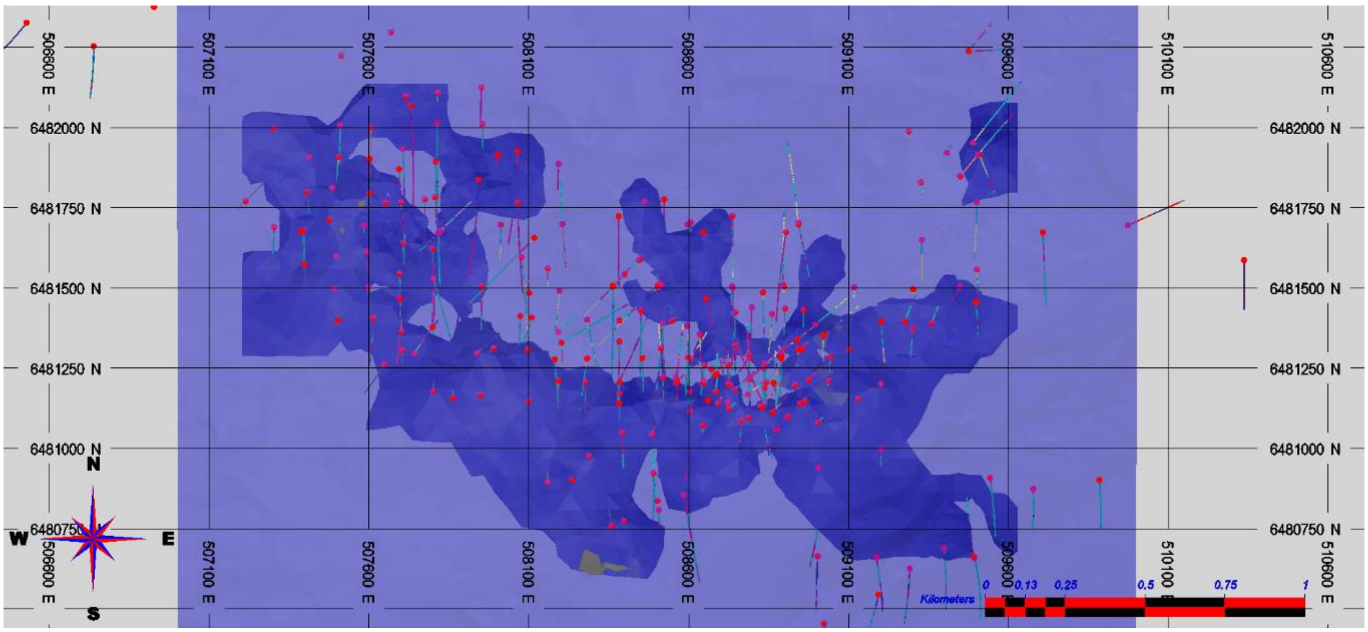


Figure 14-18: Plan View of Turnagain Deposit Geology Domains & Drill Holes

(Source: Kirkham, 2023)

Notes: light blue = Wh-Du-Sp; dark blue = pyroxenes.

The database was numerically coded by solids for the various zones. Intersections were inspected to ensure approximate agreement with the solids and then manually adjusted to match the drill intercepts where required. Once the solid model was created, it was used to code the drill hole assays and composites for subsequent statistical and geostatistical analyses. The solid zones were used to constrain the block model by matching assays to those within the zones. The orientation and ranges (distances) used for search ellipsoids in the estimation process were derived from strike and dip of the mineralized zone, site knowledge and on-site observations by Giga Metals geological staff. It is important to note that the block model is coded with the solids on a whole block majority basis which results in smoothing of the coded blocks and exclusion of thin stringers.

14.5 Composites

It was determined that a 4.0 m composite length offered the best balance between supplying common support for samples and minimizing the smoothing of the grades. The 4.0 m sample length also was consistent with the distribution of sample lengths within the mineralized domains as shown in the histogram of assay lengths in Figure 14-19.

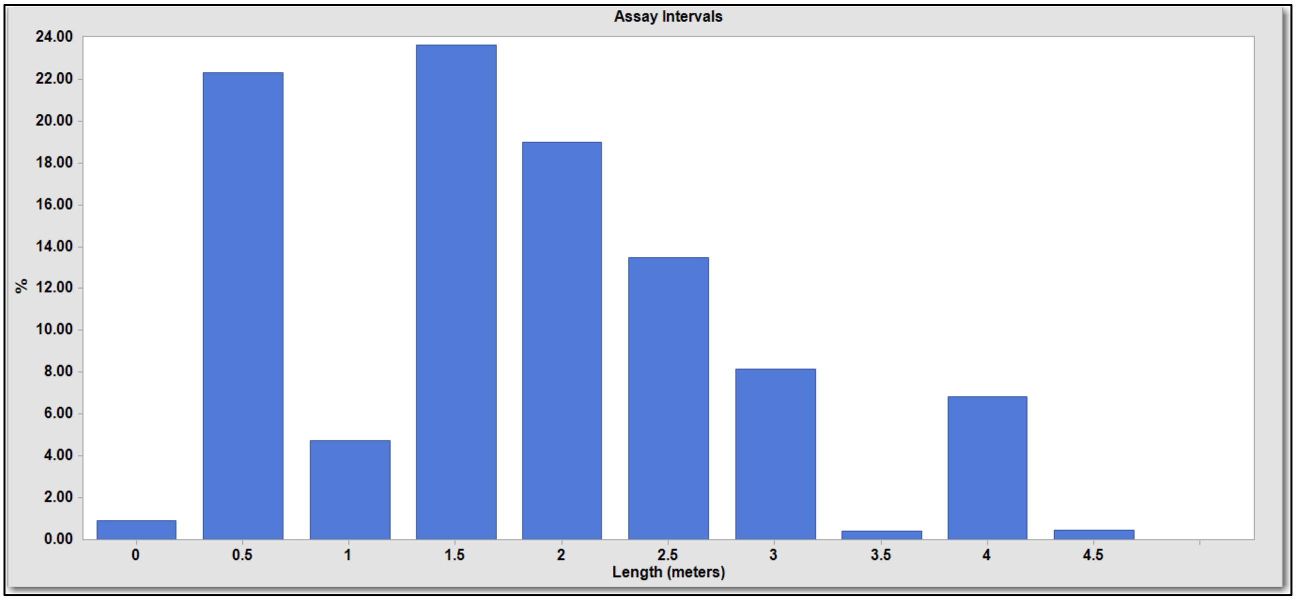


Figure 14-19: Assay Interval Lengths

(Source: Kirkham, 2023)

Figure 14-20 through Figure 14-24 show the histograms for nickel, cobalt, sulphur, palladium and platinum, respectively, within the mineralized solids for all zones which demonstrate well-formed normal distribution for nickel and cobalt and log-normal distribution for sulphur.

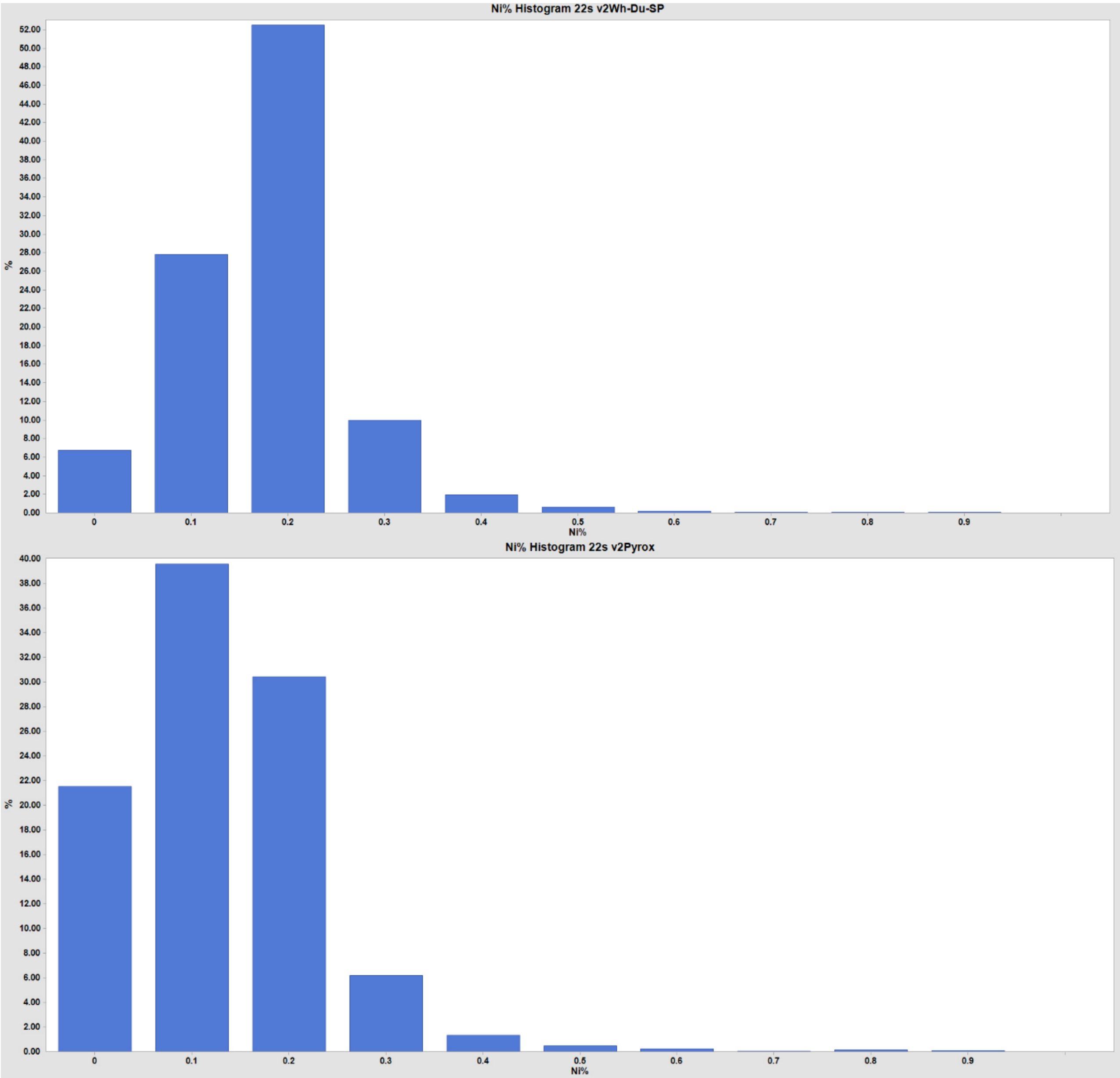


Figure 14-20: Histogram of Nickel Composite Grades in Zones

(Source: Kirkham, 2023)

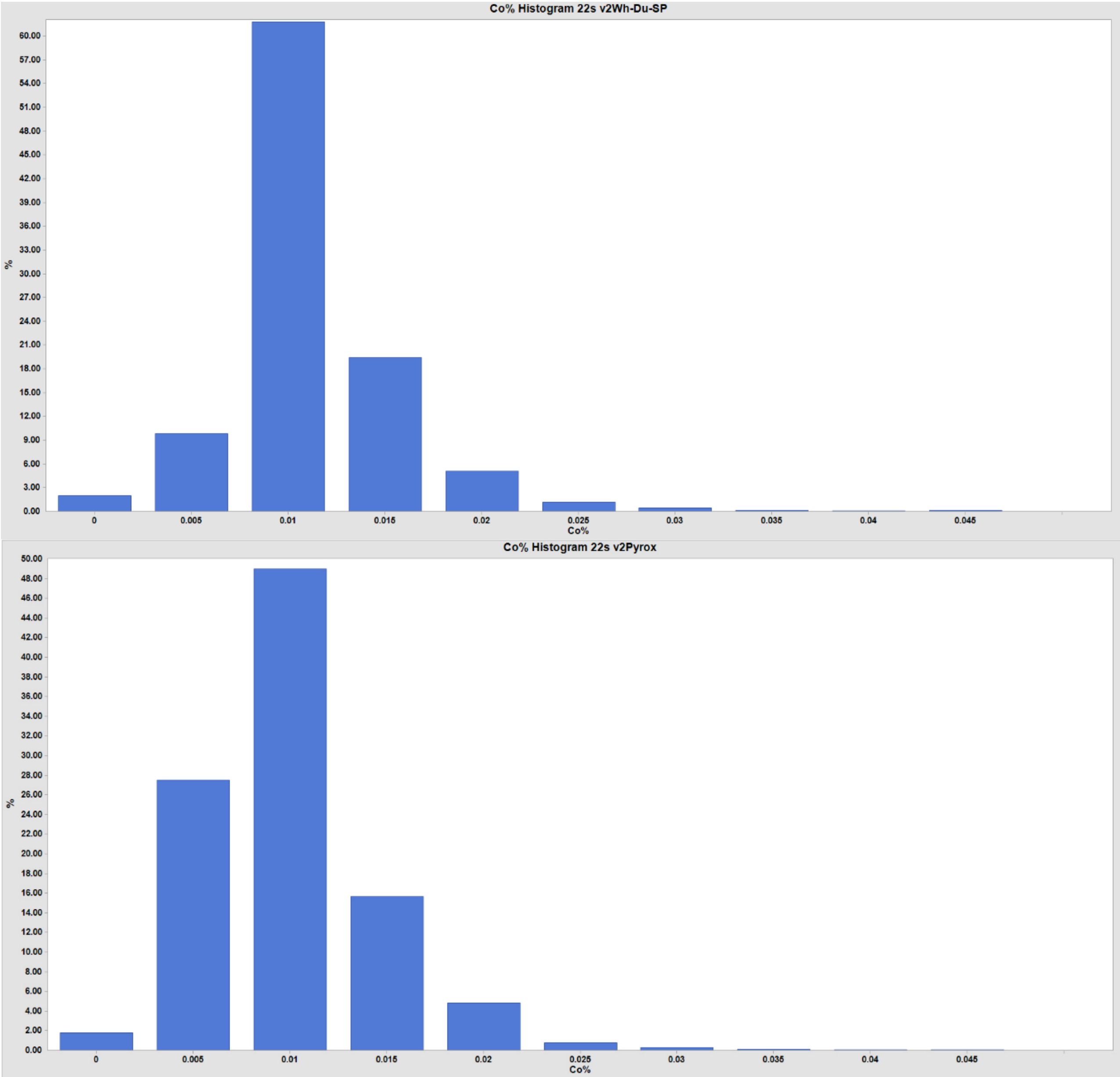


Figure 14-21: Histogram of Cobalt Composite Grades in Zones

(Source: Kirkham, 2023)

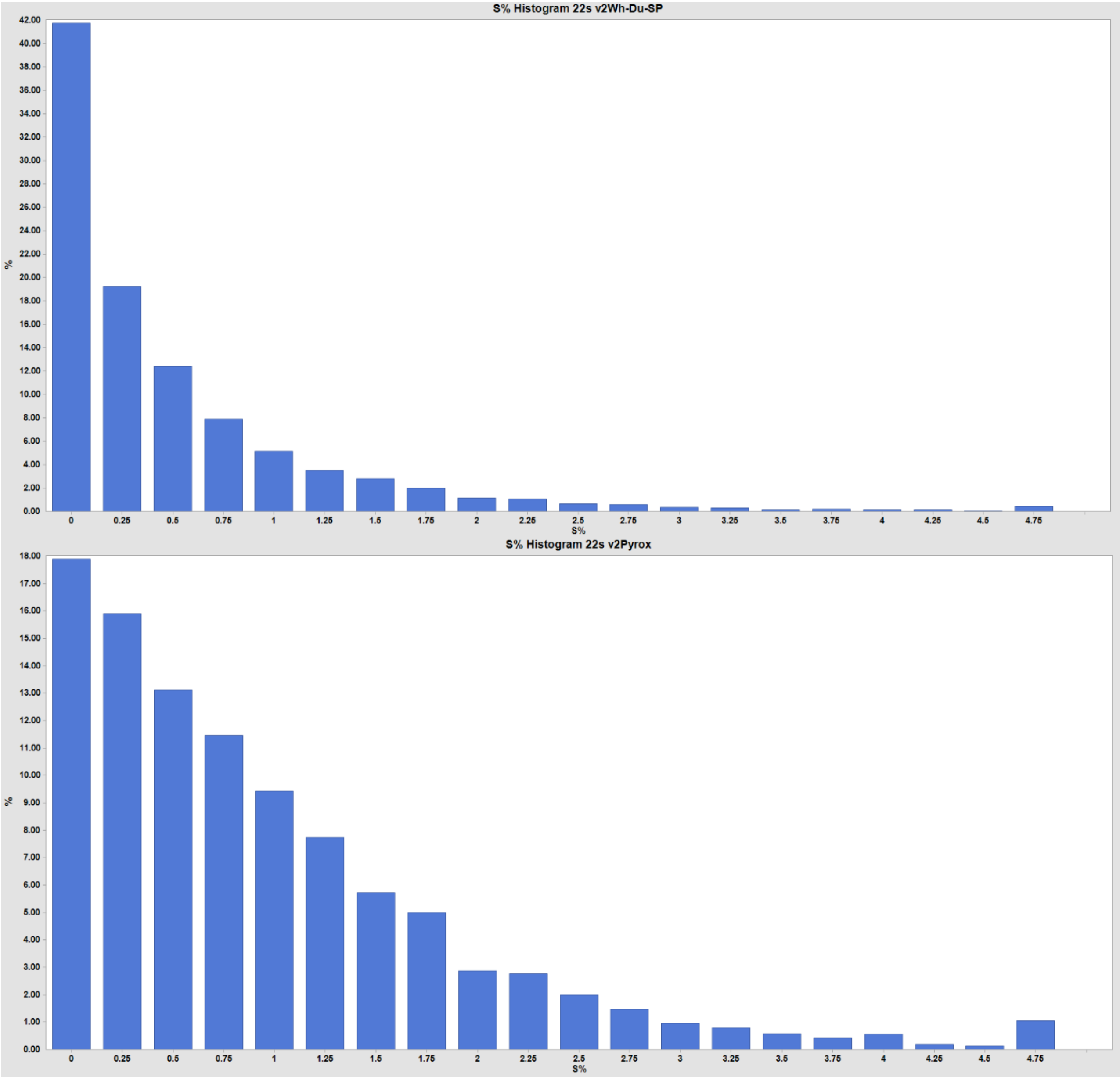


Figure 14-22: Histogram of Sulphur Composite Grades in Zones

(Source: Kirkham, 2023)

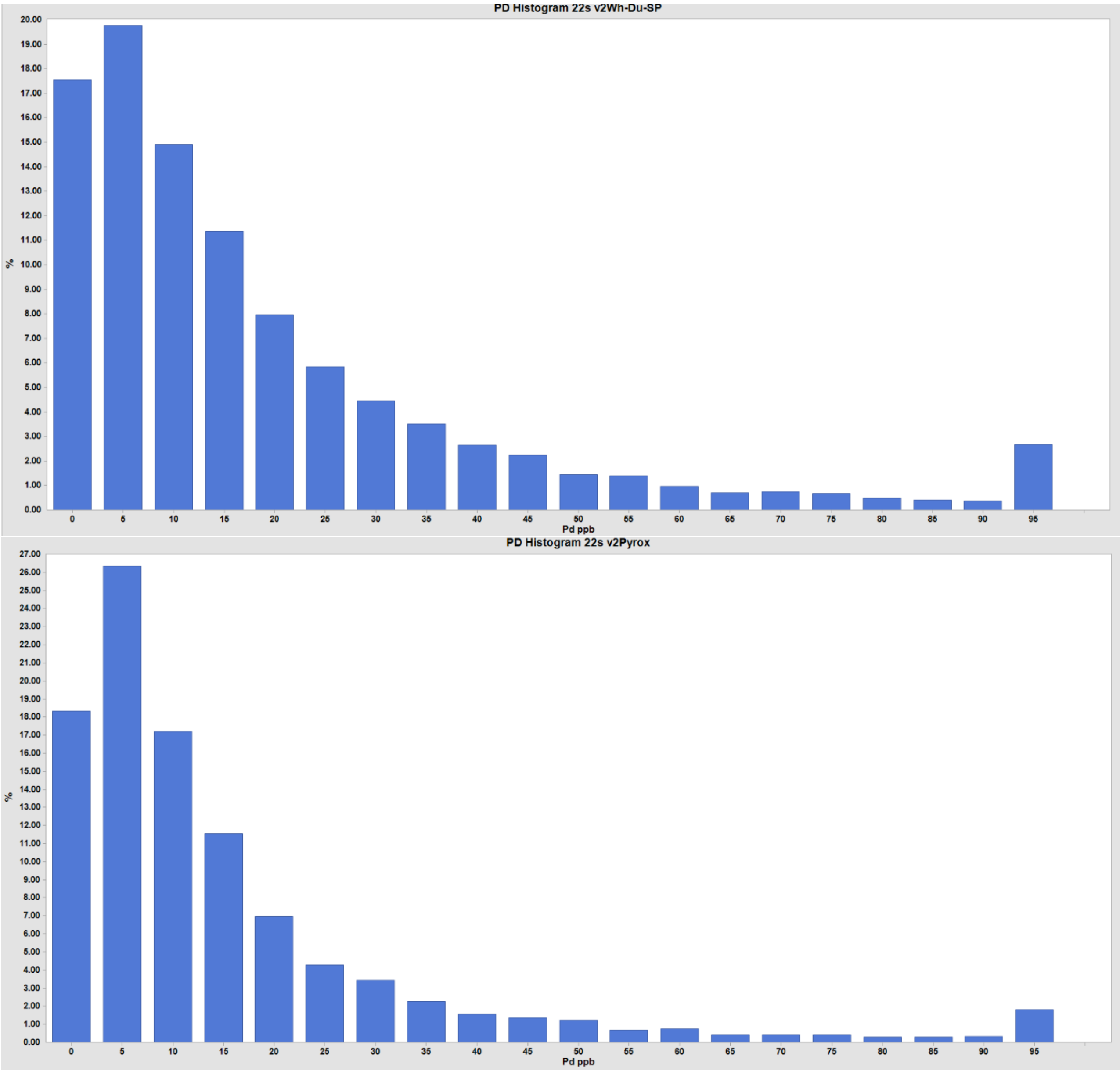


Figure 14-23: Histogram of Palladium Composite Grades in Zones

(Source: Kirkham 2023)

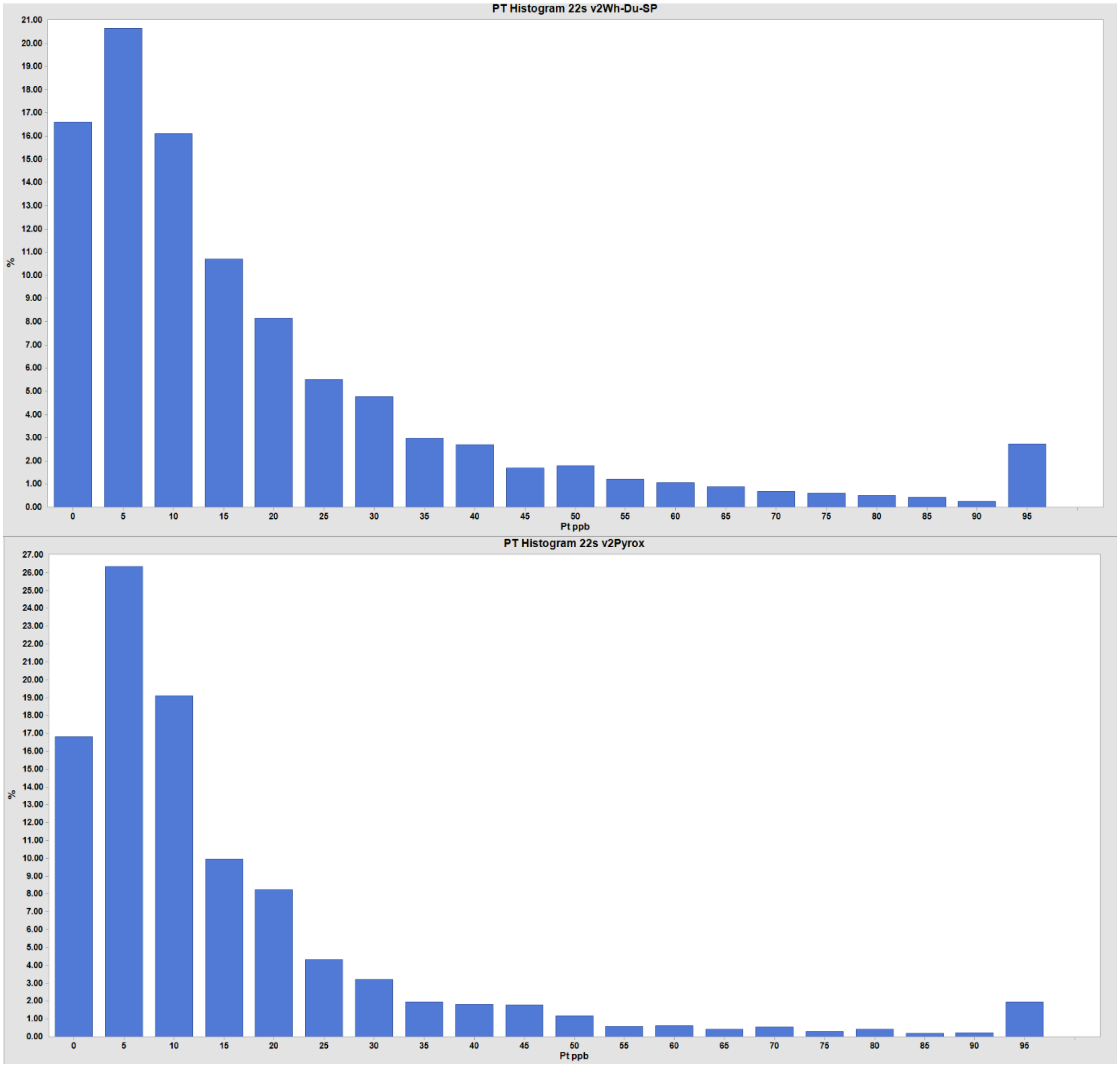


Figure 14-24: Histogram of Platinum Composite Grades in Zones

(Source: Kirkham, 2023)

Table 14-8 shows the basic statistics for the 4.0 m composite nickel grades within the mineralized domains: (1) Du-Wh-Sp (dunite, wehrlite, serpentinite, green dunite); (2) cPx-oPx (clinopyroxenite, olivine, magnetite and hornblende clinopyroxenite). It should be noted that although 4.0 m is the composite length, any residual composites of lengths greater than 2.0 m and less than 4.0 m were retained to represent a composite, while any composite residuals less than 2.0 m were combined with the previous composite.

Table 14-8: Composite Statistics Weighted by Length
(Source: Kirkham, 2023)

		#	Length (m)	Min	Max	Mean	SD	CV
Ni%	1	13,600	54,214.2	0.000	1.21	0.23	0.09	0.4
	3	4,219	16,824.7	0.001	3.44	0.18	0.11	0.6
	Total	17,819	71,038.9	0.000	3.44	0.21	0.10	0.5
	All	21,613	85,771.8	0.000	3.44	0.19	0.11	0.6
Co%	1	13,600	54,214.2	0.000	0.09	0.01	0.00	0.3
	3	4,219	16,824.7	0.001	0.09	0.01	0.00	0.4
	Total	17,819	71,038.9	0.000	0.09	0.01	0.00	0.3
	All	21,613	85,771.8	0.000	0.09	0.01	0.00	0.4
S%	1	13,600	54,214.2	0.01	11.27	0.61	0.80	1.3
	3	4,219	16,824.7	0.01	15.53	1.07	1.04	1.0
	Total	17,819	71,038.9	0.01	15.53	0.72	0.88	1.2
	All	21,613	85,771.8	0.01	15.53	0.70	0.88	1.3
Pt ppb	1	12,157	48,465.2	1.0	1,054	22	32	1.4
	3	3,510	13,995.5	1.0	738	18	27	1.4
	Total	15,667	62,460.7	1.0	1,054	22	31	1.4
	All	19,417	77,096.7	1.0	1,974	25	44	1.8
Pd ppb	1	12,740	50,786.9	1.0	1,192	22	31	1.4
	3	3,910	15,590.6	1.0	588	18	27	1.5
	Total	16,650	66,377.5	1.0	1,192	21	30	1.4
	All	20,422	81,072.2	1.0	1,602	24	42	1.7

14.6 Evaluation of Outlier Assay Values

An evaluation of the probability plot of nickel composites suggests there is justification for limiting the influence of a sub-set of outlier nickel grades that could result in an overestimation of resources. Figure 14-25 illustrates that there is an interpreted “break” in the cumulative frequency plot for nickel at 0.8% which defines the potential threshold of an outlier population. It is important to note that, as opposed to strictly “cutting” the outlier grades to the 0.8% Ni threshold, a grade limiting strategy was employed. This entailed retaining the actual composite grade to within a 20-meter radius but then limiting or “cutting” the grade to the 0.8% threshold beyond the 20-meter radius of influence.

Conversely, an evaluation of the probability plot of the sulphur composites suggests there are no outlier values that could result in an overestimation or over influence as shown in Figure 14-26.

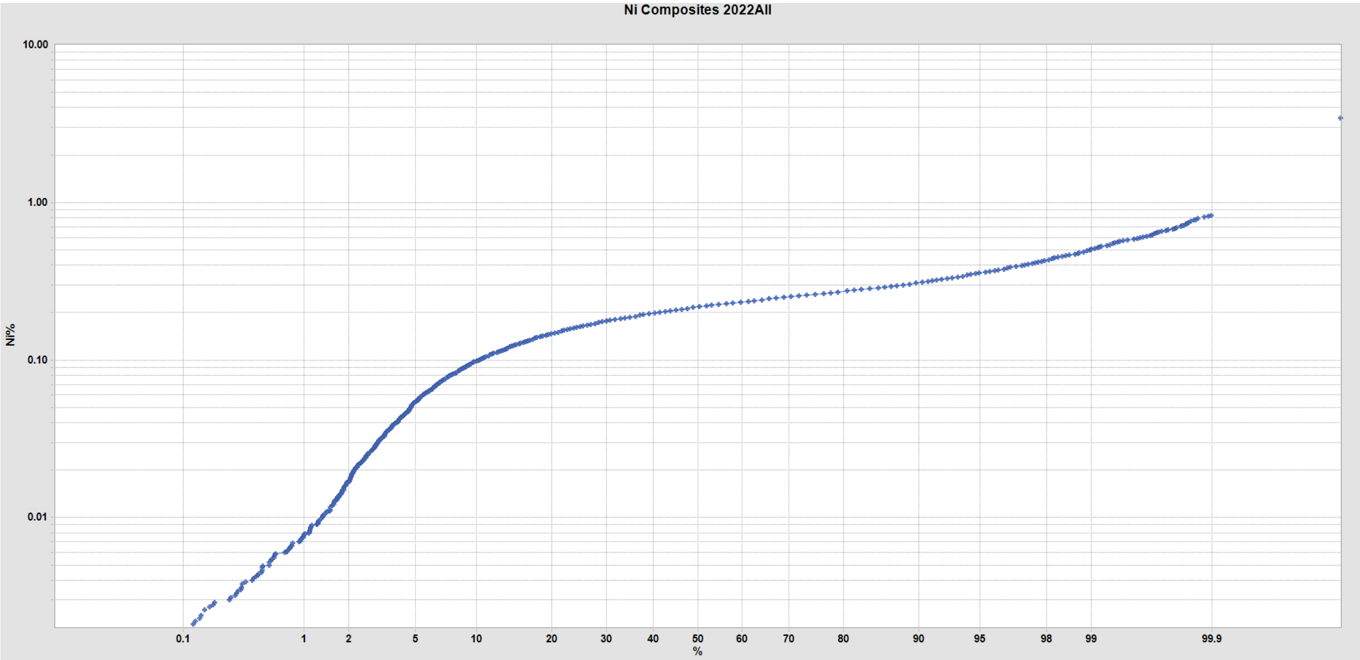


Figure 14-25: Probability Plot of Nickel Composites

(Source: Kirkham, 2023)

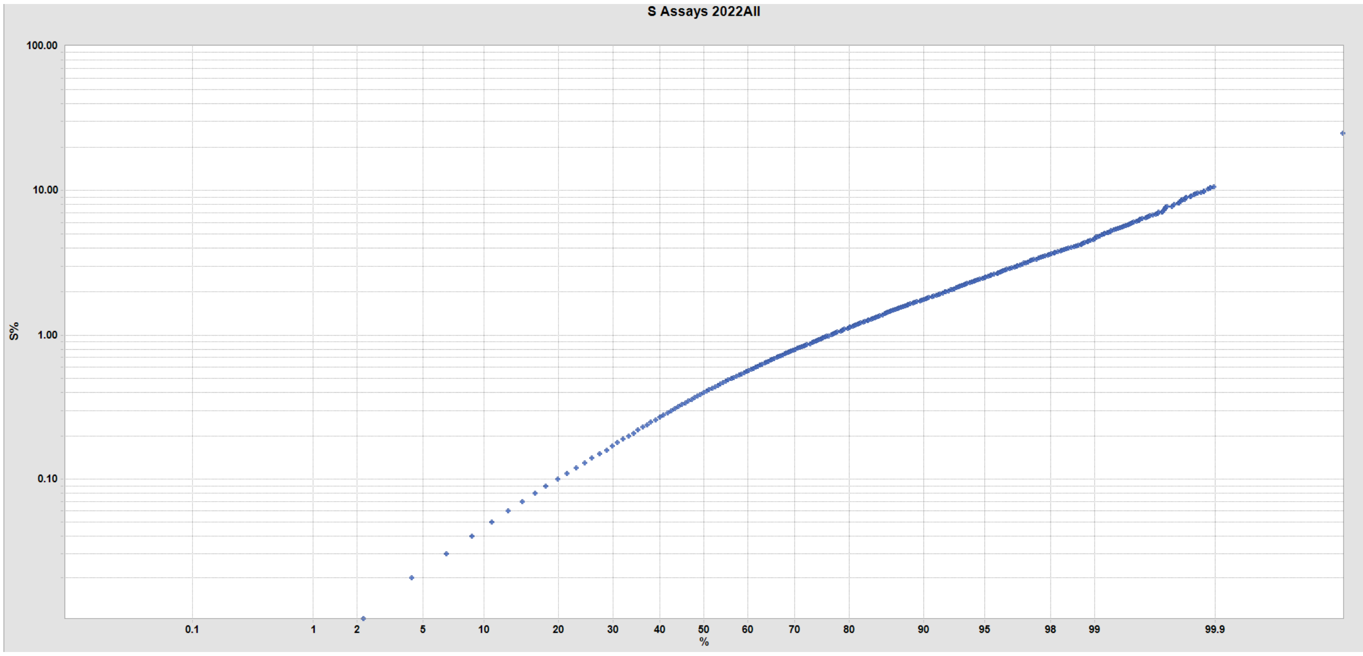


Figure 14-26: Probability Plot of Sulphur Composites

(Source: Kirkham, 2023)

14.7 Bulk Density Estimation

Bulk density measurements were completed between 2004 and 2021. Bulk density of core samples was measured in the field by the immersion method. A piece of whole core up to 50 cm in length was weighed in air and in water and the density calculated using the following formula:

Bulk density = [weight in air/(weight in air – weight in water)] * 1 t/m^3

As part of the metallurgical test program, Process Research Associates Ltd. (PRA), measured bulk density using the pycnometric method with -10 Tyler mesh assay rejects. Their results were within 5% of density determinations measured by ACME Laboratory in 2007 using the same method.

As a result, density values were assigned to the model blocks based on the mean value for the corresponding lithology, as listed in Table 14-9 although the SG for the pyroxenites was reduced to 3.08 from 3.16 for consistency with previous results and the view that it is recommended to obtain a more robust dataset going forward.

Table 14-9: Bulk Density Statistics by Zone

(Source: Kirkham, 2023)

Du-Wh-Sp			#	Min	Max	Mean	CV
110	Du	Dunite	491	2.33	3.48	3.04	0.06
111	Wh	Wehrlite	270	2.46	5.36	3.09	0.09
115	Sp	Serpentinite	34	2.68	3.42	2.93	0.06
120	gDu	Green Dunite	48	2.7	3.24	3.08	0.04
130	Um	Undifferentiated Ultramafic	3	2.87	2.93	2.89	0.01
Total			**846**	**2.33**	**5.36**	**3.05**	**0.07**
Pyroxenites			**#**	**Min**	**Max**	**Mean**	**CV**
100	cPx	Clinopyroxenite	70	2.24	4.07	3.15	0.09
101	ocPx	Olivine Clinopyroxenite	38	2.9	3.53	3.23	0.04
102	mtcPx	Magnetite Clinopyroxenite	73	2.7	3.42	3.07	0.05
108	hbcPx	Hornblende Clinopyroxenite	17	3.16	3.45	3.24	0.02
109	Hb	Hornblendite	23	2.95	3.59	3.25	0.05
Total			**221**	**2.24**	**4.07**	**3.16**	**0.06**

Note: Total may not add due to rounding.

14.8 Variography

The degree of spatial variability and continuity in a mineral deposit depends on both the distance and direction between points of comparison. Typically, the variability between samples is proportionate to the distance between samples. If the variability is related to the direction of comparison, then the deposit is said to exhibit anisotropic tendencies which can be summarized by an ellipse fitted to the ranges in the different directions. The semi-variogram is a common function used to measure the spatial variability within a deposit.

The components of the variogram include the nugget, the sill and the range. Often samples compared over very short distances (including samples from the same location) show some degree of variability. As a result, the curve of the variogram often begins at a point on the y-axis above the origin; this point is called the nugget. The nugget is a measure of not only the natural variability of the data over very short distances, but also a measure of the variability which can be introduced due to errors during sample collection, preparation and assaying.

Typically, the amount of variability between samples increases as the distance between the samples increases. Eventually, the degree of variability between samples reaches a constant or maximum value; this is called the sill and the distance between samples at which this occurs is called the range.

The spatial evaluation of the data was conducted using a correlogram instead of the traditional variogram. The correlogram is normalized to the variance of the data and is less sensitive to outlier values; this generally gives cleaner results.

Experimental variograms and variogram models in the form of correlograms were generated for nickel and cobalt along with sulphur. In addition, variography was run for both platinum and palladium.

Correlograms were generated for the distribution of nickel, cobalt, palladium and platinum along with sulphur in the various areas using the commercial software package Sage 2001© developed by Isaacs & Co. Correlogram model data is shown in Table 14-10 and Table 14-11 for nickel, cobalt, sulphur, palladium and platinum.

Table 14-10: Variography for Nickel, Cobalt & Sulphur by Zone
(Source: Kirkham, 2023)

Ni		Px	Wh/Du	Co		Px	Wh/Du	S		Px	Wh/Du
	C0	0.1	0.15		C0	0.3	0.25		C0	0.404	0.3
	C1	0.679	0.512		C1	0.459	0.479		C1	0.19	0.536
	C2	0.221	0.338		C2	0.241	0.271		C2	0.406	0.164
1st Structure	DY	13.8	126.8	1st Structure	DY	41.3	29.9	1st Structure	DY	23.9	21.6
	DX	119.9	38		DX	21.1	138.5		DX	58.8	149
	DZ	33.5	16.6		DZ	282	34.4		DZ	26.9	36.9
	R1	-91	-174		R1	-78	-24		R1	14	-89
	R2	1	83		R2	-29	11		R2	27	8
	R3	-67	-44		R3	4	95		R3	65	92
2nd Structure	DY	1811.9	320	2nd Structure	DY	1314.5	216.5	2nd Structure	DY	24.7	631.4
	DX	335.9	272.2		DX	437.7	390.1		DX	88	537.6
	DZ	2772.8	2120.8		DZ	3129.4	116.2		DZ	191.6	1347.4
	R1	-88	73		R1	23	14		R1	-44	-37
	R2	79	-9		R2	82	18		R2	73	16
	R3	28	-14		R3	-89	-14		R3	6	-7

Table 14-11: Variography for Palladium and Platinum by Zone
(Source: Kirkham, 2023)

Pd		Px	Wh/Du	Pt		Px	Wh/Du
	C0	0.4	0.38		C0	0.44	0.31
	C1	0.39	0.43		C1	0.43	0.44
	C2	0.21	0.19		C2	0.13	0.25
1st Structure	DY	11.1	14.9	1st Structure	DY	15.5	17.2
	DX	12.6	49.7		DX	25.5	11.6
	DZ	74.3	20.8		DZ	52.1	21.6
	R1	-16	66		R1	79	93
	R2	-1	-2		R2	-1	-70
	R3	1	77		R3	-4	-23
2nd Structure	DY	76.3	133.3	2nd Structure	DY	179.8	46.8
	DX	149.2	176.7		DX	139.9	115.9
	DZ	675.7	562.8		DZ	392.8	813.1
	R1	56	36		R1	-39	71
	R2	3	-10		R2	33	4
	R3	-20	-40		R3	-21	-18

14.9 Block Model Definition

The block model used to estimate the resources was defined according to the limits specified in Figure 14-27 and Figure 14-28. The block model is orthogonal and non-rotated, reflecting the orientation of the deposit. The chosen block size was 15 m x 15 m x 15 m, roughly reflecting the drill hole spacing (i.e., 3 to 6 blocks between drill holes) which is spaced at approximately 50 m centres. Note: MineSight™ uses the centroid of the blocks as the origin.

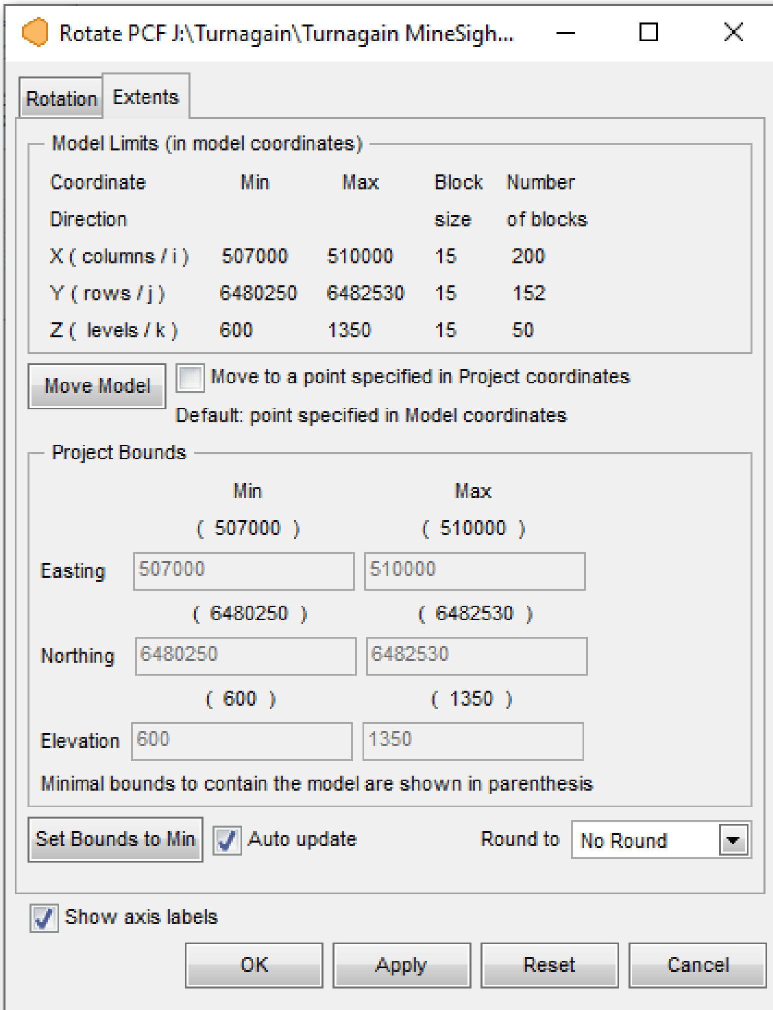


Figure 14-27: Dimensions for the Turnagain Block Model
(Source: Kirkham, 2023)

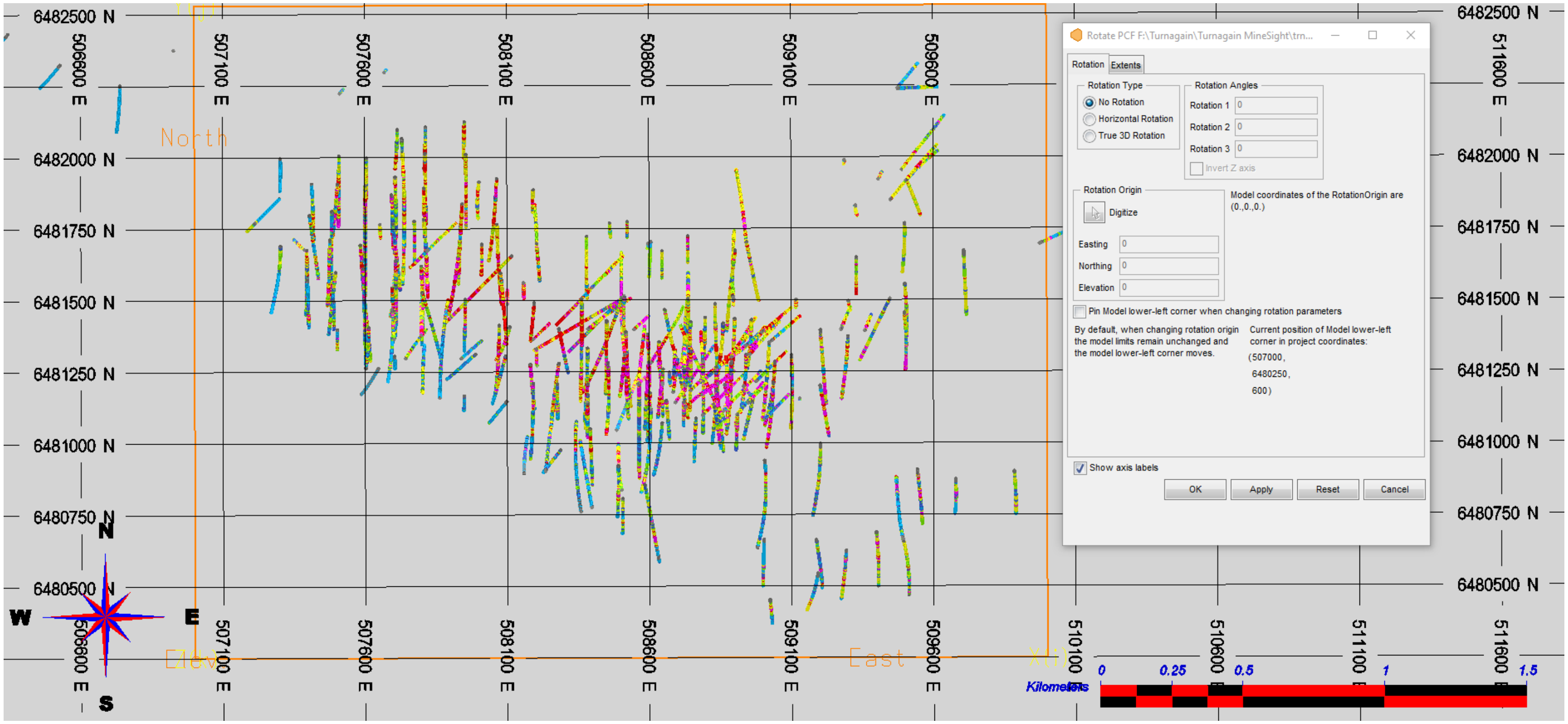


Figure 14-28: Origin & Orientation for the Turnagain Block Model

(Source: Kirkham, 2023)

14.10 Resource Estimation Methodology

The resource estimation plan includes the following items:

- Lithological zone code in each block,
- Estimated nickel, cobalt, sulphur, palladium and platinum grades using ordinary kriging,
- Estimated magnesium and iron grades using inverse distance also for metallurgical purposes,
- Assignment of density by block.

Table 14-12 summarizes the search ellipse dimensions for the two estimation passes for each zone by majority code.

Table 14-12: Search Ellipse Parameters for the Turnagain Deposit

(Source: Kirkham, 2023)

Major Axis	Semi-Major Axis	Minor Axis	1st Rotation Angle Azimuth	2nd Rotation Angle Dip	3rd Rotation Angle	Min. No. of Comps	Max. No. of Comps	Max. Samples per Drill Hole
100	100	75	0	0	0	4	16	6
200	200	100	0	0	0	1	16	4

14.11 Mineral Resource Classification

Mineral resources were estimated in conformity with generally accepted CIM's "Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines" (2019). Mineral resources are not mineral reserves and do not have demonstrated economic viability.

The mineral resources may be impacted by further infill and exploration drilling that may result in an increase or decrease in future resource evaluations. The mineral resources may also be affected by subsequent assessment of mining, environmental, processing, permitting, taxation, socio-economic and other factors.

Mineral resources for the Turnagain deposit were classified according to the CIM's "Definition Standards for Mineral Resources and Mineral Reserves" (2014) by Garth Kirkham, P.Geo., an independent QP as defined by NI 43-101 guidelines.

14.11.1 Introduction

The spatial variation pattern incorporated in the variogram and the drill hole spacing can be used to help predict the reliability of estimation for nickel production. (In this case, there are at least two potentially economic metals, but nickel is the greatest contributor to NSR.) Therefore, nickel variation will dominate estimation uncertainty and ultimately determine drill spacing. The measure of estimation reliability or uncertainty is expressed by the width of a confidence interval or the confidence limits. Then, by knowing how reliably metal content must be estimated to adequately plan, it is possible to calculate the drill hole spacing necessary to achieve the target level of reliability. For instance, indicated resources may be adequate for planning in most PFS. For FS, it is not uncommon to require measured resources to define the production within the payback period and then indicated resources for scheduling beyond payback time. Results from previous studies have been updated based on the most current drilling and some assumptions have changed.

14.11.2 Drill Hole Spacing Analysis

The spatial variation pattern of nickel in the Turnagain deposit can be represented by a variogram or correlogram. Using the variogram and the drill hole spacing the reliability of estimated grades in large volumes can be predicted. The measure of estimation reliability or uncertainty is expressed by the width of a confidence interval or the confidence limits. Then by knowing how reliably metal content must be estimated to adequately undertake mine planning, it is possible to estimate a theoretical drill hole spacing that may be necessary to achieve a target level of reliability. For instance, indicated resources is considered to be adequate for planning in PFS and FS.

As more drilling is completed the results from this study should be validated against the continuity of mineralization observed in more closely spaced holes in the various different zones.

14.11.3 Confidence Interval Estimation

Confidence intervals are intended to estimate the reliability of estimation for different volumes and drill hole spacing. A narrower interval implies a more reliable estimate. Using hypothetical regular drill spacing and the variograms from the composited drill hole sample data, confidence intervals or limits can be estimated for different drill hole spacing and production periods or equivalent volumes. The confidence limits for 90% relative confidence intervals may be interpreted as; if the limit is given as 15%, then there is a 90 percent chance the actual value (tonnes and grade) of production is within ±15% of the estimated value over a quarterly or annual production volume. This means it is unlikely the true value will be more than 8 percent different relative to the estimated value (either high or low) over the given production period.

The method of estimating confidence intervals is an approximate method that has been shown to perform well when the volume being predicted from samples is sufficiently large (Davis, B. M., Some Methods of Producing Interval Estimates for Global and Local Resources, Society for Mining, Metallurgy & Exploration (SME) Preprint 97-5, 4p.) At Turnagain, the smallest appropriate production volume may be about one year. Using these guidelines, an idealized block configured to approximate the volume produced in one month is estimated by ordinary kriging using the idealized spacing of samples.

Relative variograms are used in the estimation of the block. Note that, relative variograms are used rather than ordinary variograms because the standard deviations from the kriging variances are expressed directly in terms of a relative percentage. The relative ordinary kriging variance is achieved by scaling the correlogram to the declustered relative variance of the composite distribution. The total relative variance can be estimated by squaring the declustered coefficient of variation (declustered standard deviation divided by the declustered mean) calculated from the composite samples.

The kriging variances from the ideal blocks and spacing are divided by twelve (assuming approximate independence in the production from month to month) to get a variance for yearly ore output. The square root of this kriging variance is then used to construct confidence limits under the assumption of normally distributed errors of estimation. For example, if the kriging variance for a block is σ 2m then the kriging variance for a year is σ2y = σ 2m/12. The 90 percent confidence limits are then C.L. = ±1.645 x σ y. There are twelve monthly production volumes. Assuming approximate independence from month to month the formula for the variance of the mean is σ 2/N where N = 12 in this case.

The confidence limits for a given production rate are a function of the spatial variation of the data and the sample or drill hole spacing.

For this exercise, the drill hole spacing test uses 200 metres, 150 metres, 100 metres, 50 metres and 25 metres.

Further assumptions made for the confidence interval calculations are:

- The variograms are appropriate representations of the spatial variability for presence of mineralization and metal grade,
- The daily production is approximately 90,000 tonnes.

Figure 14-29 shows a graphical representation of how the uncertainty decreases for yearly production volumes with decreasing drill hole spacing. In general, the curve shows:

- Sampling at roughly 135 m spacing will produce uncertainty for the year of approximately ±15% at the designated production rate,
- Approximately 160 m spacing will produce uncertainty for the year of approximately ±20% at the designated production rate.

Similarly, Figure 14-30 shows a graphical representation of how the uncertainty for quarterly production volumes decreases with decreasing drill hole spacing. In general, the curve shows:

- Sampling at roughly 80 m spacing will produce uncertainty for the quarter slightly less than ±15% at the designated production rate,
- Approximately 100 m spacing will produce uncertainty for the quarter slightly greater than ±20%.

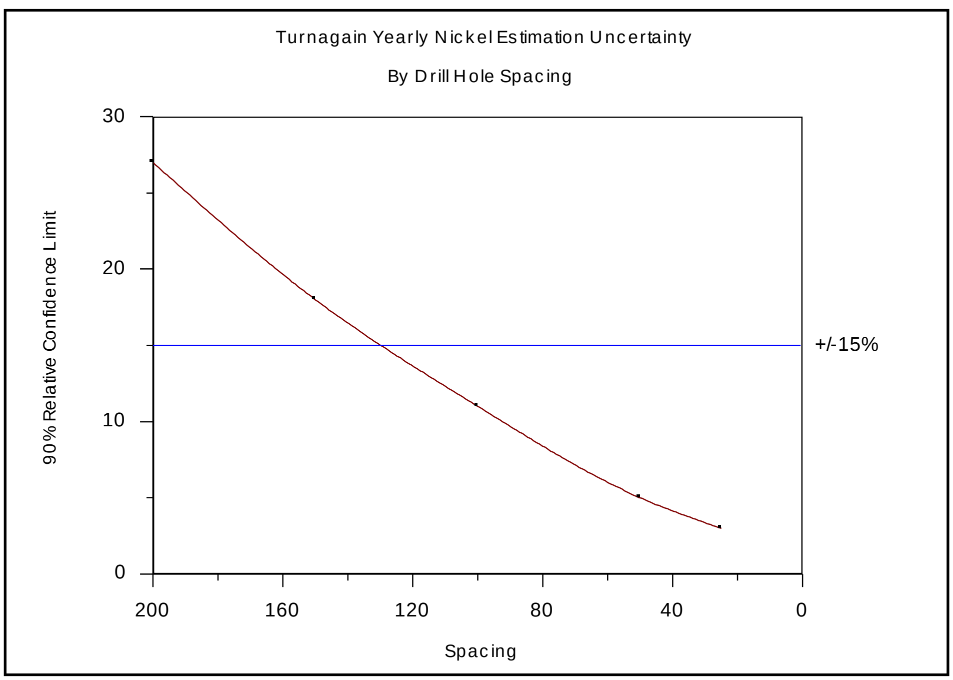


Figure 14-29: Relative Confidence Limits for the Yearly Production Volume

(Source: Kirkham, 2023)

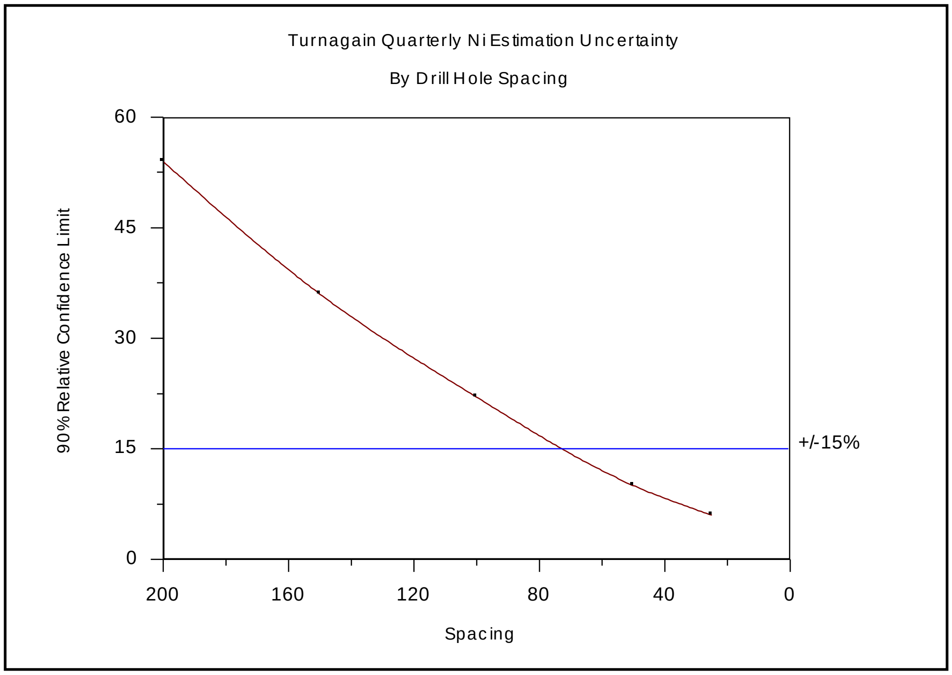


Figure 14-30: Relative Confidence Limits for the Quarterly Production Volume

(Source: Kirkham, 2023)

14.11.4 Guidance for Classification of Resources

Used as a guide, resource categories can be based on an estimate of uncertainty within a theoretical measure of confidence. The thresholds for uncertainty and confidence are based on rules of thumb however they can vary from project to project depending upon the risk tolerance that the project and the company is willing to bear. Indicated resources may be estimated so the uncertainty of yearly production is no greater than ±15–20% with 90% confidence and Measured resources may be estimated so the uncertainty of quarterly production is no greater than ±15% with 90% confidence.

It should also be noted that the confidence limits only consider the variability of grade within the deposit. There are other aspects of deposit geology and geometry such as geological contacts or the presence of faults or offsetting structures that may impact the drill spacing.

Therefore, the following lists the spacing for each resource category to classify the resources assuming the current rate of proposed operation:

- Measured: Continuity must be demonstrated in the designation of measured (and indicated) resources. Therefore, measured resources were delineated from at least three drill holes spaced on a nominal 75 m pattern.
- Indicated: Resources in this category would be delineated from at least three drill holes spaced on a nominal 150 m pattern.
- Inferred: Any material not falling in the categories above and within a maximum 200 m of one hole.

To ensure continuity, the boundary between the indicated and inferred categories was contoured and smoothed, eliminating outliers and orphan blocks. The spacing distances are intended to define contiguous volumes and they should allow for some irregularities due to actual drill hole placement. The final classification volume results typically must be adjusted manually to come to a coherent classification scheme. The thresholds are used as a guide and boundaries interpreted and defined to ensure continuity.

This suggested classification methodology and parameters differ from previous classification schema (featuring more subjective drill spacing criteria) however it is believed that this approach is appropriate as it is less subjective and based on both quantitative and qualitative criteria. Classification in future models may differ, but principal differences should be due to changes in the amount of drilling.

Drill hole spacing is sufficient for preliminary geostatistical analysis and evaluating spatial grade variability. The classification of resources was based primarily upon distance drill spacing; however, the multiple quantitative measures, as listed below, were also inspected and taken into consideration.

The estimated blocks were classified according to the following:

- Confidence in interpretation of the mineralized zones,
- Number of composites used to estimate a block,
- Number of composites allowed per drill hole,
- Distance to nearest composite used to estimate a block,
- Average distance to the composites used to estimate a block.

14.12 Mineral Resource Statement

This estimate is based upon the reasonable prospect of eventual economic extraction based on continuity of an optimized pit, using estimates of operating costs and price assumptions. The "reasonable prospects for eventual economic extraction" were tested using floating cone pit shells. The Horsetrail, Northwest, Hatzl and Duffy zones of the deposit are all included within the Horsetrail reasonable prospects pit shells. The pit optimization results are used solely for testing the "reasonable prospects for eventual economic extraction" and do not represent an attempt to estimate Mineral Reserves.

The Turnagain resource model includes the southern portions of the Horseshoe zone which abut and underlie the Turnagain River and the Hatzl zone south of the river as shown in Figure 14-31 and Figure 14-32.

The resources include the Horsetrail, Northwest, Duffy and Hatzl zones excluding material that underlies the Turnagain River and an environmental buffer. These resources that underlie the river are potentially exploitable with a diversion of a relatively short section of the Turnagain River, which remains a potentially viable option. These resources are not included in the current resource estimation nor within the mine plan, as the diversion of the river is not currently contemplated from a mining perspective, however it is still considered as a potential option eventually.

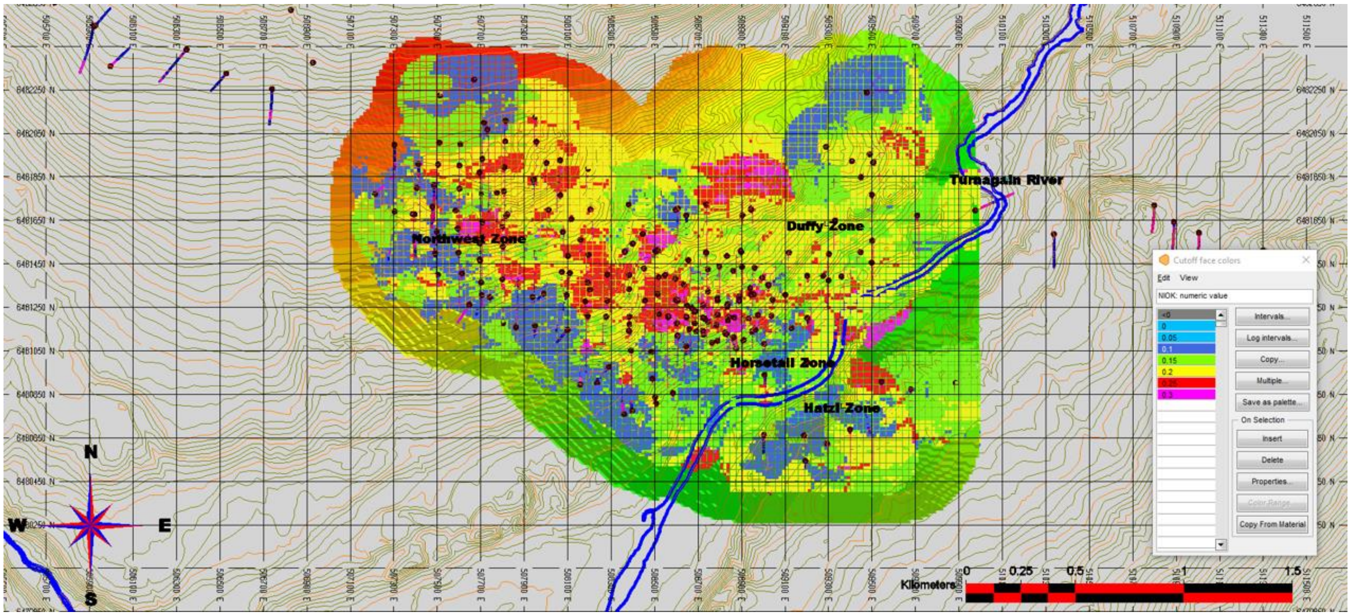


Figure 14-31: 3D Plan View of Ni% Blocks & Drill Holes along with Surface Features and Turnagain River (Source: Kirkham, 2023)

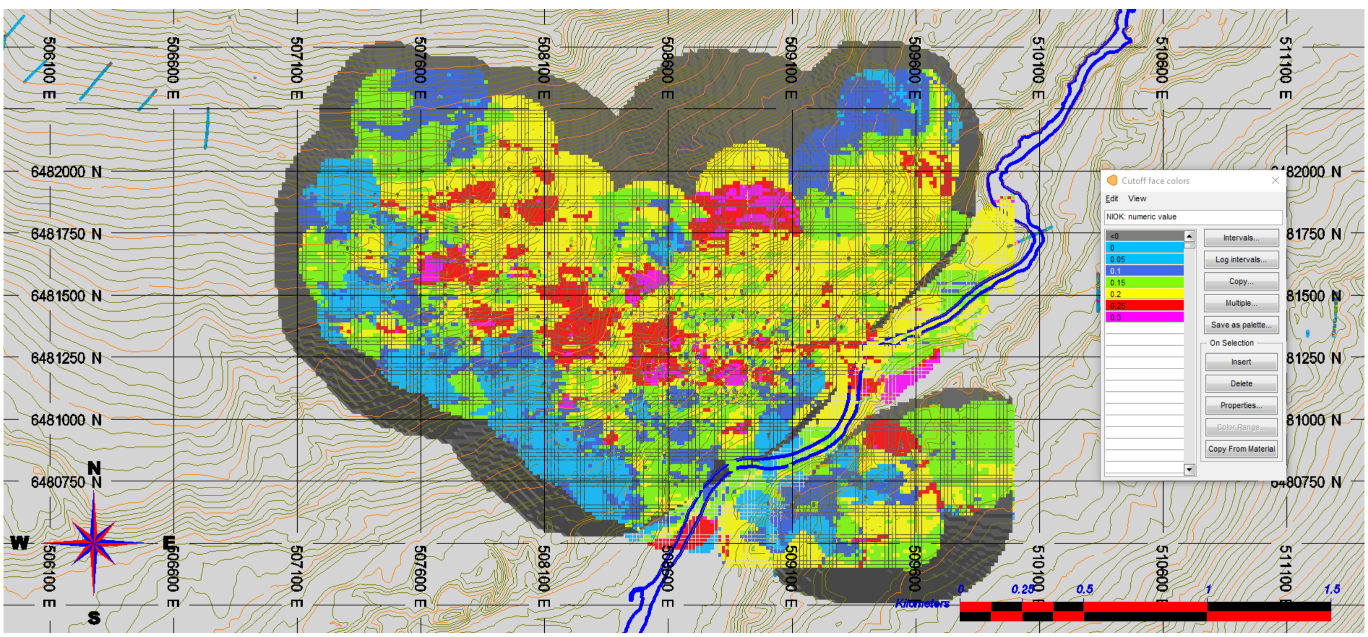


Figure 14-32: Plan View of Ni% Blocks & Drill Holes along with Surface Features and Turnagain River (Source: Kirkham, 2023)

Differences from the previous resource estimate described in Hatch PEA are the inclusion of an additional 15 infill drill holes drilled in 2021 in the areas of the conceptual open pit, updated geological modelling and current updated price and cost parameters. In addition, a change in classification strategy based on quantitative risk was employed.

Table 14-13 shows the mineral resource statement for the Turnagain deposit. Figure 14-33 through Figure 14-39 show a variety of section displays through the block model illustrating coded lithology, nickel, cobalt and sulphur grades and classification (measured, indicated and inferred) along with drillholes and ultimate reasonable prospects pit.

Table 14-13: Open Pit Mineral Resource Statement for the Turnagain Project (Base Case Estimate at 0.1% Nickel Cut-off Grade)

Classification	Tonnage (kt)	Ni Grade (%)	Contained Ni (kt)	Co Grade (%)	Contained Co (kt)	Pd Grade (g/t)	Contained Pd (koz)	Pt Grade (g/t)	Contained Pt (koz)
Measured	454,552	0.215	977	0.014	64	0.023	336	0.022	320
Indicated	1,119,387	0.207	2,317	0.013	146	0.019	679	0.021	770
Measured + Indicated	**1,573,939**	**0.210**	**3,305**	**0.013**	**205**	**0.020**	**1,015**	**0.022**	**1,090**
Inferred	1,163,830	0.206	2,397	0.012	140	0.016	583	0.018	674

Notes:
1. All mineral resources have been estimated in accordance with Canadian Institute of Mining and Metallurgy and Petroleum definitions, as required under National Instrument 43-101.
2. Mineral resources are reported in relation to a conceptual pit shell to demonstrate reasonable expectation of eventual economic extraction, as required under NI 43-101; mineralization lying outside of these pit shells is not reported as a mineral resource. Mineral resources are not mineral reserves & do not have demonstrated economic viability.
3. Open pit mineral resources are reported at a cut-off grade of 0.1% Ni. Cut-off grades are based on a price of US $9.00 per pound, nickel recoveries of 60%, mineralized material and waste mining costs of $2.80, along with milling, processing and G&A costs of $7.20.
4. Inferred mineral resources are considered too speculative geologically to have economic considerations applied to them that would enable them to be categorized as mineral reserves. However, it is reasonably expected that the majority of inferred mineral resources could be upgraded to indicated.
5. Due to rounding, numbers presented may not add up precisely to the totals provided and percentages may not precisely reflect absolute figures.

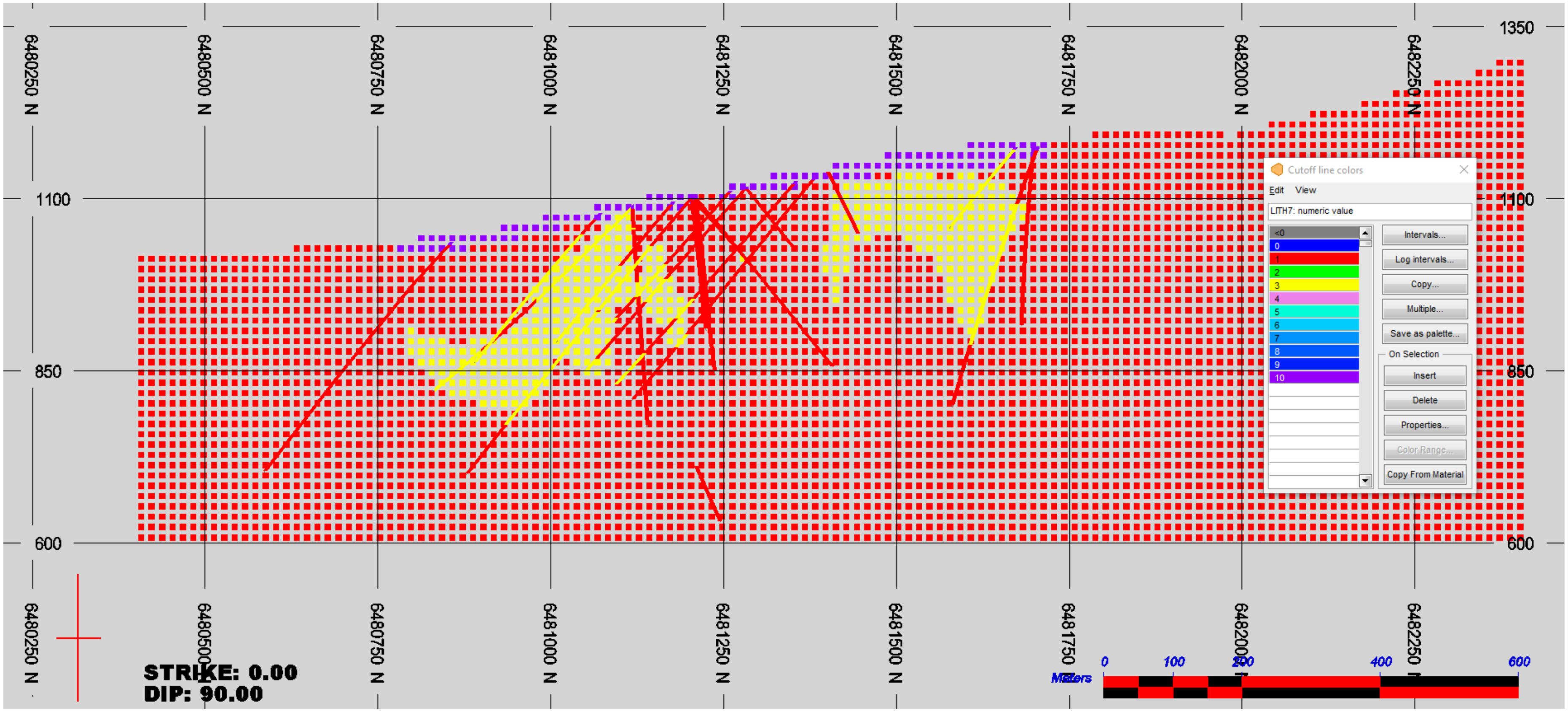


Figure 14-33: Section View of Lithology & Drill Holes for the Block Model at Section 508,600 North (note that the drillholes are displayed according to Lithology Code) (Source: Kirkham, 2023)

Note: 1 = Wehrlite-Dunite-Serpentinite-green Dunite (red), 3 = Pyroxenite-Clinopyroxenite-Olivine Clinopyroxenite (yellow), 10 = Overburden (purple).

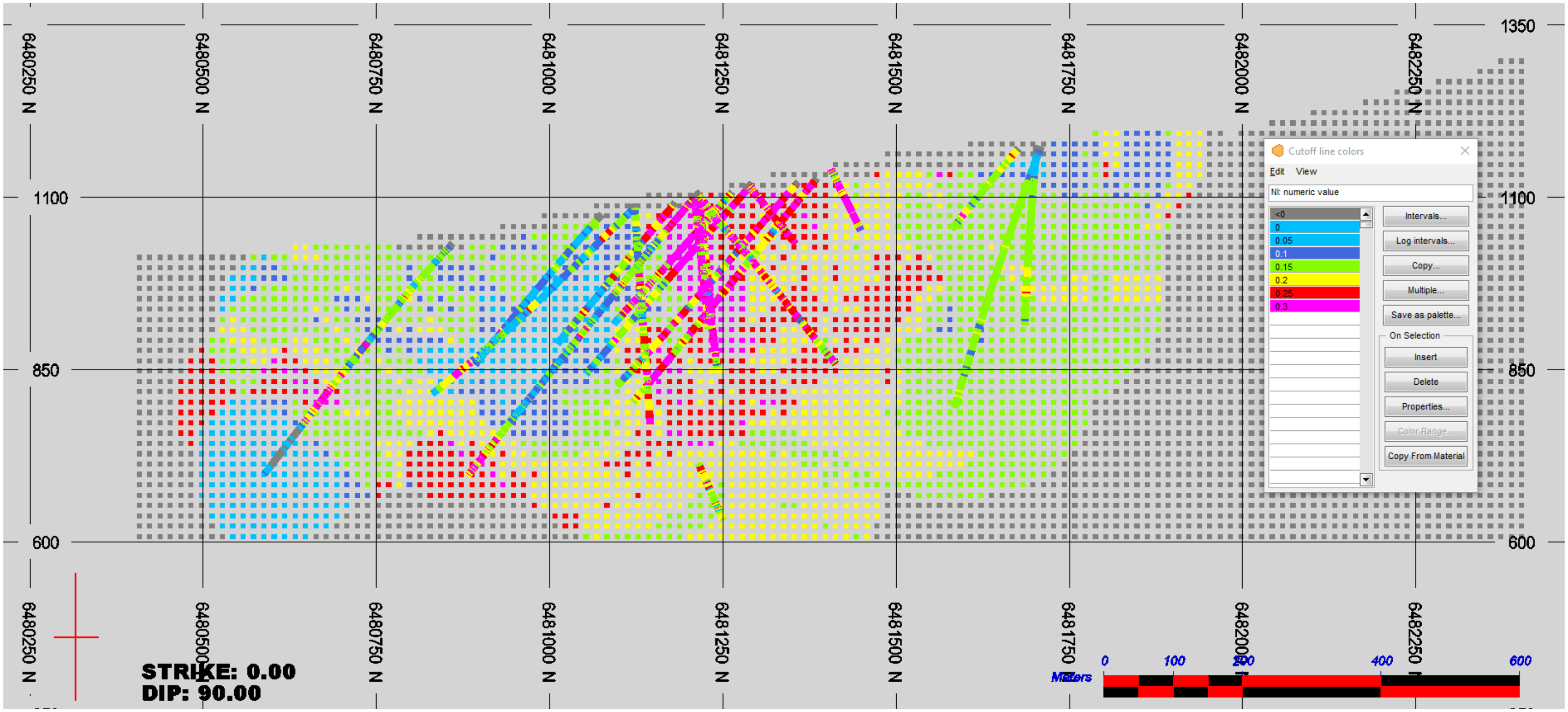


Figure 14-34: Section View of Ni% & Drill Holes for the Block Model at Section 508,600 North

(Source: Kirkham, 2023)

Note that the drillholes are displayed according to Ni% grades.

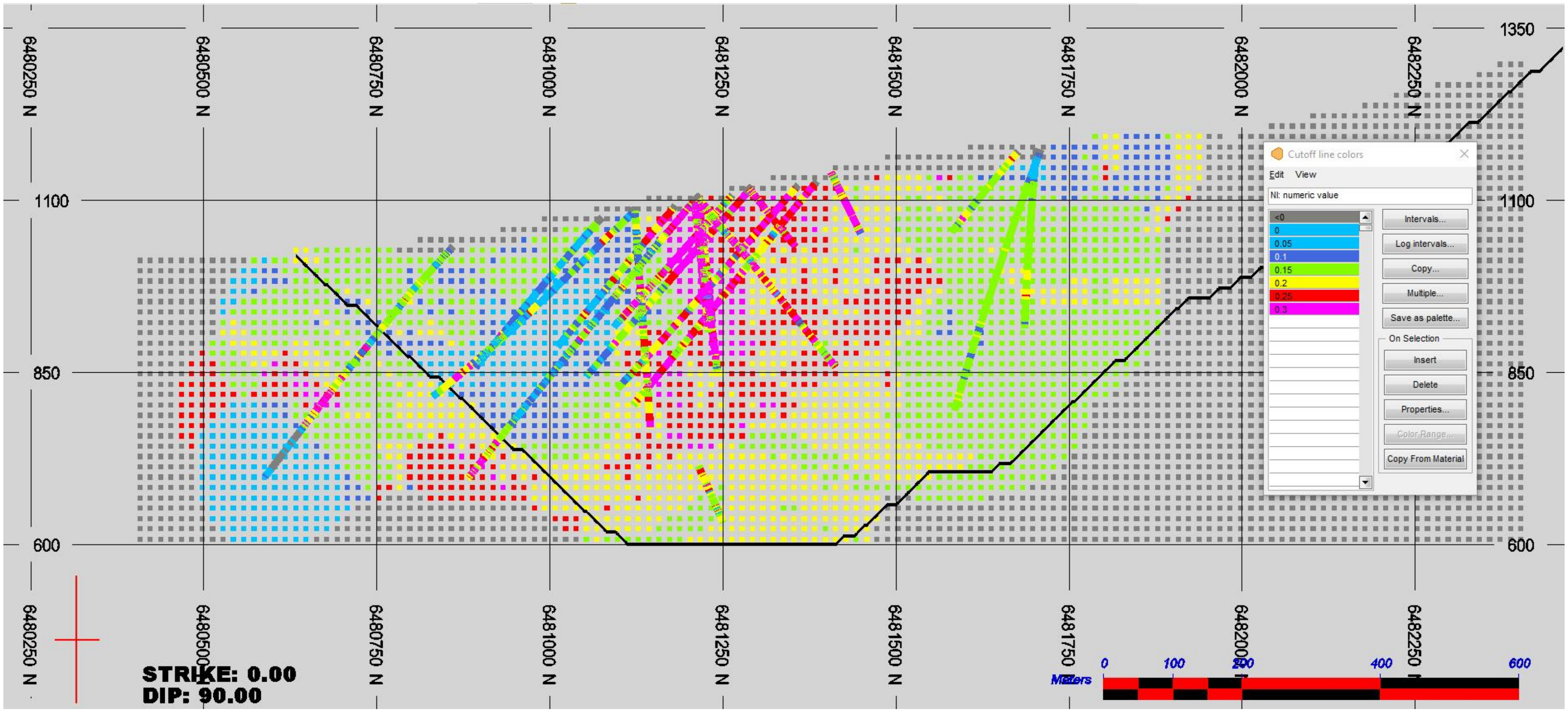


Figure 14-35: Section View of Ni% & Drill Holes for the Block Model with RP3E Pit at Section 508,600 North

(Source: Kirkham, 2023)

Note that the drillholes are displayed according to Ni% grades.

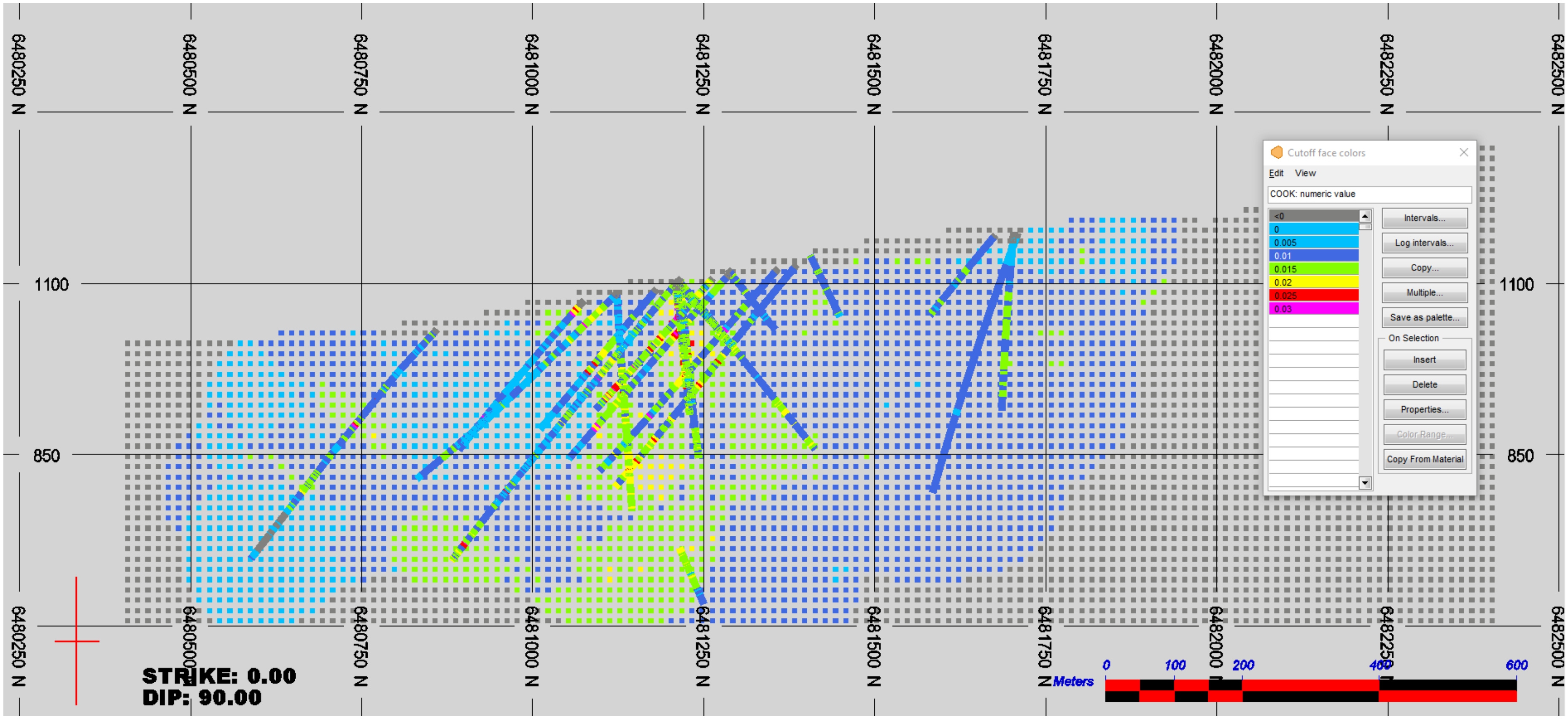


Figure 14-36: Section View of Co% & Drill Holes for the Block Model at Section 508,600 East

(Source: Kirkham, 2023)

Note that the drillholes are displayed according to Co% grades.

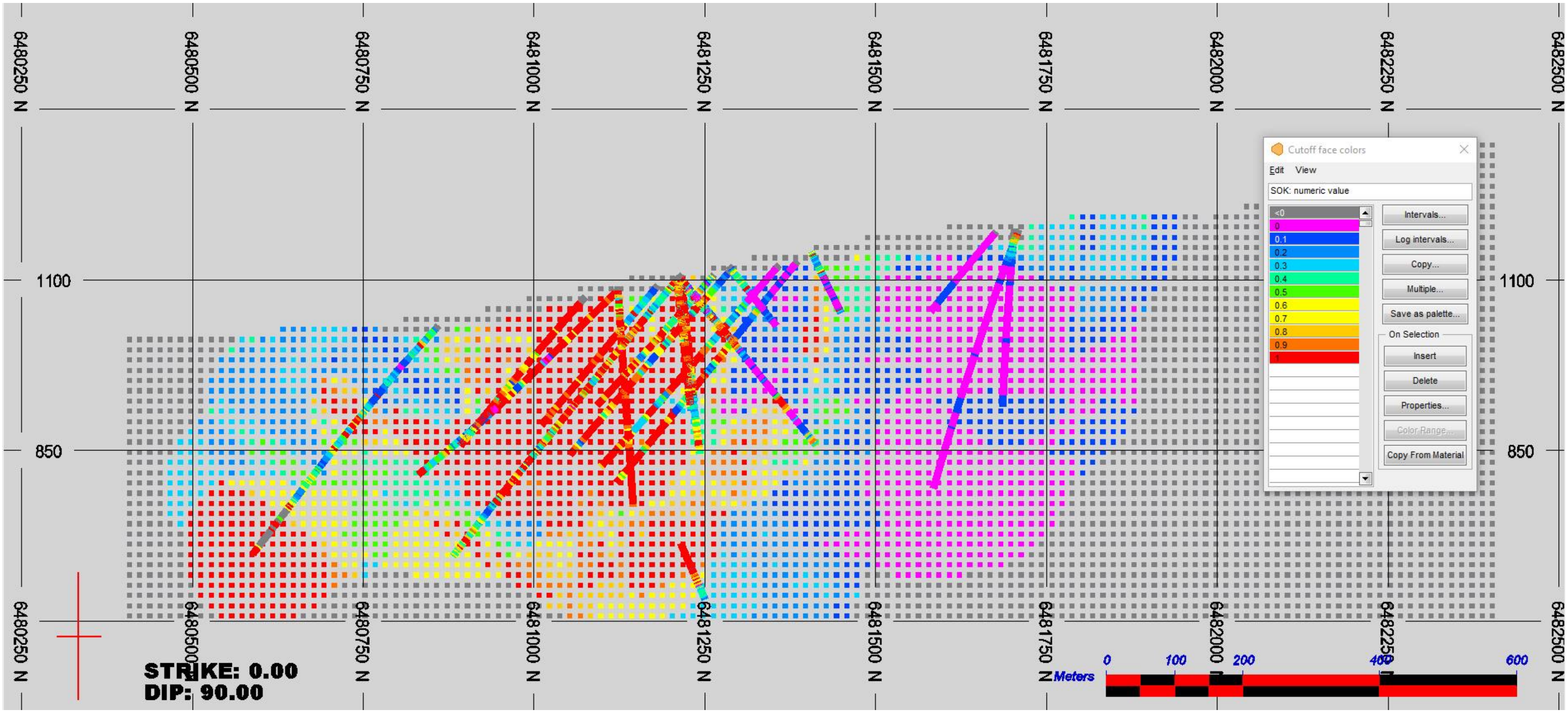


Figure 14-37: Section View of S% & Drill Holes for the Block Model at Section 508,600 East

(Source: Kirkham, 2023)

Note that the drillholes are displayed according to S% grades.

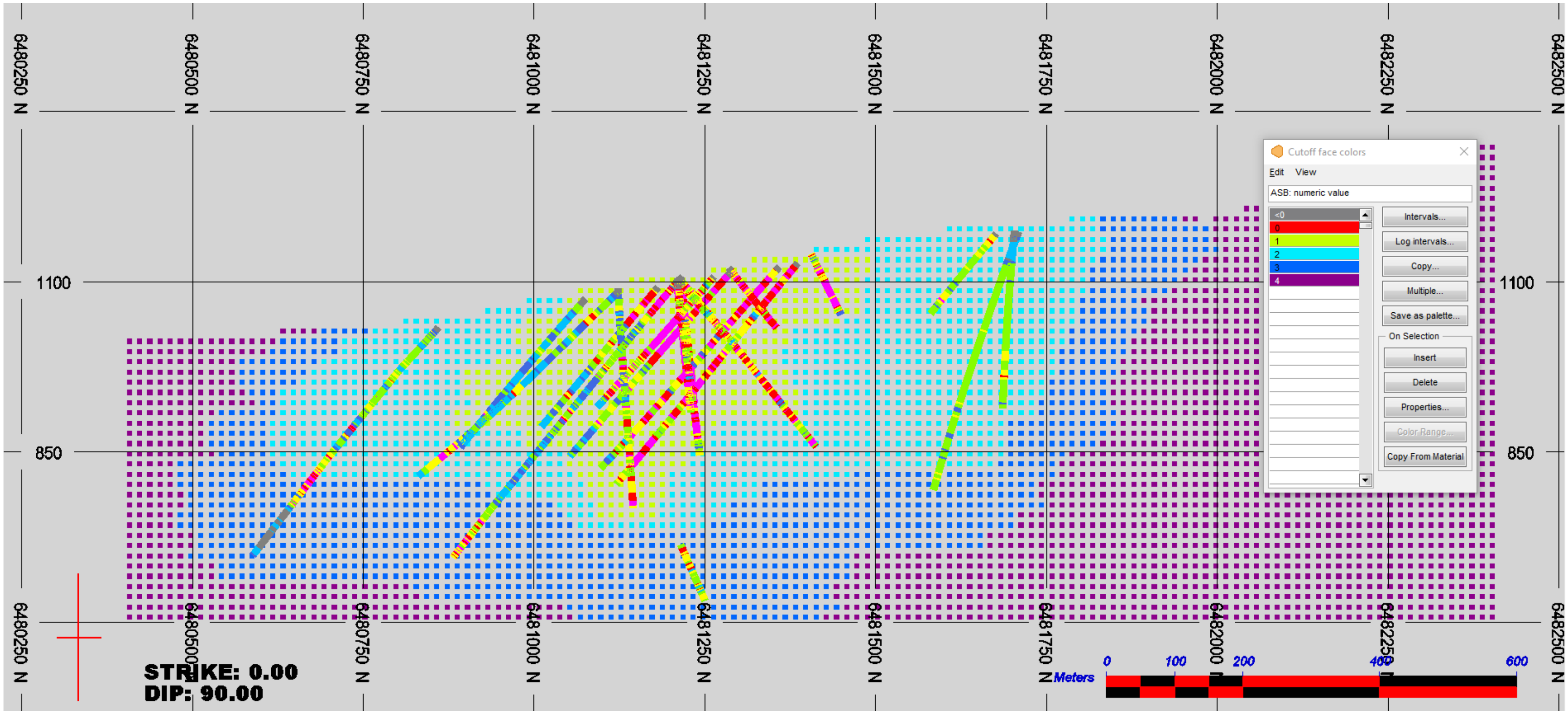


Figure 14-38: Section View of Classification of Blocks & Drill Holes at Section 508,600 East (note that the drillholes are displayed according to Ni% grades) (Source: Kirkham, 2023)

Note: 1 = Measured (green), 2 = Indicated (light blue), 3 = Inferred (blue), 4 = Unclassified (purple).

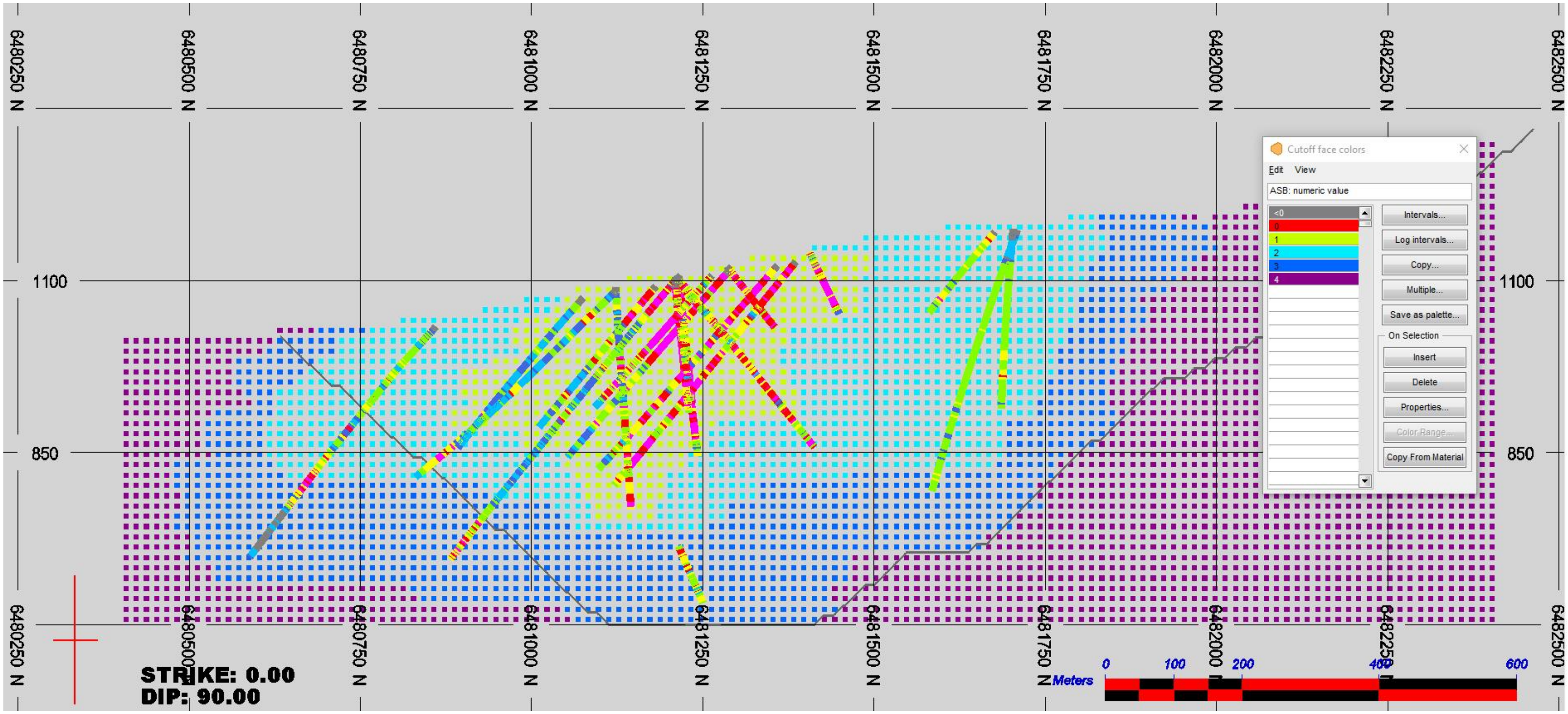


Figure 14-39: Section View of Classification of Blocks, RP3E Pit & Drill Holes at Section 508,600 East (note that the drillholes are displayed according to Ni% grades) (Source: Kirkham, 2023)

Note: 1 = Measured (green), 2 = Indicated (light blue), 3 = Inferred (blue), 4 = Unclassified (purple).

14.13 Sensitivity of the Block Model to Selection Cut-off Grade

The mineral resources are sensitive to the selection of cut-off grade. Table 14-14 shows the total resources for all metals at varying Ni% cut-off grades. The reader is cautioned that these values should not be misconstrued as a mineral reserve. The reported quantities and grades are only presented as a sensitivity of the resource model to the selection of cut-off grades. Note that the base case cut-off grade presented **in bold** is based on potentially open pit resources at a break-even cut-off of 0.1% Ni.

Table 14-14: Sensitivity Analyses of Global Tonnage & Grades at Various Ni% Cut-off Grades (Source: Kirkham, 2023)

Classification	Cut-off	Tonnage (kt)	Ni Grade (%)	Co Grade (%)	Pt Grade (g/t)	Pd Grade (g/t)
Measured	0.050	462,280	0.22	0.013	0.023	0.022
	0.100	**454,552**	**0.22**	**0.014**	0.023	0.022
	0.150	416,212	0.23	0.014	0.024	0.023
	0.200	313,389	0.25	0.014	0.025	0.024
	0.250	132,581	0.29	0.015	0.030	0.028
	0.300	29,274	0.35	0.017	0.041	0.037
Indicated	0.050	1,193,788	0.20	0.013	0.018	0.021
	0.100	**1,119,387**	**0.21**	**0.013**	**0.019**	**0.021**
	0.150	977,637	0.22	0.013	0.020	0.023
	0.200	697,696	0.24	0.014	0.021	0.024
	0.250	224,588	0.28	0.014	0.026	0.030
	0.300	30,745	0.33	0.016	0.050	0.052
Inferred	0.050	1,250,680	0.20	0.012	0.015	0.018
	0.100	**1,163,830**	**0.21**	**0.012**	**0.016**	**0.018**
	0.150	1,015,358	0.22	0.013	0.016	0.019
	0.200	701,517	0.24	0.013	0.016	0.019
	0.250	163,792	0.28	0.014	0.022	0.026
	0.300	21,697	0.34	0.015	0.043	0.046

Notes:

1. The current resource estimate was prepared by Garth Kirkham, P.Geo., of Kirkham.
2. All mineral resources have been estimated in accordance with Canadian Institute of Mining and Metallurgy and Petroleum definitions, as required under National Instrument 43-101.
3. Mineral resources are reported in relation to a conceptual pit shell to demonstrate reasonable expectation of eventual economic extraction, as required under NI 43-101; mineralization lying outside of these pit shells is not reported as a mineral resource. Mineral resources are not mineral reserves and do not have demonstrated economic viability. All figures are rounded to reflect the relative accuracy of the estimate and therefore numbers may not appear to add precisely.
4. Open pit mineral resources are reported at a cut-off grade of 0.1% Ni. Cut-off grades are based on a price of US $9.00 per pound, nickel recoveries of 60%, mineralized material and waste mining costs of $2.80, along with milling, processing and G&A costs of $7.20.

5. Inferred mineral resources are considered too speculative geologically to have economic considerations applied to them that would enable them to be categorized as mineral reserves. However, it is reasonably expected that the majority of inferred mineral resources could be upgraded to indicated.
6. Due to rounding, numbers presented may not add up precisely to the totals provided and percentages may not precisely reflect absolute figures.

14.14 Resource Validation

A graphical validation was completed on the block model. This type of validation serves the following purposes:

- Checks the reasonableness of the estimated grades based on the estimation plan and the nearby composites,
- Checks that the general drift and the local grade trends compare to the drift and local grade trends of the composites,
- Ensures that blocks in the core of the deposit have been estimated,
- Checks that topography has been properly accounted,
- Checks against manual approximate estimates of tonnages to determine reasonableness,
- Inspects for and explains potentially high-grade block estimates in the neighbourhood of the extremely high assays.

A full set of cross sections, long sections and plans were used to digitally check the block model; these showed the block grades and composites. There was no indication that a block was wrongly estimated, and it appears that block grades could be explained as a function of the surrounding composites and the applied estimation plan.

In addition, distributions of distance to nearest composite (Figure 14-40), average distance of the composites informing each block, number of composites and number of drillholes informed were analyzed. Histograms for distance to nearest composite and for average distance of composites informed for each of the measured, indicated and inferred block populations are shown in Figure 14-48 through Figure 14-43 and Figures 14-44 through 14-46, respectively. confirming expected results. Kriged variances as shown in Figure 14-47 through Figure 14-50 also illustrate very low variability within measured, progressively increasing in indicated and inferred.

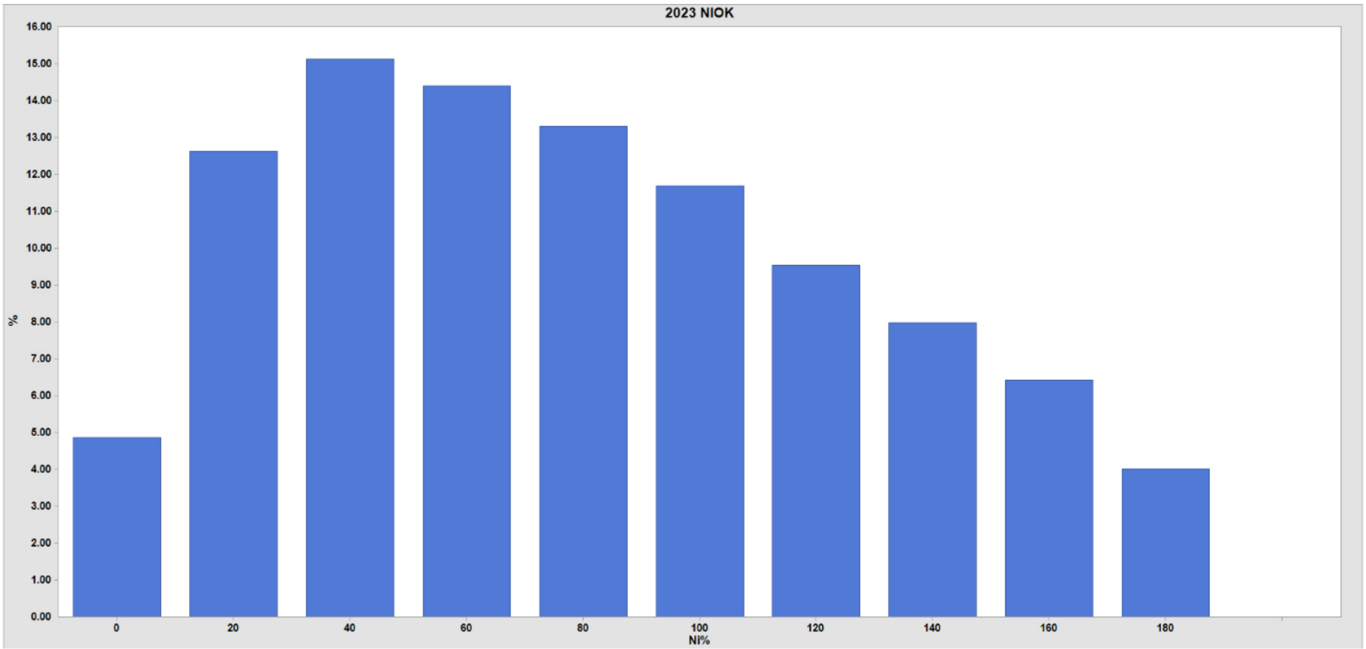


Figure 14-40: Histogram of Distance to Nearest Composite

(Source: Kirkham, 2023)

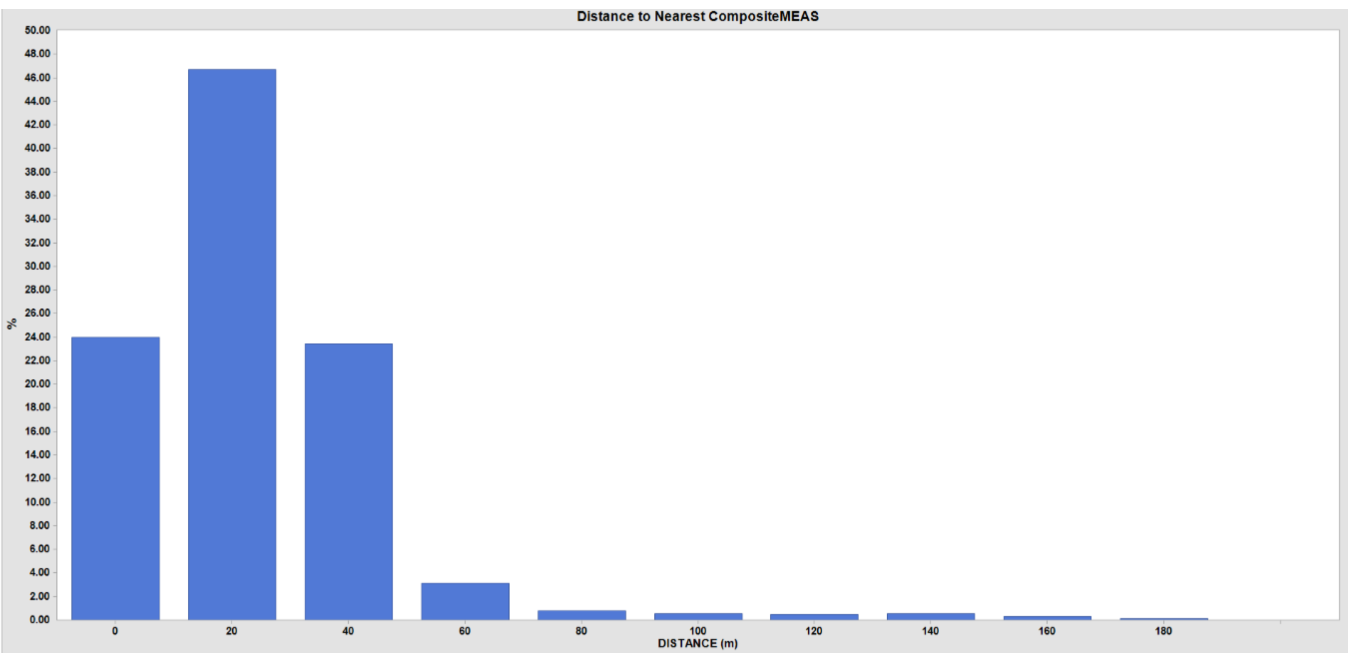


Figure 14-41: Histogram of Distance to Nearest Composite – Measured

(Source: Kirkham, 2023)

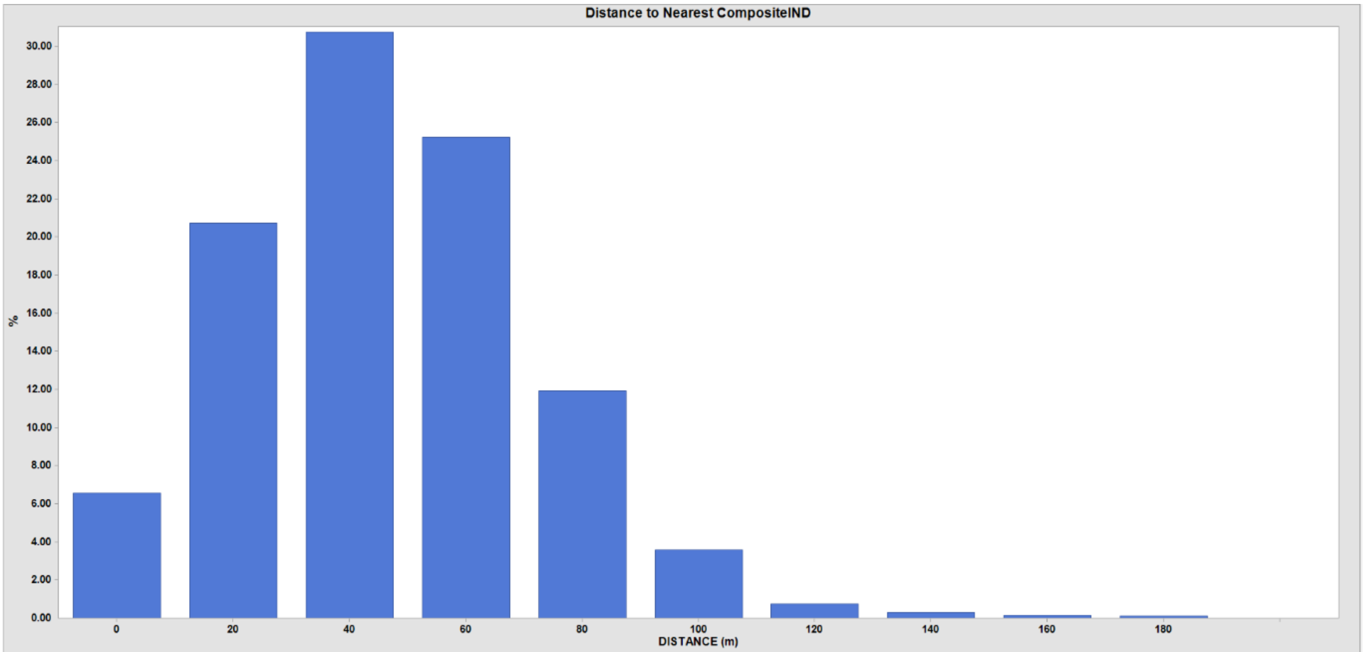


Figure 14-42: Histogram of Distance to Nearest Composite – Indicated

(Source: Kirkham, 2023)

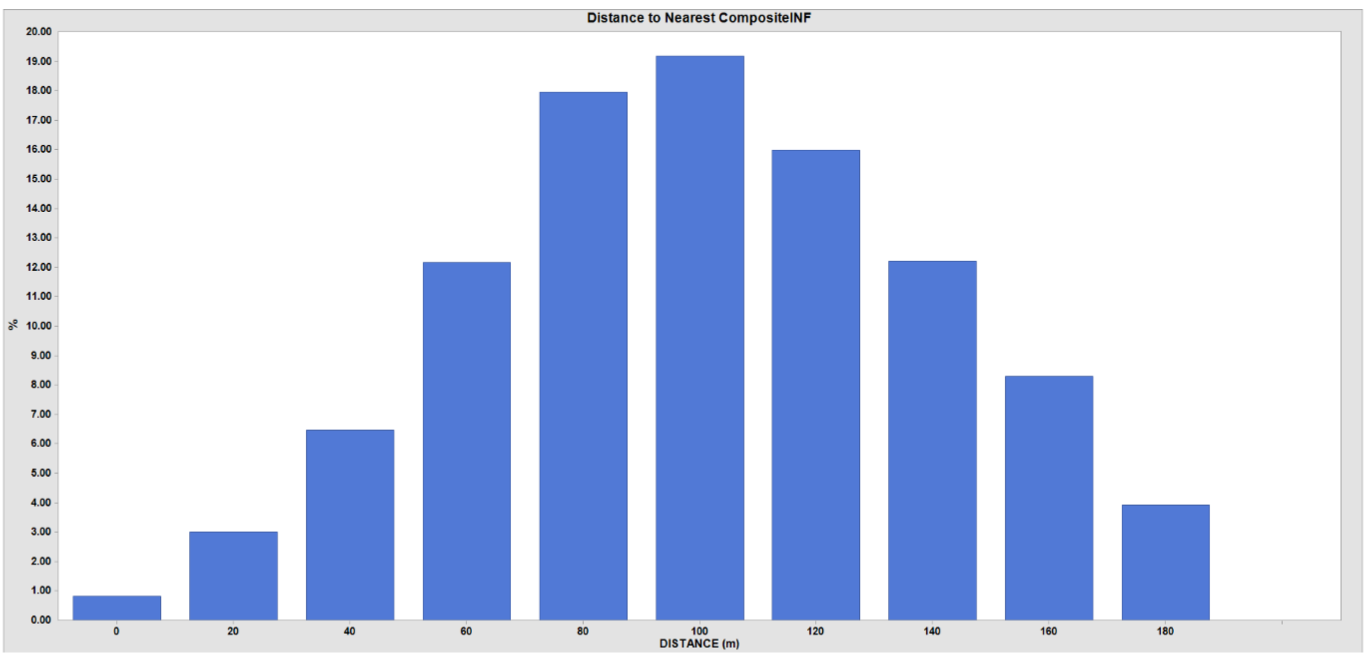


Figure 14-43: Histogram of Distance to Nearest Composite – Inferred

(Source: Kirkham, 2023)

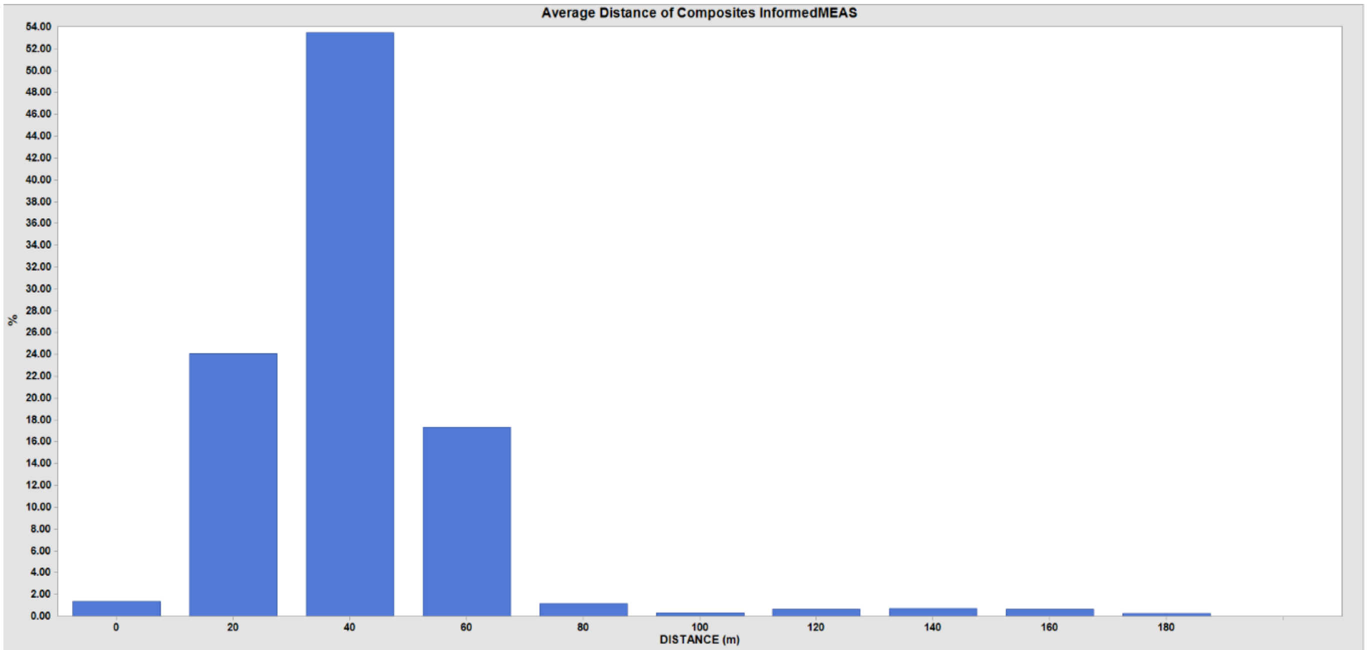


Figure 14-44: Histogram of Average Distances of Informed Composites – Measured
(Source: Kirkham, 2023)

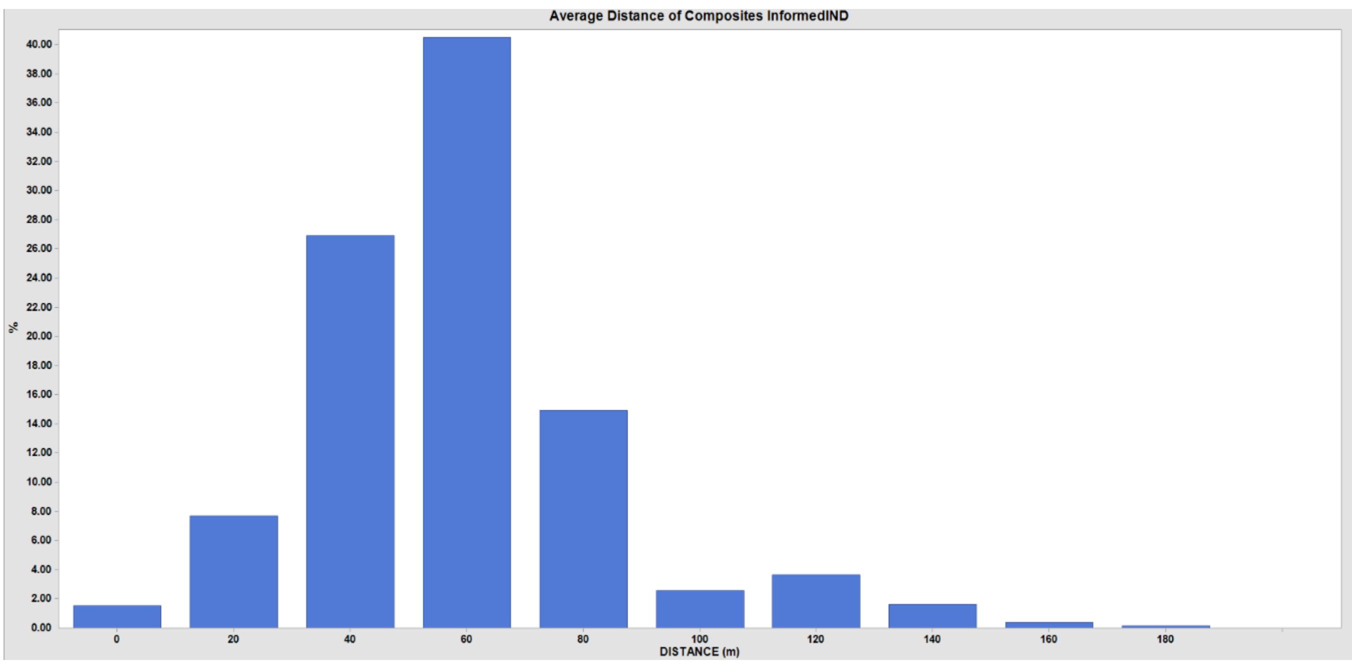


Figure 14-45: Histogram of Average Distances of Informed Composites – Indicated
(Source: Kirkham, 2023)

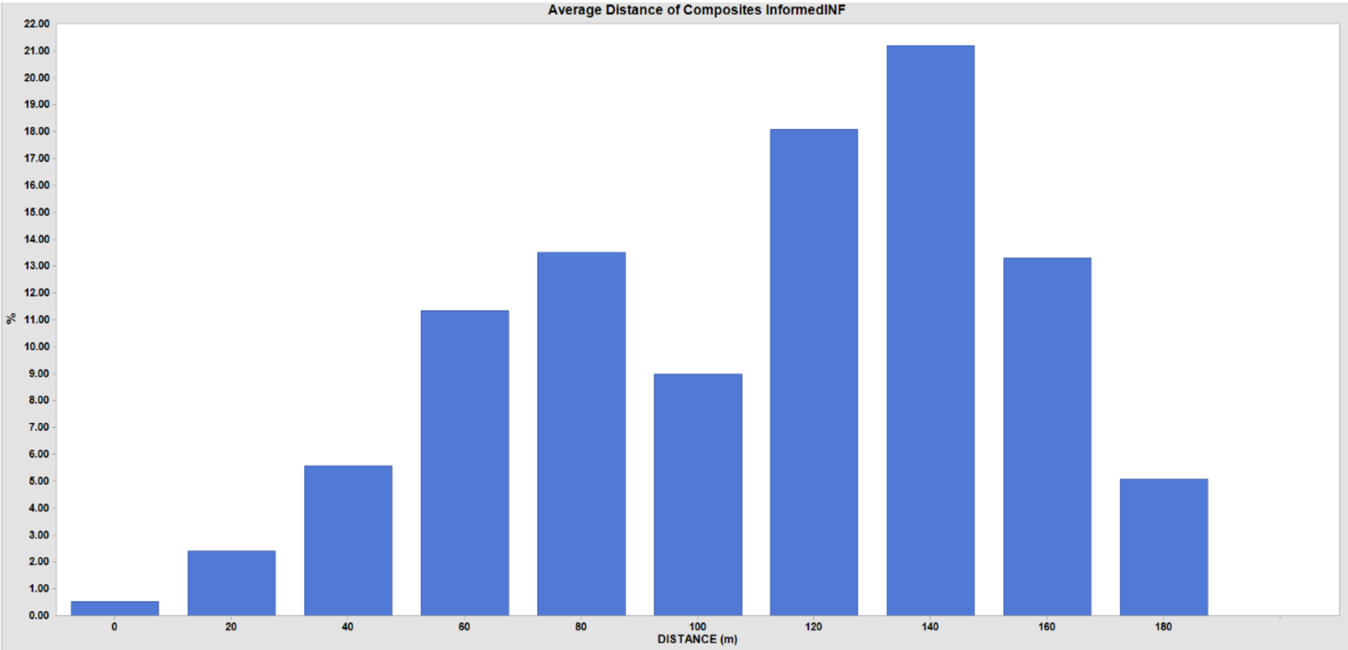


Figure 14-46: Histogram of Distance to Average Distances of Informed Composites – Inferred

(Source: Kirkham, 2023)

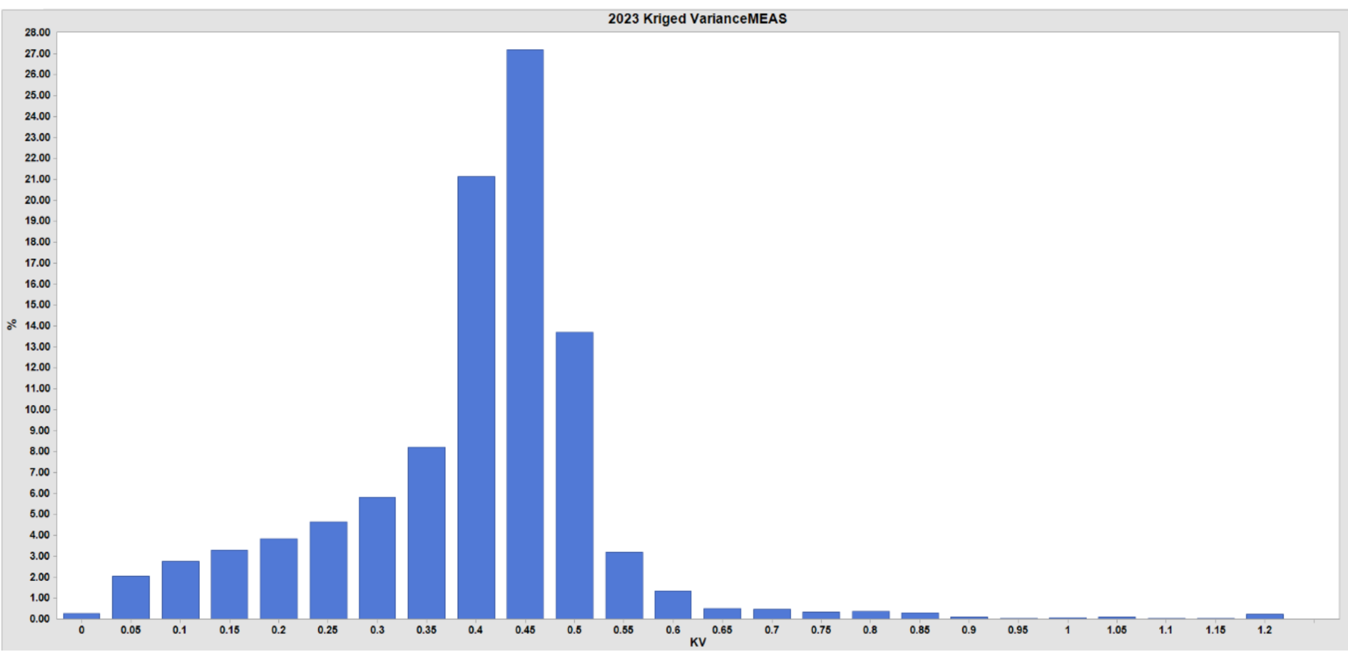


Figure 14-47: Histogram of Kriged Variances – Measured

(Source: Kirkham, 2023)

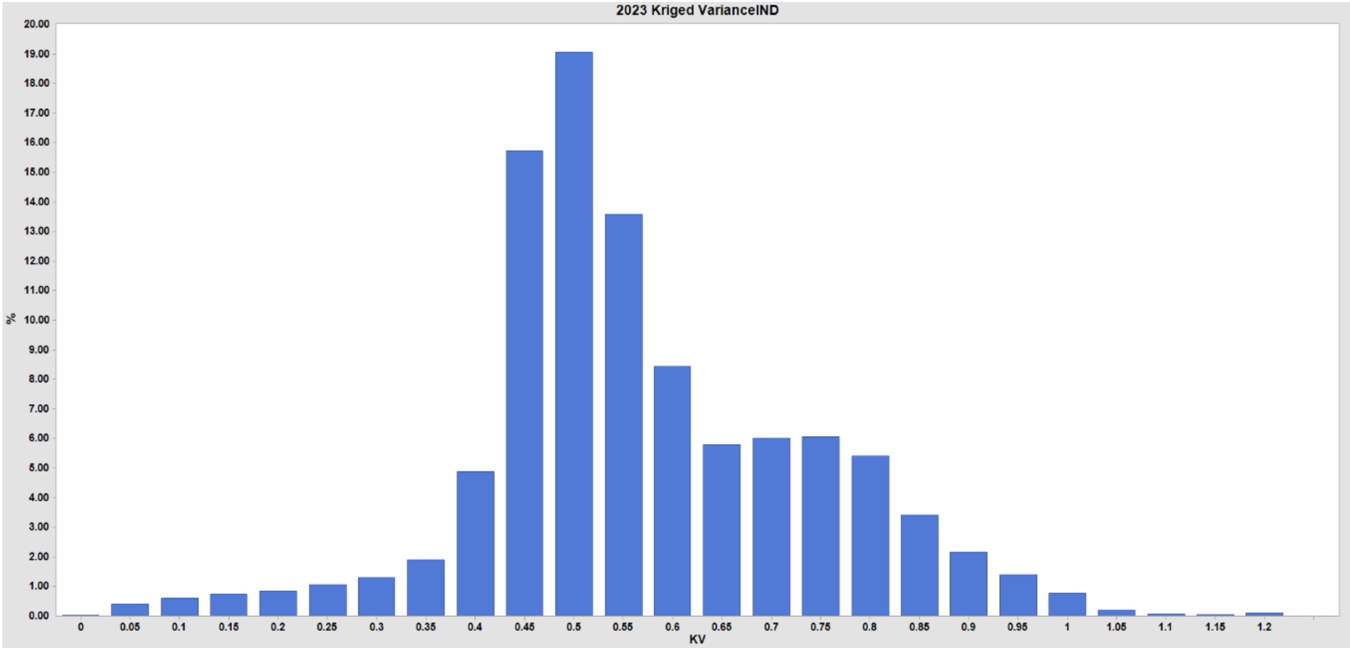


Figure 14-48: Histogram of Kriged Variances – Indicated

(Source: Kirkham, 2023)

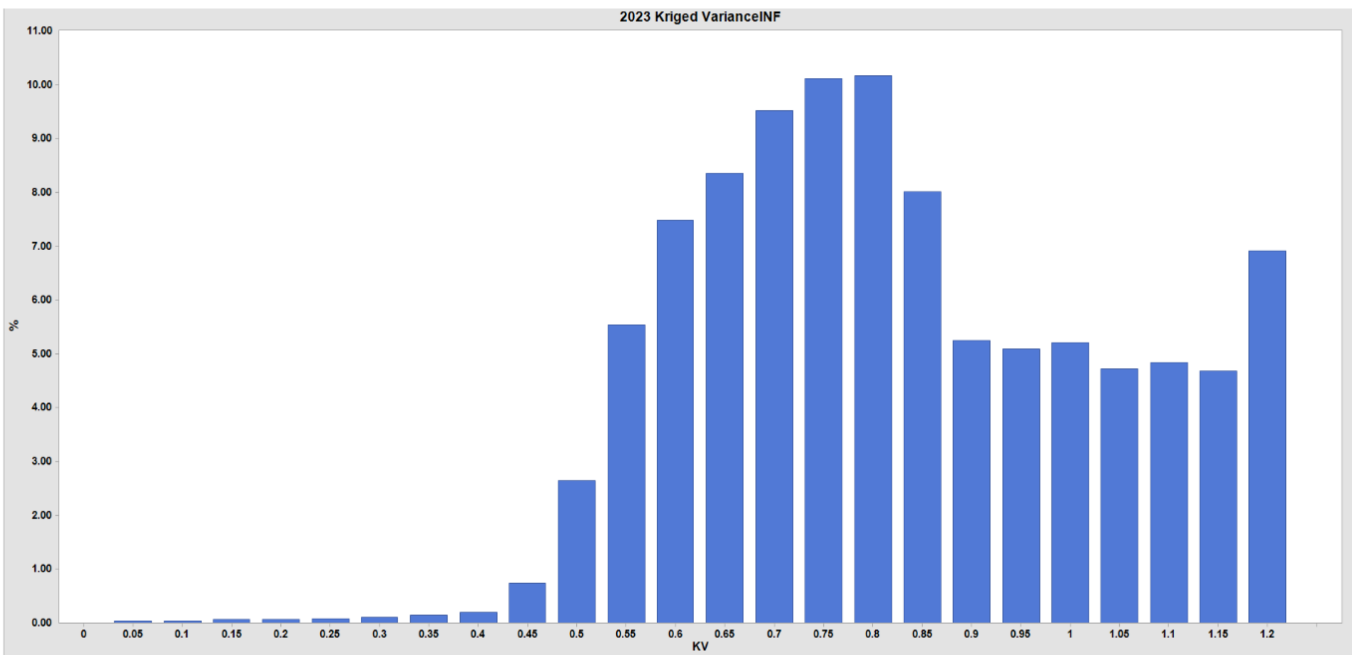


Figure 14-49: Histogram of Kriged Variances – Inferred

(Source: Kirkham, 2023)

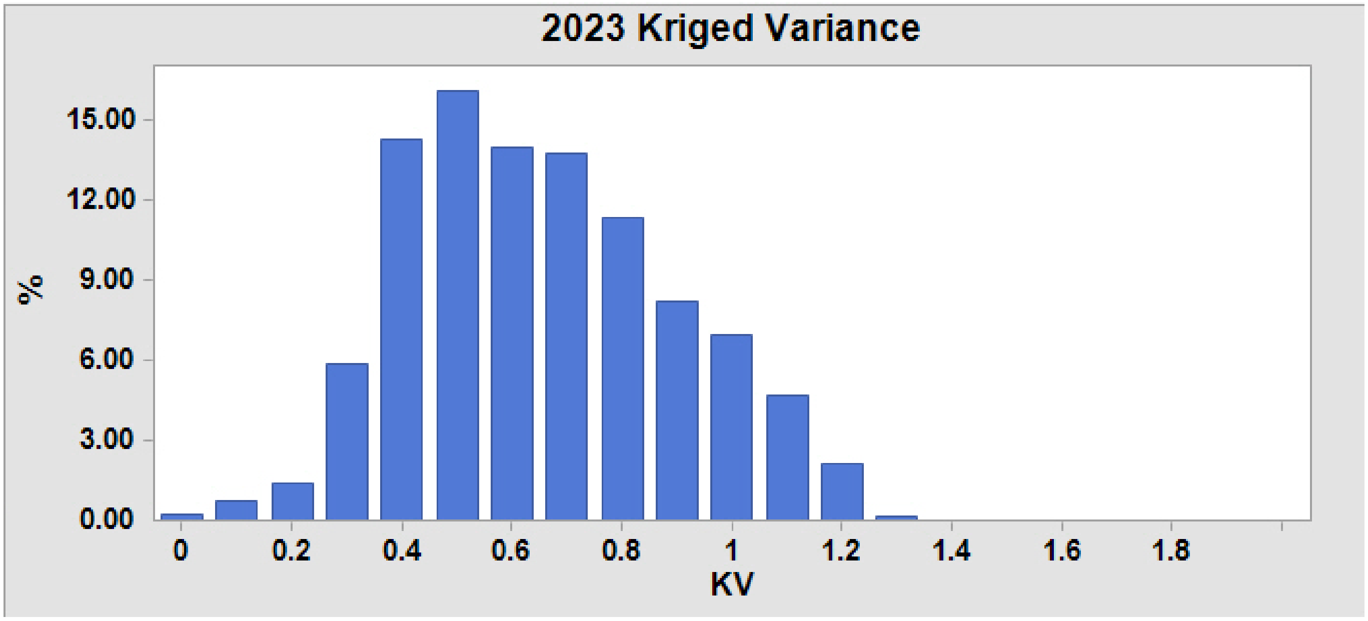


Figure 14-50: Histogram of Kriged Variances for the Turnagain Resource Estimation

(Source: Kirkham, 2023)

Grade-tonnage plots as shown in Figure 14-51 illustrate good agreement between the kriged estimate and those of nearest neighbour and inverse distance. In addition, swath plots Figure 14-52 through Figure 14-60 illustrate good agreement between the kriged estimate and those of nearest neighbour and inverse distance for nickel, cobalt and sulphur, respectively.

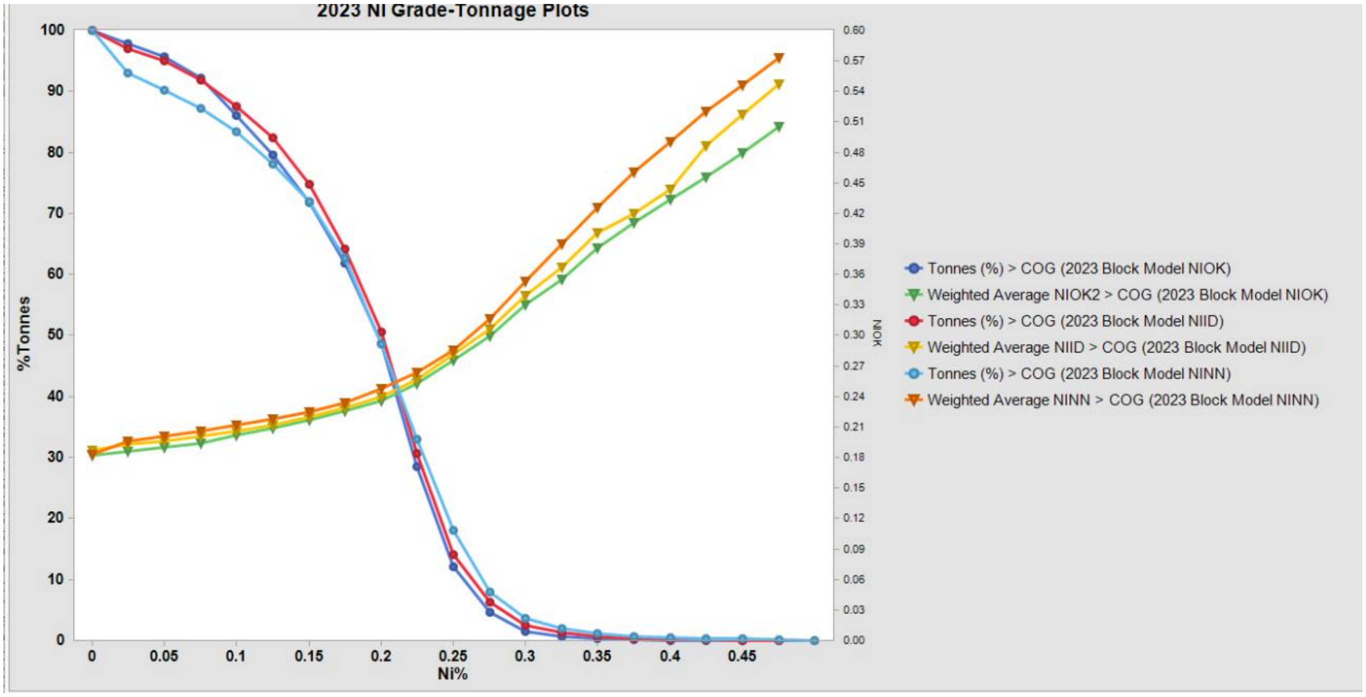


Figure 14-51: Grade-Tonnage Plot for Nickel

(Source: Kirkham, 2023)

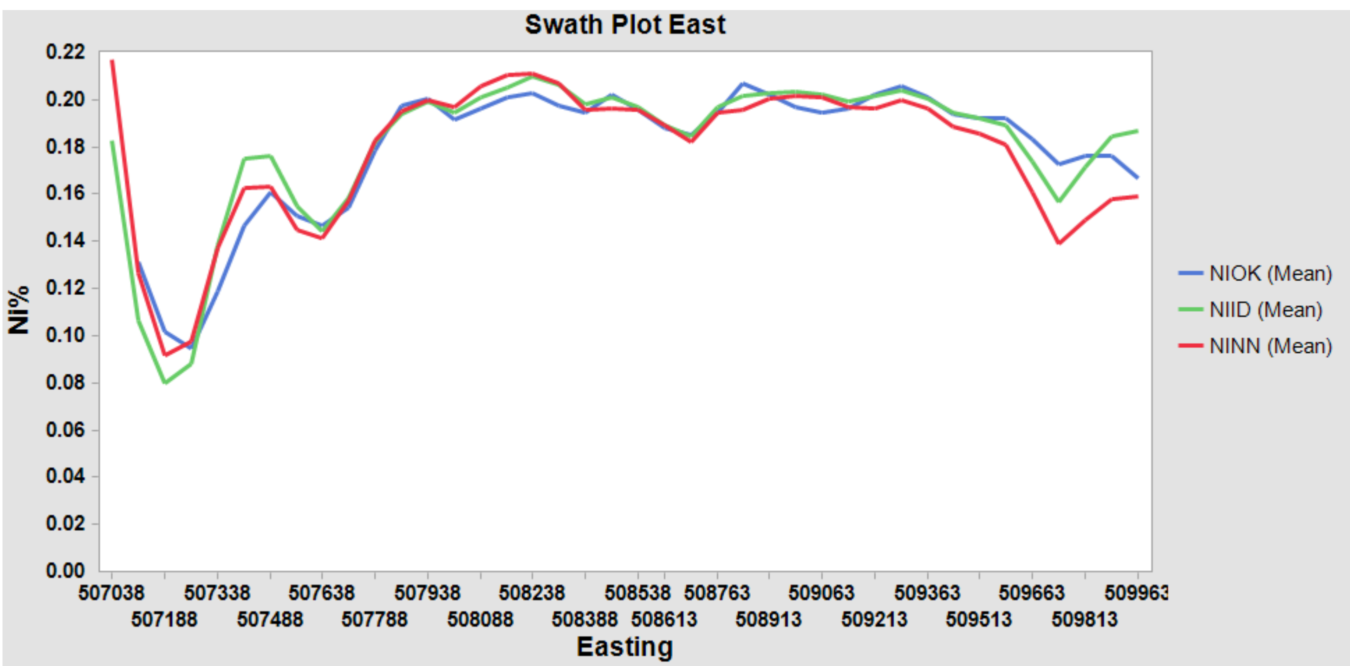


Figure 14-52: Swath Plot for Nickel by Easting

(Source: Kirkham, 2023)

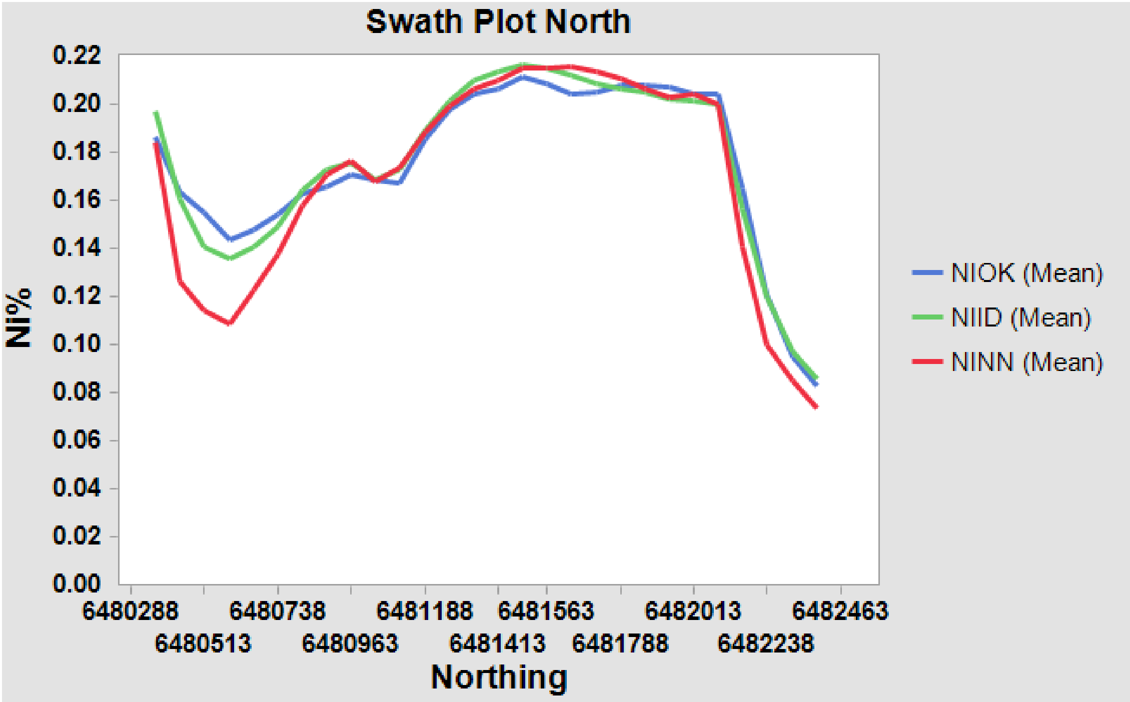


Figure 14-53: Swath Plot for Nickel by Northing

(Source: Kirkham, 2023)

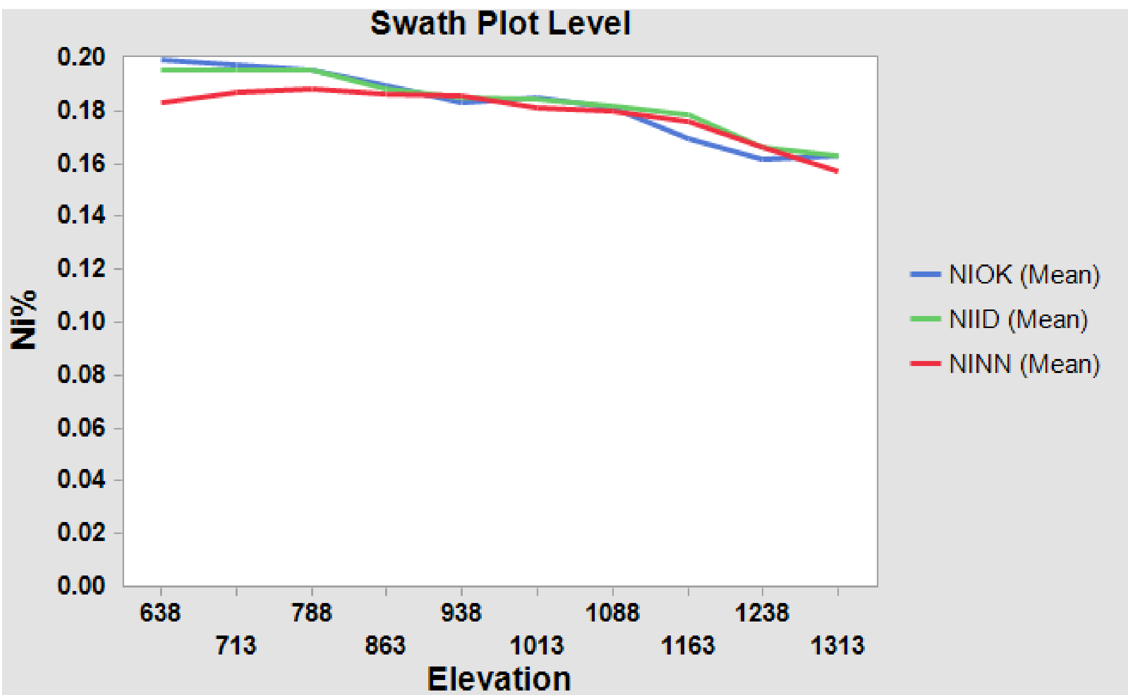


Figure 14-54: Swath Plot for Nickel by Elevation

(Source: Kirkham, 2023)

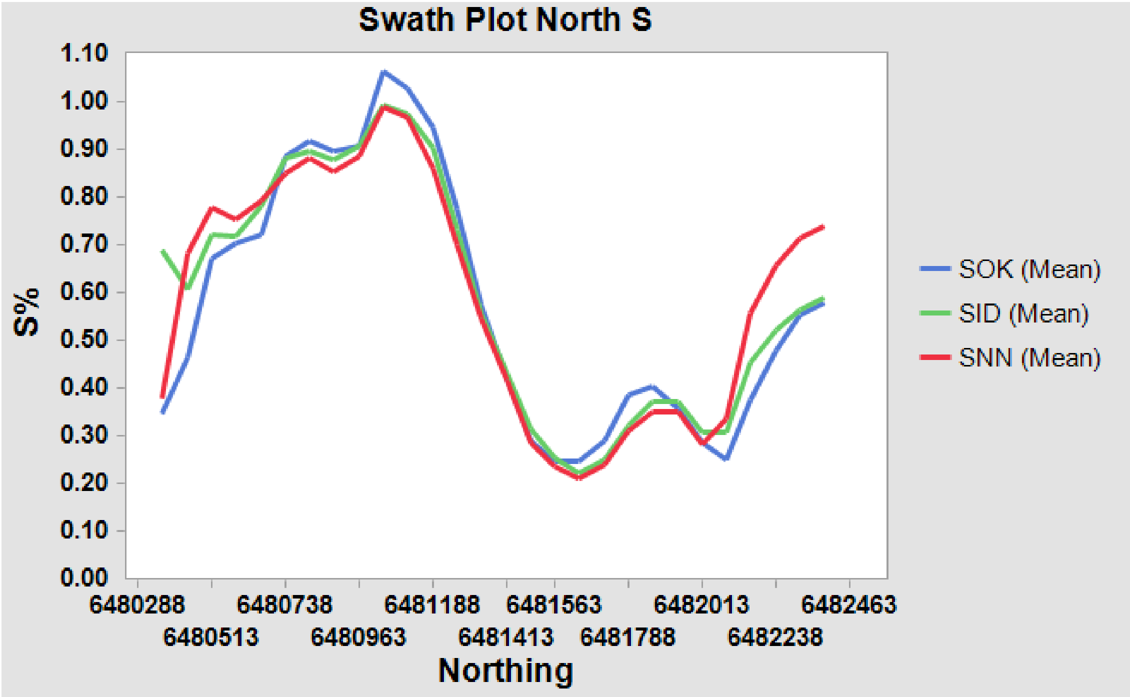


Figure 14-55: Swath Plot for Sulphur by Northing

(Source: Kirkham, 2023)

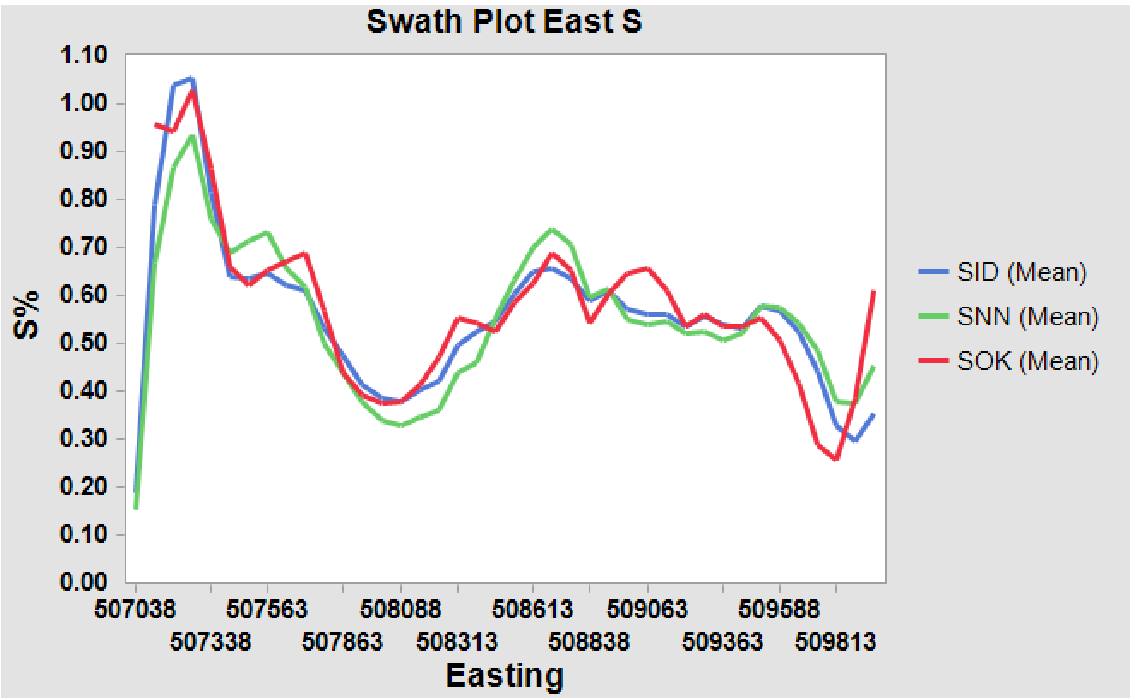


Figure 14-56: Swath Plot for Sulphur by Easting

(Source: Kirkham, 2023)

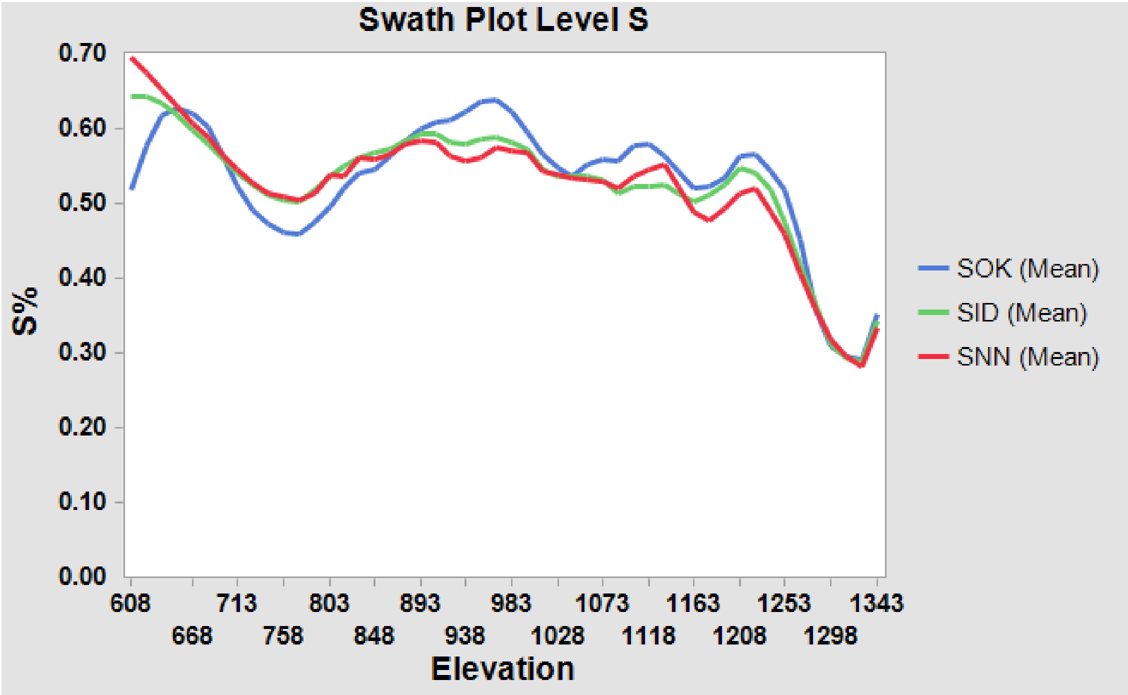


Figure 14-57: Swath Plot for Sulphur by Elevation

(Source: Kirkham, 2023)

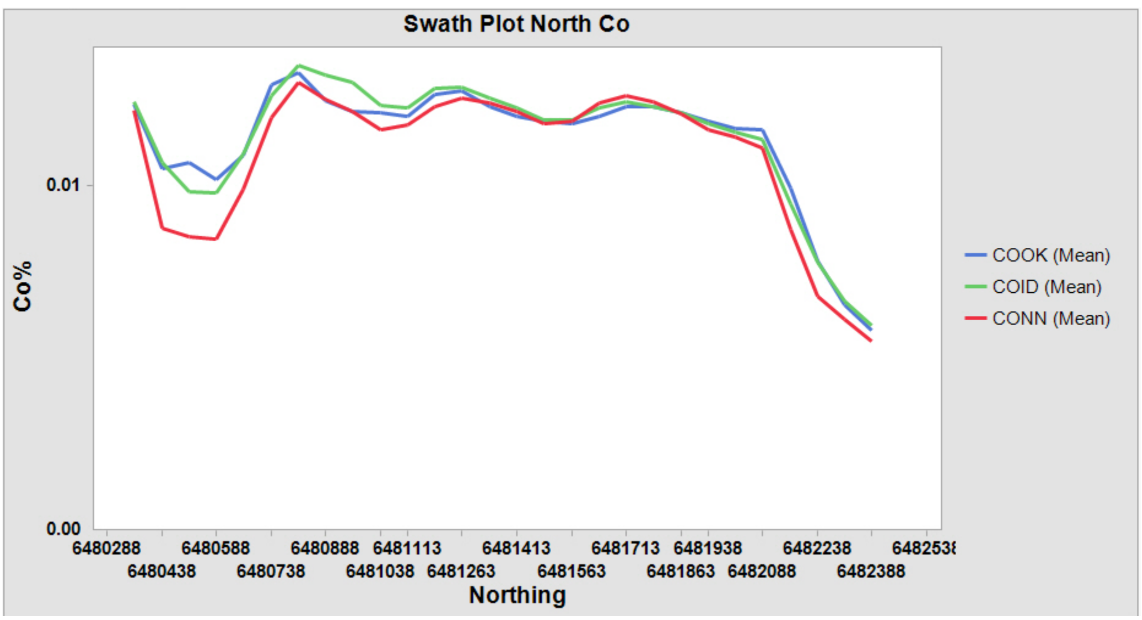


Figure 14-58: Swath Plot for Cobalt by Northing

(Source: Kirkham 2023)

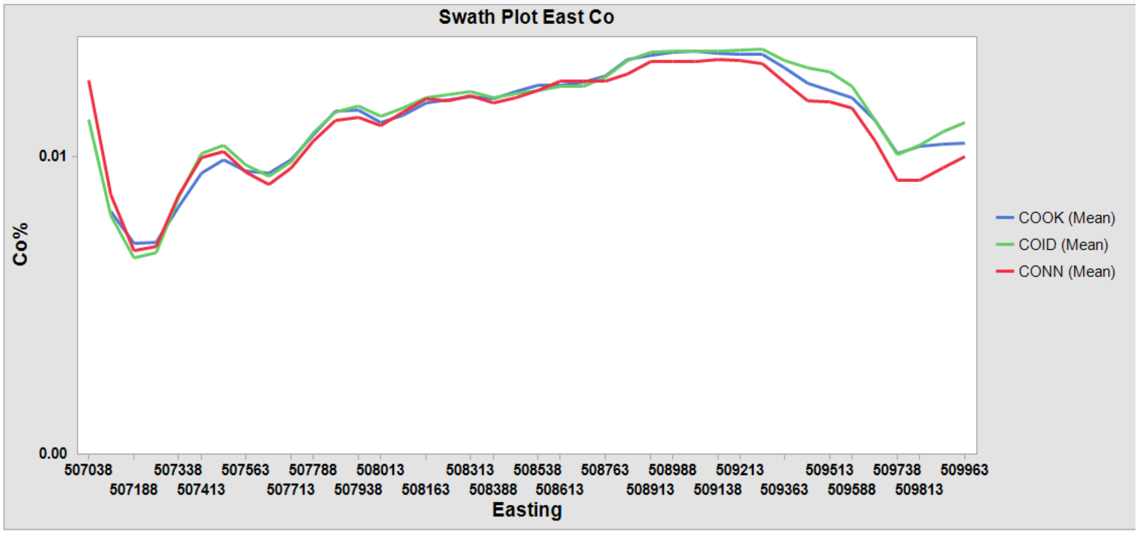


Figure 14-59: Swath Plot for Cobalt by Easting

(Source: Kirkham, 2023)

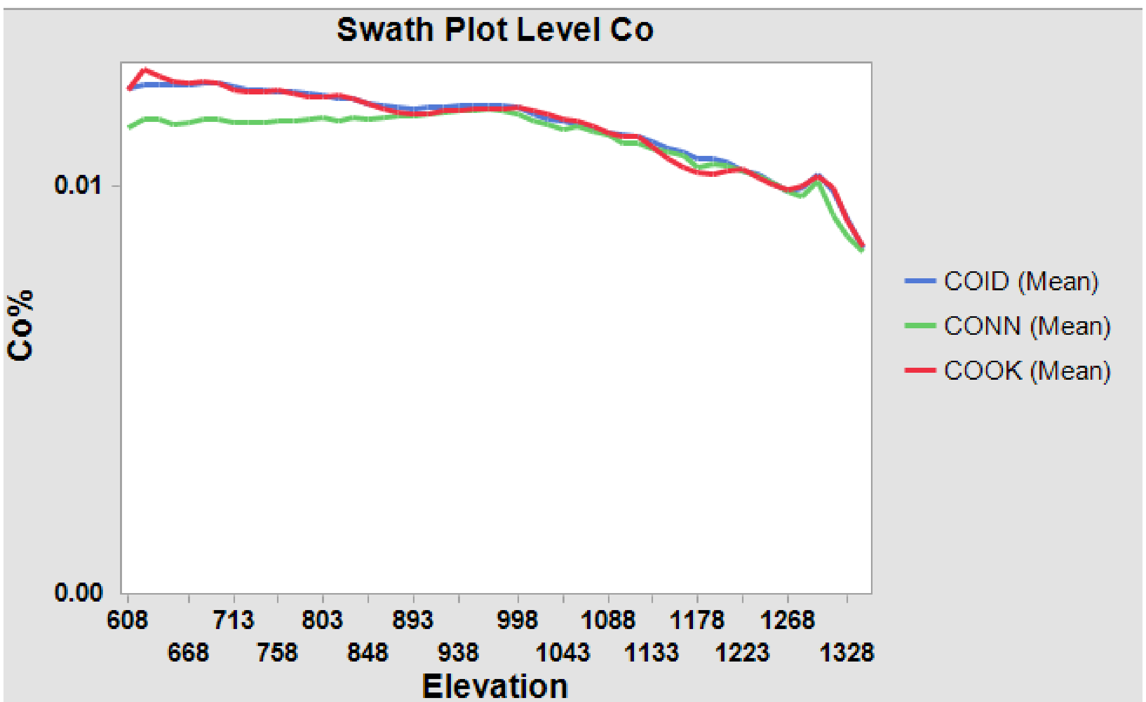


Figure 14-60: Swath Plot for Cobalt by Elevation

(Source: Kirkham, 2023)

14.15 Change of Support Model Checks

The relative degree of smoothing in the block model estimates were evaluated using the Discrete Gaussian of Hermitian Polynomial Change of Support method (described by Rossi and Deutsch, Mineral Resource Estimation, 2014).

Using this method, the distribution of the hypothetical block grades can be directly compared to the estimated (OK) model using pseudo-grade/tonnage curves. Adjustments are made to the block model interpolation parameters until an acceptable match is made with the Herco distribution. In general, the estimated model should be slightly higher in tonnage and slightly lower in grade when compared to the Herco distribution at the projected cut-off grade. These differences account for selectivity and other potential ore-handling issues which commonly occur during mining.

The Herco distribution is derived from the declustered composite grades which have been adjusted to account for the change in support, going from smaller drillhole composite samples to the large blocks in the model. The results show that the block model is smoothed appropriately and is a reasonable match for the composite data utilized.

Figure 14-61 through Figure 14-63 show examples of the distributions of the nickel, cobalt and sulphur, respectively.

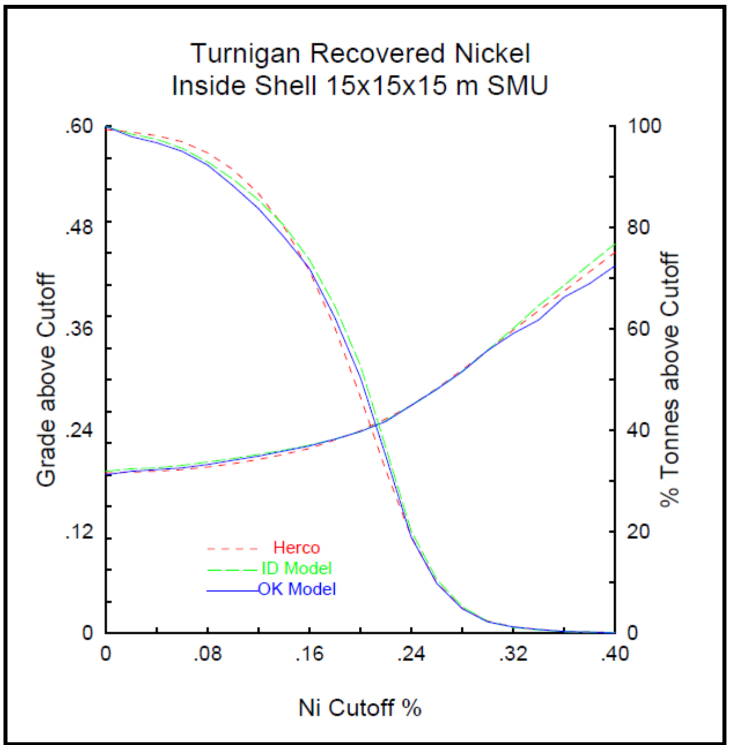


Figure 14-61: Herco Grade-Tonnage Plot for Nickel

(Source: Kirkham, 2023)

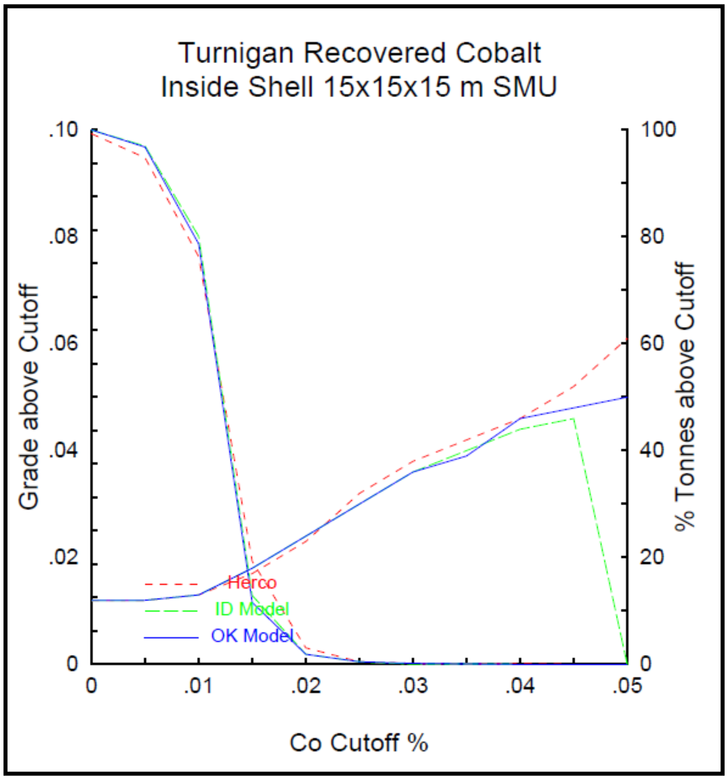


Figure 14-62: Herco Grade-Tonnage Plot for Cobalt

(Source: Kirkham, 2023)

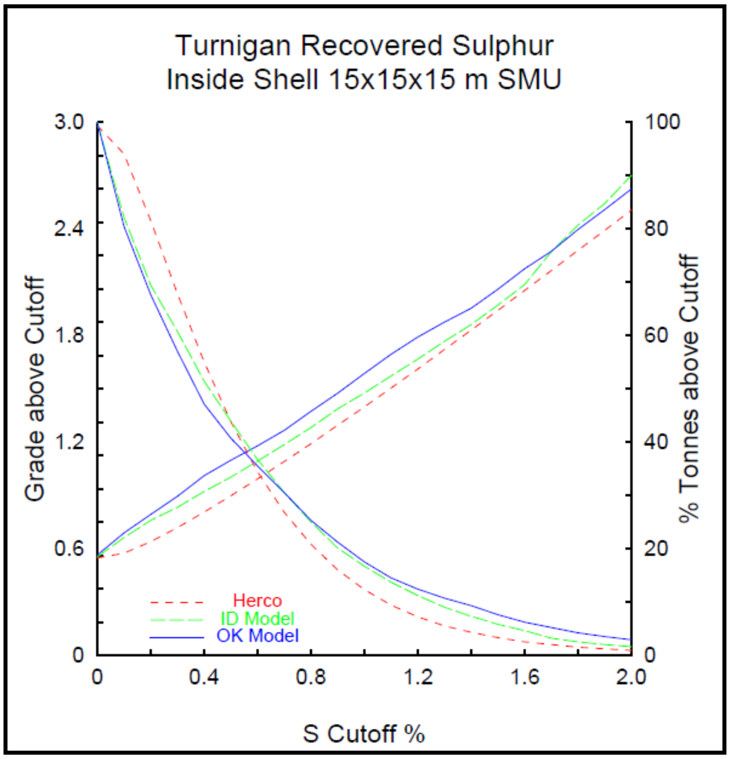


Figure 14-63: Herco Grade-Tonnage Plot for Sulphur

(Source: Kirkham, 2023)

14.16 Comparison to Previous Resource Estimates

The resource could be affected should future development options exclude the potential to divert a small section of the Turnagain River. In such a case, either the Hatzl Zone would be mined via its own independent, non-continuous pit or excluded all together.

In addition, the project as a whole relies upon attaining social license to operate and as such may be affected by First Nations and socio-economic factors however these factors are not specific to the resource estimate and affect the project as a whole.

To the extent known, the author is not aware of any legal, title, permitting, taxation, marketing or political factors that would affect the resource estimate.

Since the 2020 PEA, Giga Metals has performed infill drilling and updated its geological modelling. Differences from the previous (2020) resource estimate described in the 2022 Resource Update are the inclusion of an additional 15 infill drill holes drilled in 2021 in the areas of the conceptual open pit, updated geological modelling and current updated price and cost parameters. In addition, the 2022 update employed the utilization of a sulphur iso-shell volume for constraining the nickel estimation in an effort to better characterize the relationship between nickel and sulphur content.

The 2023 update included adjustments to the reasonable prospects of eventual economic extraction criteria and excluded the use of the sulphur iso-shell domain as a proxy for metallurgical recovery. As a result, the measured plus indicated resources have marginally grown due to a revised methodology with respect to classification strategy. In addition, the inferred resources have also grown because the volumes of the ultimate conceptual pit have grown. This comparison is provided for information purposes only.

It is important to note that, as with every deposit and resource estimation, with more data and improved understanding, there will be differences from one model to the next. These comparisons should not be interpreted as a statement of mineral reserves; mineral reserves can only be defined in a PFS or FS.

Comparisons between the current 2023 resource estimate and the previous 2022 and 2019 resource estimation are presented in Table 14-15.

Table 14-15: Comparison of Consolidated Mineral Resource Statements for Turnagain Project (Source: Kirkham, 2023)

Classification	Tonnage (kt)	Ni Grade (%)	Contained Ni (klbs)	Co Grade (%)	Contained Co (klbs)
2023 Update					
Measured and Indicated	1,573,939	0.215	7,453,649	0.013	451,506
Inferred(3)	1,163,830	0.207	5,301,548	0.012	315,860
2022 Update					
Measured and Indicated	1,518,971	0.210	7,038,035	0.013	433,072
Inferred(3)	1,222,320	0.206	5,555,061	0.012	325,301
2019 Estimate					
Measured and Indicated	1,073,319	0.220	5,206,056	0.013	312,409
Inferred(3)	1,142,101	0.217	5,473,909	0.013	327,327
2019-2022 Change					
Measured and Indicated	42%	-5%	35%	unchanged	39%
Inferred(3)	7%	-5%	1%	-8%	-1%
2022-2023 Change					
Measured and Indicated	4%	2%	6%	unchanged	4%
Inferred	-5%	-2%	-5%	3%	-3%

Notes:

1. All mineral resources have been estimated in accordance with Canadian Institute of Mining and Metallurgy and Petroleum definitions, as required under National Instrument 43-101.
2. Mineral resources are reported in relation to a conceptual pit shell in order to demonstrate reasonable expectation of eventual economic extraction, as required under NI 43-101; mineralization lying outside of these pit shells is not reported as a mineral resource. Mineral resources are not mineral reserves & do not have demonstrated economic viability. All figures are rounded to reflect the relative accuracy of the estimate and therefore numbers may not appear to add precisely.
3. Inferred mineral resources are considered too speculative geologically to have economic considerations applied to them that would enable them to be categorized as mineral reserves. However, it is reasonably expected that the majority of inferred mineral resources could be upgraded to indicated.
4. Due to rounding, numbers presented may not add up precisely to the totals provided and percentages may not precisely reflect absolute figures.

14.17 Discussion with Respect to Potential Material Risks to the Resources

There are no current known environmental, permitting, legal, taxation, title, socio-economic, political or other relevant factors that materially affect the mineral resources. However, areas that may factor as risks related to the advancement and realization of the project are as follows:

- Due to the size, mass and homogeneity of the Turnagain deposit, there will be minor global differences with subsequent revisions to lithological and geometallurgical data, understanding, domaining and volumetrics,
- Metallurgical considerations continue to be important to understand which may have material effects on the reasonable prospects of eventual economic extraction and viability of the project,
- Local, Indigenous, Territorial and Federal intergovernmental regulation and legislation will factor directly upon the project's viability and progress,
- Social license needs to be obtained and maintained in order for the resource to be realized sustainably,
- Climate change particularly in these northern environs must be considered and planned for the successful, continued operation of the project in order for the resource to be viable as source of critical minerals necessary for a net zero future,
- Market conditions will dictate viability of the Turnagain Project as the price of nickel and cobalt, both short term and long term, will be affected not only by inflation and traditional "supply and demand" economic forces but also the inevitable volatility due to international relationships and tensions.

15.0 MINERAL RESERVE ESTIMATES

15.1 Introduction

Mineral Reserves for the Turnagain deposit are based on the Measured and Indicated Resources presented in Section 14.0 and use PFS-level engineering designs for the pit and associated operating parameters. The Mineral Reserve estimates are based on a mine plan and pit design developed using modifying parameters including metal price, metal recovery algorithms developed by metallurgy QP and operating cost estimates.

Tetra Tech confirmed that overall project economics are favourable. Tetra Tech adopted standard mine planning processes to determine the Mineral Reserve Estimate. The following inputs and constraints were utilized for pit optimization and are further defined in the following sections:

- Resource model with associated assay grades and densities for mineralized zones (Section 14.0),
- Topographic surface provided by Giga Metals,
- Metallurgical recoveries provided (Section 13.0),
- Pit geotechnical slope parameters provided by BGC,
- Turnagain river setbacks based on flood modelling done by Tetra Tech,
- Commodities prices for pit optimization (Section 19.0),
- Operating cost estimates, including mining, milling and other costs,
- Dilution and mining losses,
- Processing rate of 32,850 kt/year.

15.2 Reserve Estimation Parameters

15.2.1 Geotechnical Parameters

BGC has undertaken geotechnical and hydrogeological assessments of the proposed open pit to support the economic assessment of the Turnagain Project.

Sources of Data

BGC relied on the following information sources to inform the geotechnical and hydrogeological assessments:

- A geotechnical drilling investigation that was completed by BGC in 2021 to support the current study. The program consisted of six inclined drillholes at depths between 300 m and 400 m. Drillholes were distributed within the Northwest and Horsetrail mineral zones towards a variety of different azimuths, with inclinations ranging from approximately 67° to 80°. Drilling activities included geomechanical and oriented core logging, variable head and constant head (“packer”) testing, televiewer surveys and point load index testing which were completed by BGC field staff. Laboratory sample selection and vibrating wire piezometer installations were carried out by BGC. Geotechnical testing was completed at BGC’s Laboratory in Fredericton, New Brunswick.

- Historical geological exploration drilling programs, including 112 drillholes completed prior to 2021. The data consisted of geotechnically logged data and point load index testing.
- Photogrammetry mapping data of bedrock outcrops within the proposed open pit area collected by BGC in 2019.
- The three-dimensional (3D) Turnagain geology models provided by Giga Metals.
- Technical reports prepared by others documenting regional geology, proposed open pit drill and blast parameters and site-specific seismic hazard analysis (Government of Canada 2020).

BGC performed QA and QC checks on geomechanical exploration logging data prior to their use. Data deemed erroneous were excluded from the geotechnical database.

Geotechnical Model

BGC developed a geotechnical model that characterizes the rock mass conditions, structural geology, hydrogeology and seismicity of the open pit area. This model was used as a basis for the geotechnical and hydrogeological assessments.

The rock mass model is based on data from drillhole logging, laboratory testing, the Turnagain geology model and relevant background reports. Eight geotechnical units were identified.

Rock mass quality for all geotechnical units, except for fault zones, are described as “good” while fault zones are described as “fair”. Fault Zones are associated with decreased rock mass quality and are interpreted to be generally less than 5 m wide. A layer of soil overburden up to 7 m thick is interpreted to overlie some areas within the proposed open pit and wasn’t considered in the geotechnical assessments. The structural geology model includes 3D modelled faults and discontinuity fabric, which consists of fault-parallel discontinuities and joints. Sources of structural fabric data included oriented drill core, televiewer survey data, 3D model surface orientations and photogrammetry and historical mapping. Three structural domains were defined to represent areas with similar geological structural conditions (i.e., discontinuity set orientations). Some faults of the 3D model and geologic contacts were defined as structural domain boundaries.

Hydrogeological Model

A conceptual hydrogeological model of the Project site was developed and informed by drilling and hydraulic parameter information gathered from previous site investigations. These data along with hydraulic heads recorded in VWP nests located in the proposed open pit area served as the basis for a numerical groundwater flow model and its calibration. The groundwater numerical flow modelling was conducted using MODFLOW-USG to simulate steady-state pre-mining seasonally low groundwater conditions and transient predictive modelling of the proposed open pit phases.

Predicted groundwater inflow to the proposed open pit ranged between 576 m^3/d (Year 5) and 4,583 m^3/d (end of mine life). Sensitivity analysis related to uncertainty in some hydraulic properties and boundary conditions indicated the groundwater inflow could be as high as 19,329 m^3/d at end of mine life, without groundwater control measures. The predictive simulations were conducted using interim and ultimate pit mine sequence plans provided by Tetra Tech (file transfer, AutoCAD dxf file, February 22, 2023), which differ from the current design. The current pit design includes small adjustments to the pit footprint, slope angles and mine schedule (30 years) compared to the previous design iteration. These changes are interpreted to result in a slight increase in pit inflow due to the condensed mining schedule, although the maximum estimated pit inflow (19,329 m^3/d) is considered appropriate as it is linked to the potential for greater hydraulic connection to the Turnagain River. Additionally, the adjustments to the ultimate pit result in reduced pit slope angle on the northeast wall, which could result in slightly reduced depressurization targets on the northeast wall.

The potentially higher groundwater inflow towards end of mining is related to the degree of hydraulic connection between the proposed open pit and the Turnagain River and its associated alluvium and underlying potentially fractured bedrock. Based on the potential for higher groundwater inflow to the proposed open pit along the southeast wall, groundwater inflow control measures may be needed. Based on the bulk hydraulic conductivity estimates for bedrock in this area, perimeter and/or in-pit dewatering wells could be effective at controlling groundwater inflow to the proposed open pit.

Open Pit Mining Geotechnical Assessment

To inform the geotechnical design recommendations for the open pit slopes of single and double benching configurations, BGC conducted geotechnical analyses of inter-ramp, bench and overall scale slopes. BGC considers the following design acceptance criteria to apply to the open pit slopes, based on industry standards:

- Inter-ramp scale slopes should achieve a minimum factor of safety of 1.2 under static conditions and 1.0 under pseudo-static conditions.
- Bench scale slopes should achieve a catch bench width that meets minimum requirements for rock fall mitigation and provincial regulations. A minimum reliability of 75% for single benching and 90% for double benching, based on potential failure modes having a factor of safety of 1.0 or less, is considered acceptable.
- Overall scale slopes should achieve a minimum factor of safety of 1.3 under static conditions and 1.1 under pseudo-static conditions. A target factor of safety of 1.5 under static conditions for overall scale slopes was applied to the pit slopes adjacent to the Turnagain River.

Inter-ramp scale kinematic analyses were performed in each structural domain to identify plausible planar, wedge and toppling instability modes formed by the combination of discontinuities and the pit wall orientation. Based on the results, the structural domains in the pit wall were subdivided into “kinematic sectors” with similar kinematic controls. Toppling was interpreted to be the primary kinematic control in the majority of the northwest-dipping walls of the Horsetrail mineral zone. Sliding along joints was identified as the critical kinematic control in southwest to south-dipping walls in Northwest and Horsetrail mineral zones.

The remaining pit walls are either controlled by wedge instabilities formed by the intersection of multiple discontinuity sets or are not interpreted to be kinematically controlled at the inter-ramp scale.

Bench scale kinematic analyses were completed to estimate the effective bench face angles that can be expected during mining. Back-break of the bench crest was estimated from a probabilistic analytical model that incorporated the discontinuity sets developed for each structural domain and their characteristics, a single bench height of 15 m and double bench height of 30 m and a controlled blasting bench face angle of 70°. The predicted back-break widths in the single benched open pit configuration range from 1.5 to 4.0 m, which correspond to effective bench face angles between 58° and 65°. For double benched open pit configurations, the back-break widths range from 2.5 to 6.6 m, which correspond to effective bench face angles between 60° and 66°.

Based on the results of the bench-scale and inter-ramp kinematic analyses, BGC prepared provisional recommended slope design criteria, which were then incorporated into the PFS mine plan by Tetra Tech. BGC then carried out limit equilibrium overall slope stability analyses on representative cross sections through the PFS pit plan. Predicted pore water pressures for the simulated end of mining were used to support the limit equilibrium slope stability analyses. These analyses identified two areas in the northeast walls where depressurization is required to meet design acceptance criteria. Based on the current bulk hydraulic conductivity values in the bedrock behind those portions of the proposed open pit, it is anticipated that a network of horizontal drain holes would be appropriate to support slope depressurization. Depressurization was not deemed to be required to meet the design acceptance criteria in the remainder of the proposed pit walls.

Slope Design Criteria

The recommended open pit slope design criteria are based on kinematic sectors and are summarized in Table 15-1 single and double benching cases. Recommended interramp slope angles are illustrated on the PFS pit in Figure 15-1 and range from 37° to 45° for single benching and 37° to 50° for double benching. The maximum inter-ramp stack height should be limited to 180 m. Inter-ramp stacks should be separated by ramps or geotechnical berms that are a minimum of 20 m wide. Thirty-metre-high double benches can be implemented for some sectors in the pit. The slope design criteria assume that controlled blasting will be implemented in all sectors of the pit and for single and double bench configurations. It is assumed that a program of scaling bench faces and cleaning accumulated material from bench toes is implemented during mining. Slope depressurization and pore water pressure monitoring instrumentation to evaluate its effectiveness will be required in the northeast walls to meet the design acceptance criteria in these slopes.

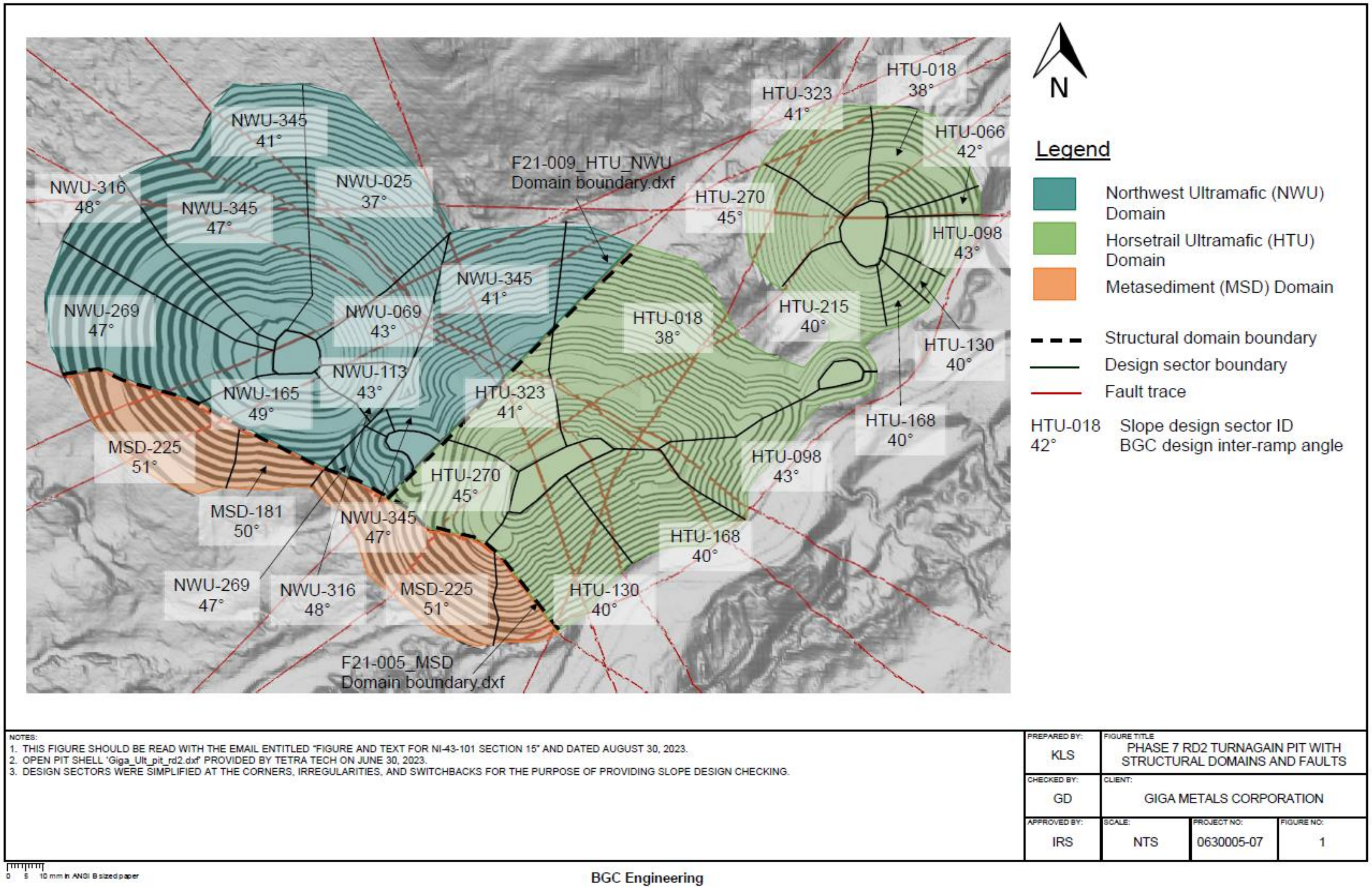


Figure 15-1: Geotechnical Sectors with the PFS Pit Shell

(source: BGC, 2023)

Table 15-1: Preliminary Pit Slope Designs

Slope Sector	Bench Height (m)	Face Angle (°)	Bench Width (m)	Max Inter-ramp height (m)	Geotechnical Catch berm Width (m)	Max Inter-ramp Angle (°)
MSD-181	30	70	14.1	180	20	50
MSD-225	30	70	13.2	180	20	51
MSD-273	30	70	13.0	180	20	51
MSD-318	30	70	14.1	180	20	50
MSD-348	30	70	15.3	180	20	49
MSD-023	15	70	12.4	180	20	40
MSD-075	30	70	15.8	180	20	48
MSD-109	15	70	12.4	180	20	40
MSD-140	15	70	12.4	180	20	40
HTU-215	30	70	19.1	180	20	45
HTU-270	30	70	19.1	180	20	45
HTU-323	30	70	17.1	180	20	47
HTU-018	15	70	13.7	180	20	38
HTU-066	30	70	15.1	180	20	49
HTU-098	30	70	15.2	180	20	49
HTU-130	15	70	12.4	180	20	40
HTU-168	15	70	12.4	180	20	40
NWU-214	30	70	14.9	180	20	49
NWU-269	30	70	17.1	180	20	47
NWU-316	30	70	16.1	180	20	48
NWU-345	30	70	17.0	180	20	47
NWU-025	15	70	14.4	180	20	37
NWU-069	30	70	15.0	180	20	49
NWU-113	30	70	14.6	180	20	50
NWU-165	30	70	14.8	180	20	49

15.3 Pit Optimization Methodology and Parameters

To help identify the most profitable reserve and mining sequence, Tetra Tech used Datamine's™ NPVS software for pit optimization. Datamine™ uses a calculation called the Lerchs-Grossman ("LG") Algorithm to calculate the net value of each block in a block model. The algorithm determines the economic limits of the open pit at a range of selling prices based on input of mining and processing costs, revenue per block and operational parameters such as mill recovery, pit slopes and other imposed physical constraints. The resulting pit outline will be defined by the blocks that give the highest combined net return while adhering to all imposed constraints.

The NPVS optimization process involves the creation of nested pit shells by applying scaling Revenue Factors (RFs). Each block's anticipated base case revenue is then multiplied by these factors and processed using the Lerchs-Grossman Algorithm. As a result, a sequence of pit shells is generated, reflecting the influence of the RFs. These nested pit shells play a key role in determining the mining sequence for the ore body and establishing the ultimate pit limit.

The Datamine™ optimization process allowed Tetra Tech to run multiple scenarios and compare the results of each of the scenarios to identify the most 'optimum' scenario.

Datamine™ analysis based on the resource model was completed to develop a final pit shell and optimize the extraction schedule. The creation of the pit shells was based on an evaluation of each block in the resource model, with blocks defined as ore provided the gross revenue for each block was greater than the combined mining, processing and selling costs. Waste to ore cut-offs were determined using an NSR (Net Smelter Return) for each block in the model.

Benches of 15 m height were designed which match the resource block model size of 15m x 15m x 15m and is appropriate for high throughput open-pit mines.

NSR is calculated using metal prices and process recoveries for each metal accounting for all off-site losses, transportation, smelting and refining charges. In addition, profit will be calculated for each block, and it facilitates the ultimate pit and pushback selection. The NSR and profit calculation can be expressed as the following:

NSR = (Metal Price x Payability – Concentrate Transportation Cost) x Ore Grade x Process Recovery

Profit = NSR – Process Cost – Mining Cost – TMF Sustaining Capital Cost – Mining Sustaining Capital Cost

Due to the nature of the Turnagain Project as a high-throughput low-grade ore mine, the inclusion of sustaining capital in the profit calculations guided decision-making around mine size and low-grade ore cut-offs. Prior to the development of the PFS, Tetra Tech conducted an electrification and autonomous fleet trade-off study vs the diesel fleet selected in the NI 43-101 Technical Report and PEA prepared by Hatch in 2021. Based on the reduction in operating costs and Scope 1+2 GHG emissions which improved the overall project NPV, the PFS incorporates a trolley-assist diesel fleet. The mining unit costs shown in Table 15-2 reflect that fleet selection.

Operating cost parameters for nickel and cobalt pricing are based on market research studies over the mid to long term periods, as discussed in Section 19.0. The base case nickel price for the PFS is $21,500/t or $9.75/lb nickel LME basis. Initial LOM operating costs were based on in-house first principal data and PEA information and were subsequently updated with PFS level operating costs estimated by Tetra Tech which are summarized in Section 21.0. A summary of the operating cost parameters can be found in Table 15-2 below.

Table 15-2: Pit Optimization Parameters

Description	Unit	Value
Nickel price	US$/t	21,500
Cobalt price	US$/t	58,500
Concentrate grade	% Ni	18
Concentrate transport cost	US$/dry t	189
Concentrate 3rd party marketing and service costs	US$/dry t	8.5
Payable (of recovered metal value) – Nickel	%	78
Payable (of recovered metal value) – Cobalt	%	50
Ni Recovery Formula	%	See Section 15.3.1
Co Recovery	%	93.8% of Ni Final Recovery
Royalties	%	2% of NSR
Process operating cost	US$/t processed	5.35
G&A	US$/t processed	0.76
Mining cost -Ore	US$/t mined	2.24
Mining cost – Waste	US$/t mined	2.41
Sustaining Capital Cost for Mining	US$/t mined	0.57
Sustaining Capital Cost for TMF	US$/t processed	0.7

Due to the multi-element nature of the Turnagain deposit, the cut-off is expressed as an NSR value rather than the grade of nickel or nickel equivalent. The calculation of cut-off includes the following considerations:

- Incremental haulage cost saving between ore and waste as waste dump destination requires longer haul than crusher feed,
- Total processing costs, including sustaining capital for ongoing construction of TMF,
- G&A costs, which average $0.76/t over the LOM.

The following equations define the cut-off calculations:

Cutoff = Incremental haulage saving + Total Processing Cost + G&A = -0.17 + 6.05 + 0.76 = $6.64/t

Where,

Incremental haulage saving = Ore mining – Waste mining = 2.24 – 2.41 = – $0.17/t

Total Processing Cost = Process cost + Sustaining TMF Cost = 5.35 + 0.7 = $6.05/t

Note that this cost does not consider rehandle cost for the stockpile which will be discussed in Section 16.0.

15.3.1 Recovery Inputs

As described in Section 13.0, the pit optimization and subsequent mine design used the MINS based algorithm to predict rougher recovery, then applied a cleaner stage recovery formula to establish the overall nickel recovery. Cobalt recoveries are also outlined in Section 13.0 in detail. These recoveries were applied on a block-by-block basis to the resource model.

15.4 Mining Area Constraint

The pit optimization focuses on the Horsetrail Zone, Northwest Zone and Duffy Zone (Figure 15-2). In addition, a mining boundary setback was applied from the Turnagain River. Tetra Tech has completed flood run-out scenarios between the Hard Creek intersection and Duffy Zone. The goal of the setback is to have an adequate setback so any potential cracking from slope deformation would not reach the riparian zone. Based on a 2-year return flood level scenario, Tetra Tech applied a 65 m setback from the flood level, which includes a 30 m riparian zone and 35 m mining infrastructure corridor. Tetra Tech then confirmed that this setback was sufficient to withstand the 200-year return flood event scenario without endangering the mine pit.

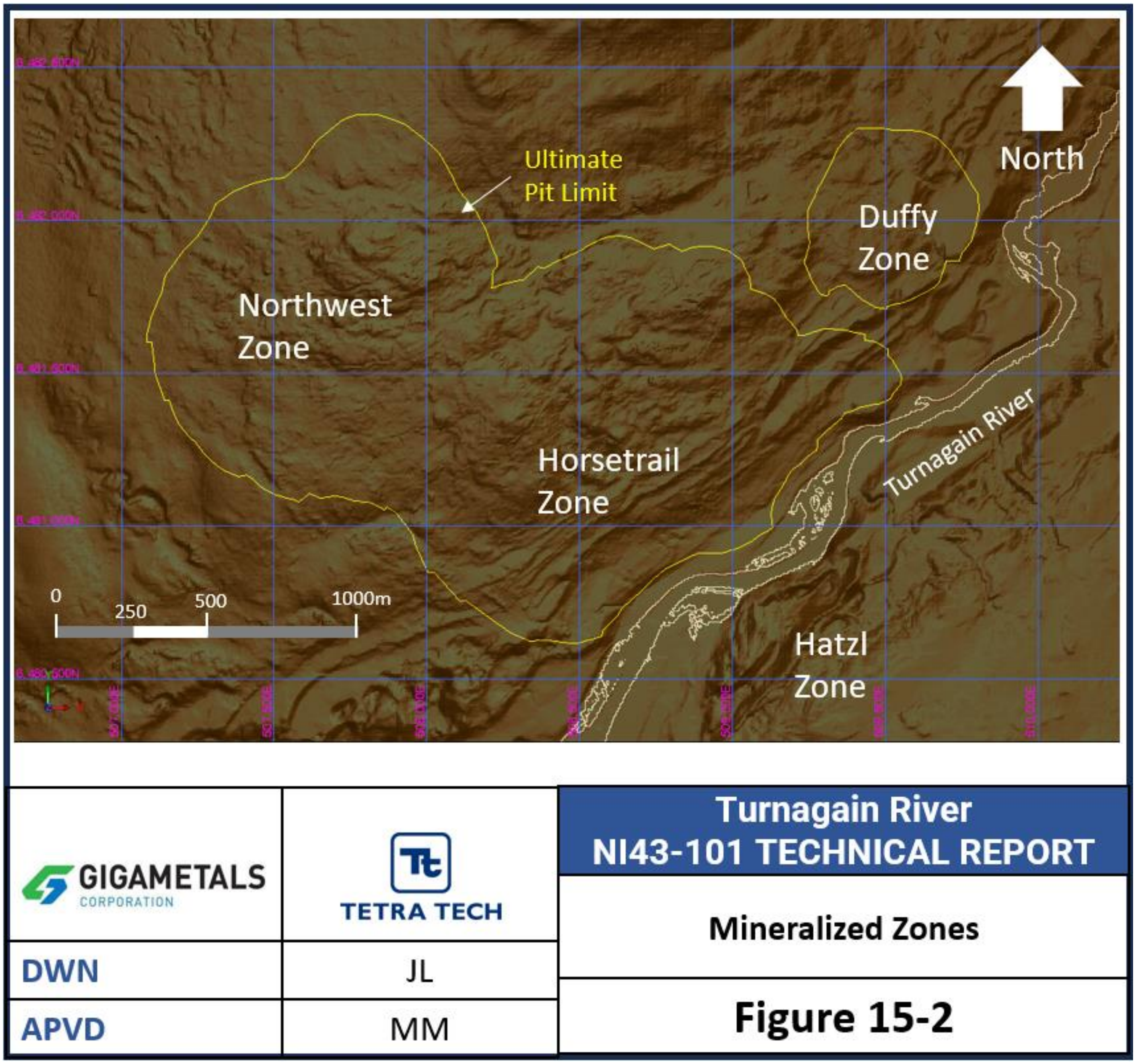


Figure 15-2: Mineralized Zones

15.5 Pit Optimization Analysis

A cash flow analysis was completed to determine the economic viability and sensitivity of shells against the base case. This cash flow assumed an average 32,850 kt/year production rate, 7% discount rate and a nickel price of $9.75/lb. In addition to the processing rate, other schedule constraints included a maximum vertical advancement of 10 benches a year and a balanced overall total material moved.

Only Measured and Indicated resources were considered. The Lerchs-Grossman pit optimization algorithm then calculated a "cone" shape pitshell that contains ore and waste stripping at a maximized NPV. Note that the NPV in this optimization is used only as a guide for the determination of the mining shapes. The actual NPV of the project is discussed in the Economic Analysis section (Section 22.0).

As discussed previously, the RF represents a percent of the forecast price of both nickel and cobalt, combined. Pit shells were generated for each subsequent 1% increment up to 100% (Figure 15-3). The results for varying RF have been summarized in Figure 15-4. Note the "worst-case" NPV occurs when the final pit is mined from top to bottom, mining each bench completely before moving to the next bench. This results in the lowest NPV for the pit, and this is also a scenario with the biggest financial risk. The "best-case" NPV occurs when each of the nested pit shells are mined one after another, maximizing NPV by mining ore as early as possible while deferring waste mining.

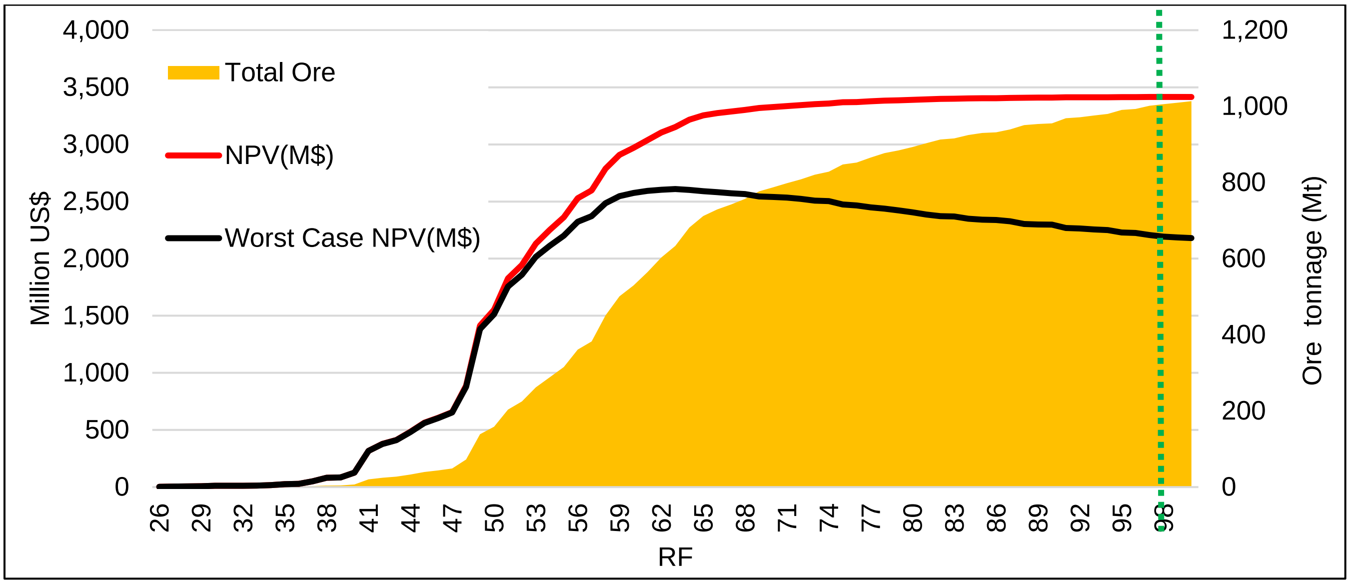


Figure 15-3: Best Case NPV vs Worst Case NPV with Ore Tonnage

The selection of the ultimate pit includes technical, financial and social factors. Maximizing the extraction of the available Mineral Resources while minimizing the quantity of waste material excavated over the life of the mine was achieved by selecting RF98 as the optimum pit shell. This pit shell was used as the basis for the ultimately designed pit and represented the best balance of value and risk for pit sizing. Decision-making included:

- Balance between "best-case" and "worst-case" NPV scenarios,
- Given a lower TMF sustaining capital cost near end of mine life and the inclusion of the cost as part of the pit optimization, a higher RF pit shell can be selected based on the Incremental profit per unit mass (Figure 15-4),
- Maximized resource potential while minimizing strip ratio.

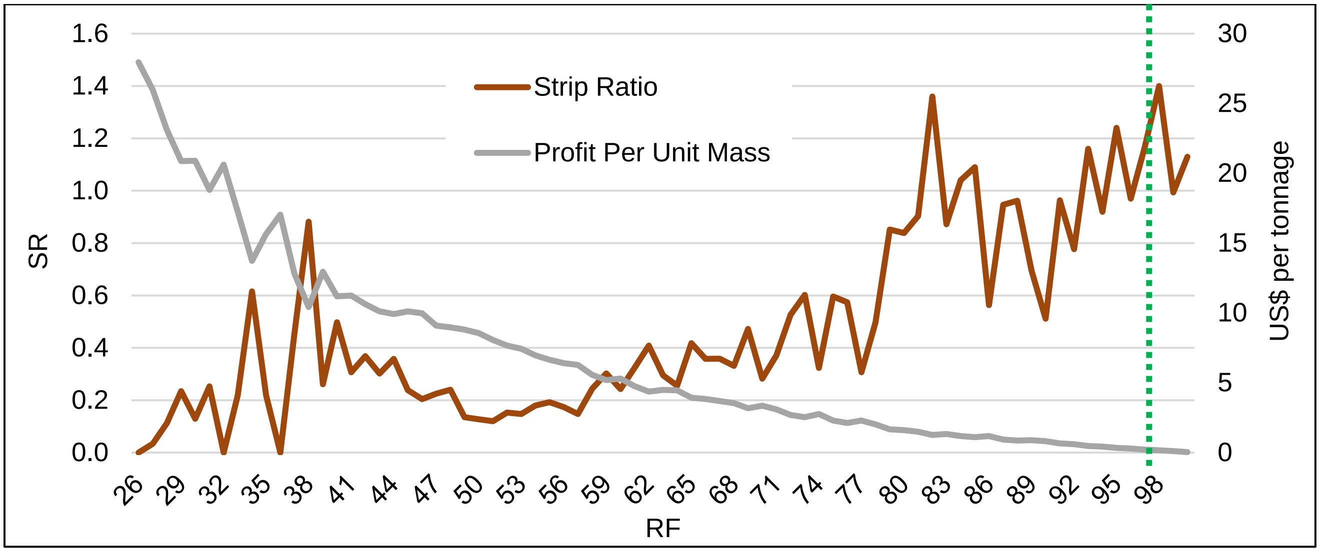


Figure 15-4: Incremental Strip Ratio and Unit Profit

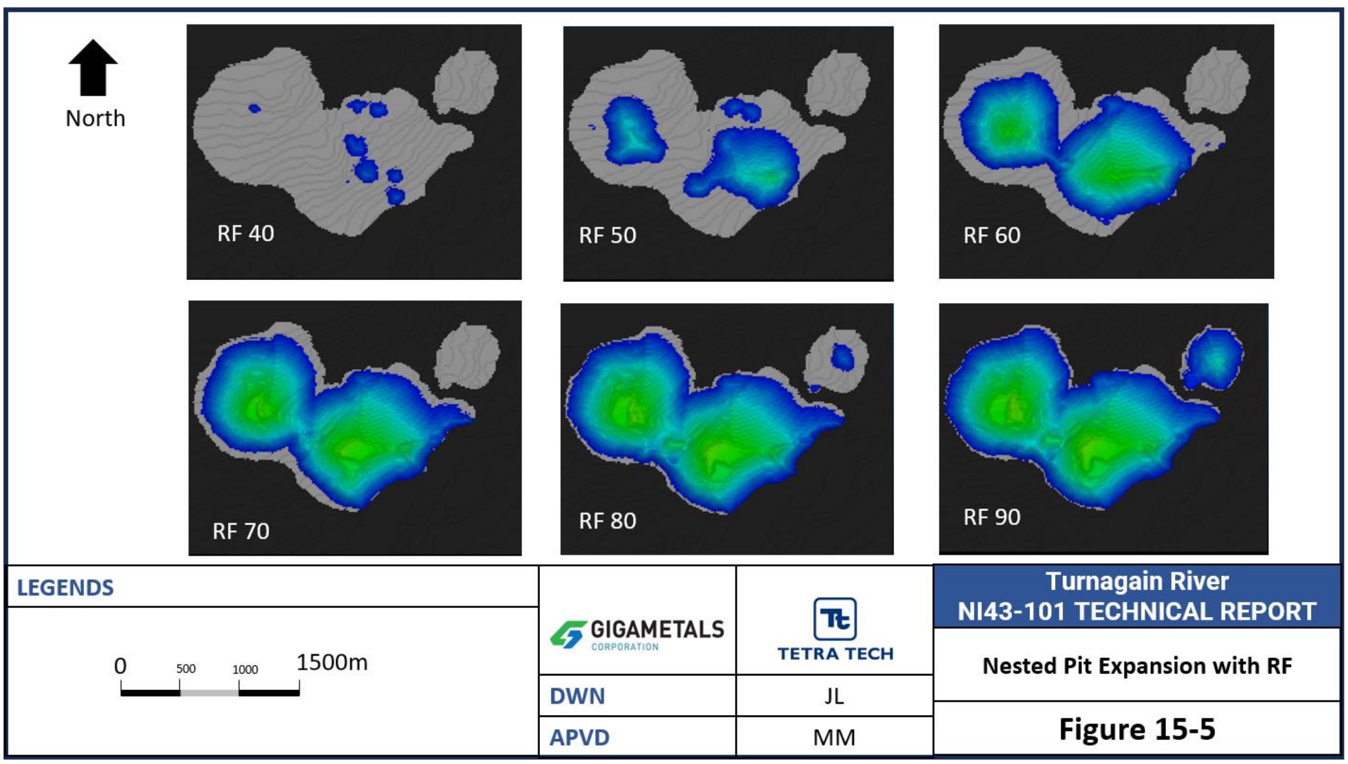


Figure 15-5: Nested Pit Expansion with RF

15.6 Ultimate Pit Design

Pit shells generated using the Lerchs-Grossman algorithm represent a theoretical design and cannot be considered a practical design as no provision is made for mining benches geometry and haul road ramps. The ultimate pit design honours the findings from pit optimization and the various operational constraints associated with mining activities.

The pit design demonstrates the viability of accessing and mining the economic reserve for the Project. Pit design was completed using Datamine™ StudioOP software and was based on the RF98 shell outlined above. In addition, the pit design complies with the geotechnical parameters previously stated in Table 15-1 in Section 15.2.

Haul roads for the Project are designed to provide both safe and efficient haulage routes from the base of the pit to the crusher and waste dumps. Typical road designs are shown in Figure 15-6 for the double-lane roads. The roads are designed specifically for the intended site equipment – including loaders (Komatsu WE1850 or similar) and haul trucks (Komatsu 830E-5 or similar). In accordance with the Health, Safety and Reclamation code for Mines in BC, the operating road width and gradients of the Komatsu 830E-5 are 40 m and 10%, respectively. The road includes adequate distance for the vehicles to operate and includes a safety berm on the pit side and a drainage ditch on the wall side as well as trolley assist infrastructures (e.g., DC substations and powerlines). The safety berm is designed to be at least 3/4 of the height of the tallest tire to be used on-site, in this case the tires of the Komatsu WE1850 or similar models. To facilitate drainage of the roadway a 2% cross slope on the roads is planned.

A minimum mining width has been maintained between pit areas and at the deepest portions of the ultimate pit which is intended to allow for efficient mining operations. For this study and the size of equipment chosen, the minimum mining width conforms to 100 m, which in turn maximizes the extraction of the reserve.

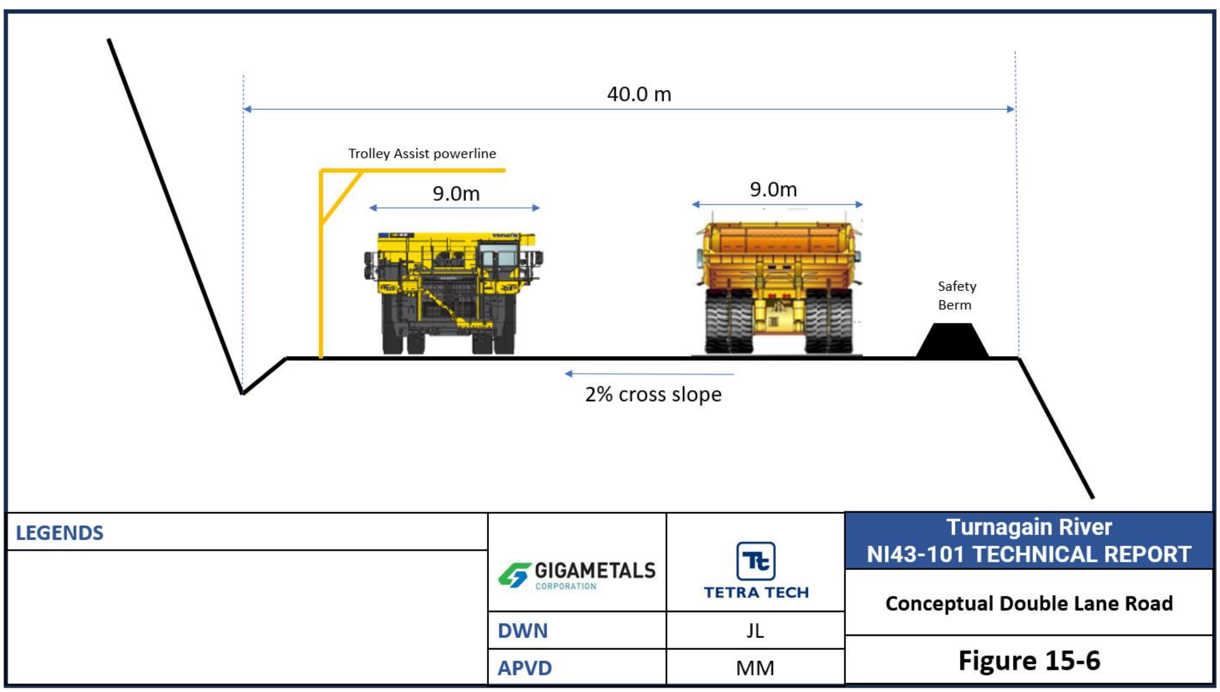


Figure 15-6: Conceptual Double Lane Road

Guided by RF nested pit shells, six cash-flow-positive pushbacks are designed in the order of profitability (Figure 15-7). Pushback 1 yields higher profit per unit mass than Pushback 2. Figure 15-8 illustrates the limits and geometry of each pushback.

- Pushback 1 targets the highest profit per tonne with a low strip ratio, located near the Horsetrail Zone,
- Pushback 2 targets the second highest profit per tonne, located near the Northwest Zone and then merges with Pushback 1,
- Pushback 3 extends south from Pushback 1 towards the ultimate pit limit (RF98). The strip ratio is slightly higher than pushback 1 and 2,
- Pushback 4 extends north from Pushback 1 towards the ultimate pit limit (RF98),
- Pushback 5 will be mined to the remainder of the ultimate pit shell, expansion from Pushback 2,
- Pushback 6 targets a satellite pit in the Duffy Zone, located northeast of the Horsetrail Zone.

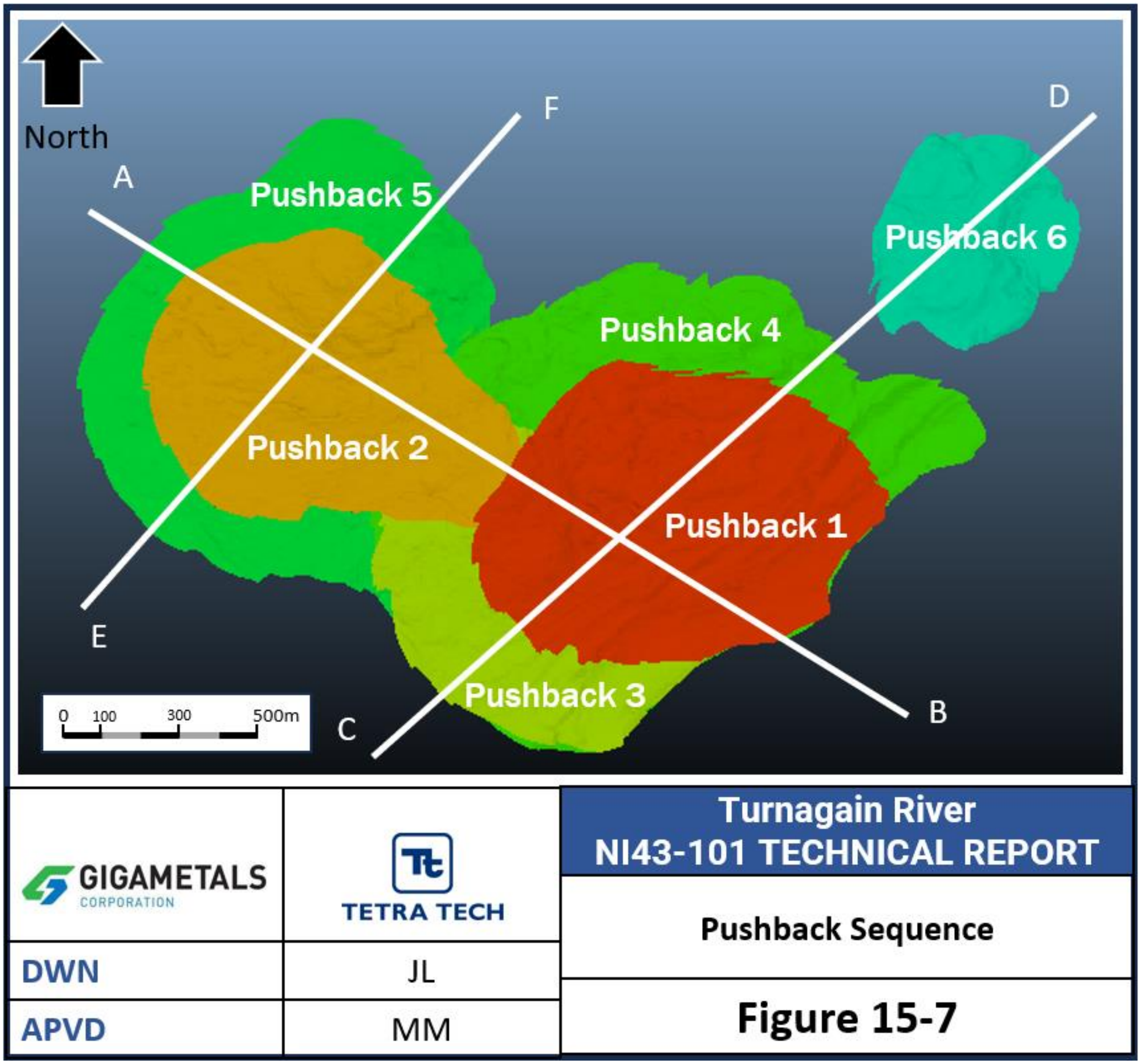


Figure 15-7: Pushback Sequence

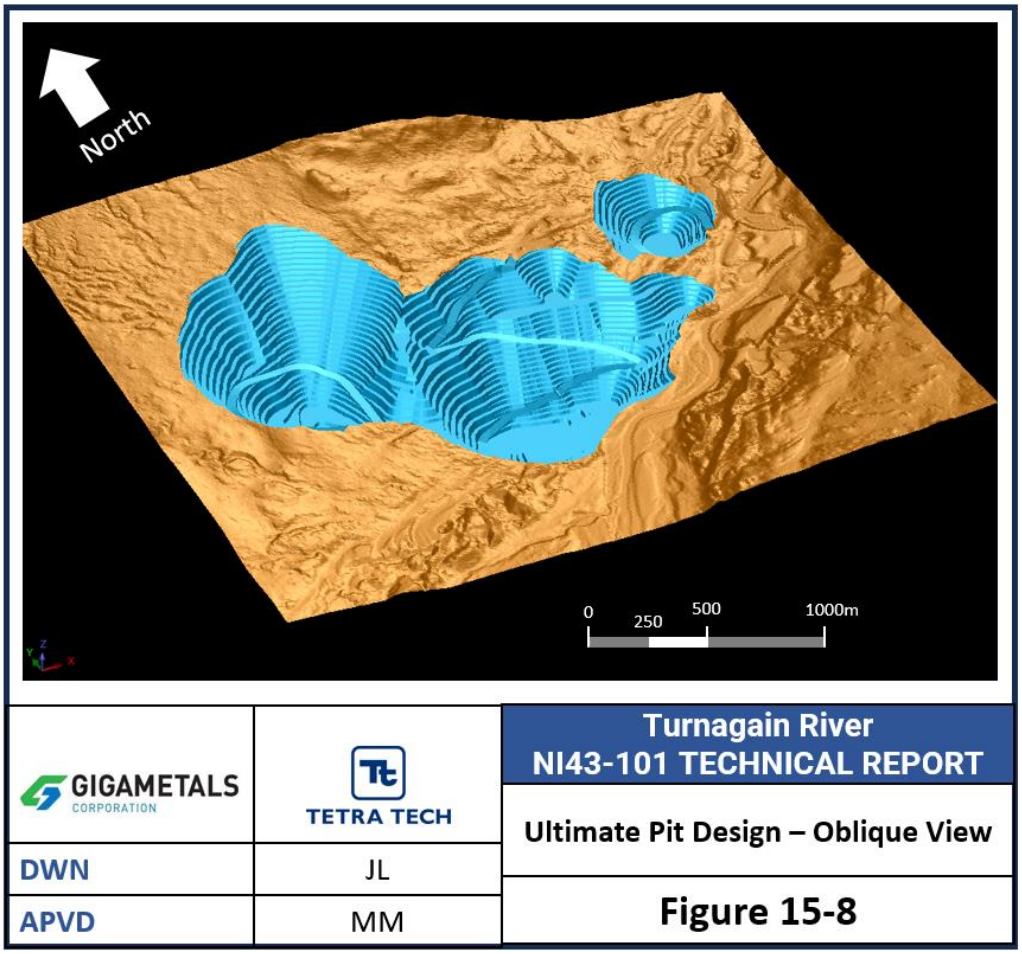


Figure 15-8: Ultimate Pit Design Oblique View

Figure 15-9 to Figure 15-11 illustrate cross-sections of each pushback and profitability of the block model. Figure 15-12 to Figure 15-17 illustrate the engineering pushback design of each pushback.

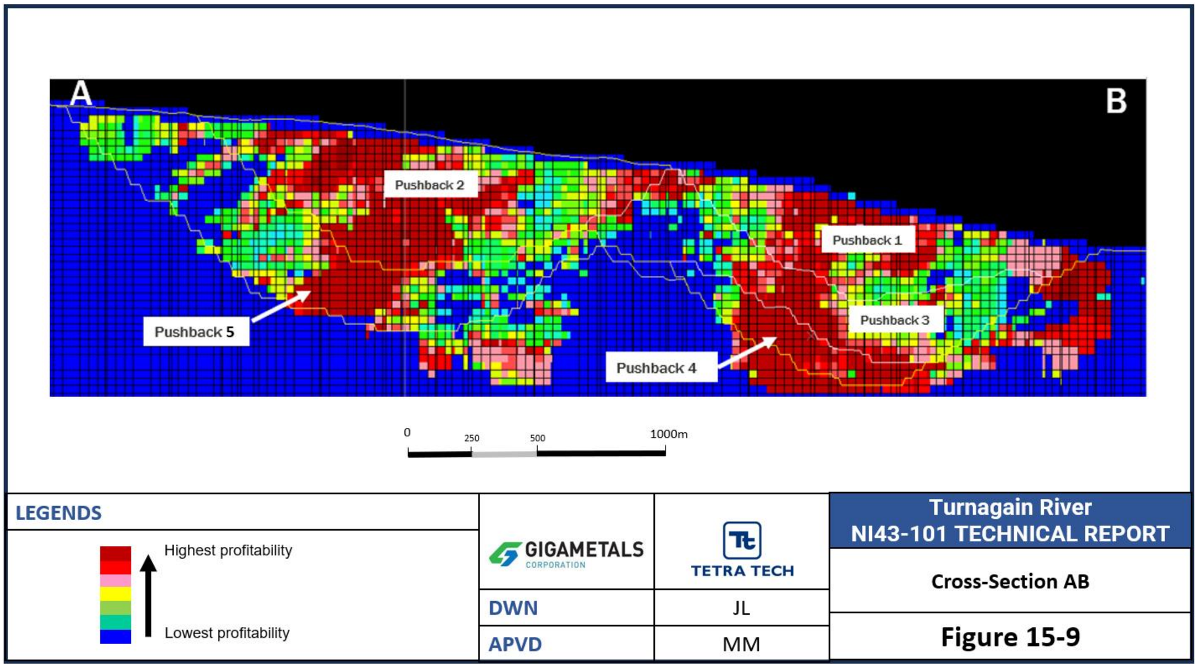


Figure 15-9: Cross-Section AB

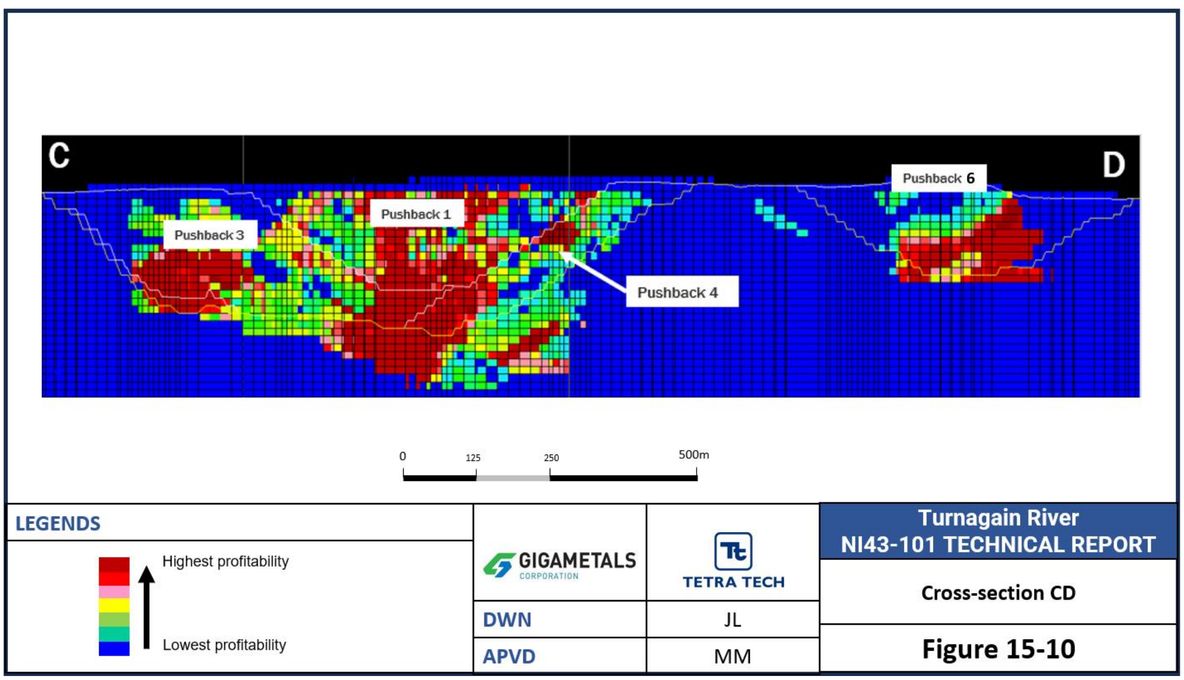
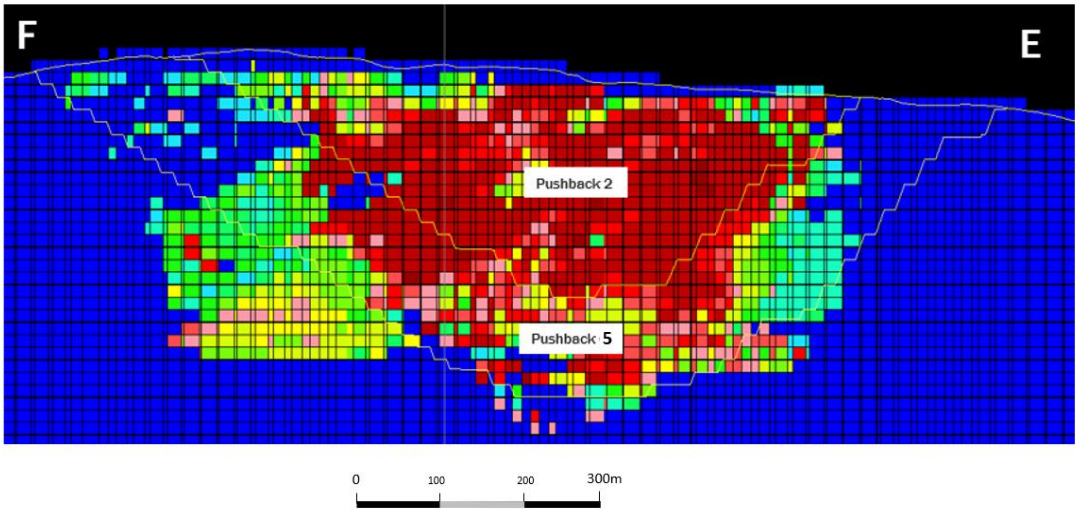


Figure 15-10: Cross-section CD



LEGENDS	GIGAMETALS CORPORATION	TETRA TECH	Turnagain River NI43-101 TECHNICAL REPORT
Highest profitability / Lowest profitability			Cross-section EF
	DWN	JL	
	APVD	MM	Figure 15-11

Figure 15-11: Cross-section EF

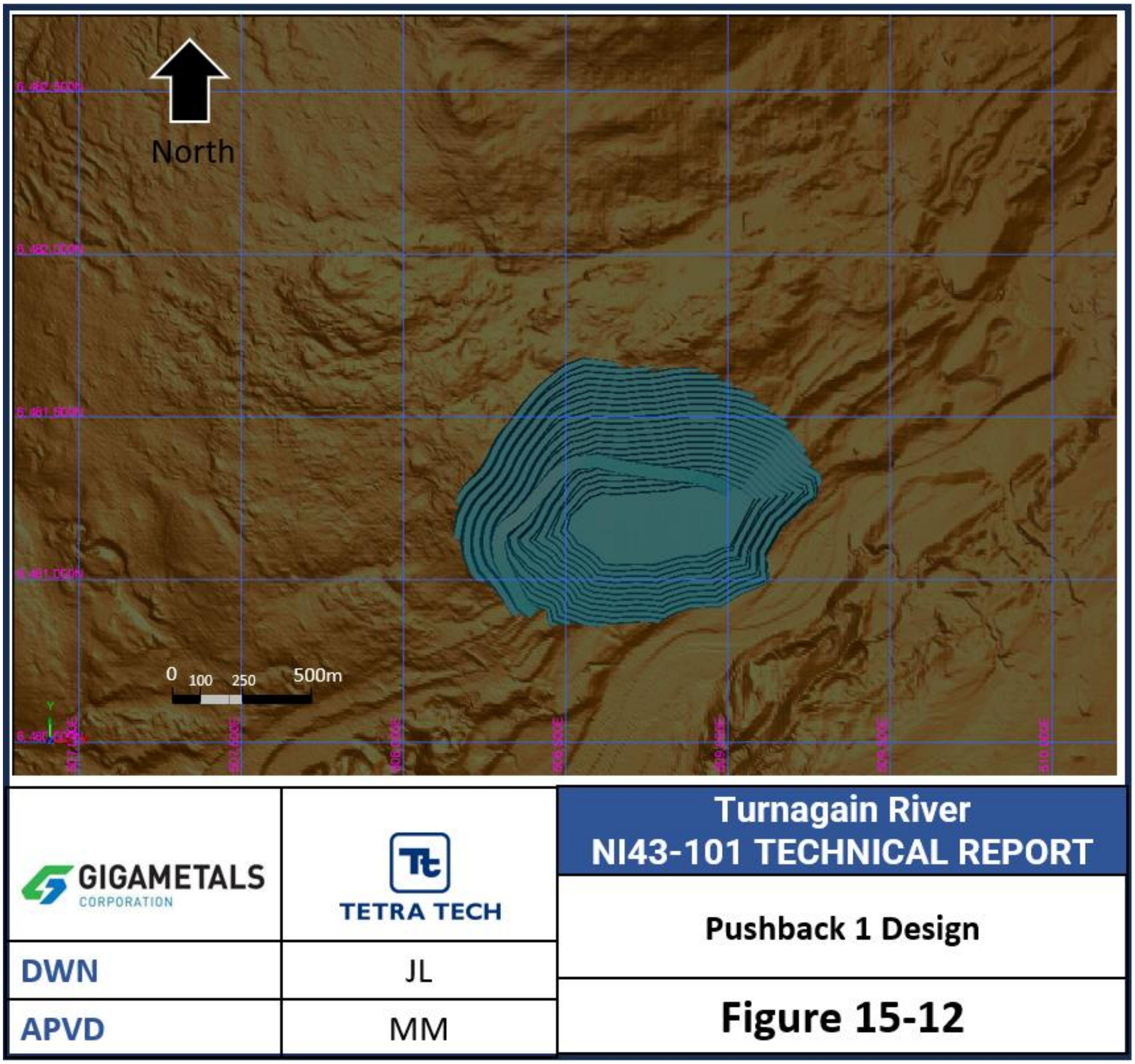


Figure 15-12: Pushback 1 Design

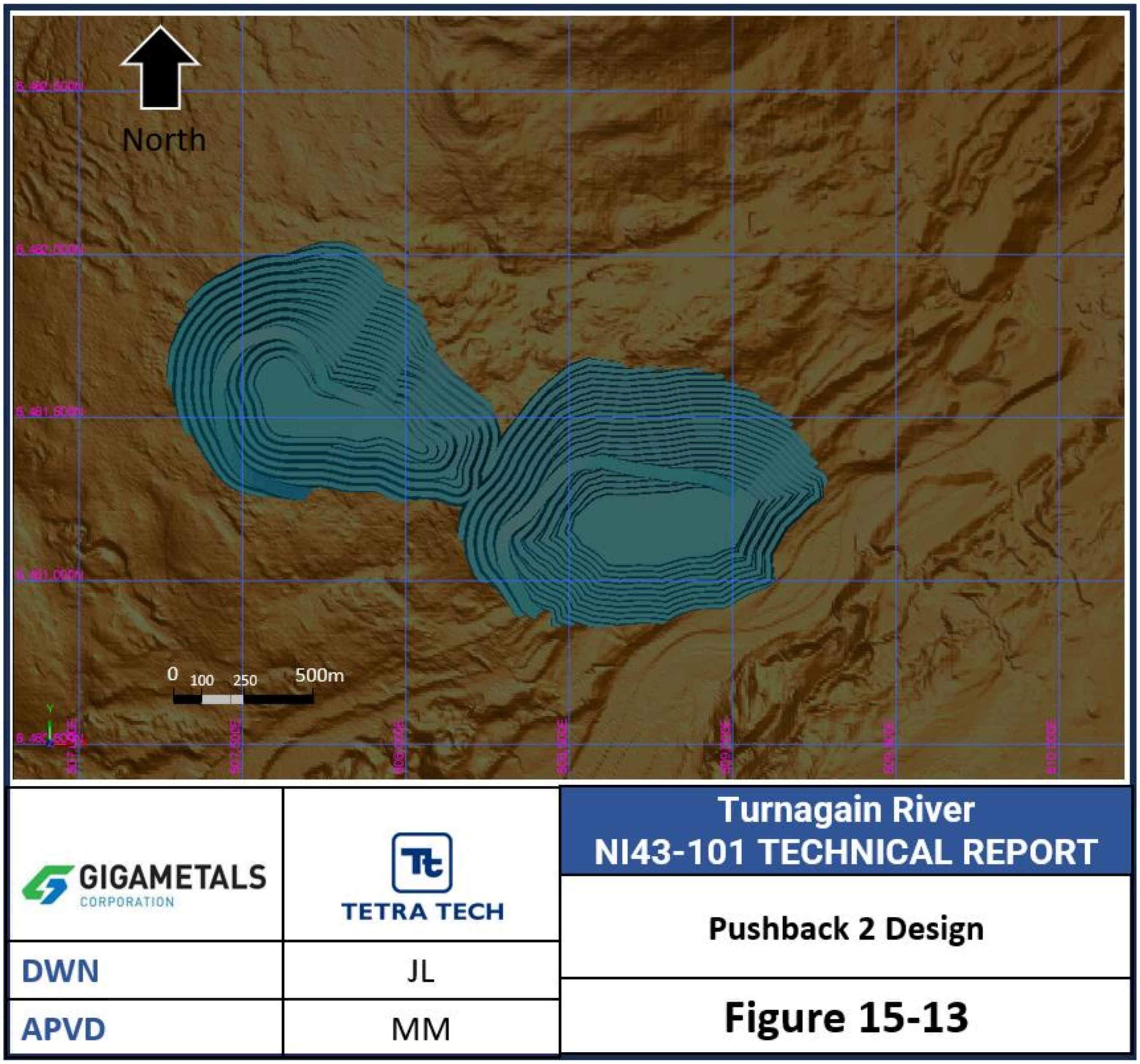
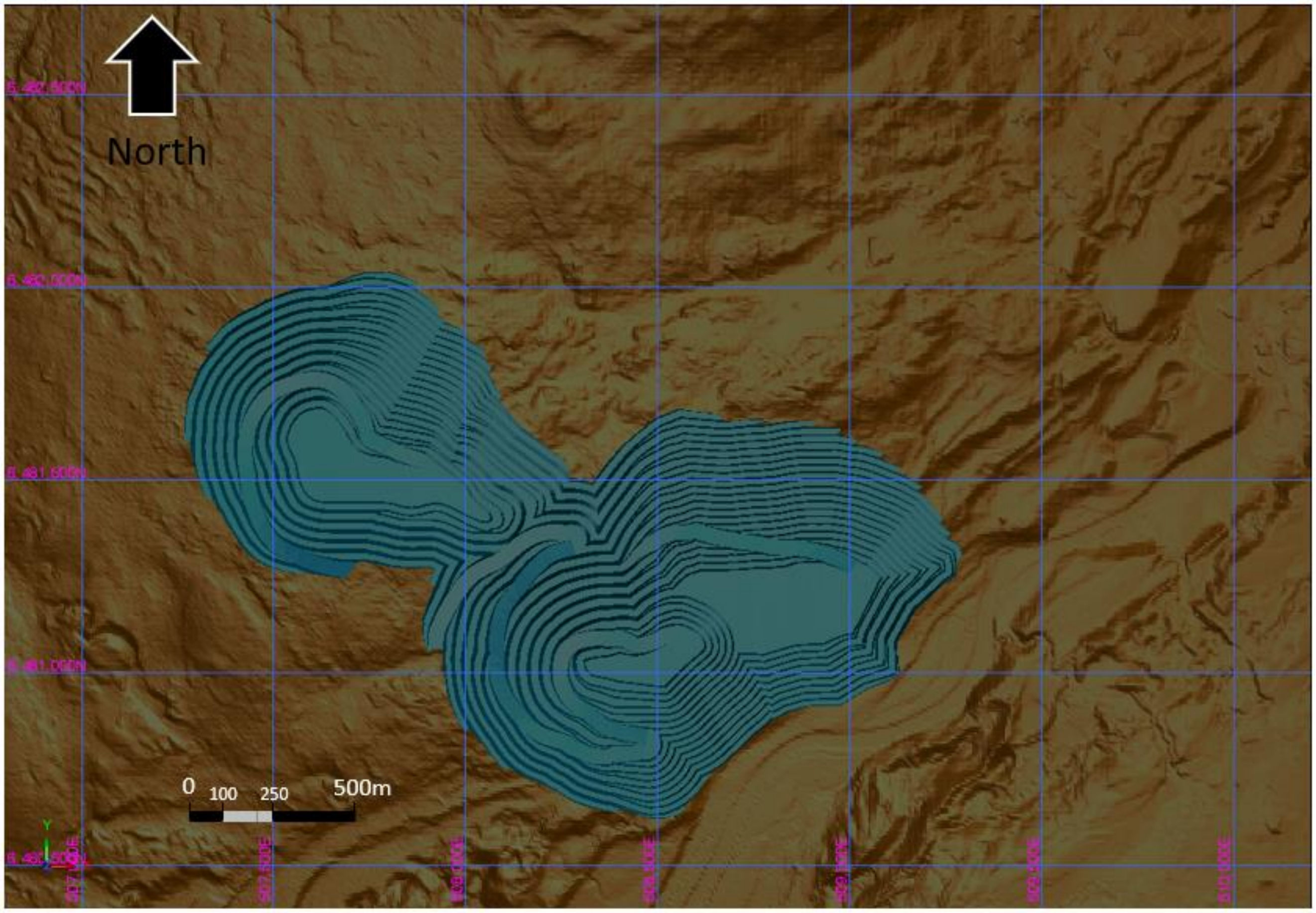


Figure 15-13: Pushback 2 Design



GIGAMETALS CORPORATION	TETRA TECH	Turnagain River NI43-101 TECHNICAL REPORT
		Pushback 3 Design
DWN	JL	
APVD	MM	Figure 15-14

Figure 15-14: Pushback 3 Design

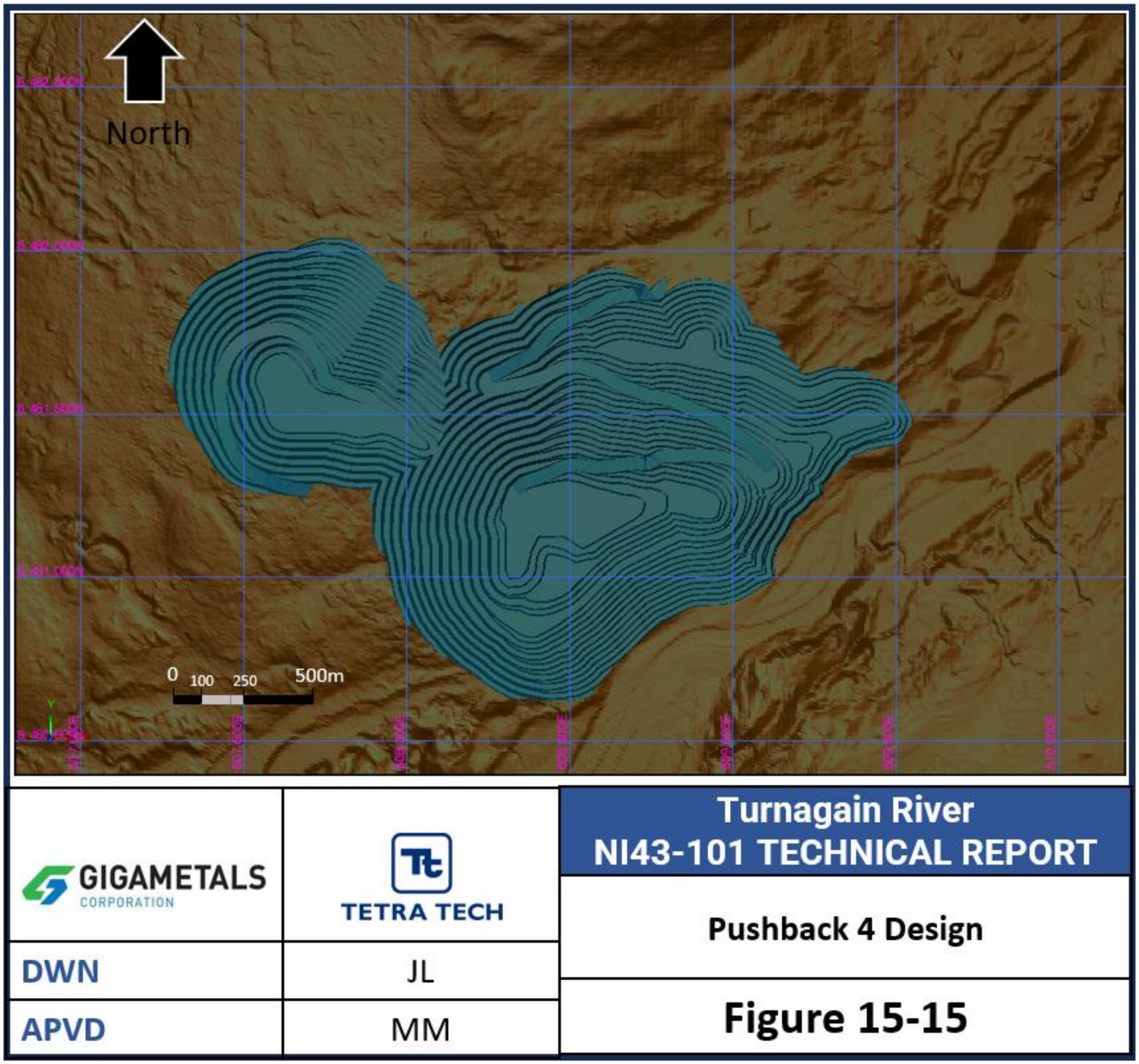


Figure 15-15: Pushback 4 Design

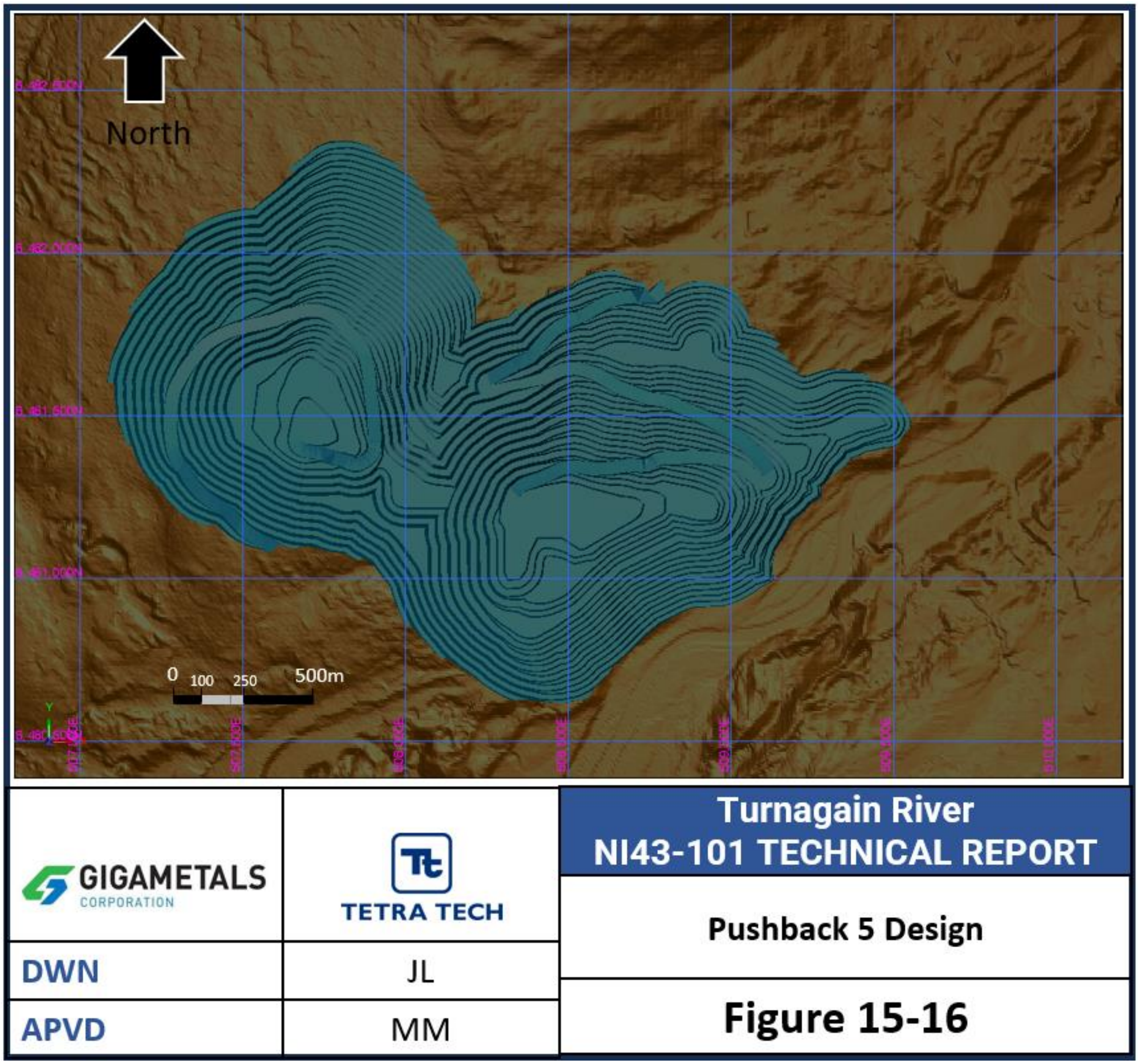


Figure 15-16: Pushback 5 Design

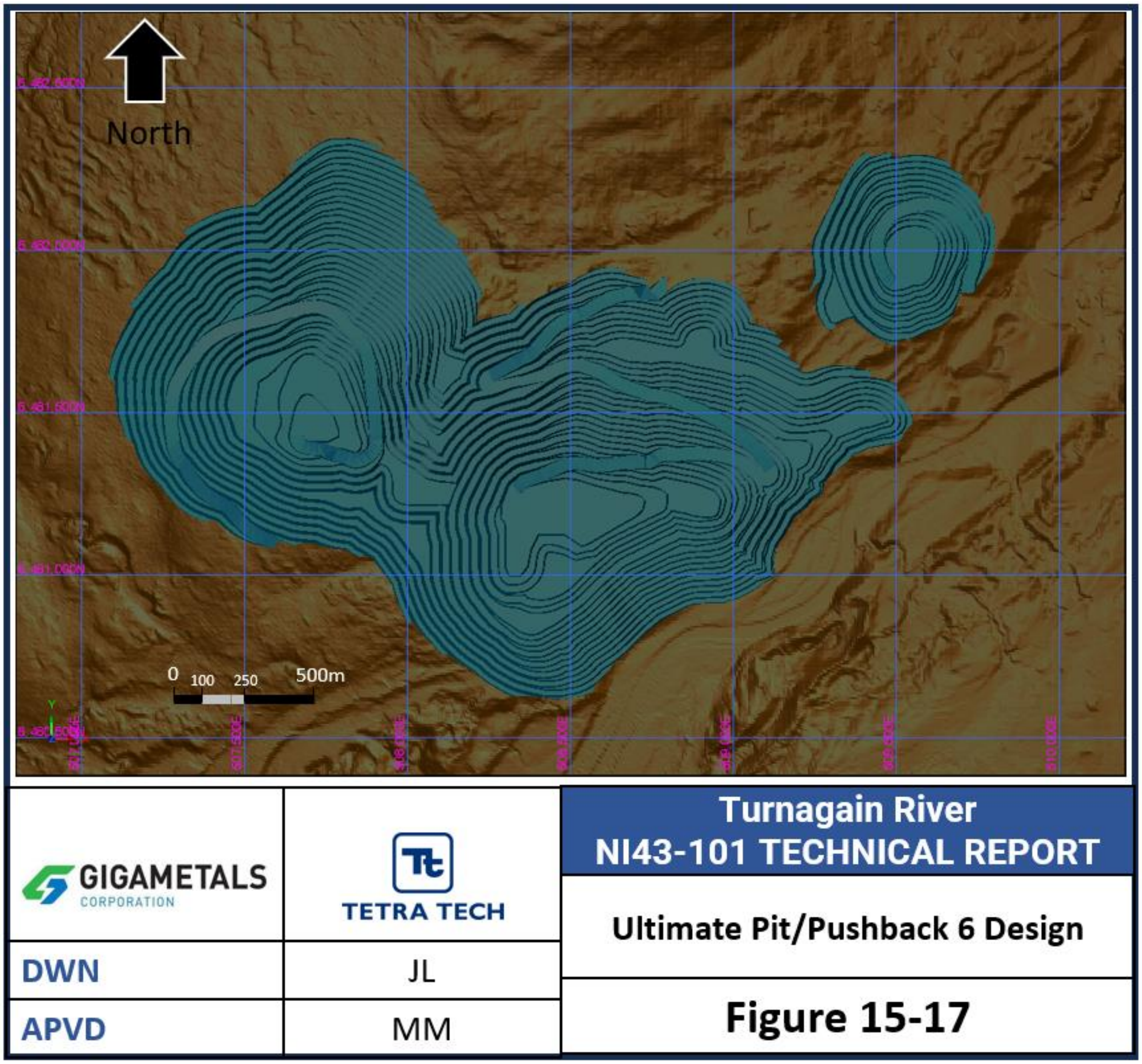


Figure 15-17: Ultimate Pit or Pushback 6 Design

Table 15-3: Pushback Design Summary

Pushbacks	Ore (Mt)	Waste (Mt)	Strip Ratio	Profit (Million US $)	Profit/t
1	166	37	0.2	1,639	8.1
2	158	39	0.2	1,379	7.0
3	121	33	0.3	611	4.0
4	219	110	0.5	1,533	4.7
5	266	108	0.4	1,400	3.7
6	21	33	1.6	36	0.7
Total	**950**	**361**	**0.4**	**6,599**	**5.0**

Note: Total may not add due to rounding.

15.7 Dilution and Mining Recovery

The Turnagain mineralization is disseminated with large continuous ore zones. There is both internal and external dilution to consider as a mining project is developed from conceptual to production phases. Internal dilution refers to waste or even low-grade ore (ore below cut-off) within a mining block that cannot be mined discretely and is eventually mined with the ore in the mining block. External dilution refers to waste outside of the orebody that is mined with the ore within the mining block. The provided resource model's dimensions are 15 m by 15 m by 15 m, which matches the bench design. Dilution in the resource model has been modelled by assuming a 2m dilution width around the contacts between ore and waste. Two metre dilution width is assumed based on the width of dipper of the employed loading unit and the spacing of blast holes. Figure 15-18 shows the dilution modelled. The block model grades are adjusted in parent cells which have adjacent cells of a different rock type (i.e., ore vs waste). Whenever the rock type changes between adjacent cells, the grades are adjusted by addition of material from the adjacent cell and the loss of the same volume of material to the adjacent cell. The adjusted grade of the parent cell will then be calculated using tonnage weighting.

Note that dilution will not occur if the adjacent blocks have the same ore-waste category.

Mining loss is expected for all mining operations in general, based on similar operations in BC, therefore Tetra Tech has applied a nominal 1% mining loss factor.

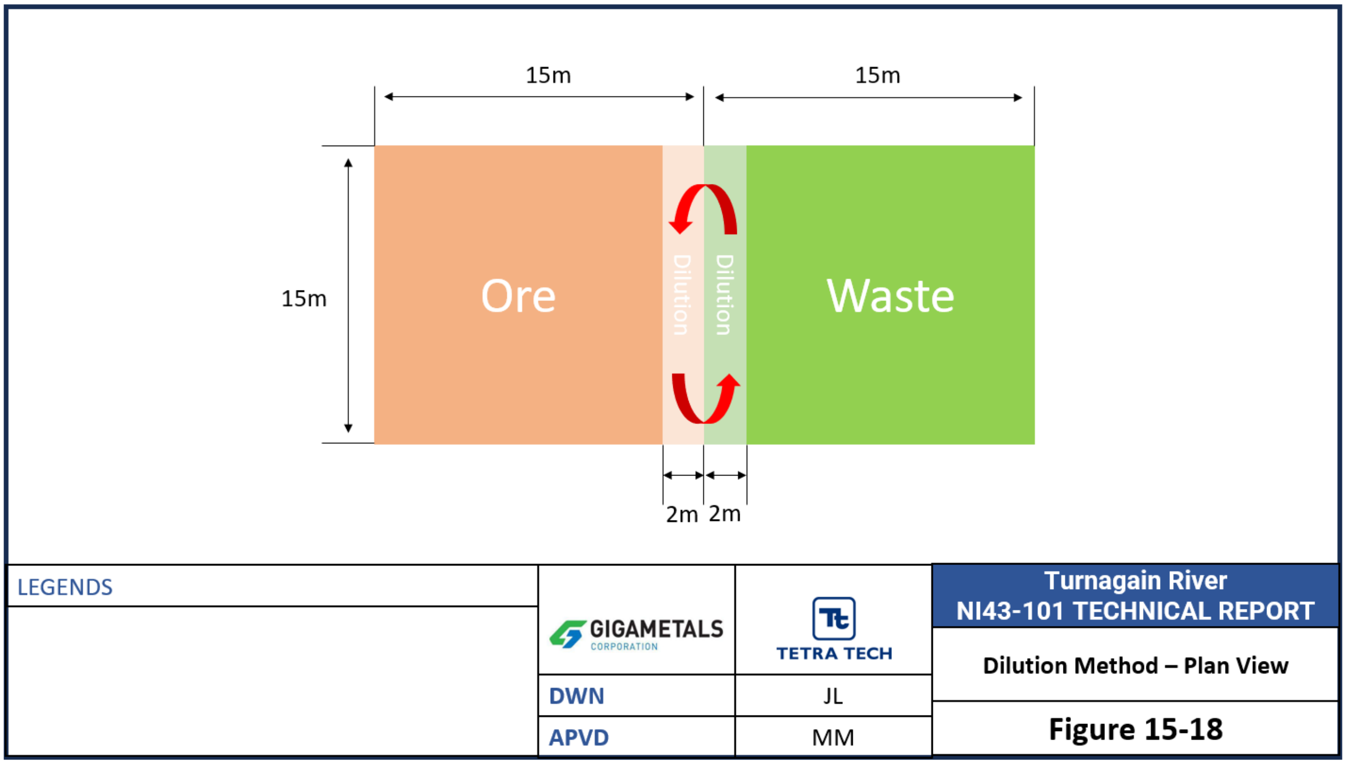


Figure 15-18: Dilution Method – Plan View

15.8 Mineral Reserve Statement

Mineral Reserves estimated for the Turnagain Project are based on Measured and Indicated Resources, with an effective date of September 22, 2023, and calculated by Tetra Tech and use PFS level engineering designs for the pit and associated process plant operating parameters.

Proven and Probable Mineral Reserves are summarized in Table 15-4 and match the production plan described in Section 16.0.

Table 15-4: Mineral Reserve Statement of the Turnagain Project

Category	Tonnage (kt)	Ni Grade (%)	Contained Ni (kt)	Co Grade (%)	Contained Co (kt)	Pd Grade (g/t)	Contained Pd (koz)	Pt Grade (g/t)	Contained Pt (koz)
Proven	408,106	0.219	894	0.013	55	0.024	341	0.022	321
Probable	542,379	0.194	1,055	0.012	66	0.020	385	0.022	418
Total	**950,485**	**0.205**	**1,949**	**0.013**	**121**	**0.022**	**727**	**0.022**	**739**

Notes:

1. The Mineral Reserve estimates were prepared with reference to the 2014 CIM Definition Standards (2014 CIM Definition Standards) and the 2019 CIM Best Practice Guidelines.
2. Reserves estimated assuming open pit mining methods.
3. Reserves are reported on a dry in-situ basis.
4. Reserves are based on a Nickel price of US $21,500/t, Cobalt price of US $58,500/t, ore mining cost of $2.24/t mined, waste mining cost $2.41/t mined, mining sustaining capital of $0.57/t mined, milling costs of $5.35/t feed, TMF sustaining capital of $0.70/t feed and G&A cost of $0.76/t feed.
5. Mineral Reserves are mined tonnes and grade includes consideration for a 2 m dilution width between ore-waste contact and mining losses of 1%.
6. Ore-waste cut-off was based on $6.63/t of NSR.
7. Due to rounding, total presented may not add up precisely to the totals provided and percentages may not precisely reflect absolute figures.

15.9 Comments on the Mineral Reserve Statement

Changes in the following factors and assumptions could affect the Mineral Reserve Estimate:

- Nickel and cobalt prices,
- Interpretations of mineralization geology and continuity of mineralization zones,
- Geological quality interpolation assumptions,
- Geotechnical and hydrogeological assumptions,
- Operating cost and sustaining capital cost assumptions and price escalation,
- Process method and recoveries,
- Ability to meet and maintain permitting and environmental license conditions.

The current Mineral Reserve estimates are based on the most current knowledge, permit status and engineering constraints. The QP believes that the Mineral Reserves have been estimated using industry best practices. The Mineral Reserves as stated in this report do not include:

- Material within the designed pit that was sent to stockpile but not recovered to the mill in this plan,
- Mineralized material, located east of the Turnagain River was not evaluated. This deposit could be considered for potential economic open pit extraction.

16.0 MINING METHODS

16.1 Introduction

The Turnagain deposit will be mined using conventional open pit mining methods consisting of drilling, blasting, loading and hauling with large-scale mining equipment. Vegetation, topsoil and overburden will be stripped and stockpiled for future reclamation use. The ore and waste rock will be drilled and blasted on 15-meter benches and loaded into autonomous trolley-assist diesel haul trucks with a fleet of electric rope shovels and front-end wheel loaders.

The mine design and schedule are based on the resources and reserves defined in Sections 14.0 and 15.0. A LOM schedule is provided in Section 16.8.

16.2 Geotechnical Pit Slope Parameters

The geotechnical pit slope parameters were presented in Section 15.2.1.

16.3 Hydrogeology

As discussed in Section 15.2.1, a numerical groundwater flow model evaluated pit water inflows during mining operations and the results of this study showed that the maximum amount of groundwater expected to enter the pit is manageable with perimeter and/or in-pit dewatering sumps, which are discussed in Section 16.9.6.

16.4 Phase Designs

To maximize the NPV of the project, mining phases (pushbacks) have been designed and incorporated into the mining sequence to bring higher grade material forward and to defer waste rock stripping. The phase designs were guided by the lower RF pit shells from the pit optimization analysis. A total of six phases have been designed. To confirm the phases can be mined safely and efficiently with the selected mining fleet, a minimum width of 100 m has been considered between each phase. For all phases, design of the haul ramps included the trolley-assist infrastructure, maximizing haul road usage and reducing infrastructure requirements.

Pushbacks were designed to provide operational flexibility while meeting geotechnical and equipment constraints. For most of the LOM, there are two active pushbacks being mined at one time reducing the loading requirements and allowing progressive sustaining capital expenditures. Having two active pushbacks available for production also lowers the operational risk from geotechnical failures.

Figure 16-1 shows the pushback schedule for the LOM.

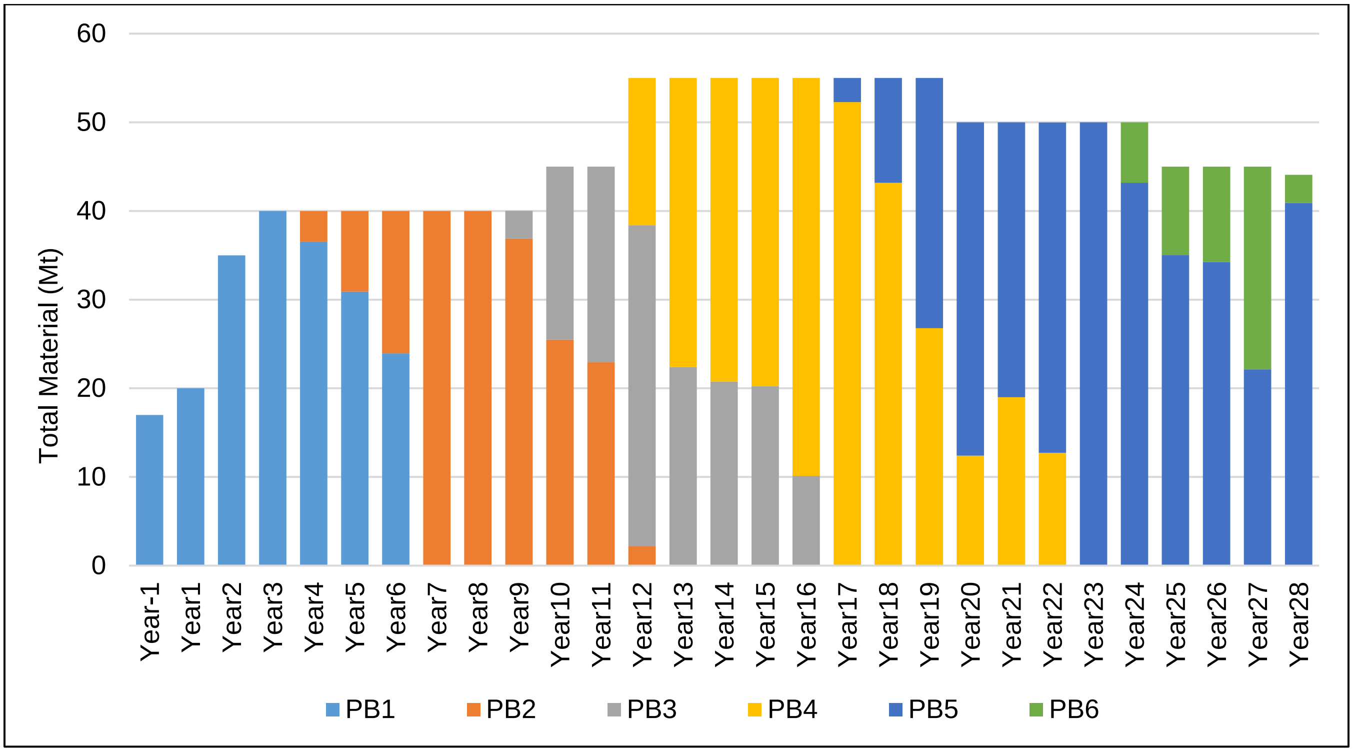


Figure 16-1: Pushback Schedule

16.5 Low-Grade Stockpile Strategy

A stockpile strategy has been defined to feed the process plant with the highest-grade material at the start of the operation and stockpile the lower-grade material to be processed in the later years. The goal was to optimize the pit to schedule the high-grade ore as early as possible and process the low-grade ore contained inside the pit at the end of the LOM. The low-grade ore stockpile is placed to the west of the ROM ore feed (Figure 16-2).

Tetra Tech evaluated several stockpile scenarios considering these key components:

- Incremental NPV based on the stockpile sizes,
- Annual stockpile reclaim rate,
- Regulatory risks on stockpile size,
- Additional stockpile rehandle cost that elevates NSR cutoff.

The scenarios showed that the NPV of the project was improved by using a stockpile but not greatly impacted by the size of the stockpile. To reduce the footprint, the maximum inventory of the stockpile is 34 Mt in Year 29 for the reclaim rate to the crusher in active mining years. Figure 16-3 and Figure 16-4 show the dynamic mill feed each year and stockpile inventory, respectively. During the mine life, there will be approximately 19 Mt of lower value ore that is not economical with the US $0.6/t rehandle cost and will be transported to waste rock storage facility. Figure 16-5 shows the quantities of marginal ore that is dumped due to rehandle cost.

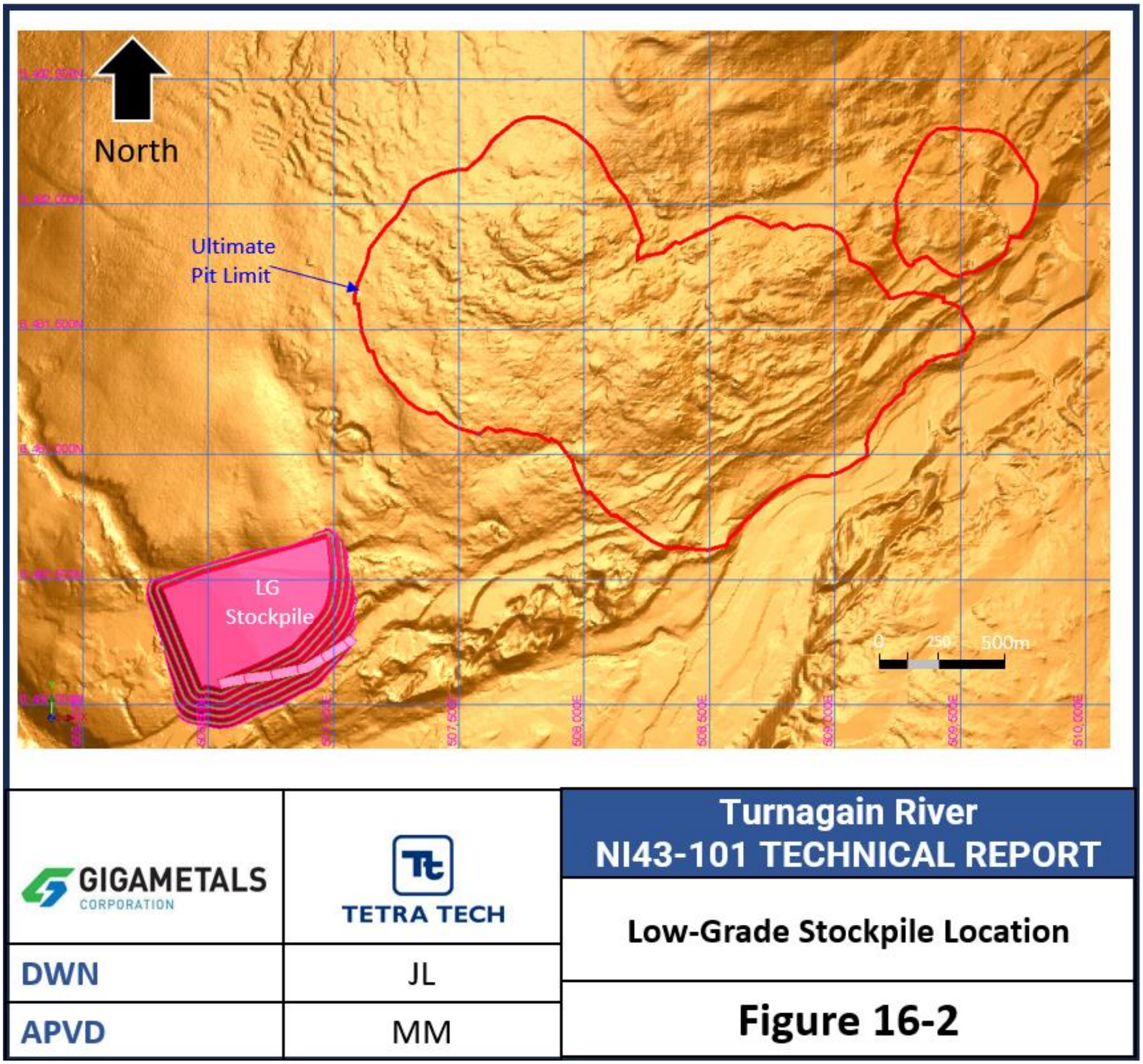


Figure 16-2: Low-Grade Stockpile Location

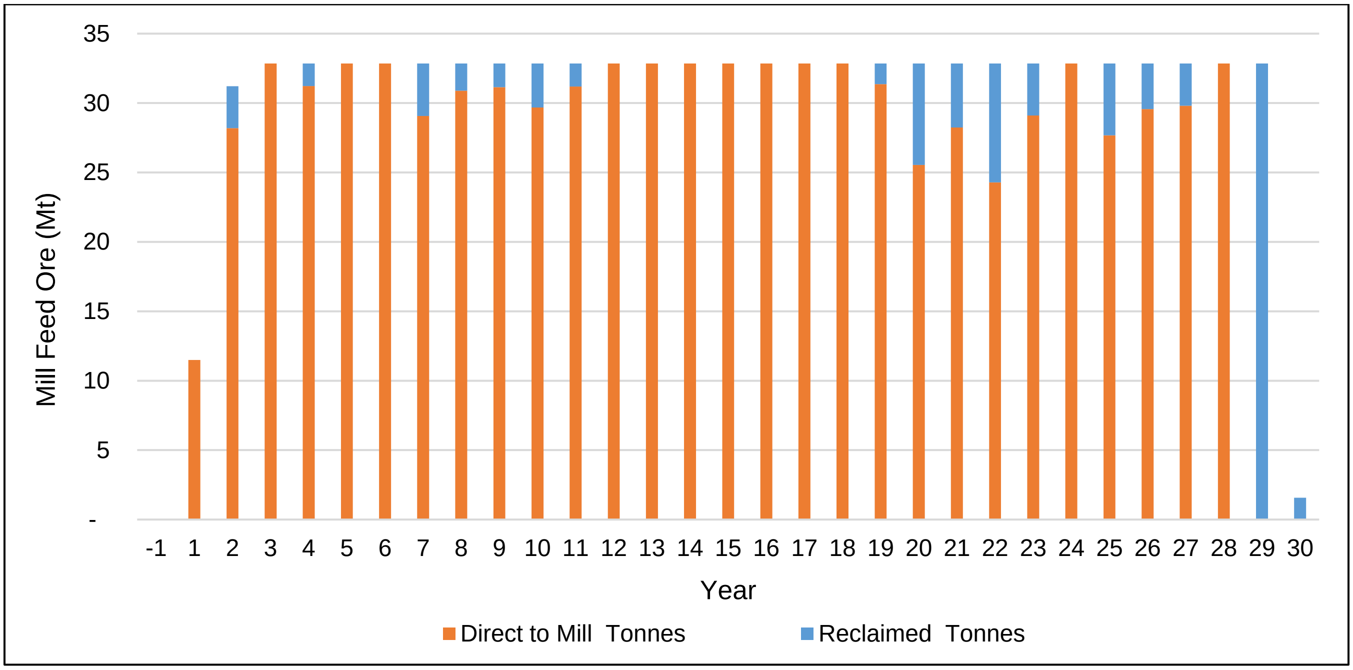


Figure 16-3: Dynamic Mill Feed

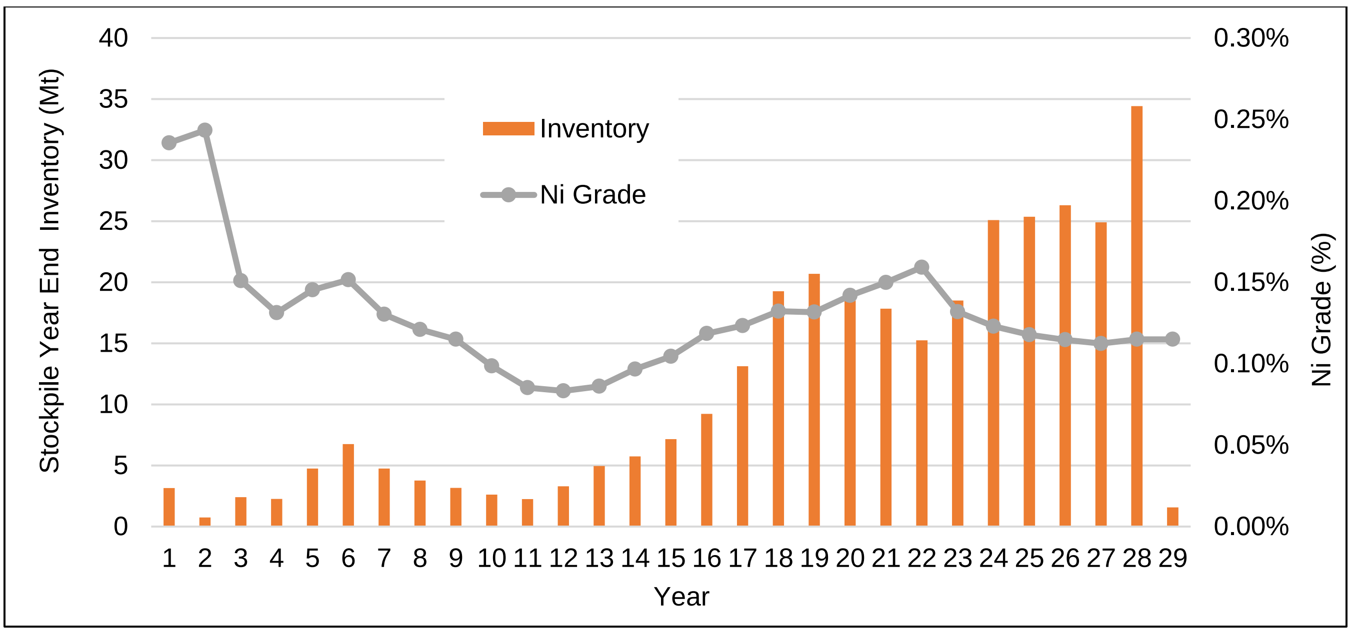


Figure 16-4: LOM Stockpile Inventory Evolution with Ni Grade

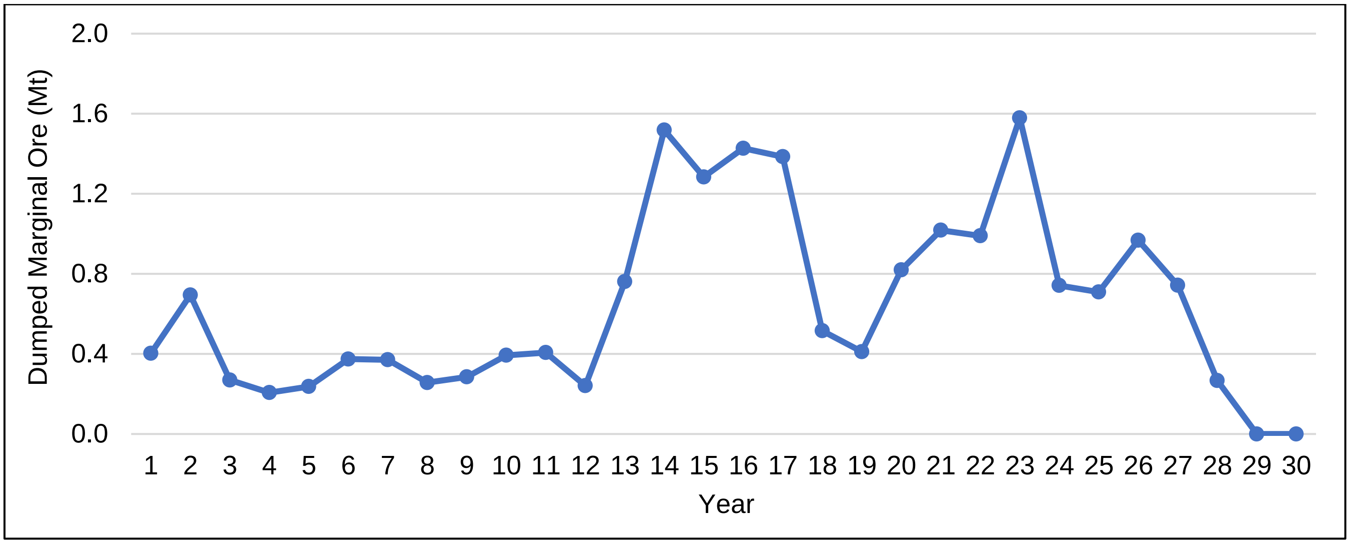


Figure 16-5*:* LOM Economically Dumped Marginal Ore

16.6 Acid Rock Drainage (ARD)/Metal Leaching (ML) Consideration

Assessment of ML/ARD characteristics of the anticipated mine waste rock and low-grade ore for the Project (BGC, 2020) focuses on materials within the Horsetail and Northwest zones of the deposit and represent the six major lithologic domains within the project including dyke, volcanic, dunite serpentinite wehrlite, green dunite and pyroxenites.

The rock units are variably classified for ARD potential as a mix of Non-Acid Generating (NAG), Uncertain (UC) and Potentially Acid Generating (PAG) and further kinetic testing is required to evaluate reactivity and contribution of silicates and rates of reaction to confirm ARD/ML potential for the mine wastes and low-grade ores. Existing data suggests that limited ARD/ML potential with waste rock exists, and it is a function of lithology (KP, 2008; MESH, 2009).

Given the uncertainty with respect to the potential environmental impact from ML/ARD of the waste rock and low-grade ore, the PFS level designs for material handling, ML/ARD mitigation and mined material management uses a conservative approach.

PFS level design includes consideration for mitigation of ML/ARD related to temporary and permanent stockpiling of mined materials, materials management, water management and control around stockpiles, stockpile foundation and cover designs, as well as access for rock and water quality monitoring programs. A low permeability liner is considered for the waste dump and LG stockpile and use of materials with high Neutralization Potential (NP) is considered to offset potential acid generation for encapsulation designs. Designs may be amended once kinetic testing is available to confirm reactivity of materials.

16.7 Waste Rock Dump Design

Over the 30-year LOM, 380 Mt of waste rock, including economically dumped ore due to rehandling cost, will be stored in the mine waste rock dump located west of the open pit area. Both overburden and waste rock will be mined in stages, depending on the pushback schedule. This phasing is to optimize overburden removal and avoid increasing the strip ratio in earlier years. Overburden will be used for liner construction of the waste rock dumps to mitigate the risk of ARD/ML challenges.

The waste rock dumps are designed to store 164 Mm^3 of waste rock. Figure 16-6 illustrates the dump location and its access haul road alignment. Dumps are designed to minimize haulage distances from the pits while also honouring geotechnical offsets from the ultimate pit and infrastructure. The waste rock dump structure also includes 53 Mt of inferred material with an average grade of 0.18% at 0.10% Ni grade cut-off.

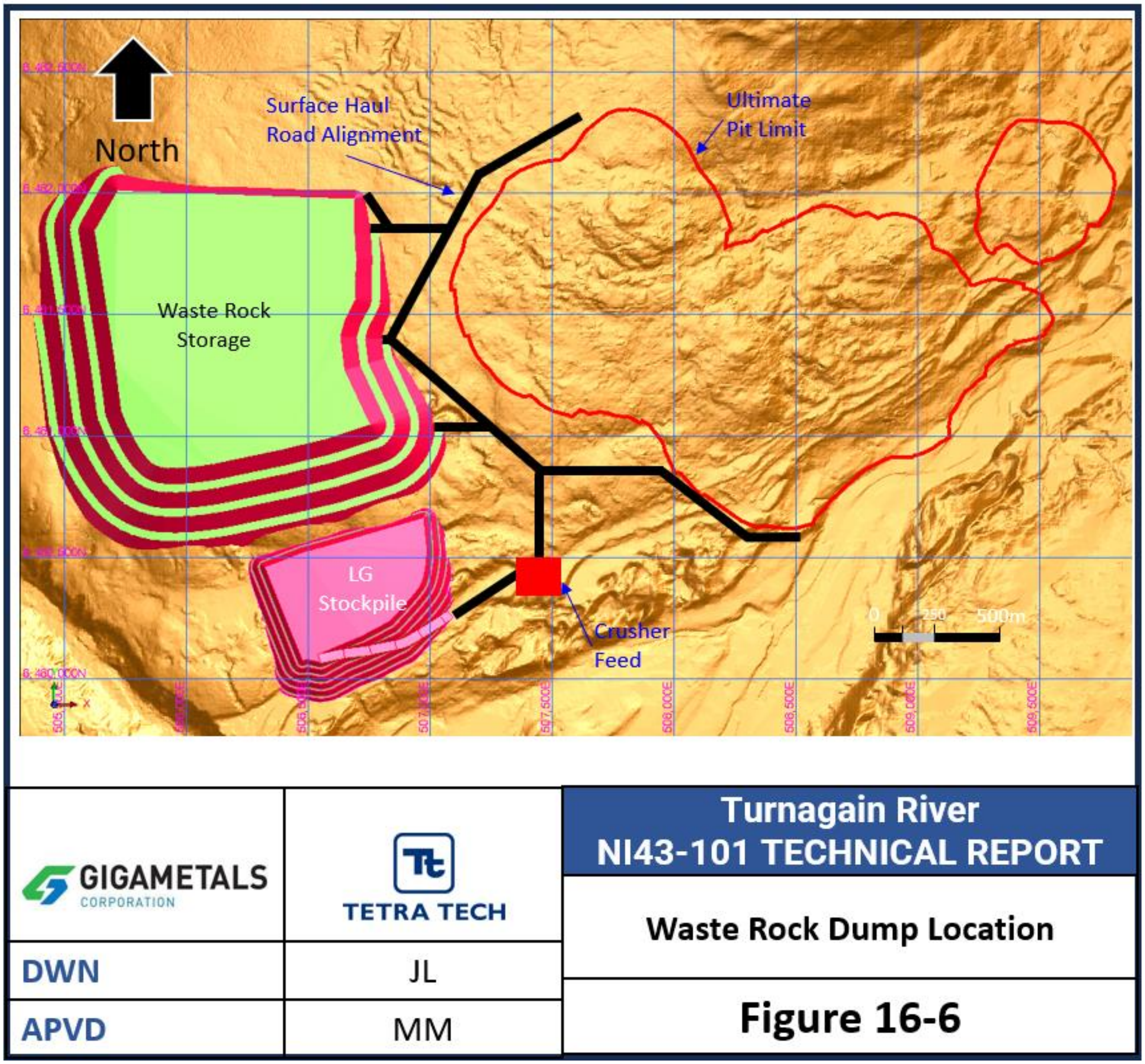


Figure 16-6: Waste Rock Dump Design Layout

Based on geotechnical slope parameters provided in BGC waste dump report (2023), the waste dumps are designed with the following parameters:

- 34 m berm width,
- 37° face angle,
- 50 m high bench lift,
- Minimum 300 m offset from the ultimate pit crest,
- Minimum 50 m offset from LG stockpile.

The 50 m high bench lift provides multiple benefits to the waste management operation which directly reduce sustaining mining capital and operating costs.

- Minimizes construction of waste dump haul roads. The haul road for the second lift of the dump is designed to last approximately 10 years,
- Less complex operation for dozers allowing higher productivity.

16.8 Mine Production Plan

The mine production plan has been prepared using Datamine's™ Studio OP and NPVS software. Provided with economic input parameters and operational constraints such as phase sequencing, maximum bench sink rates, mining and milling capacities, the software determines the optimal mining sequence and low-grade ore stockpiling strategy. The objective of the Turnagain LOM schedule was to maximize the early cash flow from the pit by targeting high-grade material to be fed to the processing plant while delaying costs by deferring waste stripping to later in the project life. The optimum throughput to the processing plant was determined to be 32.85 million tonnes per year with 2 years ramp up period (Figure 16-7). The mining strip ratio averages 0.41 overall for the LOM, after consideration of economically dumped ore due to additional rehandle cost.

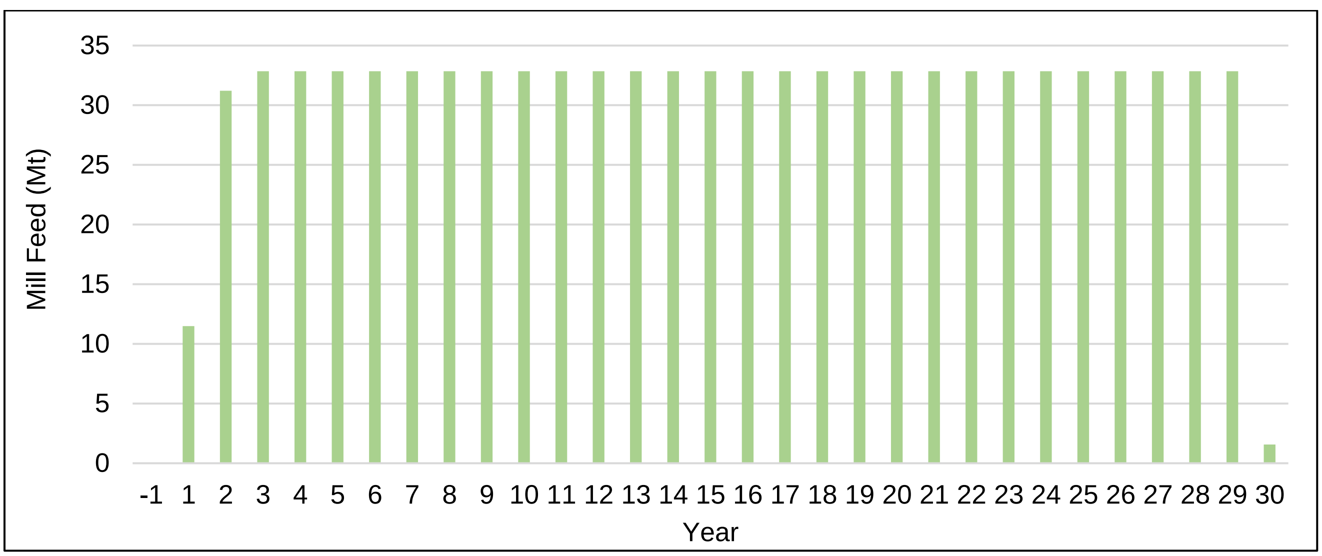


Figure 16-7: Mill Feed Schedule Over the LOM

Other considerations of the production schedule included:

- Manage total material mined annually to reduce equipment fleet fluctuations. Achieved by prioritizing lower strip areas earlier in the LOM, which allowed higher strip ratio pushbacks to be mined later in LOM at a higher mining rate,
- Leverage ore stockpile to maximize the grade of material to the processing plant,
- A maximum vertical sinking rate of 10 benches per year.

The total mining of the project takes place for approximately 29 years of mining, with an additional 2 years of ore feed from the low-grade stockpile. In the pre-production year (year -1), a total of 17 Mt of waste will be stripped, leaving an average of 6 Mt waste mining per year for the first 9 years which will facilitate effective waste fleet management. The mining rate will ramp up to 55 Mt in year 12 to accommodate the highest strip ratio of the mine life. Figure 16-8 shows the production schedule by material type and the strip ratio. After year 20, the mining rate will start to ramp down to 40 Mt as the strip ratio decreases. Table 16-1 and Figure 16-9 illustrate the LOM schedule and grade. Figure 16-10 shows life year end progression of the mine life.

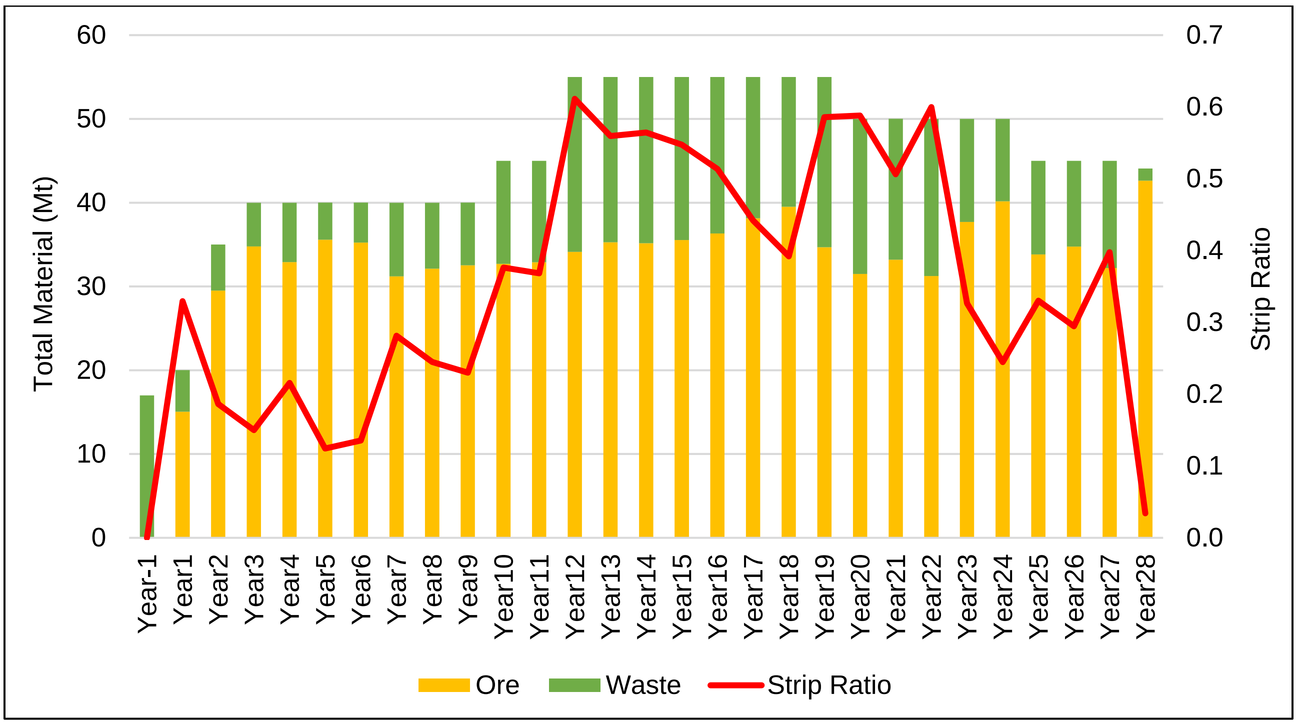


Figure 16-8: Ore and Waste Mining Schedule

Table 16-1: LOM Schedule with Feed Grade

Year	Waste (Mt)	Mill Feed (Mt)	Ni (%)	Co (%)	Pd (mg/t)	Pt (mg/t)	Mg (%)	S (%)	Fe (%)
-1	17.0	-	-	-	-	-	-	-	-
1	5.4	11.5	0.26	0.02	28.1	26.3	25.9	0.4	7.6
2	6.2	31.2	0.24	0.01	23.3	22.0	24.8	0.7	8.0
3	5.5	32.8	0.22	0.01	24.0	22.0	23.6	1.0	8.5
4	7.3	32.9	0.21	0.01	22.5	21.1	22.4	1.2	8.7
5	4.7	32.8	0.22	0.01	25.7	24.3	22.5	1.2	8.6
6	5.1	32.8	0.23	0.01	25.6	23.9	22.2	1.1	8.3
7	9.2	32.8	0.21	0.01	26.8	25.8	22.1	0.7	7.6
8	8.1	32.9	0.21	0.01	22.3	23.0	21.0	0.7	7.9
9	7.8	32.9	0.20	0.01	18.6	18.3	21.1	0.7	7.9
10	12.7	32.8	0.20	0.01	18.4	17.5	20.9	0.8	7.9
11	12.5	32.8	0.21	0.01	19.2	18.3	21.4	0.7	7.9
12	21.1	32.8	0.16	0.01	17.4	18.4	19.0	0.8	8.3
13	20.5	32.9	0.18	0.01	24.3	27.7	19.6	0.6	8.0
14	21.4	32.8	0.19	0.01	21.7	25.3	20.9	0.7	8.1
15	20.7	32.8	0.20	0.01	20.1	22.7	22.5	0.6	8.0
16	20.1	32.8	0.21	0.01	19.7	20.6	23.8	0.6	8.0
17	18.2	32.9	0.22	0.01	22.0	20.7	23.6	0.5	7.7
18	16.0	32.9	0.25	0.01	27.8	25.4	23.6	0.7	7.8
19	20.7	32.8	0.22	0.01	24.4	24.8	21.8	0.8	7.7
20	19.3	32.9	0.20	0.01	23.5	25.7	20.2	0.7	7.3
21	17.8	32.9	0.22	0.01	27.1	29.0	22.1	0.8	7.8
22	19.7	32.9	0.20	0.01	22.4	23.5	22.0	0.7	7.8
23	13.9	32.9	0.19	0.01	19.8	22.2	20.5	0.7	7.8
24	10.6	32.8	0.20	0.01	20.9	21.5	20.2	0.7	7.9
25	11.9	32.9	0.19	0.01	18.4	20.3	20.1	0.7	7.8
26	11.2	32.9	0.20	0.01	19.3	19.9	21.0	0.6	7.9
27	13.5	32.9	0.20	0.01	17.9	17.5	21.6	0.6	7.9
28	1.7	32.8	0.23	0.01	23.3	22.1	20.4	0.7	7.5
29	-	32.9	0.12	0.01	11.2	12.9	16.2	1.0	8.1
30	-	1.6	0.12	0.01	11.2	12.9	16.2	1.0	8.1
Total	**379.8**	**931.3**	**0.21**	**0.01**	**21.76**	**22.05**	**21.51**	**0.76**	**7.95**

Note: Total may not add due to rounding.

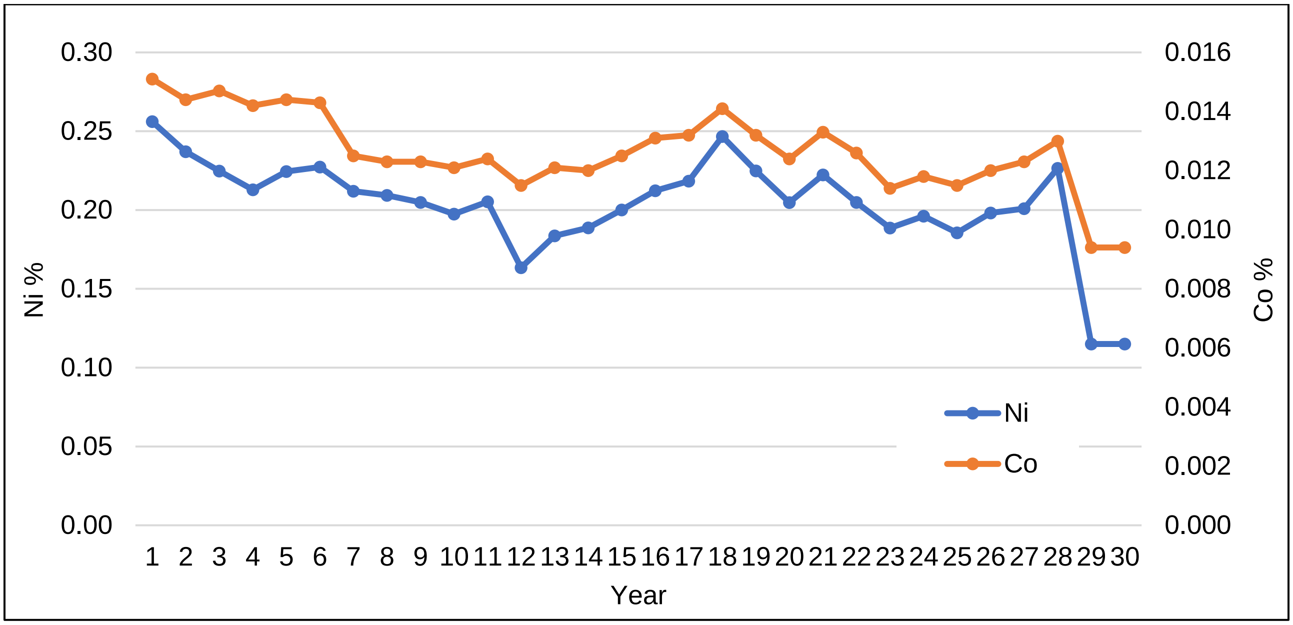


Figure 16-9: Ni and Co Feed Grade

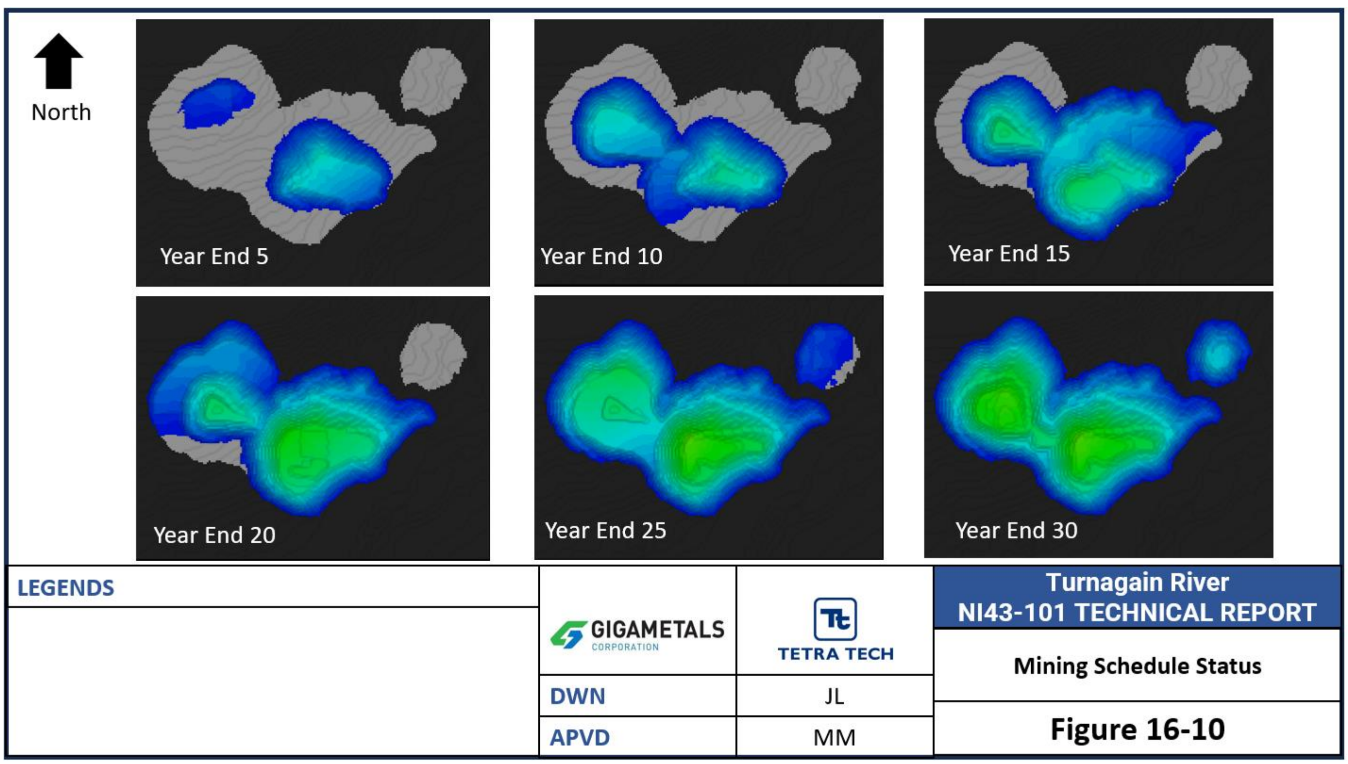


Figure 16-10: LOM Year-End Progressions

16.9 Mine Operation and Equipment Selection

Mining is to be carried out using conventional open pit techniques with electric cable shovels, wheel loaders and mining trucks in a bulk mining approach with 15 m benches. Equipment requirements are based on the design parameters of the pit and production rate requirements. Equipment is estimated on a first principles basis, with haul truck requirements based on measured haul profiles. Equipment availability and utilization are based on Tetra Tech’s experience and vendor guidance. For determining the number of each piece of equipment required, the following parameters are considered:

- Annual production rate,
- Haul road profile, gradient and length,
- Operating speeds,
- Equipment mechanical availability, utilization and overall efficiency,
- Cycle times including spot, load, haul, dump and maneuvering times,
- Effective life of the equipment.

16.9.1 Production Drilling and Blasting

Large electric rotary drills (311 mm bit size) will be used for production drilling, both in ore and waste. Medium diesel hydraulic percussive drills (140 mm bit size) will be used for controlled blasting on high wall rows and development of initial upper benches. To achieve desired fragmentation, a powder factor of an average of 0.6 kg/t will be used for ore and 0.3 kg/t in waste. Blast holes will be initiated with electronic detonators and primed with boosters. To limit the impact of groundwater inflow, blasting will be done with a 70/30 emulsion/Ammonium Nitrate-Fuel Oil (ANFO) mix explosive. A contract explosives supplier will ship the prescribed explosives and all blasting accessories to site which will be stored in a designated storage facility and magazines.

The average drill productivity for the production rigs, using down-the-hole drill string, is estimated at 35 m/h instantaneous with an overall penetration rate of 26 m/h. The overall drilling factor represents time lost in the cycle when the rig is not drilling (e.g., move time between holes, moves between patterns, drill bit changes, maintenance, etc.). Table 16-2 and Table 16-3 shows drill parameters and requirements. Blasting accessories will be stored in magazines adjacent to the mining areas suitably located to meet federal and provincial regulations and to avoid potential geohazards. The loading of the explosives will be done with bulk explosives loading trucks provided by the explosive supplier.

Table 16-2: Drill Equipment Parameters

Description	Unit	Value
Instantaneous penetration rates	m/h	35
Planned hole depth	m	16
Allowance for re-drilling of holes	%	5
Delays for moving between holes min	minutes	10
Moving between patterns of total ops time	%	20
Average penetration rate	m/h	26

Table 16-3: LOM Drill Equipment Requirements

Drill Equipment	Y1- Y2	Y3 -Y11	Max
Large Drills (SANDVIK DR416e)	2	3	4
Medium Drills (Leopard DI650i T4F/S5)	1	1	2

16.9.2 Loading Unit Requirements

Loading will be done using a mix of electric rope shovels and large front-end wheel loaders. The shovels will be matched with a fleet of Komatsu 830E-5 mining trucks, or similar model. The wheel loaders will primarily be responsible for the LG stockpile rehandling activities while complementing the shovel to improve the loading unit's physical availability and reduction of the truck queueing time. The loading productivity assumptions and requirement for both types of loading equipment are presented in Table 16-4 and Table 16-5, respectively.

Table 16-4: Loading Unit Productivity Assumptions

Description	Unit	Rope Shovel	Front End Loader
Model		P&H 2800XPC	Komatsu WE1850-3
Nominal Bucket Size	Tonne	59	59
Cycle time per load	Seconds	30	40
Truck Spot Time	Seconds	30	30
Passes to Load a Truck	Number	4	4
Cycle time per truck	Minutes	2.5	3.2
Physical Availability	%	70%	70%
Operating Efficiency*	%	70%	70%
Shovel Operating Hour	Hour/Year	4292	4292
Nominal Productivity	Tonne/Year	22,149,000	17,486,000

* Includes blast delays, waiting for trucks and other operator delays

Table 16-5: Loading Unit Requirement Chart

Loading Unit	Y1	Y2-Y11	Max
Rope Shovel	1	2	3
Front End Loader	1	1	1

16.9.3 Hauling Unit Requirements

The Turnagain project will implement both trolley-assist and autonomous technologies as part of the hauling fleet. The associated performance parameters are based on other existing mining operations using these technologies. Although battery-powered mining trucks could offer additional benefits, this technology is either in the early learning stage or prototype development. As such, most mining truck suppliers (e.g., Komatsu or Caterpillar) cannot provide operational-based performance data for the study and these options have not been included in the PFS.

Trolley-Assist Technology

Trolley-assist mining truck technology has been successfully employed at numerous mine sites in Europe, Africa and Canada. In early 2022, Copper Mountain Mine, located near Princeton (BC), announced that it had successfully commissioned its first 1-kilometer-long trolley-assist project in partnership with SMS Equipment, Komatsu, ABB, Clean BC and BC Hydro.

For the trolley-assist technology, a diesel-electric haul truck will utilize electricity to power the wheel motor while driving on a trolley-equipped haul road and switch to the diesel engine while driving on a regular haul road. The truck is equipped with two pantographs to collect electric power from overhead lines. While the haul truck is powered by electricity or under trolley mode, the diesel engine will drop to idle.

Trolley-assist technology offers the following cost-saving reductions:

- Instead of burning diesel, wheel motors receive power from the electrical grid. The value of savings is a function of the truck net operating hour (NOH) and the relative cost between diesel fuel and electricity. While the truck is under trolley mode, the diesel consumption can be 70% less than traditional diesel trucks. As such, Tetra Tech applied a 70% diesel reduction while the truck is under trolley mode.
- The speed of travelling uphill can be nearly doubled under the trolley-assist technology. Faster travel speed results in higher truck productivity and, ultimately, reduced truck requirements. Labour and G&A costs also are reduced due to fewer truck requirements.
- Tetra Tech contacted vendors regarding the equipment's life. Trolley-assist mining trucks are expected to obtain an additional 25% of engine life. Tetra Tech assumed a truck life of 60,000 gross hours for conventional trucks and 75,000 gross hours for diesel-electric trolley trucks, reducing haulage replacement units.
- Trolley-assist technology will reduce GHG generation from operating mining trucks.

The savings associated with trolley-assist are partially offset by costs associated with operating the system, including the following:

- Trolley-assist infrastructure, including, DC substations, powerlines and poles,
- Trolley-assist truck, including pantographs and on-board control devices,

- Shallower overall pit slopes due to wider haul ramps to accommodate DC substations and associated infrastructures,
- Frequent road maintenance to ensure seamless utilization between mounted pantographs and overhead powerlines.

Tetra Tech developed haulage profiles and designed major ramps that can be equipped with trolley-assist infrastructures. Over the LOM, the design for the trolley-equipped ramp systems included:

- The initial trolley-assist system will be equipped for the Pushback 1 starting pre-production year. The system will ultimately extend 2.8 km and handle 35% of the total truck NOH. As Pushback 1 approaches its end of life, the system will be decommissioned after year 7 and reused for the next pushback (Figure 16-11).
- Pushback 2 will be equipped in Year 4. Infrastructure on this ramp will ultimately extend 2.0 km and handle 30% of the total truck NOH. The system will be decommissioned after Year 12 which will be used for pushback 3 (Figure 16-12).
- Pushback 3 will also be equipped starting in Year 9. Infrastructure on this ramp will ultimately extend 2.6 km and handle 39% of the total truck NOH. The system will be decommissioned after Year 16 which will be used for pushback 4 (Figure 16-13).
- Pushback 4 will also be equipped starting in Year 12. Infrastructure on this ramp will ultimately extend 7.5 km and handle 39% of the total truck NOH. The system will be decommissioned after Year 22 which will be used for pushback 5 (Figure 16-14).
- Pushback 5 will also be equipped starting in Year 17. Infrastructure on this ramp will ultimately extend 3.2 km and handle 29% of the total truck NOH (Figure 16-15).
- Pushback 6 will also be equipped starting in Year 24. Infrastructure on this ramp will ultimately extend 3.0 km and handle 38% of the total truck NOH (Figure 16-16).

Throughout the LOM, the trolley-assist system will be installed by a third-party contractor including installation, testing and maintenance.

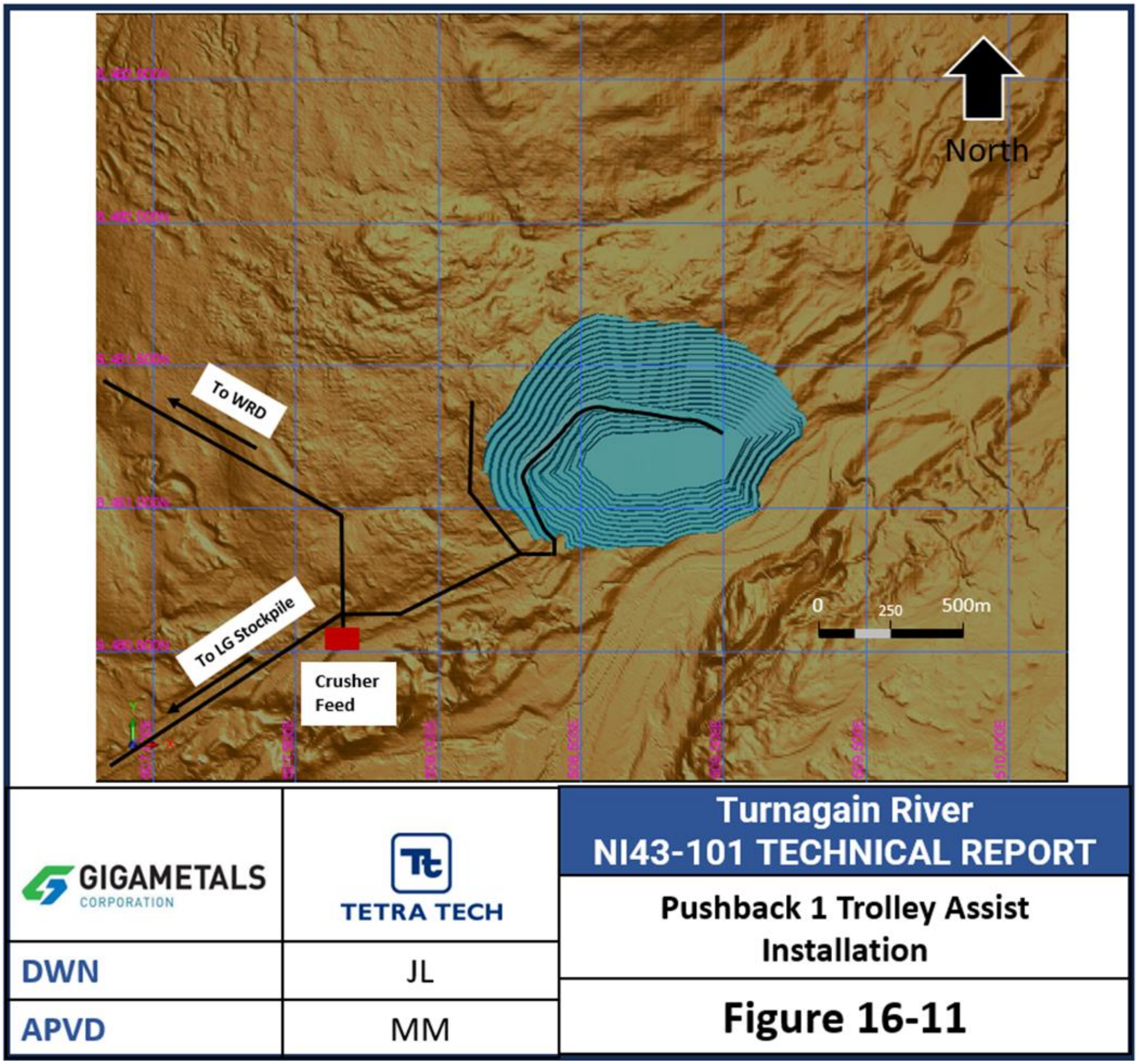
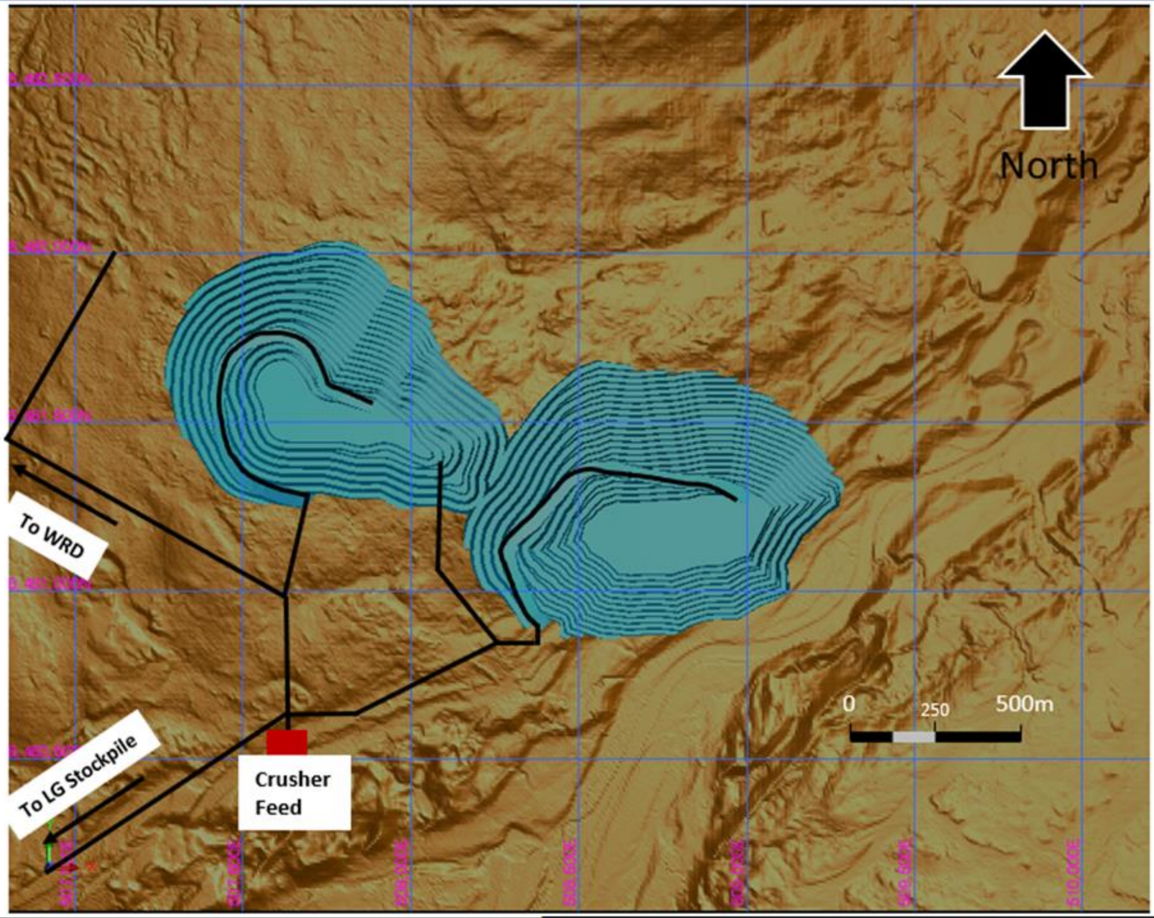


Figure 16-11: Pushback 1 Trolley-Assist Installation Plan



GIGAMETALS CORPORATION	TETRA TECH	Turnagain River NI43-101 TECHNICAL REPORT
		Pushback 2 Trolley Assist Installation
DWN	JL	
APVD	MM	Figure 16-12

Figure 16-12: Pushback 2 Trolley-Assist Installation Plan

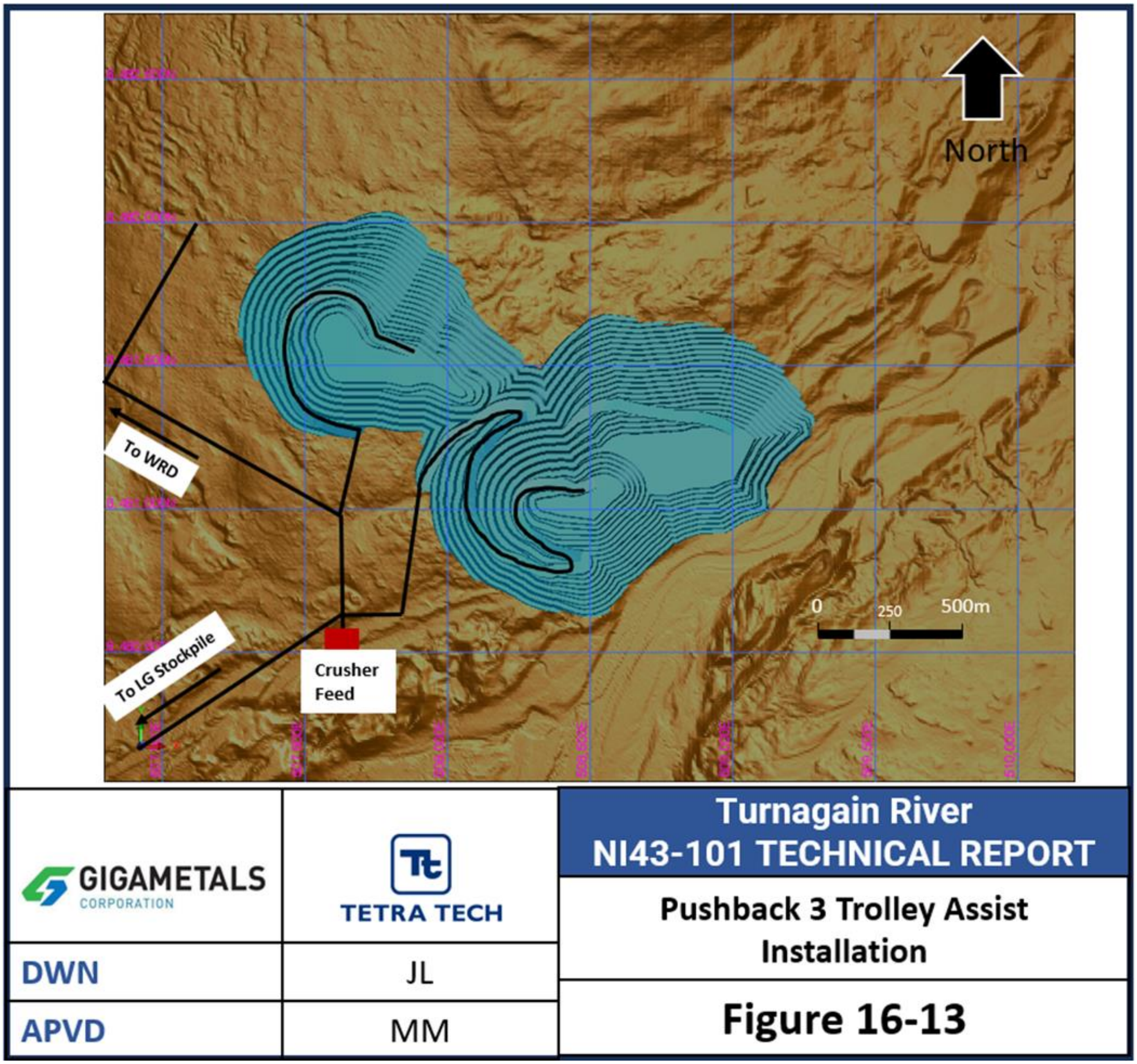


Figure 16-13: Pushback 3 Trolley-Assist Installation Plan

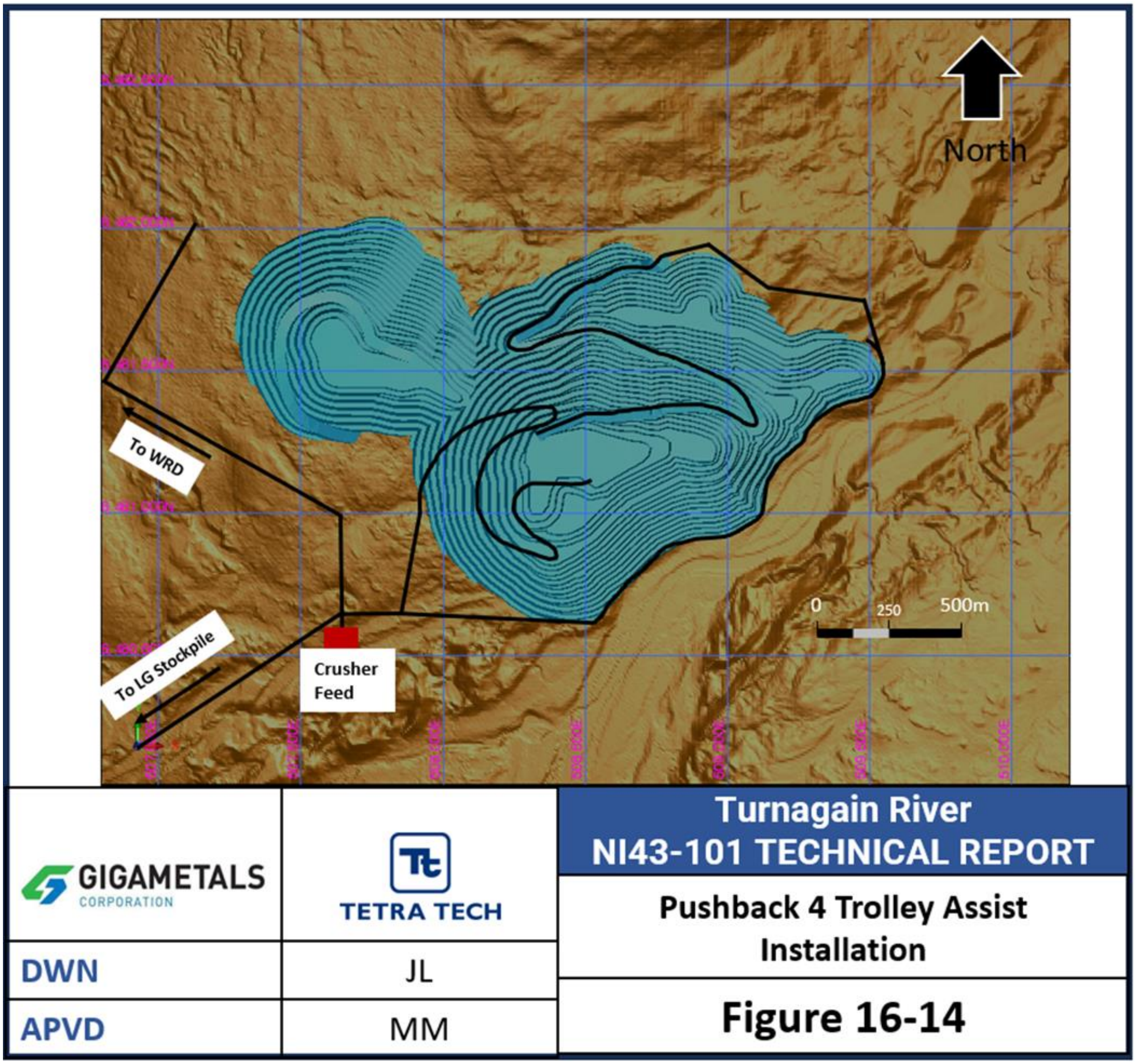


Figure 16-14: Pushback 4 Trolley-Assist Installation Plan

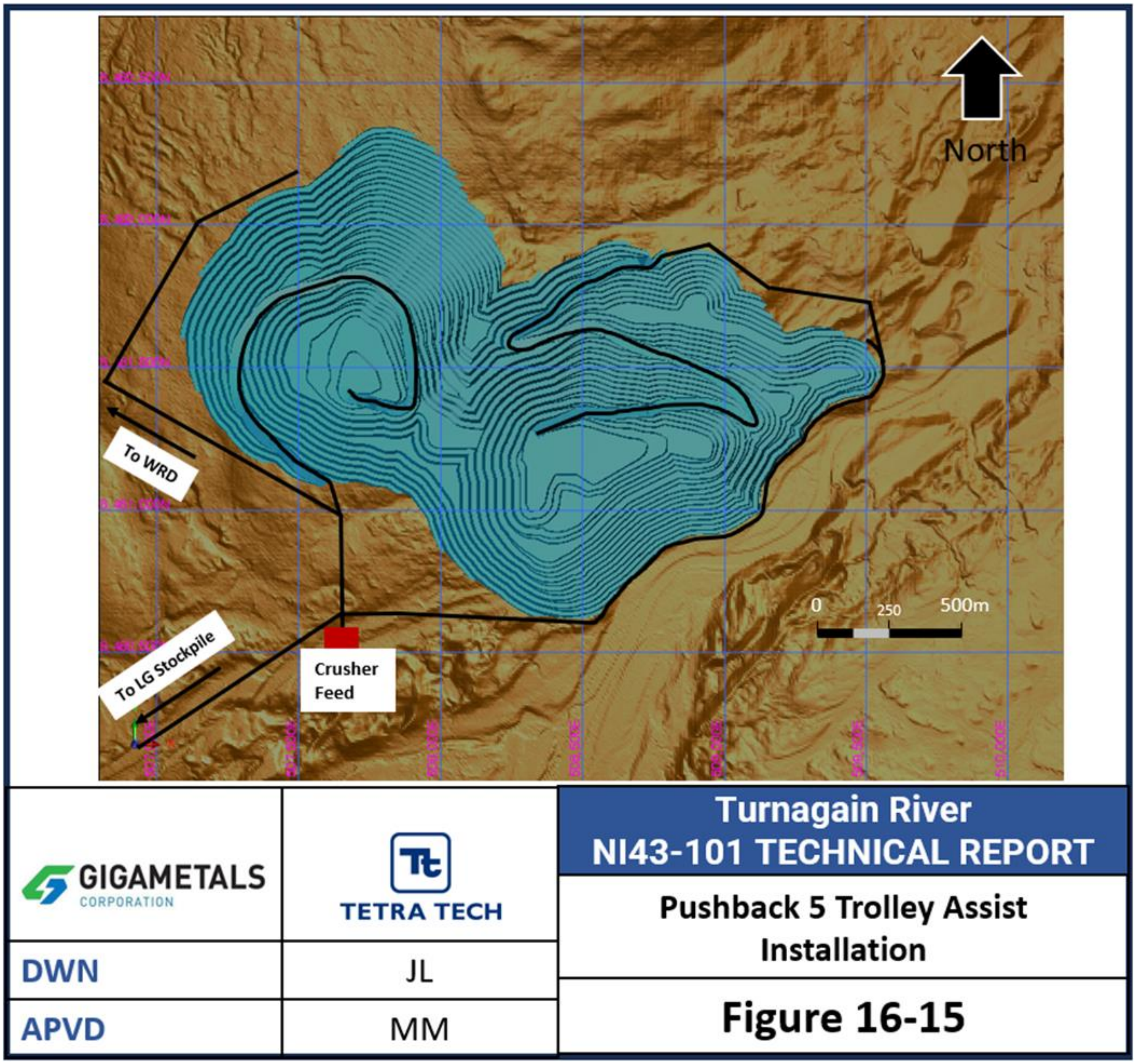


Figure 16-15: Pushback 5 Trolley-Assist Installation Plan

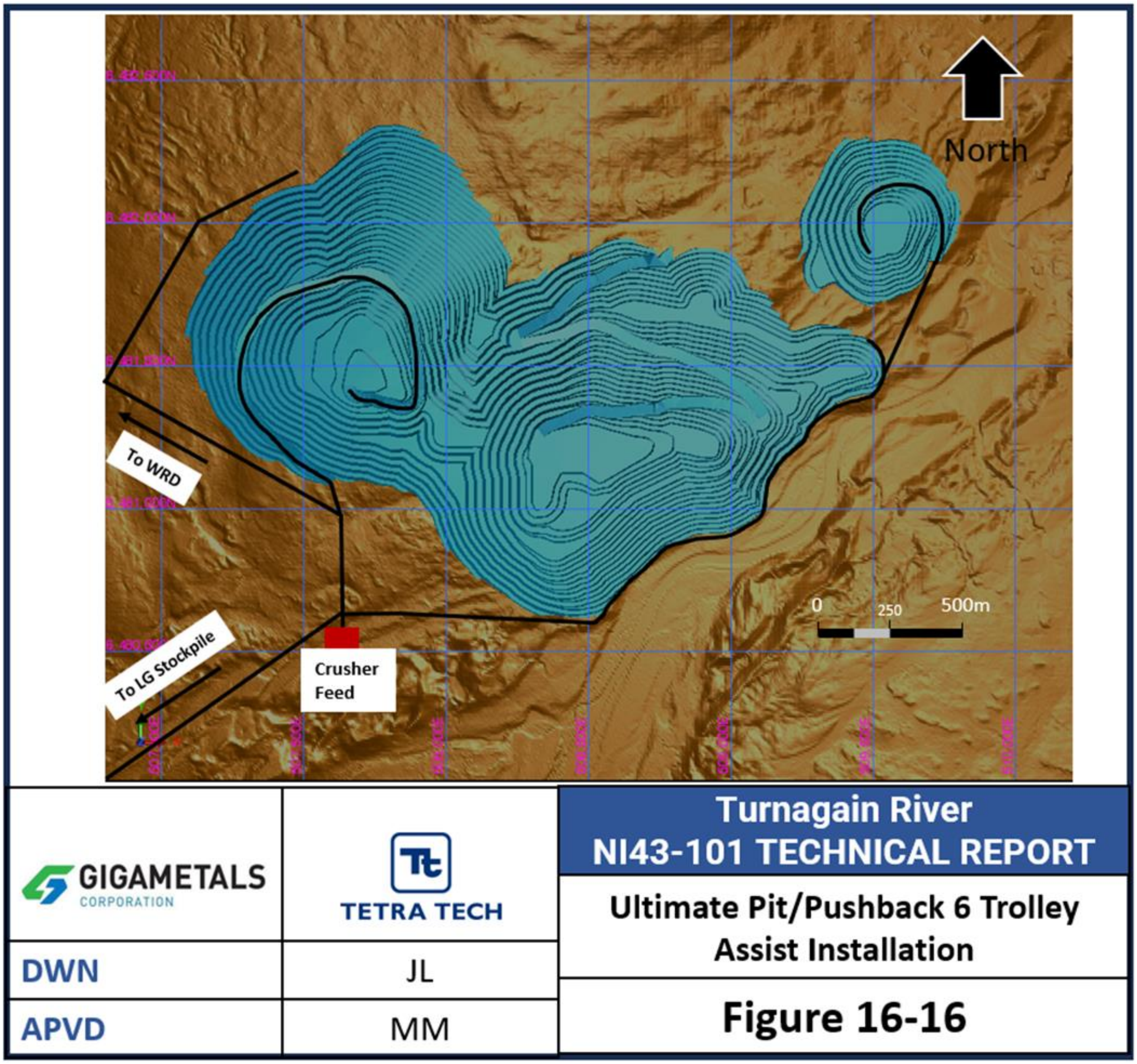


Figure 16-16: Pushback 6 Trolley-Assist Installation Plan

Autonomous Haulage System (AHS) Technology

AHS technology is widely adopted in large-scale mining operations in western Canada and worldwide. In 2018, Highland Valley Copper, located near Kamloops, BC, launched 6 autonomous haul trucks and will retrofit the remaining fleet to autonomous trucking in the coming years. In early 2022, Kearl operation, an oil sands mine located in northern Alberta, has provided full funding to convert 55 trucks into an autonomous fleet and is expected to transition to a fully autonomous fleet by year-end 2023.

AHS will eliminate the need for an onboard operator for a mining truck. Directed by a control centre and onboard intelligence system, the autonomous truck will compute the optimum path and speed and navigate through a pre-determined task. Most importantly, the AHS technology allows the autonomous truck to work safely around other equipment and personnel. AHS technology allows trucks to operate unconstrained at specified designed limits. All surrounding objects intercepting the area where AHS trucks are active will be electronically tagged to be visible to the truck. Any person or equipment crossing the path of an AHS unit will automatically cause the autonomous unit to be slowed down or stopped.

16.9.4 Truck Requirements

Haulage will be performed with Komatsu 830E-5 trucks, or similar models. The truck fleet productivity was estimated in annual haulage distance and average travel speed (Table 16-6 and Table 16-7). Three haulage routes, including the crusher feed, waste dump and LG stockpile, were digitized for each pushback at a given production year. The average travel speed was estimated based on the truck rimpull chart, depending on the status of the truck. (e.g., loaded, empty, retarding and propulsion).

Table 16-6: Haul Truck One-way Travel Distance

Destination	Average One-Way Haulage Distance (km)					
	PB1	PB2	PB3	PB4	PB5	PB6
Direct Feed	1.4	1.7	2.1	5.2	2.1	3.2
Waste Rock Dump	3.5	2.3	4.5	8.3	3.5	6.5
LG Stockpile	2.5	2.7	3.4	6.6	3.1	4.2

Table 16-7: Haul Truck Productivity Assumptions

Description	Unit	Conventional Truck	Trolley-Assist + AHS Truck
Model	-	Komatsu 830E-5	Komatsu 830E-5
Diesel Engine Life (incl. rebuilt)	Hours	60,000	75,000
Effective Payload	Tonnes	215	215
Loading Time	minutes	2	2
Dumping Time	minutes	1	1
Spotting and Queuing Time	minutes	4	3
Average Speed - Loaded	km/h	15	29
Average Speed - Empty	km/h	40	40
Operating Efficiency	%	80%	88%
Physical Availability	%	85%	85%
Trolley Power Line Availability	%	NA	98%

The total NOH by period combined with truck's productivity was used to determine the number of trucks required (Figure 16-17). The truck fleet reaches a maximum of 20 units in Year 16 and will consume 196 million litres of diesel and 2016 MWh throughout the LOM.

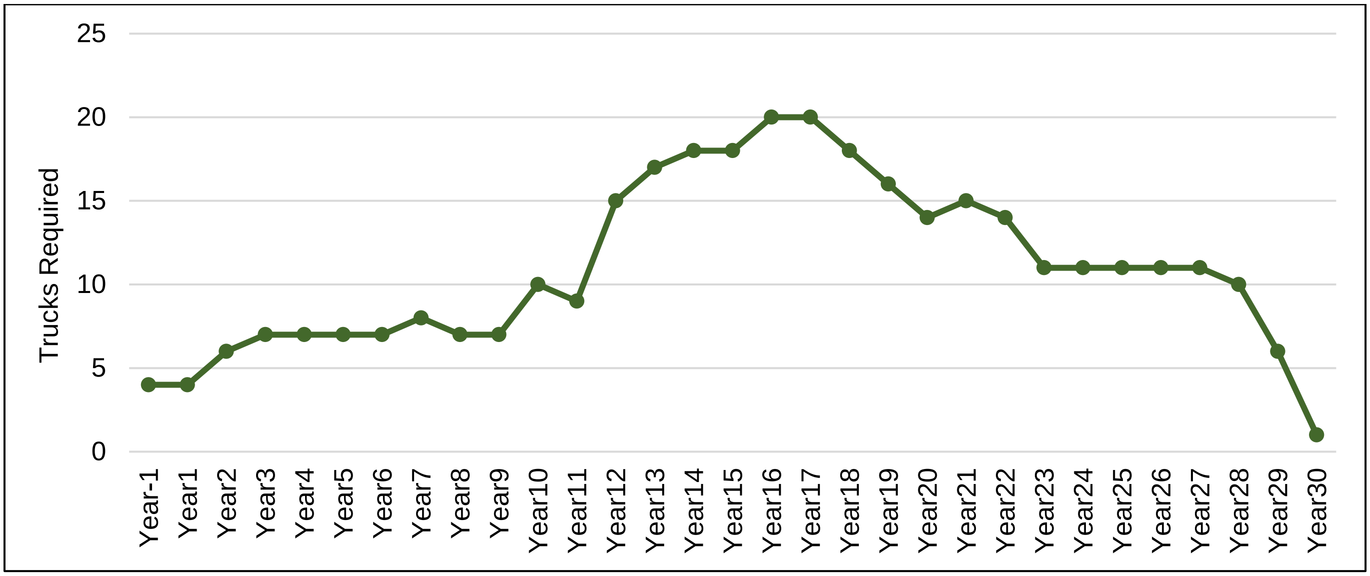


Figure 16-17: AHS Trolley-Assist Haul Truck Requirement

If both AHS and trolley-assist were not employed, the NOH for the conventional haul trucks would increase 30% while fuel burn would increase 62%. Figure 16-18 shows the conventional truck requirements.

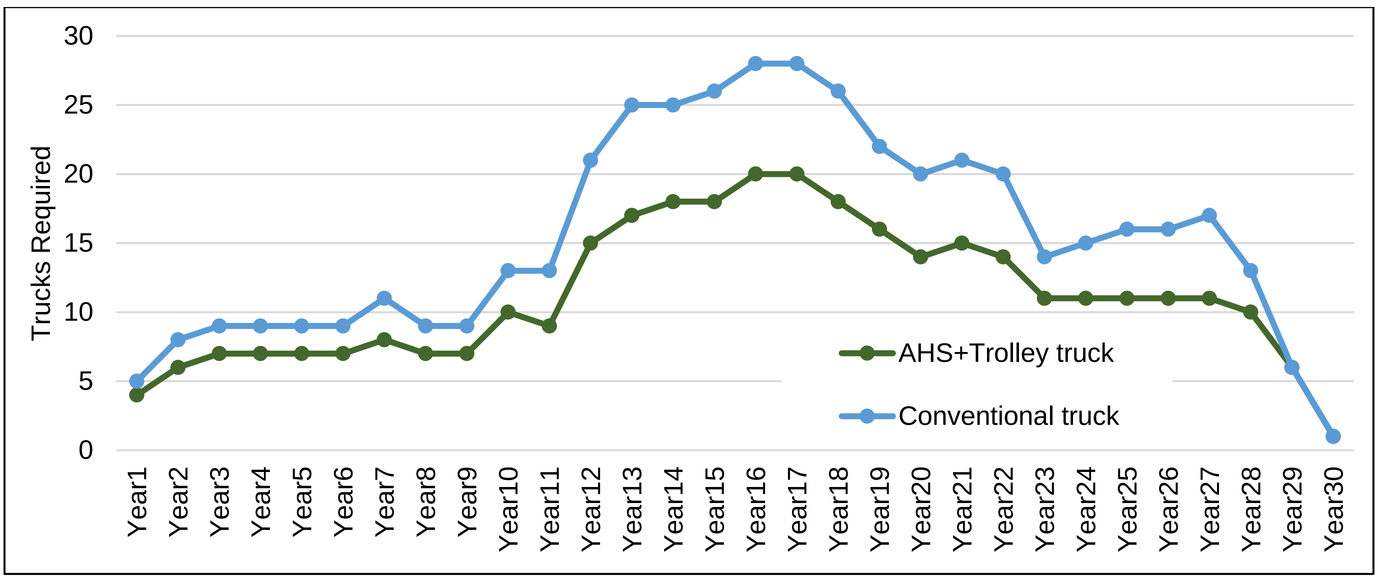


Figure 16-18: Comparison Between AHS Trolley-Assist Haul Truck and Conventional Truck Requirement

16.9.5 Support Equipment

Primary support equipment required for operations has been selected for activities that are directly related to production and material movement:

- At the waste rock dump and LG stockpile, track dozers will be used to maintain desired bench geometry and facilitate LG ore rehandling. The number of track dozers and operating hours were estimated based on the material quantity handled.
- At active mining benches, track dozers will be used for bench cleanups, facilitate ore and waste selectivity and increase shovel productivity. When the shovel is down for maintenance, track dozers can be used for heavy civil construction tasks, including ramp development, pit floor clean ups, etc.
- For haul roads, two types of graders will be employed. Graders with 24 ft blade will be designated for haul roads and ramps that are equipped with trolley assist powerlines while units with 18 ft blade would maintain bench access roads and light vehicle roads. In addition, water and sand trucks will be employed for dust suppression in summer and truck traction at winter, respectively. Note that the water and sand truck can be the same unit all year round, with an appropriate retrofit.
- Miscellaneous civil tasks: additional excavators, smaller haul trucks and wheel loaders were selected for pit maintenance, snow clearing, dewatering ditching and sumps.

Figure 16-19 and Figure 16-20 show the primary support equipment requirement schedule and diesel consumption throughout the mine life.

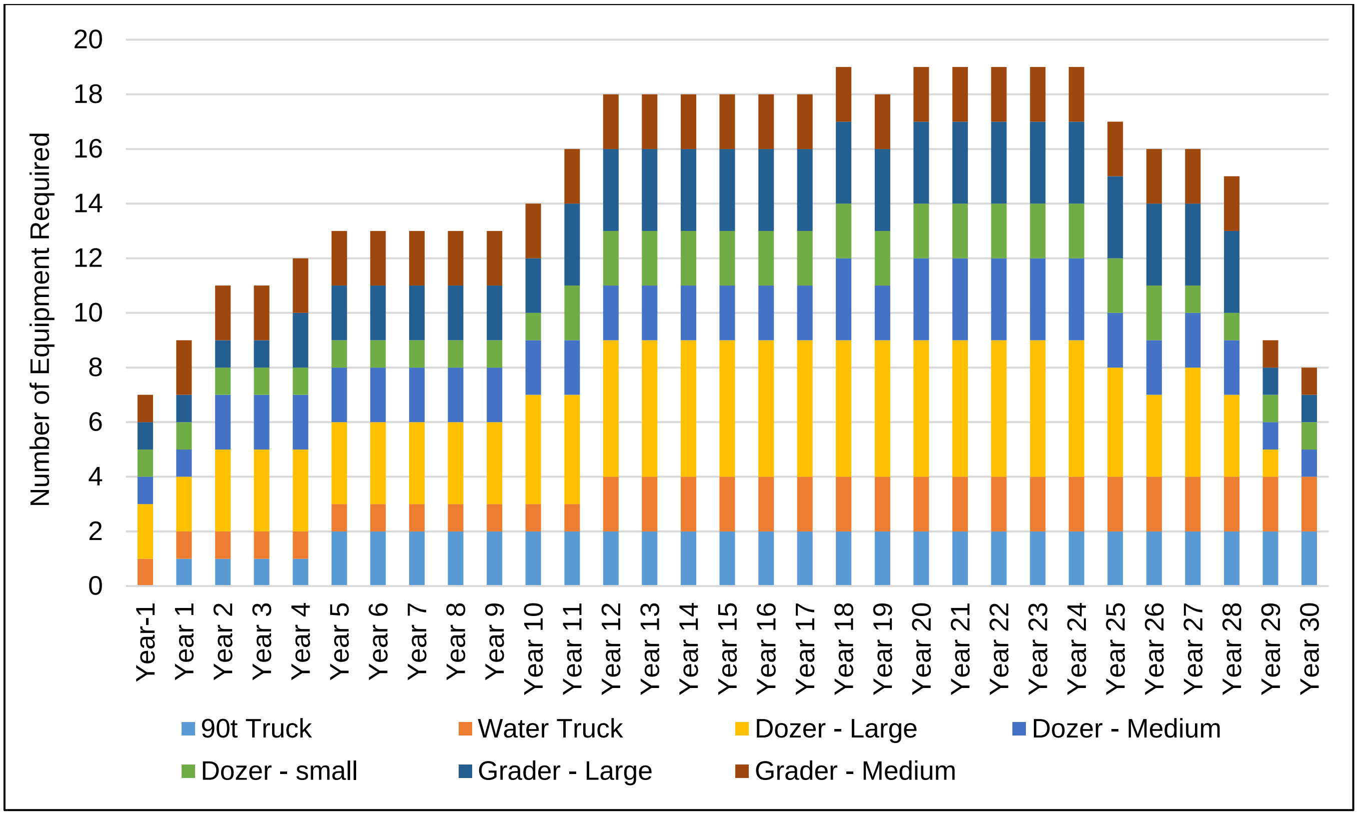


Figure 16-19: Primary Support Equipment Requirement

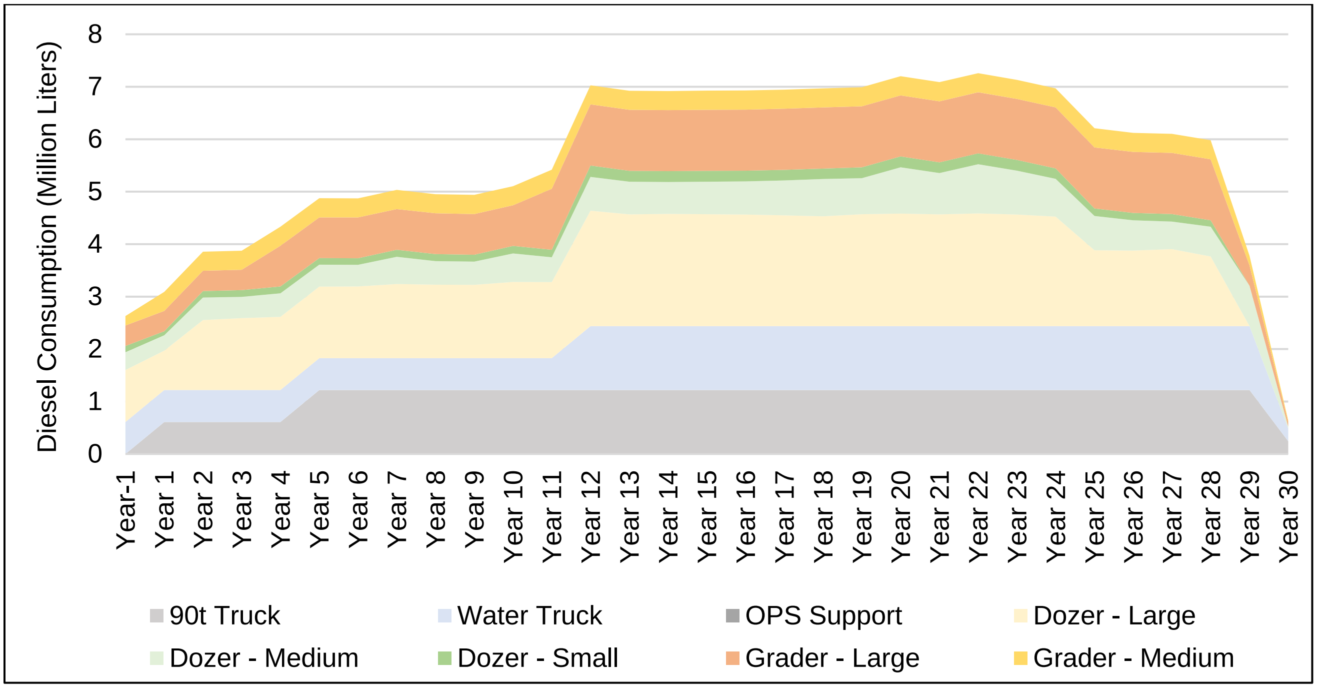


Figure 16-20: Primary Support Equipment Diesel Consumption

16.9.6 Inner Pit Dewatering

The pumping requirements to dewater the pits was primarily based on the following:

- 2 years return period and 24 hours duration rainfall, provided by Swiftwater Consulting (Swiftwater, 2023),
- Groundwater inflows provided by BGC,
- Pit disturbance area designed by Tetra Tech.

Initially, a 373-kW pump will be suitable for up to and including Year 6. Ultimately, the pit will require two electric-powered pit dewatering pumps at the lowest level of each mining bench and pushback and each system will have its own dedicated dewatering transfer line to the original ground surface.

16.9.7 Mine Operation Labour

The open pit will operate continuously, with two 12-hour shifts daily, 365 days per year. This can be achieved by four crews. The total labour was estimated to match the primary and support mining equipment requirements and total tonnage mined per year. Figure 16-21, Figure 16-22 and Figure 16-23 illustrate the breakdown of hourly labour and salary labour.

Over the LOM, including the period of pre-stripping, the total labour will average 241 per year, reaching a peak in Year 22 of 283. In the event that trolley-assist and automation technologies are not employed, the average labour count would be 20% higher.

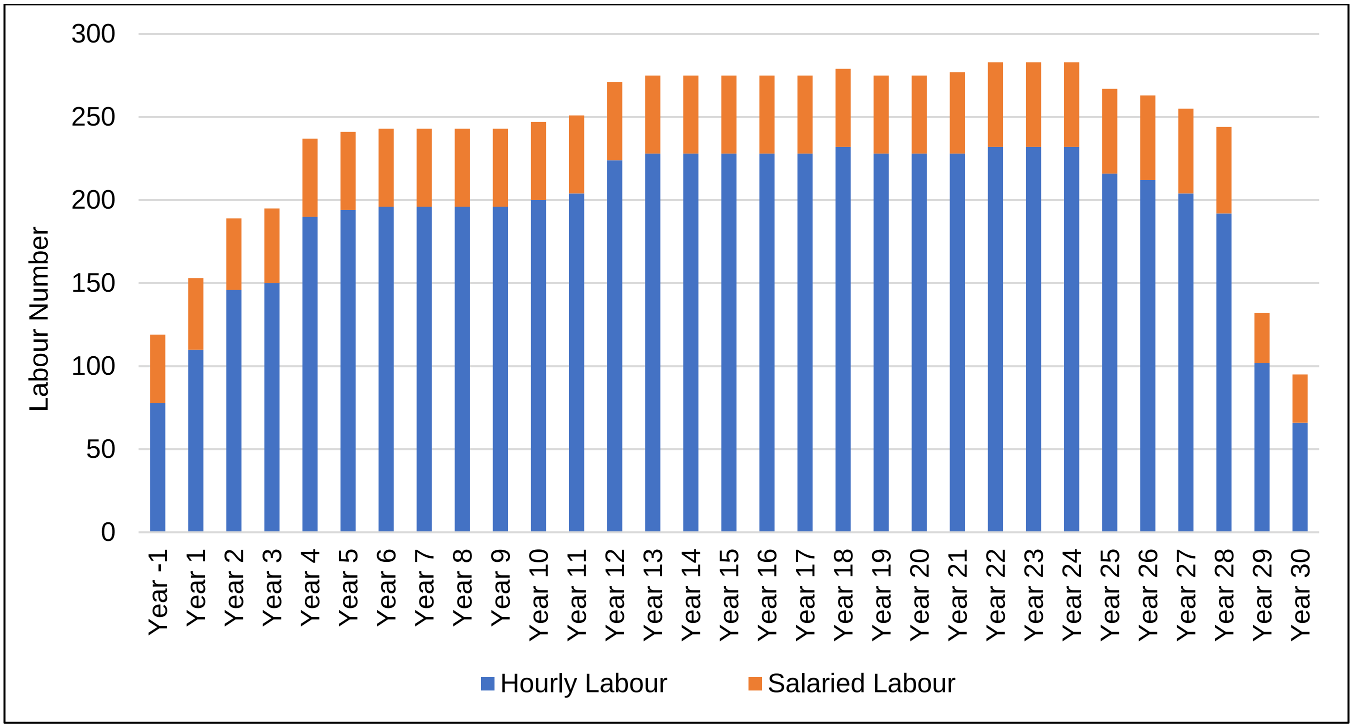


Figure 16-21: Total Labour Per Year

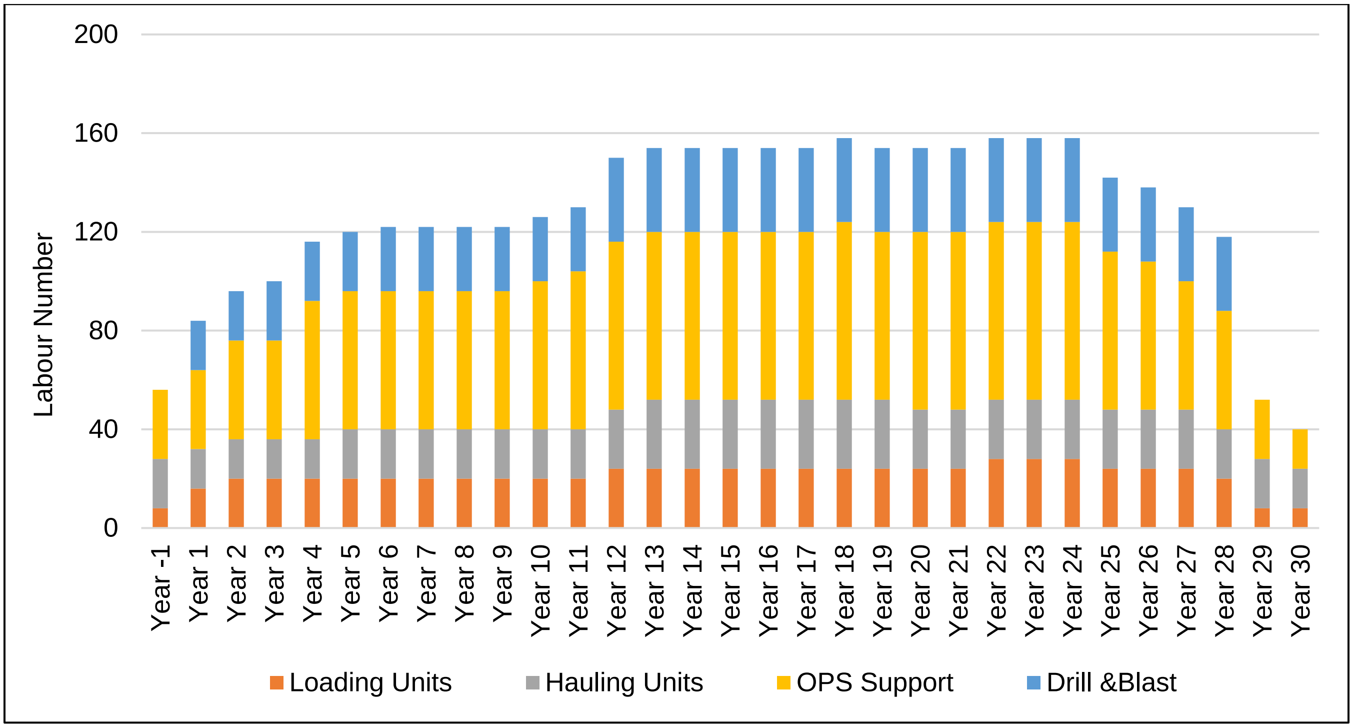


Figure 16-22: Hourly Labour Per Year

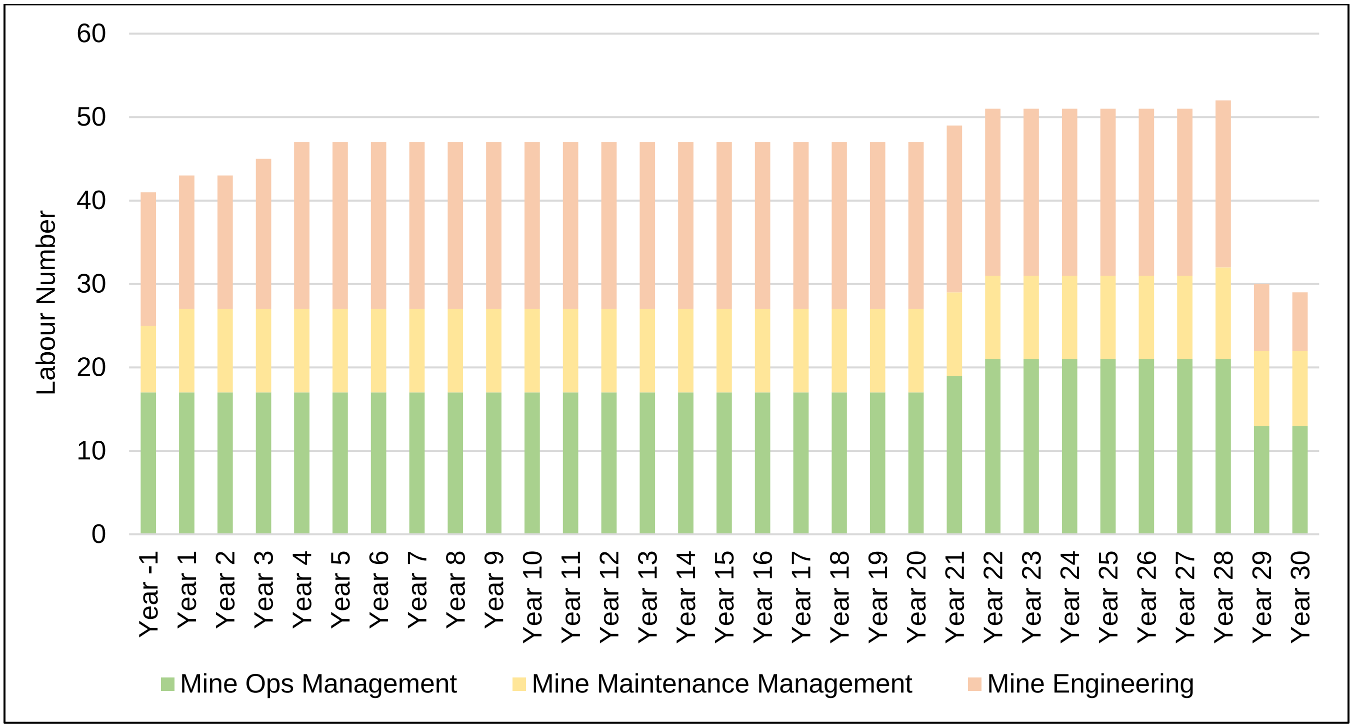


Figure 16-23: Salaried Labour Per Year

17.0 RECOVERY METHODS

17.1 Introduction

The main mineral resource at the Turnagain Nickel deposit is pentlandite ($(Fe, Ni)_9S_8$) with minor nickel presence in pyrrhotite. The remainder of nickel is in non-sulphide minerals, such as olivine and serpentine. Cobalt – a valuable byproduct – is associated closely with pentlandite and recoverable into the nickel sulphide concentrate.

The deposit will be mined using conventional truck-shovel, open-pit mining equipment and processed in a conventional flotation plant with HPGR-Ball mill integrated grinding, producing a nickel sulphide concentrate and tailings, which will be deposited in the TMF, where the tailings will be permanently impounded and will potentially absorb and sequester carbon dioxide over the long term. This section outlines the major design criteria and describes the unit processes of the flowsheet.

17.2 Flowsheet Development

The processing plant has been designed to process ore from the Turnagain Nickel deposit at a nominal throughput of 45,000 t/d for the first year and then increased to 90,000 t/d in Year 2, producing a market-grade nickel sulphide concentrate. The LOM average mill feed grade will be 0.205% Ni and the anticipated average LOM nickel recovery will be 51.4%. The LOM average annual concentrate production will be 196 kt/y at 18% Ni (LOM average) for the full operation years and the peak production is expected to be 237 kt/y at 18% Ni (LOM average). The concentrate production Schule for the LOM is presented in Figure 17-1. The processing flowsheet has been developed based on the test results discussed in Section 13.0.

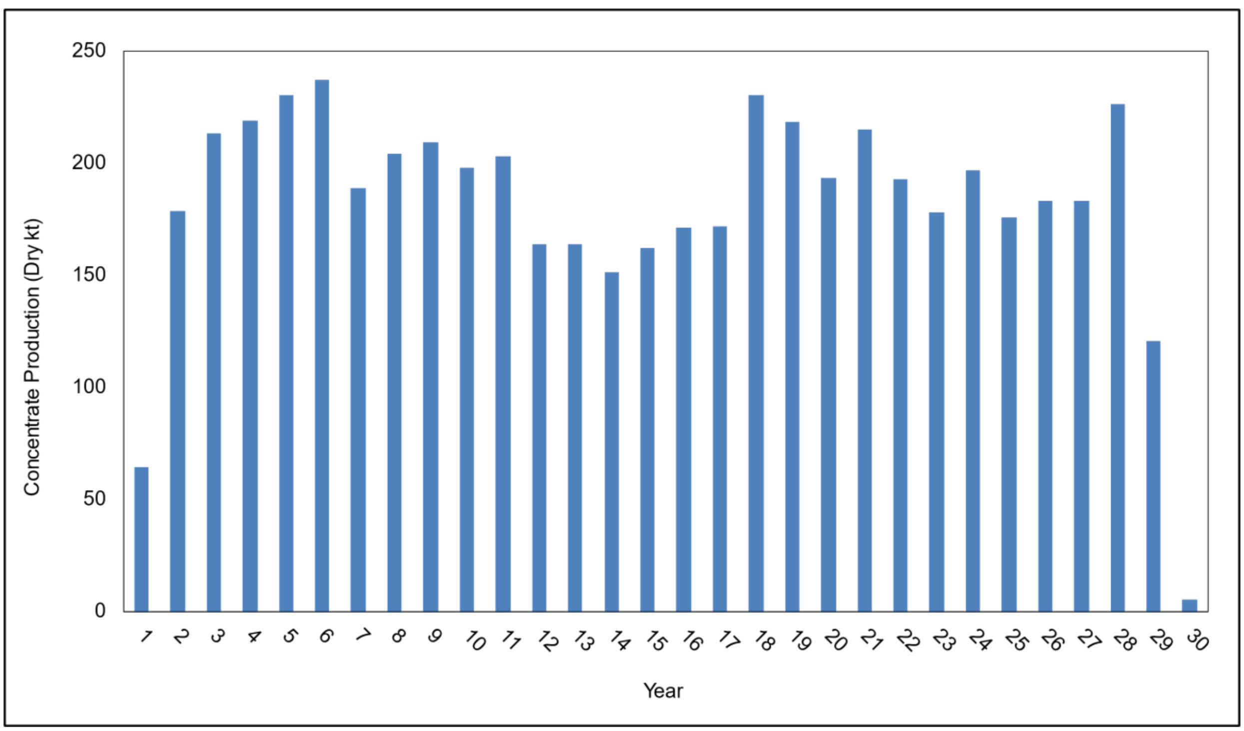


Figure 17-1: Projected Concentrate Production Schedule

The processing plant will consist of the following:

- A primary crushing and handling facility at the mine site,
- An overland conveying system to transport the crushed material from the mine site to the plant site,
- A crushed ore stockpile,
- Secondary crushing circuit using cone crushers in closed circuit with dry screens,
- Tertiary crushing circuit using HPGRs in closed circuit with wet screens,
- Primary and secondary grinding circuits using ball mills,
- A flotation circuit including rougher flotation and three stages of cleaner flotation,
- Concentrate dewatering and handling circuit,
- Tailings disposal to the TMF.

The simplified process flowsheet is shown in Figure 17-2 and detailed in the following sections.

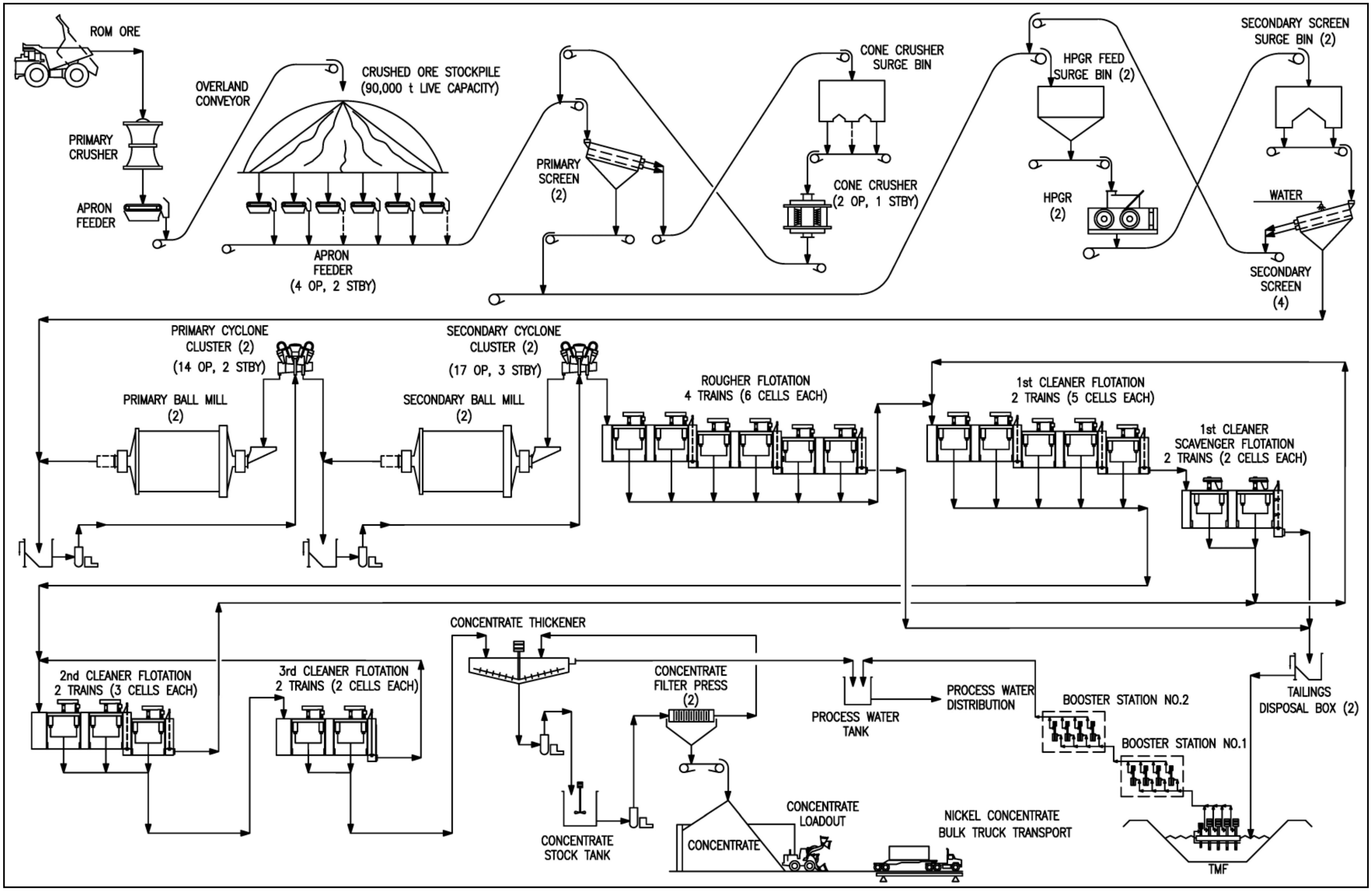


Figure 17-2: Simplified Process Flowsheet

17.3 Process Design Criteria

The processing plant is designed at a nominal throughput of 90,000 t/d for an average annual throughput of 32.85 million tonnes at full capacity. The major criteria used for the design of the processing plant are listed in Table 17-1.

Table 17-1: Major Processing Plant Design Criteria

Description	Unit	Value	Source
Ore Characteristics			
SG	g/cm^3	3.0	Test work
Bulk Density	t/m^3	1.8	Industry Experience
Moisture Content	% (by wt.)	3.0	Industry Experience
Bond Crusher Work Index (75^{th} Percentile)	kWh/t	18.0	Test work
Bond Ball Mill Work Index (75^{th} Percentile)	kWh/t	22.0	Test work
Abrasion Index (Average)	g	0.23	Test work
Operating Schedule			
Shift/Day	--	2	Client
Plant Hours/Shift	h	12	Client
Plant Hours/Day	h	24	Client
Days/Year	days	365	Client
Plant Throughput			
Overall Plant Feed	t/d	90,000	Client
Overall Plant Feed	Million t/y	32.8	Calculation
Primary Crushing			
Primary Crushing Circuit Availability	%	70	Industry Experience
Primary Crushing Circuit Feed Rate	t/h	5,357	Calculation
ROM Top Size, P_{100}	mm	1,000	Industry Experience
Primary Crushing Circuit Product Particle Size, P_{80}	mm	146	Calculation
Secondary and Tertiary Crushing			
Secondary and Tertiary Crushing Circuit availability	%	92	Industry Experience
Secondary and Tertiary Crushing Circuit Feed Rate	t/h	4,076	Calculation
Secondary Crushing Circuit Product Particle Size, P_{80}	mm	38	Calculation
Tertiary Crushing Circuit Product Particle Size, P_{80}	mm	3.5	Calculation
Milling and Flotation			
Milling and Flotation Circuit Availability	%	92	Industry Experience
Milling and Flotation Circuit Feed Rate	t/h	4,076	Calculation
Primary Grinding Circuit Particle Size, P_{80}	µm	250	Calculation
Secondary Grinding Circuit Particle Size, P_{80}	µm	80	Test work

Description	Unit	Value	Source
Grades and Productions Estimates			
Average LOM Head Grade	% Ni (total)	0.205	Mine Plan
	% Ni (sulfide nickel)	0.150	Mine Plan
Average LOM Head Grade	% Co	0.013	Mine Plan
Average LOM Nickel Recovery	%	51.4	Calculation
Average LOM Cobalt Recovery	%	49.0	Calculation
Concentrate Grade	% Ni	18	Test work
Concentrate Grade	% Co	1.1	Calculation
Concentrate MgO Content	% Mg	9.2	Estimate
Concentrate Moisture	% (by wt.)	9	Industry Experience
Annual Concentrate Production (LOM Average)	kt/a, dry	182	Calculation
Annual Concentrate Production (Full Operation Years)	kt/a, dry	196	Calculation
Annual Concentrate Production (Peak)	kt/a dry	237	Calculation

The sizing and selection of the crushing and grinding circuits are based on the comminution test work results. The flotation cells are sized based on optimum flotation residence time determined by laboratory test work and scale-up factors and slurry volumetric flowrates. The dewatering circuit is sized based on the industry experience on the thickener unit area and filtration rates for similar operations.

17.4 Process Description

The processing plant is designed to treat 90,000 t/d of the ROM. The designed mill feed rate will be 45,000 t/d in the first year. Equipment for achieving 45,000 t/d throughput and the concentrate dewatering system will be installed before Year 1. Additional equipment will be installed in Year 1 to increase the mill process rate to 90,000 t/d for Year 2. The electricity power required for the process plant will be provided from an onsite substation located northwest of the process plant. Details of the power supply are described in Section 18.0.

17.4.1 Primary Crushing and Conveying

ROM ore will be transported from the open pit mine to the primary gyratory crusher by 240-t capacity haul trucks. The ore will be dumped into a gyratory crusher receiving pocket where a static grizzly screen with a 1,000 mm aperture will be provided to retain the oversize on the grizzly bars. The oversize material will be broken using a hydraulic rock breaker.

The gyratory crusher will crush the grizzly screen undersize to a particle size of 80% passing 150 mm. The crushed material will feed a surge pocket under the crusher by gravity prior to being loaded onto an apron feeder. The apron feeder discharge will be conveyed using a sacrificial belt conveyor to an overland conveyor feed chute. An overland conveyor will convey the crushed ore from the mine site to a crushed ore stockpile at the plant site.

The main crushing equipment installed at the mine site will be:

- One 1.52 m x 2.79 m gyratory crusher with 1,353 kW installed power,

- A hydraulic rock breaker,
- One 2.74 m wide x 9.20 m long apron feeder,
- One 1.83 m wide x 57 m long sacrificial belt conveyor,
- One 1.52 m wide x 3,950 m long overland belt conveyor with 13.2 MW (6 drive pulleys each with 2 x 1.1 MW motor) installed power,
- Related auxiliary equipment.

Dust control systems will be installed at the crushing facility to control fugitive dust generated during crushing and conveying. The sacrificial belt conveyor will be equipped with a belt scale and a magnet/metal separator to protect the overland conveyor against damage caused by metal pieces.

17.4.2 Crushed Ore Stockpile and Reclaim

The live capacity of the crushed ore stockpile is approximately 90,000 t. The crushed ore stockpile will be covered. Apart from the conveyor tunnel, a vertical escape tunnel that joins the reclaim tunnel and the surface will be constructed for emergency egress.

The ore will be reclaimed from the stockpile in two parallel lines, each feeding one 45,000 tonnes processing circuit. Each line will be equipped with three 1.37 m wide x 8.20 m long reclaim apron feeders (two operating and one standby) operating at a nominal rate of 1,019 t/h per feeder. The stockpile reclaim area will also be equipped with a dust collection system to minimize the spread of dust generated during ore handling and transportation. The stockpile reclaim tunnel area will have sumps and pumps to recycle any spillage.

The reclaimed ore from the apron feeders will be discharged on two parallel 1.37 m wide x 270 m long belt conveyors. Each conveyor will have a weightometer to measure the fresh feed flow rate to the secondary crushing circuit.

The crushed ore stockpile and reclaim system will consist of the following key equipment:

- One 90,000 t line capacity covered stockpile,
- Six 1.37 m wide x 8.20 m long reclaim apron feeders,
- Two 1.37 m wide x 270 m long belt conveyors,
- Related auxiliary equipment.

17.4.3 Secondary Crushing

The reclaimed ore will be conveyed to two double-deck vibrating primary screens, each with an 85 mm aperture size for the top deck and a 53 mm aperture size for the bottom deck. The material is dry-screened at a cut size of approximately 53 mm. The screen oversize from the primary screens will be conveyed to a common cone crusher feed surge bin. Each surge bin feed conveyor will have a magnet and a metal detector to remove tramp metal to protect the cone crushers. Primary screen undersize product (P_{80} of 38 mm) will be delivered by belt conveyor to two HPGR feed surge bins, each with a 2,500-t live capacity.

The cone crusher feed surge bin will have a live capacity of 2,350 tonnes. The material from the bin will be reclaimed by 1.52 m wide x 20 m long belt feeders, which will feed three cone crushers (2 operating and 1 standby). The cone crusher product will be returned to the primary screen feed conveyor.

The secondary crushing circuit will consist of the following key equipment:

- Two 3.00 m wide x 7.30 m long double deck vibrating screens,
- One 2,350 tonnes live capacity cone crusher feed surge bin,
- Three cone crushers, each with 933 kW installed power,
- Related feeding and conveying systems and auxiliary equipment.

The cone crusher and screening area will be equipped with a dust collection system to minimize the spread of dust generated during operation. Both cone crusher and screening areas will also have sumps and pumps to recycle any spillage.

17.4.4 Tertiary Crushing

The primary screen undersize product will be conveyed to two HPGR feed surge bins. Each surge bin feed conveyor will have a magnet and a metal detector to remove tramp metal to protect the HPGRs. The HPGR feed surge bin will have a live capacity of 2,500 tonnes. The material will be reclaimed by 1.52 m wide x 25 m long belt feeders, feeding two HPGRs.

The HPGR product will be conveyed to two HPGR discharge screen surge bins. The HPGR discharge screen surge bin will have a live capacity of 2,500 tonnes. The material from the surge bin will be reclaimed by 1.06 m wide x 10 m long belt feeders, which will feed four double deck vibrating screens with a 16 mm aperture size for the top deck and a 6 mm aperture size for the bottom deck. The material is wet-screened at a cut size of approximately 6 mm. The oversized material from the screens will return to the HPGR surge bin feed conveyor. The screen undersize product (P_{80} of 3.5 mm) will report to the primary grinding circuit.

The tertiary crushing circuit will consist of the following key equipment:

- Two 2,500 tonnes live capacity HPGR feed surge bins,
- Two 2.54 m diameter x 2.31 m wide HPGRs, each equipped with two 4,800 kW Variable Frequency Drive VFD motors,
- Two 2,500 tonnes live capacity HPGR discharge screen feed surge bins,
- Four 4.20 m wide x 8.50 m long double deck vibrating screens,
- Related feeding and conveying systems and auxiliary equipment.

The HPGR area will be equipped with a dust collection system to minimize the spread of dust generated during operation. It is expected that the HPGR process should be better for dust control compared to conventional crushing processes.

17.4.5 Primary Grinding and Classification

The primary grinding circuit will include two ball mills, each in a reverse closed-circuit with a cyclone cluster. The primary grinding circuit will grind the tertiary crushing circuit product to a particle size of 80% passing 250 µm.

The HPGR discharge screen undersize from each tertiary crushing circuit will be gravity fed to the primary cyclone feed pump box. The screen undersize product and the primary ball mill discharge will be pumped to the respective cyclone cluster. The cyclone underflow will flow by gravity to the primary ball mill, while the cyclone overflow will be sent to the downstream secondary grinding circuit at a pulp density of approximately 40% (w/w).

The major equipment in the primary grinding circuit will be:

- Two 8.53 m diameter x 14.00 m Effective Grinding Length (EGL) ball mills, each driven by two 11 MW synchronous motors,
- Two cyclone clusters, each consisting of sixteen 840 mm diameter cyclones (fourteen operating and two standby),
- Four 710 mm by 660 mm centrifugal slurry pumps (two operating and two standby), each equipped with a 1,880 kW variable speed drive motor,
- Related feeding systems and auxiliary equipment.

A particle size analyzer will be installed to monitor the particle size of the cyclone overflow and to facilitate the production of ground slurry at the required particle size. Automatic ball charging systems will be provided to add grinding media to the ball mills at a controlled rate. The primary ball mill area will have sumps and pumps to recycle any spillage.

17.4.6 Secondary Grinding and Classification

The secondary grinding circuit will include two ball mills, each in a reverse closed-circuit with a cyclone cluster. The secondary grinding circuit will grind the primary grinding circuit product to a particle size of 80% passing 80 µm.

The primary cyclone overflow from each grinding circuit will be gravity fed to the secondary cyclone feed pump box. The primary cyclone overflow and the secondary ball mill discharge will be pumped to the respective cyclone cluster. The cyclone underflow will flow by gravity to the secondary ball mill, while the cyclone overflow will be sent to the downstream rougher flotation circuit at a pulp density of approximately 30% (w/w).

The major equipment in the secondary grinding circuit will be:

- Two 8.53 m diameter x 14.00 m EGL ball mills, each driven by two 11 MW synchronous motors,
- Two cyclone clusters, each consisting of twenty 660 mm diameter cyclones (seventeen operating and three standby),
- Four 860 mm by 760 mm centrifugal slurry pumps (two operating and two standby), each equipped with a 1,815 kW variable speed drive motor,
- Related feeding systems and auxiliary equipment.

A particle size analyzer will be installed to monitor the particle size of the cyclone overflow and to facilitate the production of ground slurry at the required particle size. Automatic ball charging systems will be provided to add grinding media to the ball mills at a controlled rate. The secondary ball mill area will have sumps and pumps to recycle any spillage.

Sodium hexametaphosphate (Calgon) dispersant will be added to each secondary cyclone feed pump box.

17.4.7 Rougher Flotation

The cyclone overflow from the secondary grinding circuit will be gravity fed to four rougher flotation banks, each with six 630 m^3 tank cells. Rougher concentrate will be pumped to the cleaner flotation circuit. The rougher tailings will flow to a pump box and be pumped to the tailings disposal tank. The rougher flotation area will have sumps and pumps to recycle any spillage.

Major equipment in the rougher flotation circuit will be:

- Four flotation banks, each with six 630 m^3 tank cells (447 kW installed power for each cell),
- Related feeding systems and auxiliary equipment.

The rougher flotation will be operated at natural pH. The reagents for the rougher flotation are Calgon as a dispersant, SIPX as a collector and MIBC as a frother.

17.4.8 Cleaner Flotation Circuit

The rougher concentrate will be upgraded by three stages of cleaner flotation, increasing the rougher concentrate to an average grade of 18% Ni using conventional flotation cells.

Major equipment in the cleaner flotation circuit will be:

- Two first cleaner flotation banks, each with five 300 m^3 tank cells (224 kW installed power for each cell),
- Two first cleaner scavenger flotation banks, each with two 300 m^3 tank cells (224 kW installed power for each cell),
- Two second cleaner flotation banks, each with three 100 m^3 tank cells (93 kW installed power for each cell),
- Two third cleaner flotation banks, each with two 70 m^3 tank cells (75 kW installed power for each cell),
- Related feeding systems and auxiliary equipment.

The rougher concentrate will be fed to the first cleaner flotation cells. The first cleaner concentrate will be further upgraded in the second cleaner flotation cells. The first cleaner flotation tailings will be fed to the first cleaner scavenger flotation cells. The cleaner scavenger flotation concentrate will be recirculated back to the first cleaner flotation cells, whereas the cleaner scavenger flotation tailings will report to a pump box and then be pumped into the tailings disposal tank.

The first cleaner concentrate will be pumped for further cleaning in the second cleaner flotation cells. The second cleaner flotation concentrate will feed the third cleaner flotation cells to produce the final concentrate and the second cleaner flotation tailings will be recirculated back to the first cleaner flotation. The third cleaner flotation concentrate will be sent to the concentrate dewatering circuit and the third cleaner flotation tailings will be recirculated back to the second cleaner flotation.

The cleaner flotation stages will be operated at natural pH. The reagents for the cleaner flotation are SIPX as collector and MIBC as frother. The cleaner flotation area will have sumps and pumps to recycle any spillage.

17.4.9 Concentrate Dewatering

The final concentrate from the flotation will be treated by two dewatering stages, including thickening and filtration.

The concentrates from both third cleaner flotation banks will be pumped to a high-rate concentrate thickener. Flocculant (5 g/t) will be added to the thickener feed to assist with the settling of fine particles. The thickener overflow will be recycled to the process water tank for reuse. The concentrate slurry will be thickened to 60% (by wt.) solids, stored in a stock tank and then pumped to pressure filters at a controlled rate. The filtered concentrate from pressure filters, containing approximately 9% moisture (by wt.), will be discharged to the concentrate stockpile. The filtrate discharged from the filter will be recycled to the concentrate thickener to recover the fine solids.

The key dewatering equipment will include the following:

- One 12.0 m diameter high-rate thickener,
- One 7.0 m diameter x 7.0 m high concentrate stock tank,
- Two 82 m^2 pressure filters, each with 24 chambers and plate dimensions of 1.97 m x 2.17 m,
- Related feeding systems and auxiliary equipment.

The onsite concentrate stockpile will provide a storage capacity of 7 days. The average concentrate production is approximately 196 dry kt/d at full capacity. The stockpiled concentrate will be transported by trucks to a port facility at Stewart, where the concentrate will be stored and loaded into ships for ocean transport to overseas smelters. Concentrate can also be trucked to a rail connection at Kitwanga for domestic processing.

17.4.10 Tailings Handling and Process Water Supply

Two flotation tailings streams will be produced from the processing plant, the rougher flotation tailings and the first cleaner scavenger flotation tailings. Both tailings will be pumped to two tailings disposal tanks from which it will gravity-flow to the TMF via two pipelines. Crossovers between both tailings lines will be provided at the processing plant for operational flexibility.

The supernatant from the TMF will be reclaimed by a reclaim water barge and sent to the process water tanks by three pumping stages. The reclaimed water will be reused as process water for grinding and flotation circuits. Anti-scalant will be added to the reclaimed water to protect against potential scaling.

The TMF and reclaim water system are further detailed in Section 18.0.

17.5 Reagents and Consumables

The type of reagents and major consumable consumption rate for the process plant are summarized in Table 17-2.

Table 17-2: Reagents and Major Consumables Consumption

Reagent/Consumable	Consumption (g/t of Mill Feed)
Collector (SIPX)	78
Dispersant (Calgon)	115
Frother (MIBC)	40
Flocculant (Magnafloc 10 or Equivalent)	5
Anti-scalant	4
Primary Ball Mill Grinding Media	665
Secondary Ball Mill Grinding Media	550

17.5.1 Reagent Handling and Storage

Reagents are added to the flotation circuit to enhance selective floatability during the flotation process, while flocculants are added to facilitate the settling of solids in the dewatering circuit. All reagents will be prepared and stored in a separate and self-contained area within the concentrator building to ensure containment in the event of an accidental spill and will be designed to accommodate 110% of the content of the largest tank.

The reagents will be delivered by individual metering or centrifugal pumps to the required addition points. All the reagents will be prepared using fresh water. The covered and curbed reagent storage and preparation area will be located adjacent to the flotation area. The reagent system will include unloading and storage facilities, mixing tanks, transfer pumps and feeding equipment. The storage tanks will have level indicators and instrumentation to ensure that spills do not occur. Appropriate ventilation, fire and safety protection will be provided at the facility.

Material Safety Data Sheets (MSDS) will be provided to the operating staff as a training and reference source. Each tank, reagent line and addition point will be labelled following Workplace Hazardous Materials Information Systems (WHMIS) standards. All operational personnel will receive WHMIS training for safely handling and using the reagents.

17.5.1.1 Collector

Collector (SIPX) will be received in powder or pellet form in one or two-tonne bulk bags. Bags will be unloaded in a hopper equipped with a bag breaker and dust collector when needed. SIPX will be mixed with fresh water in a mixing tank at 20% solids density, stored in a holding tank and distributed via metering pumps to the flotation circuit.

17.5.1.2 Dispersant

Dispersant (Calgon) will be received in powder or pellet form in one or two-tonne bulk bags. Bags will be unloaded in a hopper equipped with a bag breaker and dust collector when needed. Calgon will be mixed with fresh water at 20% solids density in a mixing tank, stored in a holding tank and distributed via metering pumps to secondary grinding and flotation circuits.

17.5.1.3 Frother

The frother (MIBC) will be received in liquid form, in either bulk tankers or drums. The frother will be added to the flotation circuit without dilution by metering pumps.

17.5.1.4 Flocculant

Flocculant (Magnafloc 10 or equivalent) will be received in 25 kg bags on site. Bags will be unloaded in a hopper equipped with a bag breaker and dust collector. A flocculant screw feeder will feed the flocculant eductor using freshwater addition. The mixed solution will be transferred and stored in a flocculant holding tank. The packaged flocculant mixing system will run automatically based on the solution level of the holding tank. Flocculant will be made up to 0.2% solution strength and stored in a holding tank. The solution will be diluted to 0.02% using inline mixing before being added to the concentrate thickener via metering pumps.

17.5.1.5 Other reagents

Anti-scale chemicals, as required, will be added to minimize scale build-up in the reclaim or recycle water lines. This reagent will be delivered in liquid form and metered directly into the intake of the reclaim water pumps.

New flotation reagents will occasionally be tested to determine their effect on metal recovery and concentrate grading. These reagents will be handled following MSDS requirements. A facility for mixing and dosing these test reagents will be provided.

17.5.2 Consumables

The major consumable items will be grinding media, liners and flotation reagents. Grinding media will be used in the primary and secondary ball mills at different sizes. The liners are the essential component of the gyratory crusher, cone crushers, HPGRs and ball mills. Other consumables include screen decks, concentrate filter cloths and laboratory supplies. Maintenance spares for crushing, grinding, flotation, reagents and assaying will also be provided.

17.6 Online Sample Analysis

The plant will rely on automatic sampling and analysis of various flotation streams. The system will provide the necessary information for process control, sufficient sample quantities for metallurgical accounting, QC and possible metallurgical test work. The process streams that will be sampled and monitored/controlled periodically are:

- Rougher flotation feed (secondary cyclone overflow),
- Rougher flotation concentrate (first cleaner flotation feed),
- Rougher flotation tailings,
- First cleaner concentrate (second cleaner flotation feed),
- First cleaner scavenger flotation concentrate,
- First cleaner scavenger flotation tailings,
- Second cleaner flotation concentrate (third cleaner flotation feed),
- Second cleaner flotation tailings,
- Third cleaner flotation concentrate (dewatering circuit feed),

- Third cleaner flotation tailings,
- Final concentrate.

The information obtained from these samplers will provide circuit metallurgical performance. The analyzed slurries will be returned to the slurry feed stream in the flotation circuit, excluding the shift samples used for metallurgical accounting and balance analysis.

17.7 Assay and Metallurgical Laboratory

An assay laboratory in the processing plant building provides all the routine assays for the mine, the processing plant and the environmental and geological departments. The main instruments will include:

- An Atomic Absorption Spectrophotometer (AAS),
- A Leco furnace,
- An Inductively Coupled Plasma Mass Spectrophotometer (ICP-MS).

The metallurgical laboratory will undertake all necessary tests to monitor metallurgical performance and, more importantly, to improve process flowsheet and efficiency. The laboratory will be equipped with the following:

- Laboratory jaw and cone crushers,
- Laboratory rod and ball mills,
- Ro-Tap® sieve shaker and test sieves,
- Ring and puck pulverizer,
- Oven-style moisture determination equipment,
- Denver D12 rougher flotation machine with the necessary cells,
- Laboratory cleaner flotation cells,
- Filtering units (pressure/vacuum filters),
- Sedimentation devices,
- Laser particle size analyzer,
- pH meters,
- Convection oven,
- Weighing devices,
- Fume hoods with extraction fans,
- Dust collection system,
- Bulk sample preparation equipment, including laboratory glassware and reagents.

Appropriate samplers will be available for routine bulk sampling and plant surveys for process control and metallurgical accounting.

17.8 Water Supply and Compressed Air

Two separate water supply systems for fresh and process water will support the operations. Based on the preliminary water requirement and water balance estimates, approximately 11,540 m^3/h of process make-up water and 180 m^3/h of freshwater will be required at full capacity.

17.8.1 Fresh and Potable Water Supply System

Two separate freshwater supply systems will be used to provide fresh water, one at the mine site (near the truck shop) and the other at the plant site. Freshwater will be pumped from wells near the mine and plant site, supplied to a freshwater storage tank and distributed by pumping. Fresh water will be stored in a 12 m diameter by 12 m high freshwater storage tank at the plant site and a 12 m diameter by 9 m high freshwater tank at the mine site. The freshwater tank will always be full and capable of providing at least two hours of firewater in an emergency.

All freshwater pipelines outside heated buildings will be buried below frost level or provided with insulation and heat tracing to prevent freezing. Freshwater will be used primarily for the following:

- Firewater for emergency use,
- Reagent preparation,
- Mill cooling water,
- Dust suppression,
- Potable water supply.

The potable water will be treated via chlorination and ultraviolet lamps and stored in a potable water tank (3 m diameter x 4 m high) at the plant site before delivery to various service points. Potable water for the mine site will be provided as bottled water from the plant site system.

17.8.2 Process Water

Process water will consist of the concentrate thickener overflow, reclaim water pumped back from the TMF and fresh make-up water. Process water will be directed to two 25 m diameter by 15 m high process water surge tanks and pumped to the distribution points in the processing plant. As with fresh water, process water supply and distribution pipelines outside the heated buildings will be buried below frost level or provided with insulation and heat tracing to prevent freezing.

17.8.3 Air Supply

Separate air service systems will supply air to the following areas:

- Flotation: Four air blowers (three operating and one standby) will provide low-pressure air for flotation cells.
- Filtration: Two dedicated air compressors will provide the high-pressure air required for pressure filters (one operating and one standby).

- Crushing: A dedicated air compressor will provide high-pressure air for the dust suppression system and other services.
- Plant services: Three dedicated air compressors will provide high-pressure air for various services (two operating and one standby).
- Instrumentation: Instrument air at the mine and plant sites will be provided by local air compressors and dried and stored in dedicated air receivers.

17.9 Process Control and Instrumentation

The plant control system will consist of a Distributed Control System (DCS) with personal computer (PC) based Operator Control Stations (OCSs) located in the following two separate control rooms:

- The primary crusher control room at the mine site,
- The processing plant control room.

The plant control room will be staffed by trained operations personnel 24 h/d.

In conjunction with the OCS, the DCS will perform all equipment and process interlocking, control, alarming, trending, event logging and report generation. DCS input/output (I/O) cabinets will be located in control rooms and interconnected via a plant-wide fibre-optic network. Field instrumentation will consist of microprocessor-based “smart” type devices. Instruments will be grouped into process areas and wired to local field instrument junction boxes within those areas. Signal trunk cables will connect the field instrument junction boxes to DCS I/O cabinets.

Intelligent-type Motor Control Centres (MCCs) will be located in the electrical rooms. The MCC remote operation and monitoring will be via DeviceNet (or other approved industrial communications protocol) interface to the DCS. Programmable Logic Controllers (PLCs) or other third-party control systems supplied as a part of mechanical packages shall be interfaced with the plant control system via ethernet network interfaces.

A supervisory expert control system will control product particle size and optimize the fresh mill feed tonnage in the grinding circuit. Expert supervisory control will be developed to optimize the set points for controllers at the regulatory level. Mill solid concentration variable-ratio control, dilution water flow rate control and level control will be carried out at the regulatory level to reach the control targets. The set-point modification by expert control for the dilution water controller will provide optimal dynamic performance. The set-point adjustment for the feed rate controller will ensure long-term stability in the particle size even if the mill feed hardness should change. Process control will be enhanced with the installation of automatic sampling systems. The system will collect samples from various streams for online analysis and the daily metallurgical balance. Further expert system data from the DCS shall also be provided to optimize pit blast patterns.

17.9.1 Primary Crushing Facility

A control room in the primary crushing building will be provided with a single OCS. All primary crushing and conveying operations (including the overland conveyor and discharging onto the crushed ore stockpile) will be controlled and monitored from this location. Control and monitoring functions will include the following:

- Plugged chute detection at all transfer points,
- Zero-speed switches, side-travel switches, emergency pull cords and belt rip detection of all conveyors,

- Weightometers on selected conveyors to monitor feed rates and quantities,
- Equipment bearing temperatures and lubrication system status,
- Vendors' Instrumentation packages.

17.9.2 Process Plant

The central control room in the process building will be provided with three OCSs. Control and monitoring of all processes in the mill building, reagent area, concentrate loadout and remote ancillary areas will be conducted from this location. Control and monitoring functions will include, but are not limited to, the following:

- All conveyors (zero-speed switches, side-travel switches, emergency pull cords, belt scales, metal detectors and plugged chute detection),
- Cone crushers (bearing temperatures, lubrication systems, clutches and motors),
- HPGR (bearing temperatures, lubrication systems, rolls, motors),
- Vibratory screens (frequency, bed depth, spray water controls),
- Grinding mills (mill speed, bearing temperatures, lubrication systems, motors and feed rates),
- Grinding particle size monitoring and control by particle size analyzers for the primary and secondary grinding circuits,
- Pump box, tank and bin levels,
- Variable speed pumps,
- Cyclone feed density controls,
- Flotation cells (level controls, reagent addition and airflow rates),
- Froth monitoring cameras,
- X-ray analyzers and samplers,
- Concentrate thickeners (drives, slurry interface levels, underflow density and flocculants addition),
- Pressure filters and loadout,
- Reagent handling and distribution systems,
- Water storage and distribution,
- Air compressors,
- Vendors' Instrumentation packages,
- Tailings disposal system,
- Water storage, reclamation and distribution, including tank-level automatic control.

17.9.3 Remote Monitoring

Closed-circuit Television (CCTV) cameras will be installed throughout the plant, with monitors in the two control rooms. The CCTV monitoring locations will include primary crushing facilities, stockpile conveyor discharge point, stockpile reclaim tunnel, cone crushing and HPGR area, main mill building, concentrate loadout area and other relevant areas.

17.10 Annual Production Estimate

The annual nickel production estimates based on the mine production plan and metallurgical performance are presented in Table 17-3. Most of the cobalt associated with nickel sulphides is expected to be recovered into the nickel sulphide concentrate as a by-product together with palladium and platinum. On average, magnesium level is expected to be approximately 9.2% MgO, higher than smelting penalty levels set up by most pyrometallurgical smelters.

Table 17-3: Projected Metal Production

Year	Ore Milled (t)	Head Grade (% Ni)	Ni Recovery (%)	Concentrate Production (dry t)	Contained Nickel (t)
Year 1	11,496,195	0.256	39.6	64,844	11,672
Year 2	31,210,000	0.237	43.5	178,672	32,161
Year 3	32,847,843	0.225	52.1	213,589	38,446
Year 4	32,850,000	0.213	56.5	219,511	39,512
Year 5	32,848,451	0.224	56.3	230,378	41,468
Year 6	32,848,436	0.227	57.2	237,450	42,741
Year 7	32,849,999	0.212	48.9	189,139	34,045
Year 8	32,850,000	0.209	53.6	204,733	36,852
Year 9	32,850,000	0.205	56.0	209,400	37,692
Year 10	32,847,676	0.197	55.0	198,033	35,646
Year 11	32,849,999	0.205	54.3	203,400	36,612
Year 12	32,845,131	0.163	55.1	164,172	29,551
Year 13	32,850,866	0.184	49.0	164,333	29,580
Year 14	32,844,994	0.189	44.0	151,644	27,296
Year 15	32,847,593	0.200	44.5	162,517	29,253
Year 16	32,847,458	0.212	44.2	171,394	30,851
Year 17	32,854,376	0.218	43.1	171,833	30,930
Year 18	32,853,229	0.247	51.2	230,594	41,507
Year 19	32,849,999	0.225	53.3	218,533	39,336
Year 20	32,850,000	0.205	51.9	193,861	34,895
Year 21	32,850,000	0.222	53.1	215,422	38,776
Year 22	32,850,000	0.205	51.7	193,139	34,765

Year	Ore Milled (t)	Head Grade (% Ni)	Ni Recovery (%)	Concentrate Production (dry t)	Contained Nickel (t)
Year 23	32,850,000	0.189	51.8	178,428	32,117
Year 24	32,846,344	0.196	55.1	197,189	35,494
Year 25	32,850,000	0.186	51.9	175,894	31,661
Year 26	32,850,000	0.198	50.7	183,311	32,996
Year 27	32,850,000	0.201	50.0	183,389	33,010
Year 28	32,847,728	0.227	54.8	226,578	40,784
Year 29	32,850,000	0.115	57.7	121,006	21,781
Year 30	1,571,574	0.115	57.7	5,789	1,042
Total	**931,207,891**	**0.205**	**51.4**	**5,458,178**	**982,472**
Average (Y3-28)	32,849,235	0.207	51.8	195,687	35,224

Note: Total may not add due to rounding.

17.11 Processing Plant Staffing

Personnel requirements are developed based on the operation, shift, equipment attendance, safety, training and maintenance requirements. Average annual staffing requirements are provided in Table 17-4. The staffing is based on two crews operating two 12-hour shifts daily on a 2-week fly-in/fly-out basis.

Table 17-4: Processing Plant Staffing Requirements

Description	Number*
Mill Management	12
Mill Operations	48
Mill Maintenance	44
Metallurgical and Assay Laboratory	13
Total	**117**

*Includes cross shifts

18.0 PROJECT INFRASTRUCTURE

18.1 Overview

The Turnagain project is located approximately 65 km east of Dease Lake in northwestern BC. The Property is accessible via a seasonal exploration trail from Highway 37; however, an upgrade to all-weather access roads will be required for the Project's construction and operation.

There is no permanent power supply available at or near the Project site. A transmission line will be developed to fulfil the project power demand during operation. This connection comprises designing and constructing an approximately 160 km 287kV transmission line from BC Hydro's existing Tatogga Substation (near Iskut, BC) to the Project site.

The overall site layout is presented in Figure 18-1 to Figure 18-3 and will consist of the following areas and major facilities.

- Open Pit Mine Area:
  - Open pit mine,
  - Haul roads,
  - Access and service roads,
  - Trolley assist system,
  - A waste rock pad and a low-grade stockpile,
  - Temporary ore stockpile,
  - Primary crusher,
  - Overland crushed ore conveyor loading station,
  - Overland conveyor,
  - A mining equipment maintenance complex with a warehouse,
  - Fuel storage and refuel station,
  - An effluent treatment plant.
- Camp/Office Area:
  - Accommodation camp,
  - Administration building with mine dry,
  - Laydown area,
  - Offsite and onsite access roads, including bridges.

- Processing Plant Area:
  - Access roads,
  - Overland crushed ore conveyor unloading station and crushed ore stockpile,
  - Processing plant,
  - TMF, along with diversion ditches and channels, tailings transport and deposition systems and a reclaim water system,
  - Site access road and local service roads,
  - Fresh water supply and distribution system,
  - Sewage treatment plant and waste disposal,
  - Incoming 287kV transmission line, site power substation and power distribution network,
  - Incoming data fibre optic cable and site communication system.

The locations of project facilities and infrastructure items are selected to take advantage of local topography, accommodate environmental considerations and enhance efficient and convenient operation.

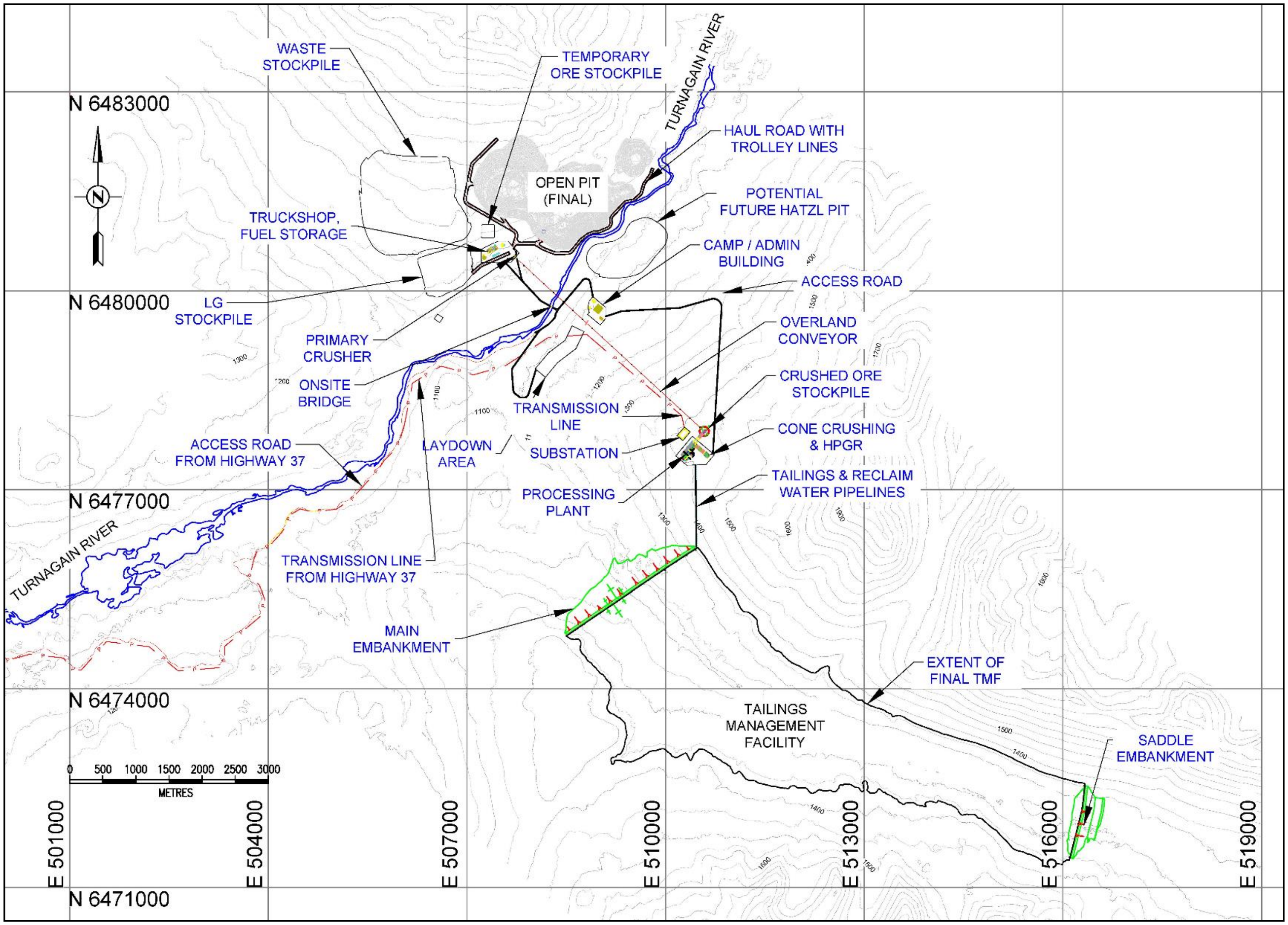


Figure 18-1: Overall Site Layout

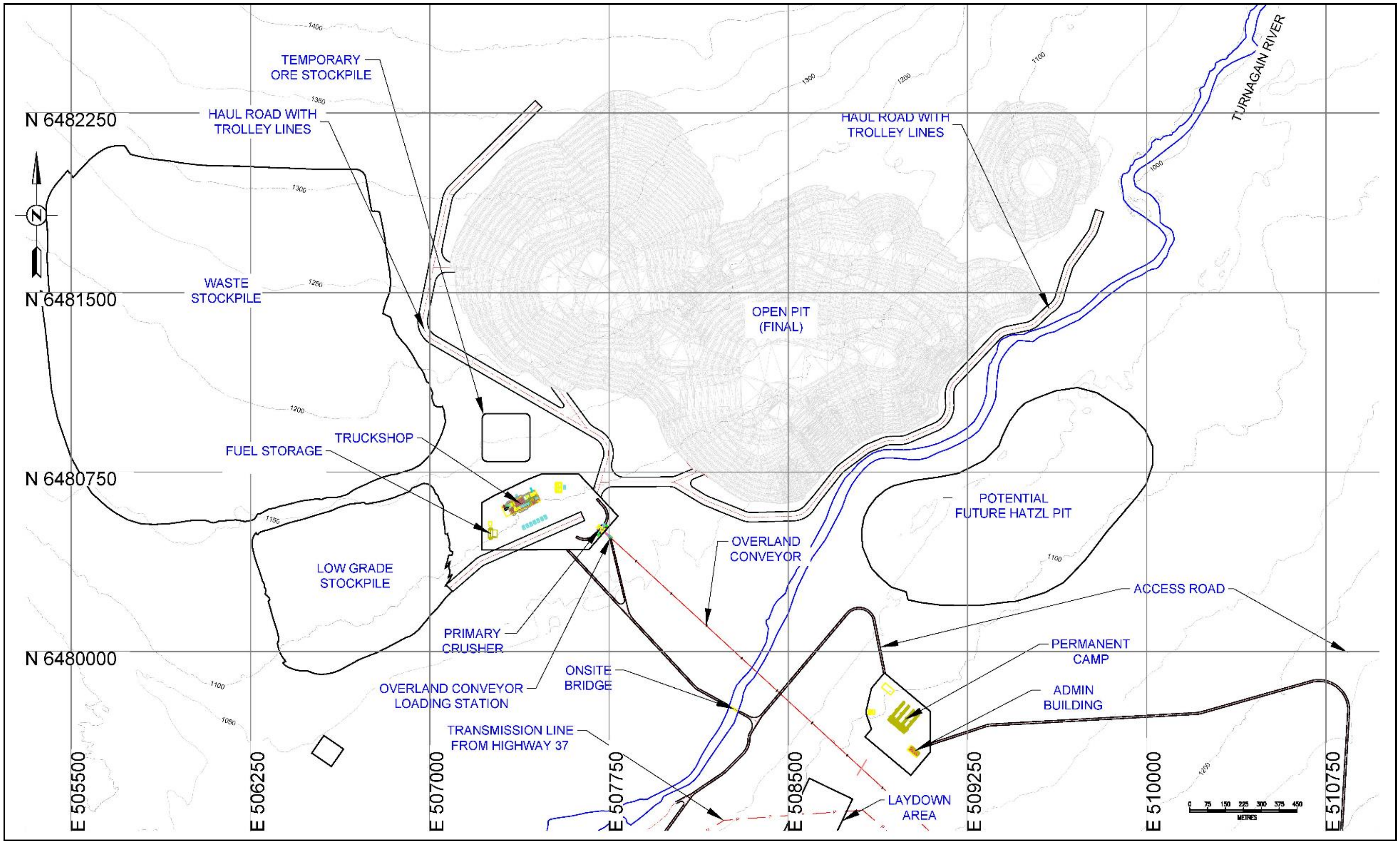


Figure 18-2: Mine Site Layout

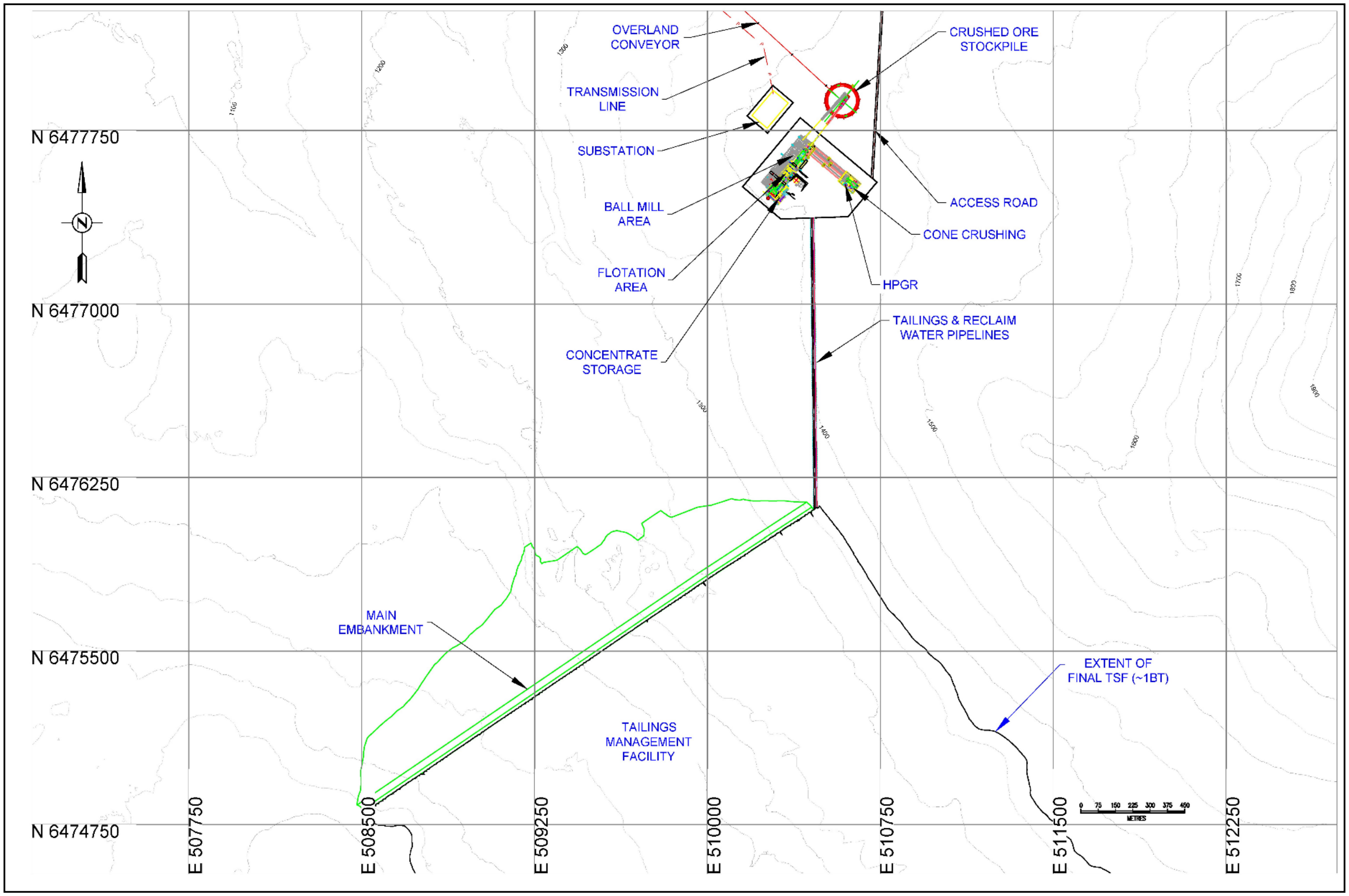


Figure 18-3: Plant Site Layout

18.2 Access Roads

18.2.1 Offsite Access Road

The offsite access road requirements were analyzed for the Project and a preliminary road design was developed. The access road will be a year-round, radio-controlled, single-lane road with pullouts capable of carrying the legal axle loading for trucks on BC highways. The road is required to provide vehicle access for the development of the mine site and year-round road access for supplies, equipment and personnel transport. Once operations commence, the road will be used for continuous concentrate and supply haulage. The road will mostly be an upgrade of the existing Boulder trail with some detours to accommodate the BC forest road guidelines and optimize the cut and fill quantities.

The route will mostly follow the Boulder trail from Highway 37 to the Turnagain River crossing for approximately 59 km and the existing trail south of the Turnagain River to the Project site for approximately 19 km. An alternative route on the north side of the Turnagain River was also studied that would require significantly larger area clearing and cut-fill volumes. This route could be considered a lower impact route if other mining facilities north of the Turnagain River were to proceed in a timely fashion. The access road from Highway 37 to the Turnagain project site is approximately 78 km. The general design criteria for the offsite access road are presented in Table 18-1. The access road profiles are shown in Figure 18-4 and Figure 18-5.

The road will require 16 culvert crossings of varying diameters and 3 clear-span bridges. The bridge lengths are anticipated to be 20 m to 25 m each. For every 300 m of the access road, smaller cross-drain culverts are also provided to maintain natural drainage as prescribed in the Ministry of Forests Engineering Guidebook (2002).

The proposed access road will undergo scheduled maintenance such as snow removal, sanding, ditch clearing, rock scaling and spot gravelling and grading. All structures, including bridges and culverts, will also undergo scheduled inspection and maintenance for:

- Riprap replacement,
- Clearing of log jams,
- Semi-annual inspections,
- Repairing scour damage,
- Replacing curbs, deck and delineators when needed,
- Sign maintenance.

Table 18-1: Offsite Access Road Design Criteria
(Tetra Tech, 2022)

<table>
<tr><th>Parameters</th><th colspan="2">Values</th><th colspan="3">Notes</th></tr>
<tr><td>Classification</td><td colspan="2">Single Lane
Radio Control</td><td colspan="3">All-weather use road, 100% of GCVW year-round</td></tr>
<tr><td>Design speed (km/h)</td><td colspan="5">≤ 50 (Ref*: Chapter 11)</td></tr>
<tr><td>Design vehicle</td><td colspan="5">GCVW B-Train Configurations Maximum 63,500 kg.
Structures BCFS L-100 Maximum 90,680 kg.</td></tr>
<tr><td>Roadway Cross Slope</td><td colspan="5">Standard 4% (Ref: Figure 11.4.8)</td></tr>
<tr><td>Maximum Superelevation</td><td colspan="5">6% (normal cross slope 3%) (Ref: Table 11.3.10)</td></tr>
<tr><td rowspan="4">Horizontal alignment criteria</td><td>Speed (km/h)</td><td>Minimum SSD (m)</td><td colspan="2">Minimum curve radius (m)</td><td>Maximum road gradient (short pitch)</td></tr>
<tr><td>50</td><td>130</td><td colspan="2">90</td><td>10% (14%)</td></tr>
<tr><td>40</td><td>90</td><td colspan="2">55</td><td>11% (15%)</td></tr>
<tr><td>30</td><td>60</td><td colspan="2">35</td><td>11% (16%)</td></tr>
<tr><td rowspan="5">Vertical alignment criteria</td><td rowspan="2">Speed (km/h)</td><td rowspan="2">Minimum SSD (m)</td><td colspan="2">Minimum K-value</td><td rowspan="2">Maximum road gradient (short pitch)</td></tr>
<tr><td>Sag</td><td>Crest</td></tr>
<tr><td>50</td><td>130</td><td>12</td><td>18</td><td>10% (14%)</td></tr>
<tr><td>40</td><td>90</td><td>7</td><td>9</td><td>11% (15%)</td></tr>
<tr><td>30</td><td>60</td><td>4</td><td>4</td><td>11% (16%)</td></tr>
<tr><td>Switchbacks
Minimum Radius (m)
Maximum Grade</td><td colspan="2">13.6
8%</td><td colspan="3">Site-specific engineering is required for switchbacks with a radius less than 35 m or grades above 8%.</td></tr>
<tr><td>Road Width (m)</td><td colspan="2">≥5.2, ≤6</td><td colspan="3">The primary road finished surface width shall be: (Ref: Table 11.4.8)
Single Lane: 6.0 m
Subgrade widths are 1.2 m wider</td></tr>
<tr><td>Side slope basis</td><td colspan="5">Fill slope = 2:1, Cut slope = 1.5:1 (Chapter 1, Table 5**)</td></tr>
<tr><td>Pull-Out-Width (m)</td><td colspan="2">Add 4.0 m</td><td colspan="3">With pullouts "intervisible" (every 250m to 300m)
Standard turnout length 30 m, plus tapers at 15:1</td></tr>
<tr><td>Right-of-Way (m)</td><td colspan="2">≥30m</td><td colspan="3">Variable width as required for road prism, construction, snow removal, maintenance, powerline, etc.,</td></tr>
<tr><td>Structure Design</td><td colspan="2">L100 Load</td><td colspan="3">The structure design will meet L-100 Off-Highway logging truck requirements.</td></tr>
</table>

GCVW: Gross combined weight rating
SSD: Stopping sight distance
*Ref: All chapters, figures and tables are referred to the Transportation Association of Canada Geometric Design Guide for Canadian Roads.
**Forest Practices Code of BC, Forest Road Engineering Guidebook

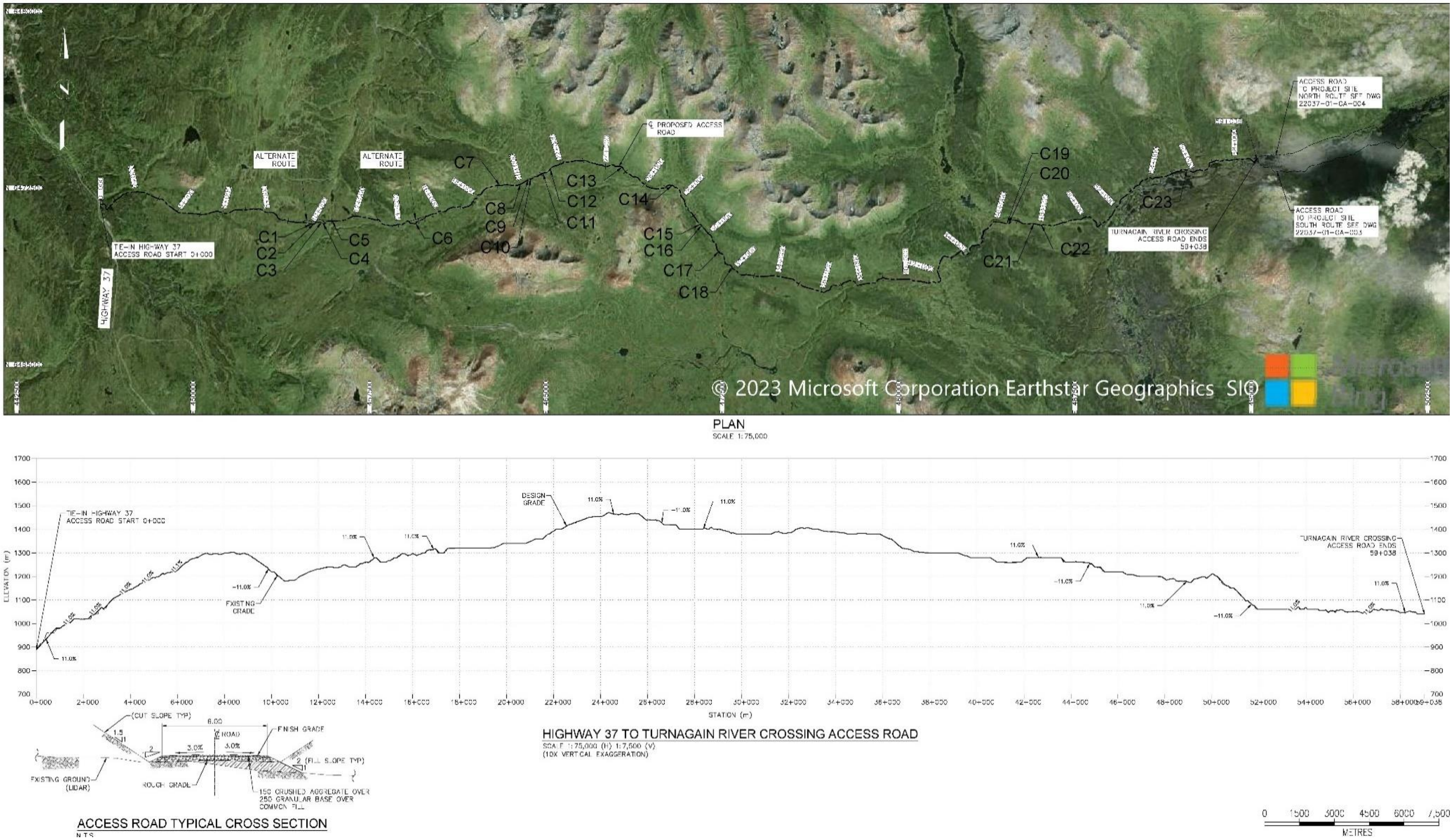


Figure 18-4: Offsite Access Road Profile – Highway 37 to Turnagain River Crossing (0+KM to 58+KM)

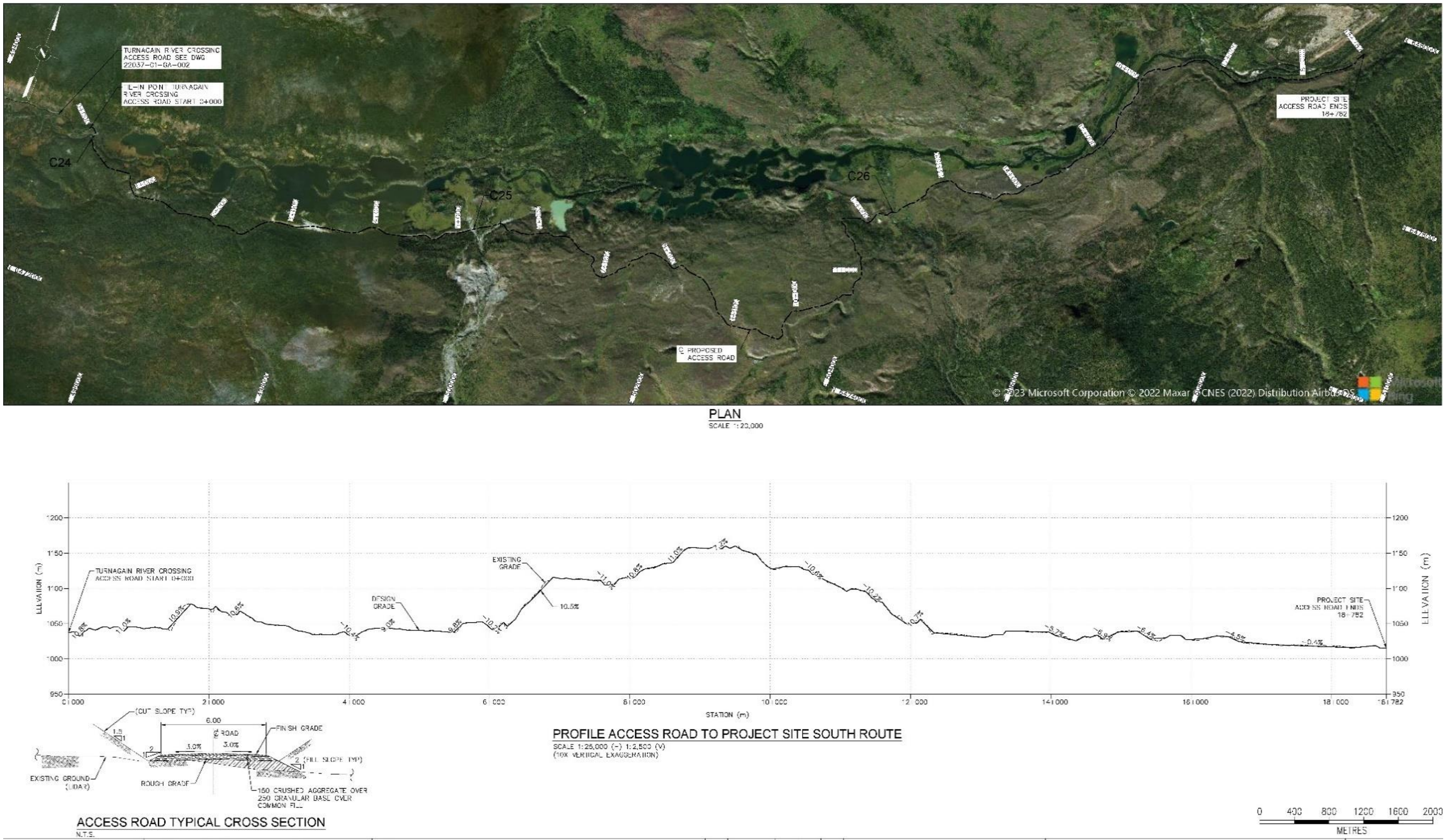


Figure 18-5: Offsite Access Road Profile – Turnagain River Crossing to Project Site (58+KM to 77+KM)

As mentioned earlier, the offsite access road will require three clear-span bridges. The bridge lengths are anticipated to be 20 to 25 m each. Bridge structures will have a steel girder superstructure with precast concrete deck panels. All bridges are designed following CAN/CSA-S6:19 to pass the 100-year flood and maintain 1.5 m debris clearance. Figure 18-6 shows the profile for the 25 m offsite bridge. A similar profile is adopted for the other two offsite bridges.

Steel girders with composite reinforced concrete deck were selected for these single-span bridges. The clear roadway width was 6.0 m to accommodate single-lane traffic. The standard details of the Ministry were followed where applicable to determine the details of the bridge superstructure. The bridge was conceptually designed for the L-100 vehicular load. Two 1200-mm deep steel girders composite with 250-mm thick reinforced concrete deck were selected. Standard class CL-2 HSS guardrail will be attached to the reinforced concrete deck.

No geotechnical information was available at the proposed bridge location or proximity. Therefore, similar foundation details to those designed for the onsite bridge were used for this bridge despite the shorter span length. Rock socketed piles with an allowable end-bearing pressure of 10 MPa were proposed. Two 900-mm diameter rock-socketed, concrete-filled steel piles were selected at each abutment. The piles will be embedded approximately 8 m in the rock layer. A precast concrete ballast wall will be used at each abutment.

In the post-PFS phases of the Project, a comprehensive geotechnical study will be required at the selected bridge locations to determine soil properties and provide recommendations for foundation options.

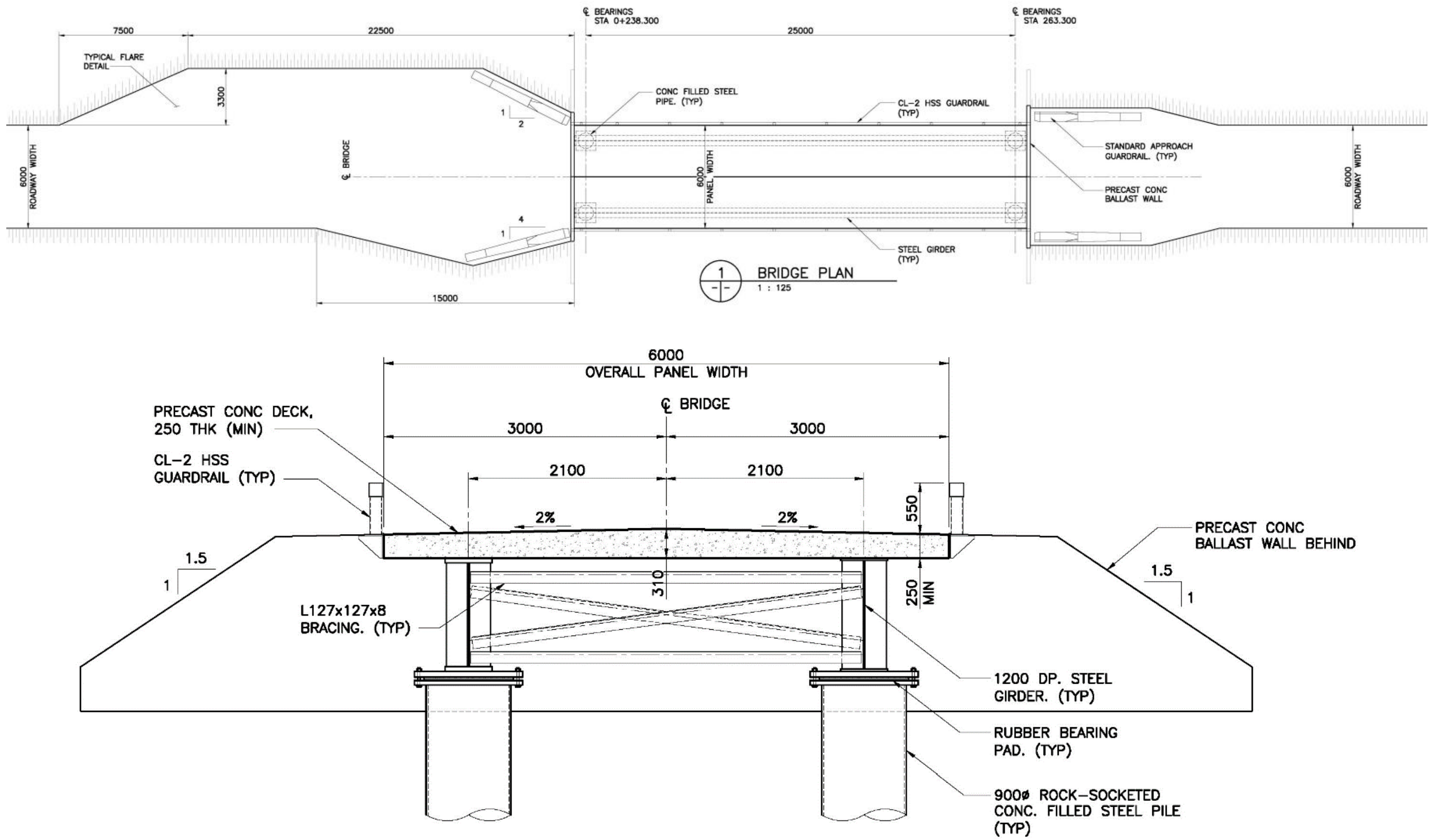


Figure 18-6: Offsite Bridge Plan Profile and Section at Abutment

(all units are in mm)

18.2.2 Onsite Access Roads

Permanent onsite access roads will facilitate vehicle, material and supply movements throughout the site and infrastructure facilities. The onsite access roads have a total length of approximately 10 km, including the camp, processing plant and TMF access roads. A 48 m single-span steel girder bridge will be installed to cross the Turnagain River onsite, connecting the open pit mine and the camp/processing plant areas.

The access roads at the site will be constructed to connect all the infrastructure listed in Section 18.1.

The onsite access roads are classified into primary and service roads. Each category uses an optimized typical section depending on the intended use. Primary access roads and service roads are needed for the project site based on the site layout (including the TMF perimeter road, which will be built progressively supporting TMF development during LOM).

The primary access roads are designed to be 8 m wide to accommodate two-way, light vehicle traffic. The service roads are designed to be 6 m wide for single-lane traffic. Depending on the location, all site access roads and access controls will be monitored and radio-controlled by site security or operational personnel. An onsite gatehouse will be established to prevent entry by unauthorized vehicles.

The proposed roadway profile at the facility site requires a bridge crossing adjacent to the overland conveyor south of the open pit. Based on the flood inundation mapping of the Turnagain River in the vicinity of the open pit, the proposed bridge location aimed to develop the shortest practical bridge length, providing sufficient clearance over flood levels in the Turnagain River mainstream. The bridge structure will have a steel girder superstructure with precast concrete deck panels and is designed following CAN/CSA-S6:19 to pass the 100-year flood and maintain 1.5 m debris clearance. Figure 18-7 shows the profile for the 48 m onsite bridge. A series of culverts will be installed through the road approaching the bridge at multiple locations to convey and maintain flow within the floodplain during varying high-flow events.

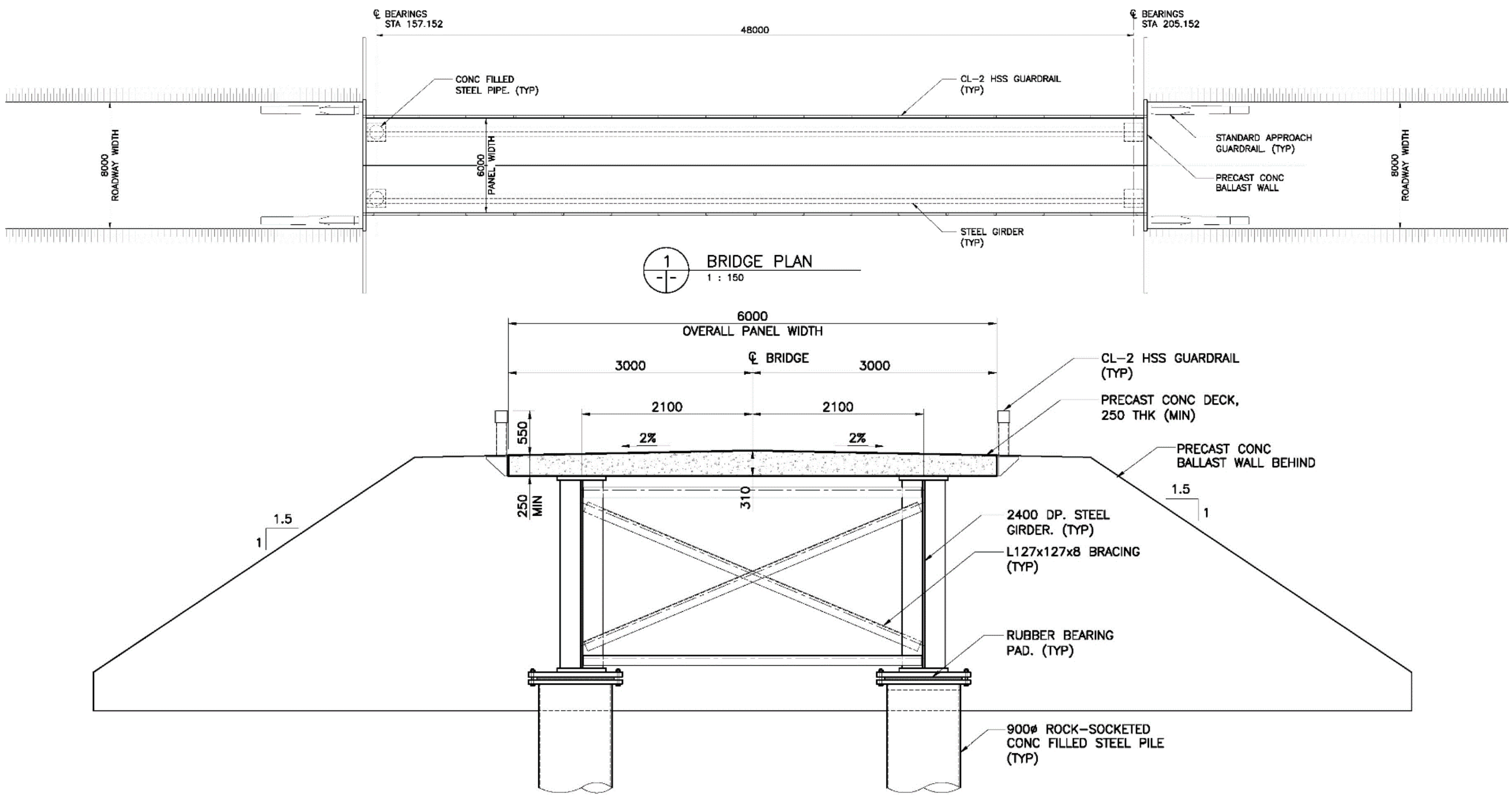


Figure 18-7: Onsite Bridge Plan Profile and Section at Abutment

(all units are in mm)

Steel girders with composite reinforced concrete deck were selected for the 48-m single-span bridge. The clear roadway width was 6.0 m to accommodate single-lane traffic. The standard details of the Ministry were followed where applicable to determine the details of the bridge superstructure. The bridge was conceptually designed for the L-100 vehicular load. Two 2400-mm deep steel girders composite with 250-mm thick reinforced concrete deck were selected. Standard class CL-2 HSS guardrail will be attached to the reinforced concrete deck.

The exploratory borings indicate the presence of ultramafic strong bedrock with depths varying from 0 to 8 m below the drilled surface near the open pit. No information exists at the proposed bridge location. Based on these observations, the bedrock elevation was conservatively estimated to be 8 m below the surface at the proposed bridge location. Conservatively, the selected foundation type was rock socketed piles, where the allowable end bearing pressure was estimated to be 10 MPa based on moderately spaced bedrock jointing and medium-strength bedrock.

Two 900-mm diameter rock-socketed, concrete-filled steel piles were selected at each abutment. The piles will be embedded approximately 8 m in the rock layer. A precast concrete ballast wall will be used at each abutment.

In the post-PFS phases of the Project, a comprehensive geotechnical study will be required at the selected bridge location to determine soil properties and provide recommendations for foundation options.

18.3 Stockpile Management

18.3.1 Waste Rock Management

Over the mine life, 380 Mt of waste rock will be stored in the mine waste rock dump located west of the open pit, as shown in Figure 18-2. The waste dump is designed to minimize haulage distances from the pit while honouring geotechnical offsets from the ultimate pit and infrastructure. Compacted overburden will be used for liner construction to mitigate the risk of ARD/ML challenges. Runoff collection ditches will be constructed to collect contact water for use or treatment. Detailed information is provided in Section 16.8.

18.3.2 Low-Grade Ore Stockpile

The low-grade stockpile is to optimize the pit for the high-grade ore and process the low-grade ore at the end of the mine life. The low-grade ore stockpile is placed west of the open pit, as shown in Figure 18-2. The maximum inventory of the low-grade ore stockpile is approximately 30 Mt. The low-grade ore stockpile will be lined with compacted overburden material and runoff collection ditches will be constructed to collect contact water for use or treatment. Detailed information is provided in Section 16.6.

18.3.3 Temporary Ore Stockpile

The temporary ore stockpile will lie directly northwest of the primary crusher to provide temporary ore storage. It will also provide storage during the ramping activities during the initial years of production. The stockpile will have a maximum footprint of 5.27 ha. Ore from the temporary stockpile will be reclaimed with a front-end loader and fed back into the primary crushing system. The temporary ore stockpile will be lined with compacted overburden material and runoff collection ditches will be constructed to collect contact water for use or treatment.

18.4 Processing Plant Infrastructure

18.4.1.1 Primary Crushing Building

The primary crushing structure will be of concrete construction with multiple levels housing the grizzly screen, gyratory (primary) crusher, primary apron feeder, sacrificial belt conveyor, rock breaker and overhead bridge crane. The apron feeder discharge will be conveyed using a sacrificial belt conveyor to the overland conveyor and the overland conveyor will convey the crushed ore from the mine site to the crushed ore stockpile near the processing plant.

A rock-constructed access ramp structure will provide truck access on both sides of the primary crushing building. ROM ore will be discharged into the dump pocket at the top level from both sides. Interior steel platforms and overhead crane beams will be provided to support equipment for ongoing operation and maintenance needs. The control room adjacent to the dump pocket will be a modular prefabricated unit. The preliminary elevation view of the primary crusher is presented in Figure 18-8.

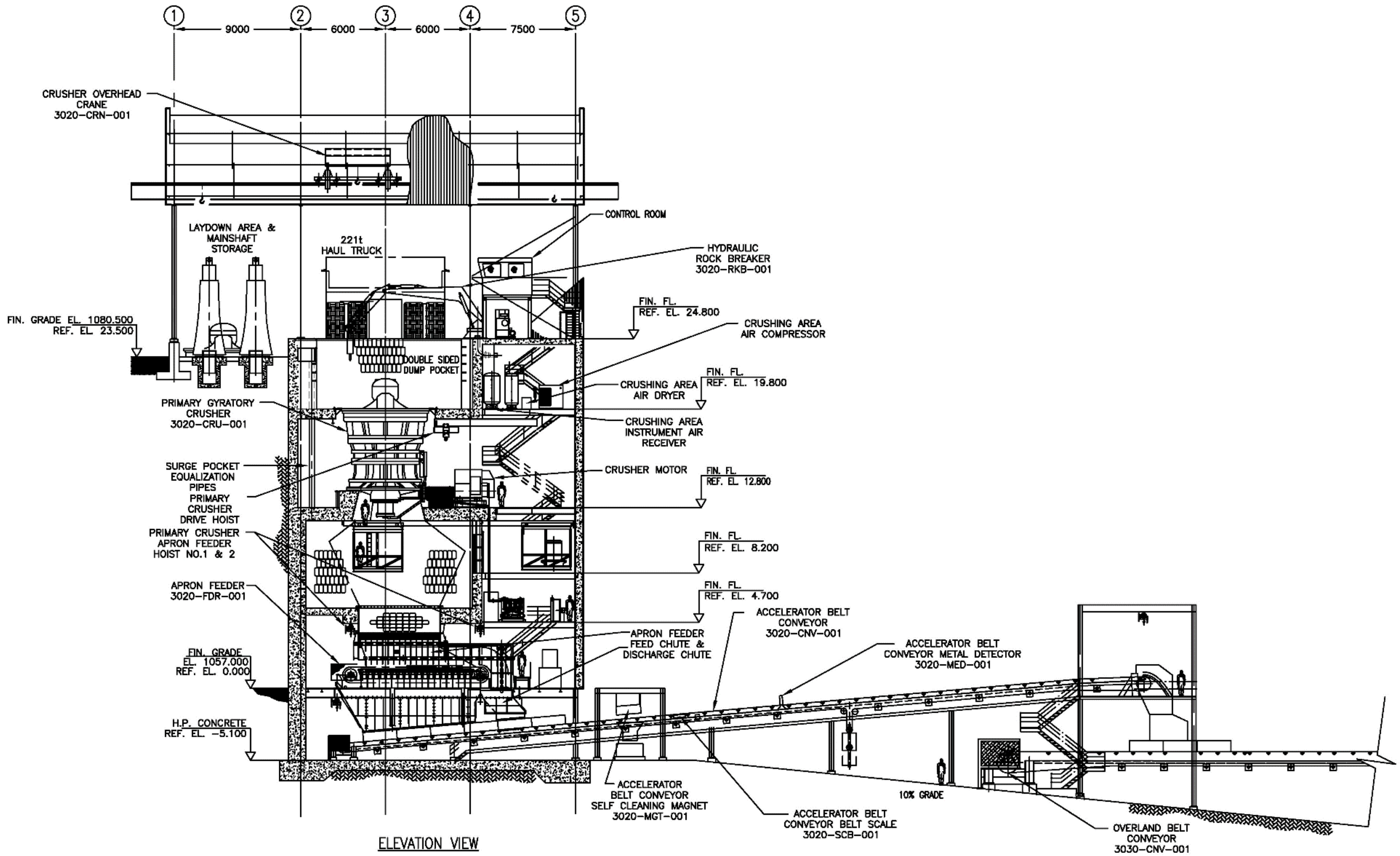


Figure 18-8: Preliminary Elevation Drawing for Primary Crusher

18.4.1.2 Overland Conveyor

The overland conveyor will convey the crushed ore from the mine site to the plant site. The overland conveyor will discharge the material onto the crushed ore stockpile at the plant site. The overland conveyor will be a 1.52 m wide x 3,950 m long belt conveyor with 13.2 MW (6 drive pulleys each with 2 x 1.1 MW motor) installed power. The overland conveyor will be a vendor-supplied system. The drive system will be equipped with disc brakes that will serve as holdbacks. A winch take-up will be located on the return side of the conveyor near the tail. The tail pulley utilizes a dynamic brake to control the belt sag in the low point of the conveyor during a power outage or uncontrolled stop. The conveyor will be equipped with a full hood cover.

18.4.1.3 Crushed Ore Stockpile

The overland conveyor will feed the 125 m diameter crushed ore stockpile. The crushed ore stockpile will be covered with a large dome structure supported on reinforced concrete ring footing. Two concrete reclaim tunnels with six apron feeders (three for each tunnel) will discharge crushed ore onto two primary screen feed conveyors to feed the secondary crushing circuit inside the processing plant.

Main stockpile reclaim tunnels are heavy reinforced concrete structures with elevated steel platforms that support apron feeders. These platforms include steel grating, handrails and staircases. The reclaim tunnels will be equipped with an escape tunnel constructed from a corrugated steel culvert and an escape stair tower to the ground surface.

The preliminary elevation view of the crushed ore stockpile is presented in Figure 18-9.

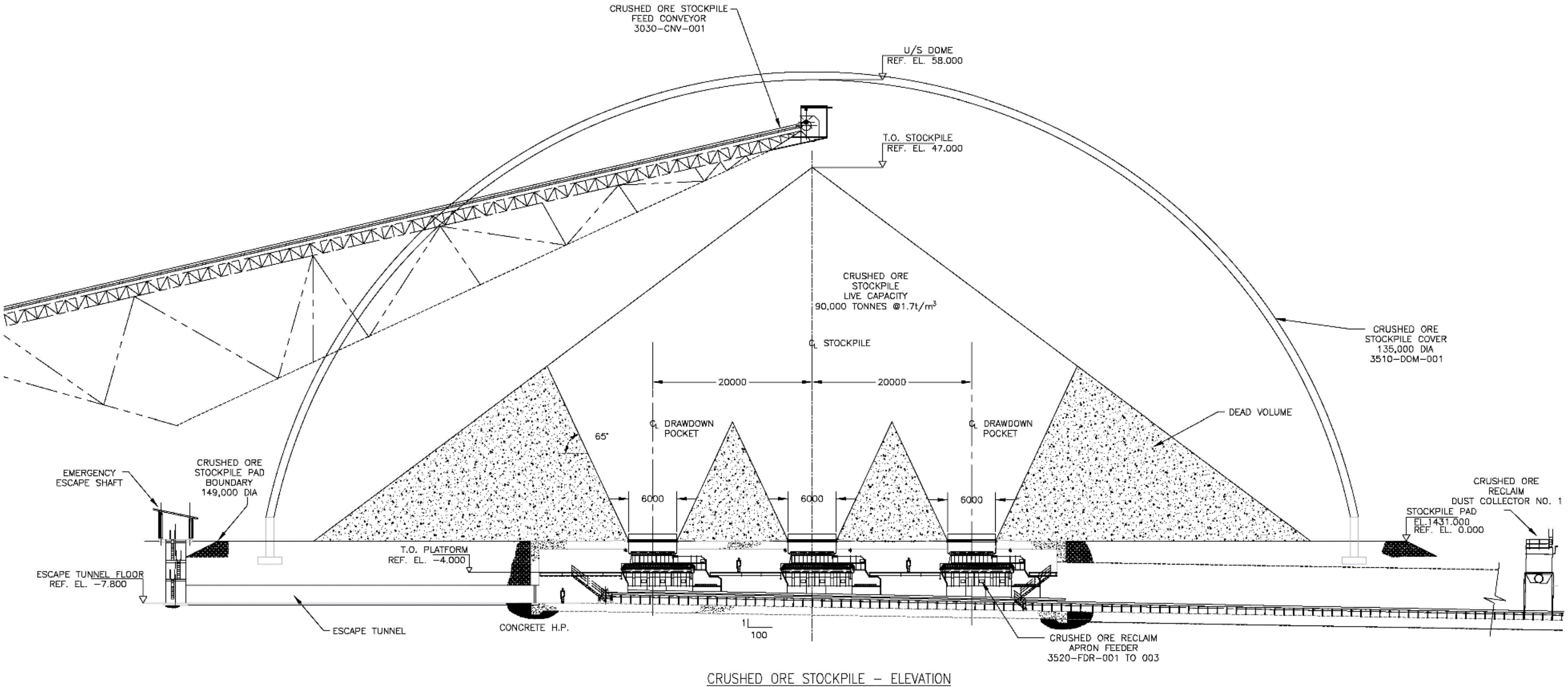


Figure 18-9: Preliminary Elevation Drawings for Crushed Ore Stockpile

18.4.1.4 Cone Crusher / HPGR Building

The cone crusher / HPGR building will be an 80 m long x 52.5 m wide pre-engineered structure with an insulated steel roof deck and wall cladding panels. A 110-t and 35-t overhead crane will be included and supported off the main building columns. Interior steel platforms on multiple levels will be provided for ongoing operation and maintenance. Several means of egress and staircases will also be provided.

Equipment will be supported on independent steel platforms with steel grating and handrails. The HPGR and cone crushers will be supported on a heavy concrete mat foundation with reinforced concrete piers. The building will be supported on isolated spread footings with perimeter-grade beams. The HPGR and cone crusher surge bins will be independently supported. A main stair tower will be provided to access the top level of the bin.

The preliminary layout for the cone crusher / HPGR building is presented in Figure 18-10.

18.4.1.5 Grinding and Flotation Building

The grinding and flotation building will be a pre-engineered structure with an insulated steel roof deck and insulated wall cladding. Overhead cranes supported off the building columns include a 10-t crane for the primary screening area, a combined 50/10-t crane over the grinding area, a 30-t crane over the rougher flotation area, a 20-t crane over the cleaner flotation area and a 10-t crane over the dewatering area.

During initial construction, a 286.5 m long x 42.5 m wide section will be erected to accommodate train 1 equipment. Another 265 m long x 42 m wide section will be erected to accommodate train 2 equipment.

Major equipment will be supported on steel platforms with steel grating and handrails (e.g., cyclones, samplers, analyzers, screens, etc.). These multi-level steel platforms provide services for ongoing operation and maintenance needs. Several means of egress and staircases will also be provided. The building foundation will comprise concrete spread footings, grade walls along the building perimeters and a slab-on-grade floor.

Mat concrete foundations and piers will be used for ball mills. The flotation cells will be supported on a concrete mat foundation and natural topography will be utilized to accommodate various cell elevations and gravity flow. The floor surfaces will have localized areas sloped toward sumps for cleanup operations. The building will also house modular prefabricated electrical rooms, control rooms, change rooms and offices.

The preliminary layout for the mill building is presented in Figure 18-11 and Figure 18-12. Black (train 1) vs grey (train 2) colours represent staged construction.

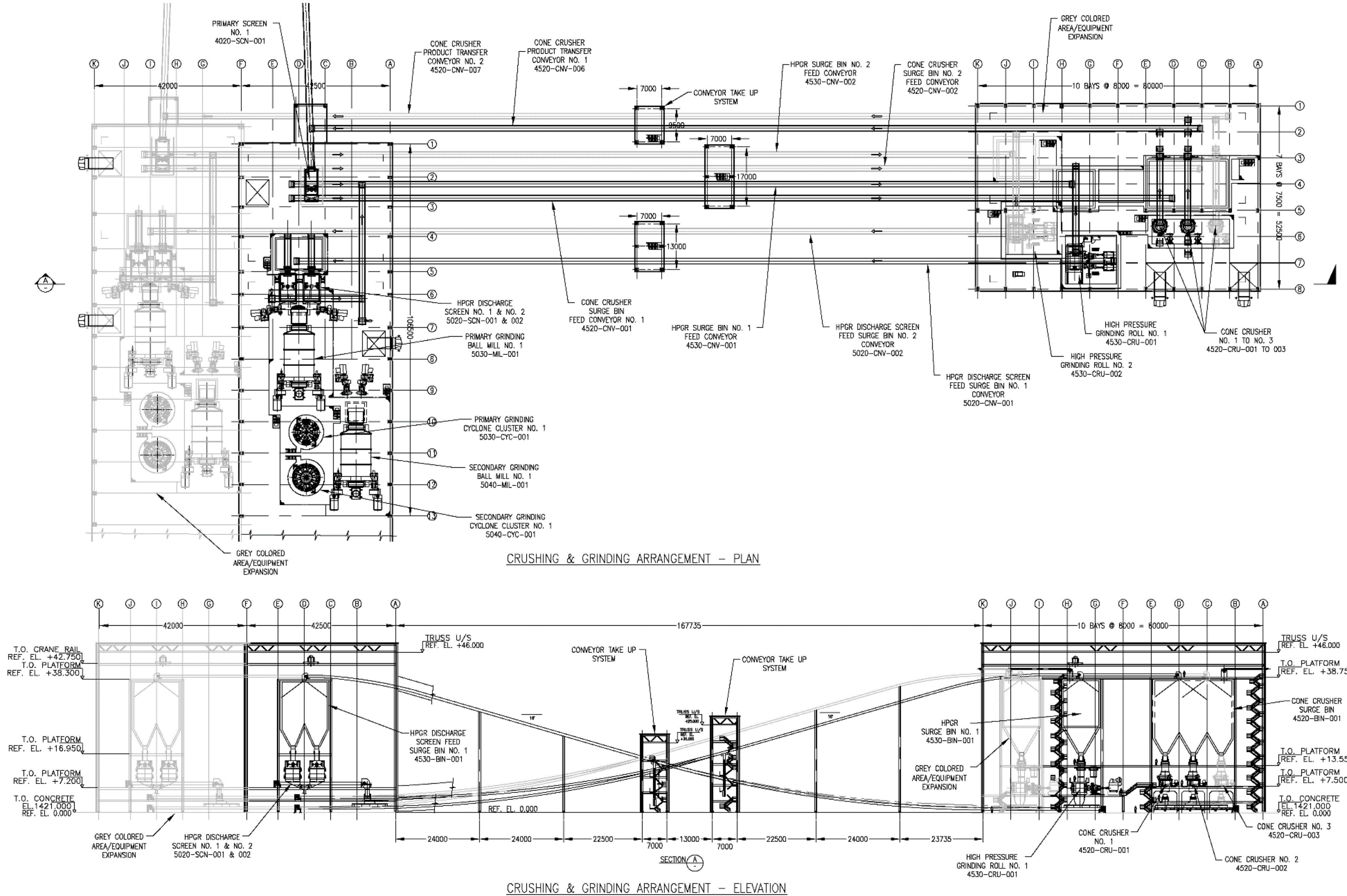


Figure 18-10: Preliminary Drawings for Cone Crusher/HPGR Building and Grinding Area

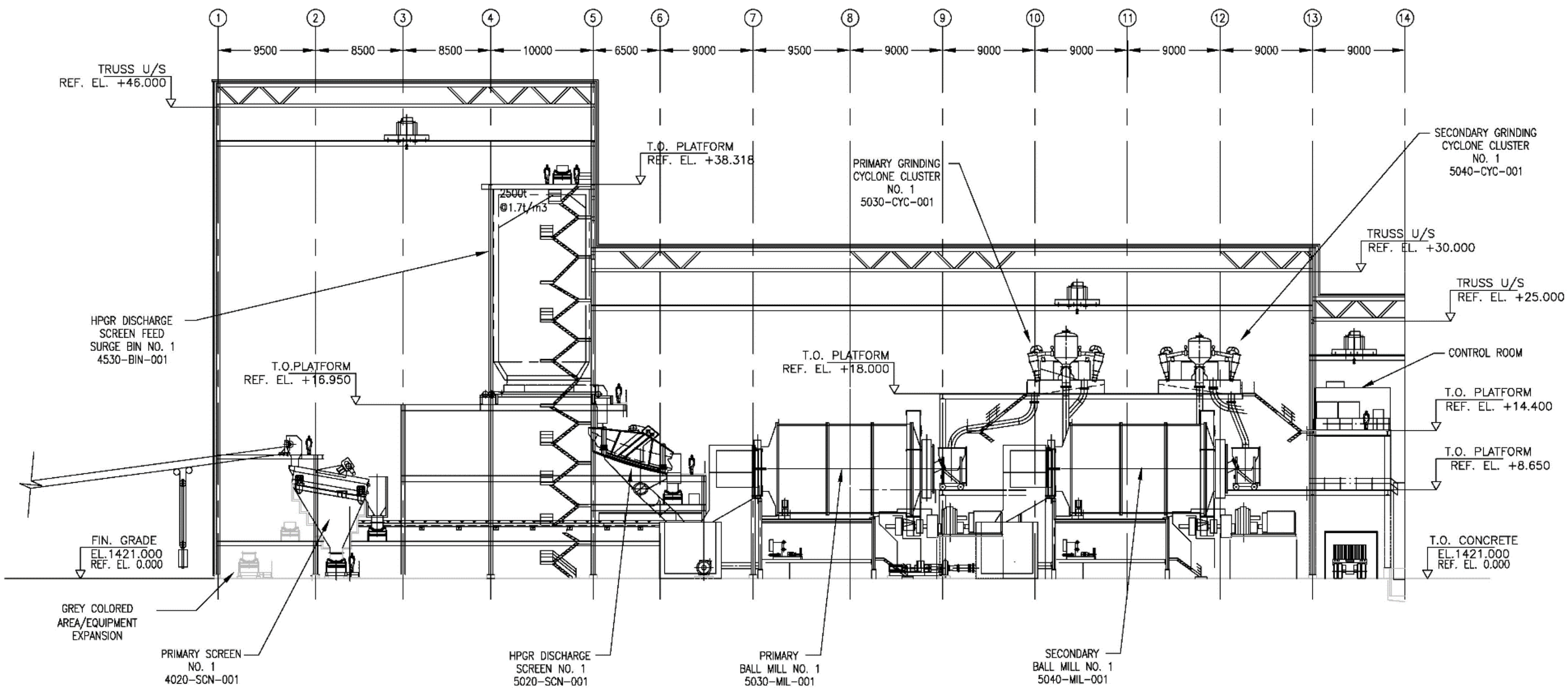


Figure 18-11: Preliminary Elevation Drawing for Grinding Area

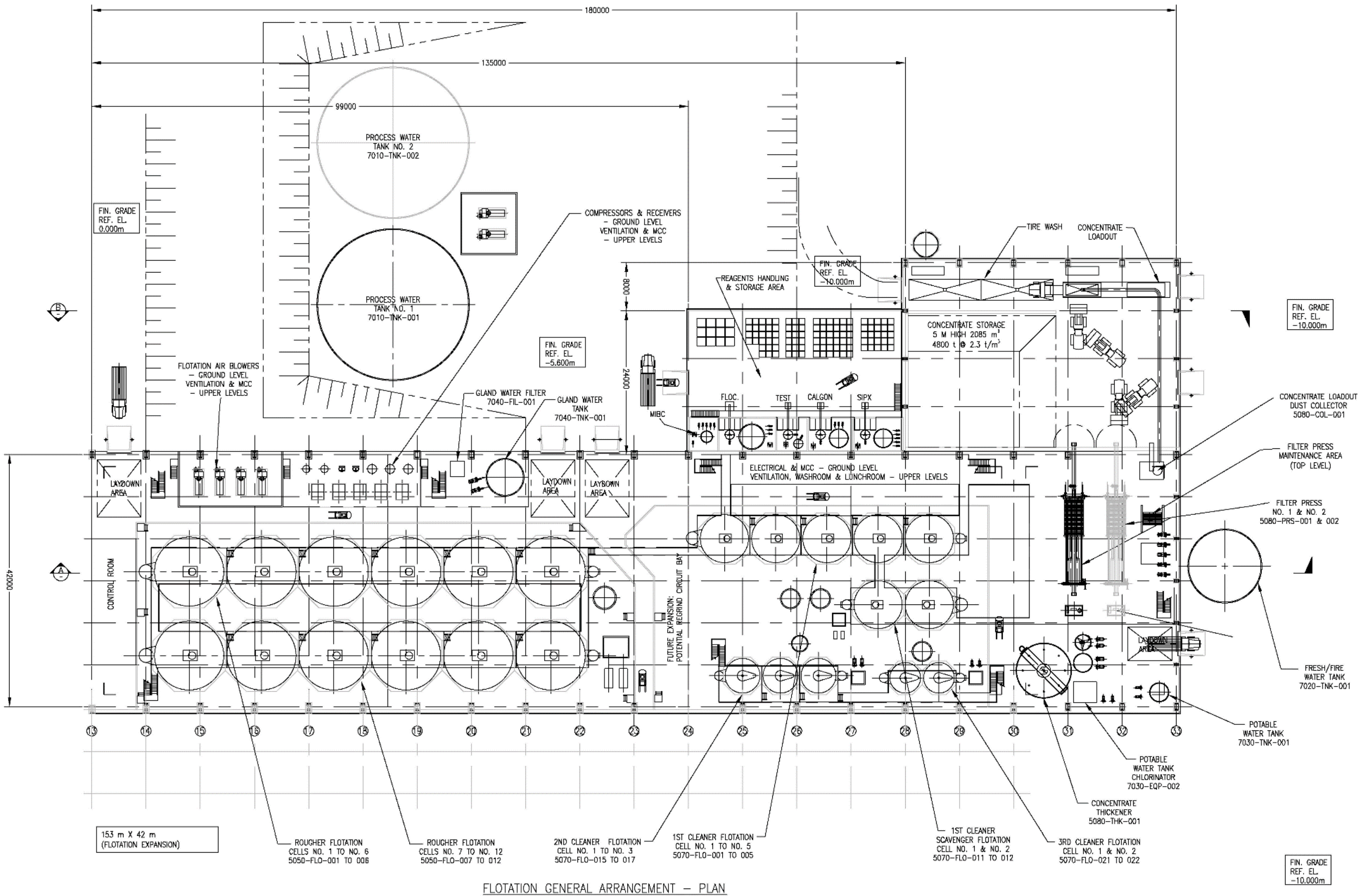


Figure 18-12: Preliminary Drawing for Flotation, Dewatering, Reagent and Concentrate Storage Area

18.4.1.6 Onsite Concentrate Storage

The onsite concentrate storage facility will have a seven-day storage capacity for approximately 4,800 t of concentrate. The storage area will be 45 m long x 32 m wide. Reinforced concrete retaining walls will be provided for the concentrate load-out area.

Filtered concentrate will be loaded by front-end loaders into 40 t capacity, side-dump B-train trucks. The trucks will move through a wheel-wash spray to remove road ice and dirt before entering the loading bay. Before leaving the loading bay, the vehicles will move through a spray bar to remove concentrate spillage, which will be periodically collected from the settling sump and pumped to the concentrate thickener. A truck scale pit will also be provided.

18.4.1.7 Reagent Storage and Handling

The reagent storage and handling area will be a 36 m long x 24 m wide pre-engineered steel structure with an insulated steel roof and wall. The foundation will comprise concrete spread footings, grade walls along the building perimeters and slab-on-grade. The area will be serviced with a 5-t overhead crane. The majority of equipment will be small tanks, pumps and mixing equipment. Please refer to Section 17.5 for reagent storage and handling details.

18.4.1.8 Assay and Metallurgical Laboratory

The assay and metallurgical laboratory will be a 52 m long x 12 m wide single-story modular structure. The laboratory will be equipped to perform routine assays for the mine, the processing plant and the environmental and geological departments. The laboratory will also have a metallurgical investigation section to support operations and test future mill feed ores. Please refer to Section 17.7 for assay and metallurgical laboratory details.

18.5 Tailings Transport System

The tailings transport system will be constructed in stages throughout the LOM. Tailings will initially flow by gravity from the processing plant to the TMF main embankment and will be distributed from off-takes (spigots) located along the dam crest. The tailings pipeline corridor will follow the service road alignment between the processing plant and TMF.

Two pipelines, one for each flotation line capable of handling 45,000 t/d at a solids density of 26% (by wt.), will transport the tailings from the processing plant to the TMF. Two pipelines will provide flexibility in the tailings transport system and ease maintenance requirements and efforts. Tailings pipelines will be constructed using High Density Polyethylene (HDPE) wherever practical. During the first 12 years of operation, the tailings will be deposited from the main embankment and surrounding perimeter. Refer to Section 18.6.2.1 for the details of the deposition plan.

It is anticipated that the tailings will be deposited from the southern shore of the TMF (saddle dam) starting in Year 13. To allow for deposition from the saddle embankment, one of the tailings pipelines will be extended to the saddle dam along the northern boundary of the TMF and deposition will occur from off-takes (spigots) located along the saddle dam crest and surrounding perimeter. Two 700 mm x 700 mm centrifugal booster slurry pumps (one operating and one standby), each equipped with a 1,100 kW VFD motor, will be installed to provide sufficient dynamic head to discharge tailings to the saddle embankment.

Knife gate valves with hydraulic actuators will be used for main flow control in the tailings system. Crossovers between both tailings lines will be provided at the processing plant and the north corner of the TMF.

The advantages of the proposed piping alignment are:

- Maximize the use of HDPE pipes for cost advantage,
- Gravity discharge is possible through the entire mine life to the main embankment,
- Pipelines will be located within the TMF catchment and any leakage that occurs within the TMF pipeline corridor will flow toward and will be contained in the impoundment.

18.6 Tailings Management Facility

The PFS design of the Turnagain Project TMF was developed based on project requirements, geotechnical and hydrogeological site investigations and particle size distribution test results of the proposed tailings.

The design was developed on the basis of work completed by KP (2023) and Tetra Tech (2022). A TMF site selection and trade-off study (Tetra Tech, 2022) determined that a conventional TMF with a slurry deposition behind earth-fill embankment dams to be raised in stages using centreline construction methods was the preferred approach.

18.6.1 TMF Design Basis

The TMF was designed to store approximately 925.7 Mt of tailings over the 30-year LOM. The annual tailings produced from the process plant is provided in Table 18-2, along with the summarized design basis considerations for this study.

Table 18-2: TMF Design Basis Summary

Description	Unit	Value	Reference
LOM	Years	30	Mine Plan
Tailings Production			
Year 1	Mt	11.4	Tetra Tech, 2023
Year 2	Mt	31.0	
Year 3 to 29	Mt/y	32.6	
Year 30	Mt	1.6	
LOM	Mt	925.7	
Geotechnical Assessment			
Preliminary Consequence Classification	-	High	Preliminary consideration based on potential environmental impacts downstream of the facility
Annual Exceedance Probability (AEP) – Earthquakes	-	1 in 2,475	Canadian Dam Association (CDA), 2019 BCMEM, 2016 Ministry of Energy, Mines and Low Carbon Innovation (MEMLCI), 2022
Inflow Design Flood (IDF)	-	1/3 Between 1 in 1000 and Probable Maximum Flood	
Stability Analysis Considerations	-	Minimum Factor of Safety (FoS)	
Static Loading Condition	-	1.5	
Pseudo-Static Loading Condition	-	1.0	

18.6.2 TMF Design

The TMF has been designed to contain tailings solids, process water and runoff from storm events that may occur during the mine operations. The TMF will be located in Flat Creek Valley, situated across the Turnagain River from the mine site and below the processing plant. The TMF will be a single facility bounded by the Flat Creek valley walls and earth-fill embankments at each end. The TMF design work and features include:

- Tailings deposition strategy,
- Embankments,
- Access roads,
- TMF diversion channels,
- Seepage collection structure.

Figure 18-13 illustrates the TMF spatial arrangement of the embankments at its final height, deposited tailings and supernatant pond.

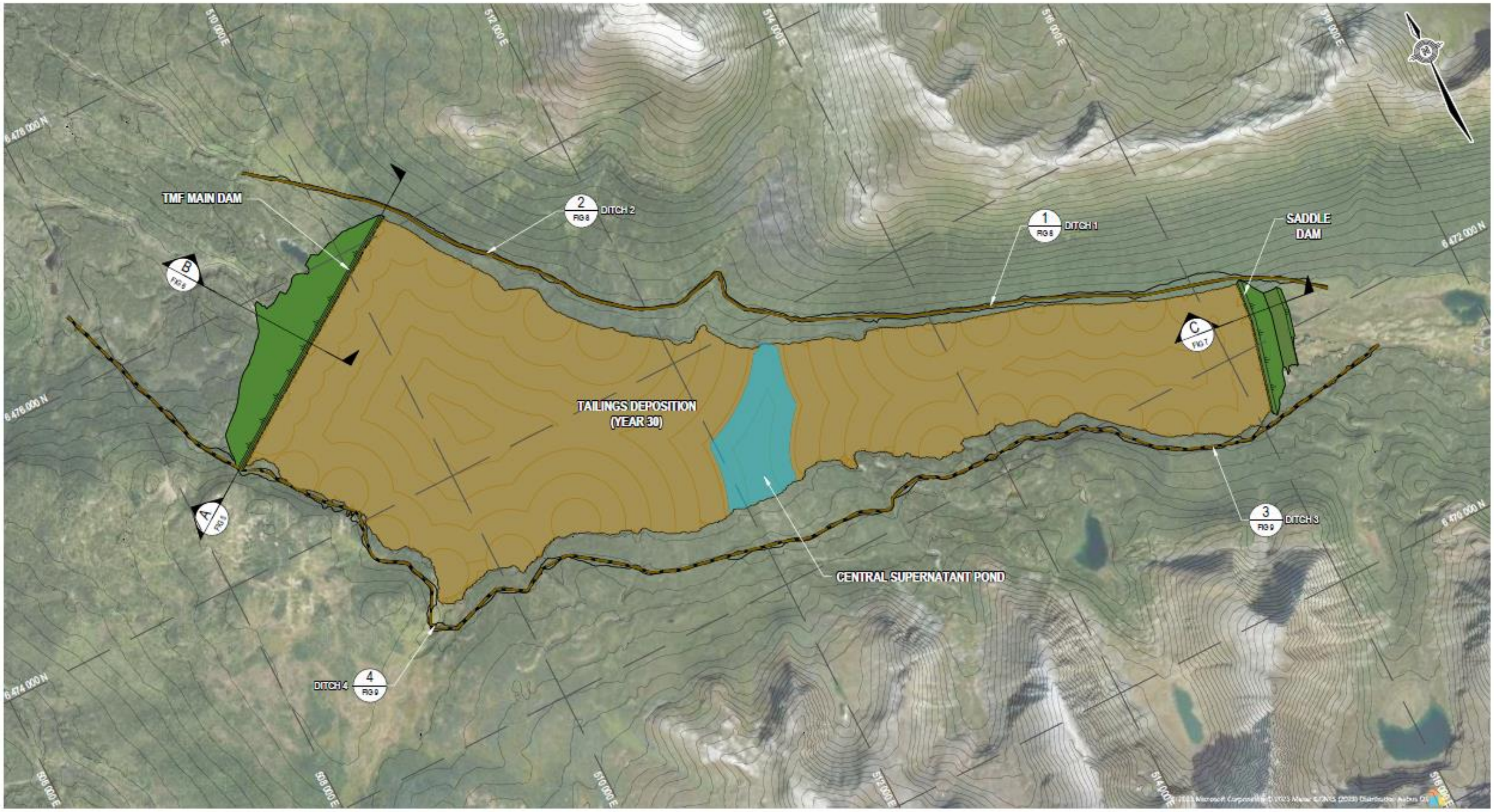


Figure 18-13: General Layout of TMF at Final Year Deposition with Supernatant Pond at Centre (Tetra Tech, 2023)

18.6.2.1 Tailings Deposition Strategy

Tailings will be discharged from the crest of the embankments and the perimeter of the TMF to develop a wide tailings beach that is aimed at maintaining the water pond in a central location, away from the embankment dams and provide air-exposed tailings to enhance carbon mineralization processes.

Coarse tailings are expected to settle closer to the discharge points and finer tailings travel further to form a flatter slope at the supernatant pond. The beach will be developed to optimize storage capacity and control the supernatant pond location.

Figure 18-14 illustrates the depth-area-capacity relationship of the TMF, showing how the storage capacity relates to the tailings depth. TMF embankments are designed for staged expansions as tailings and water levels increase.

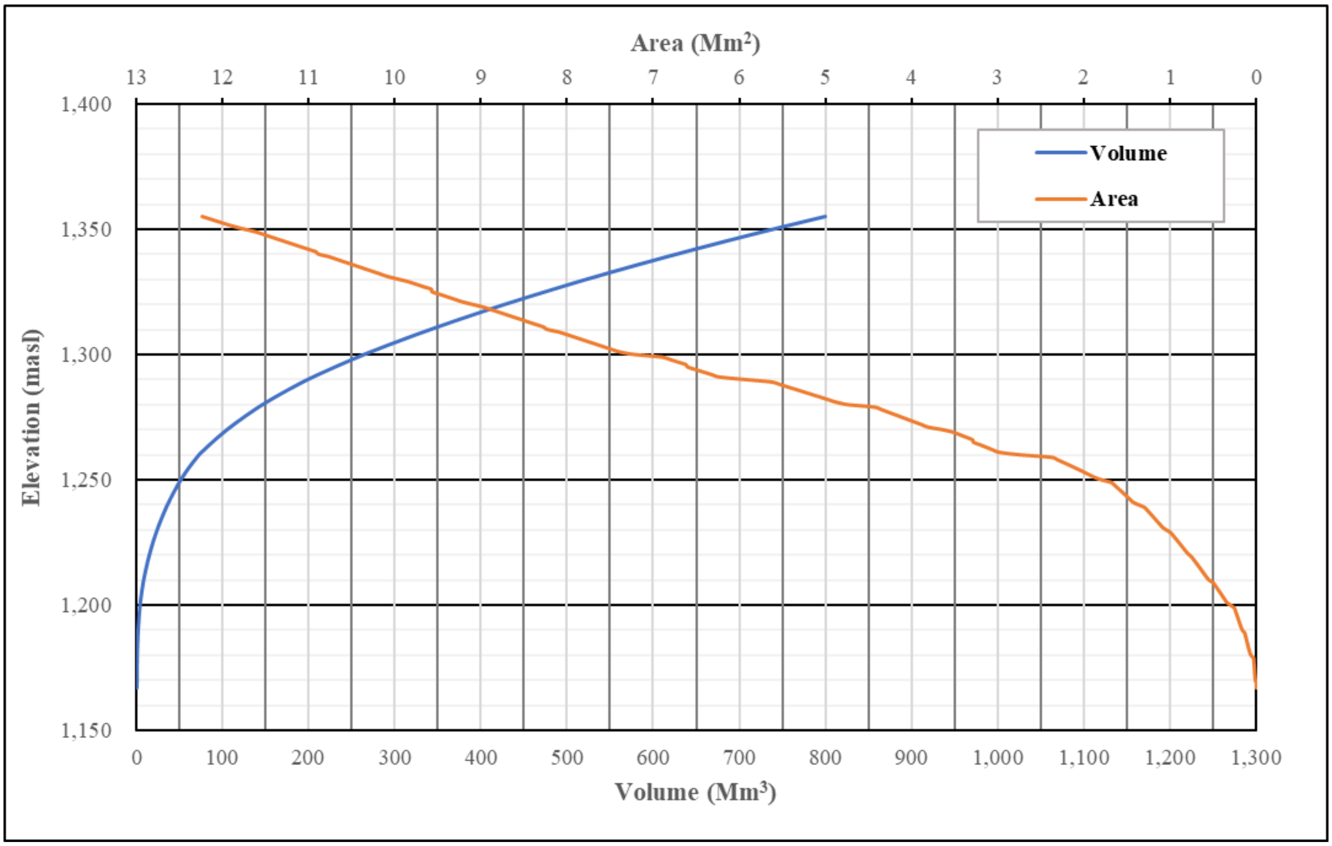


Figure 18-14: TMF Depth-Area-Capacity Curve

Figure 18-15 shows TMF tailings deposition layouts at selected periods over the LOM.

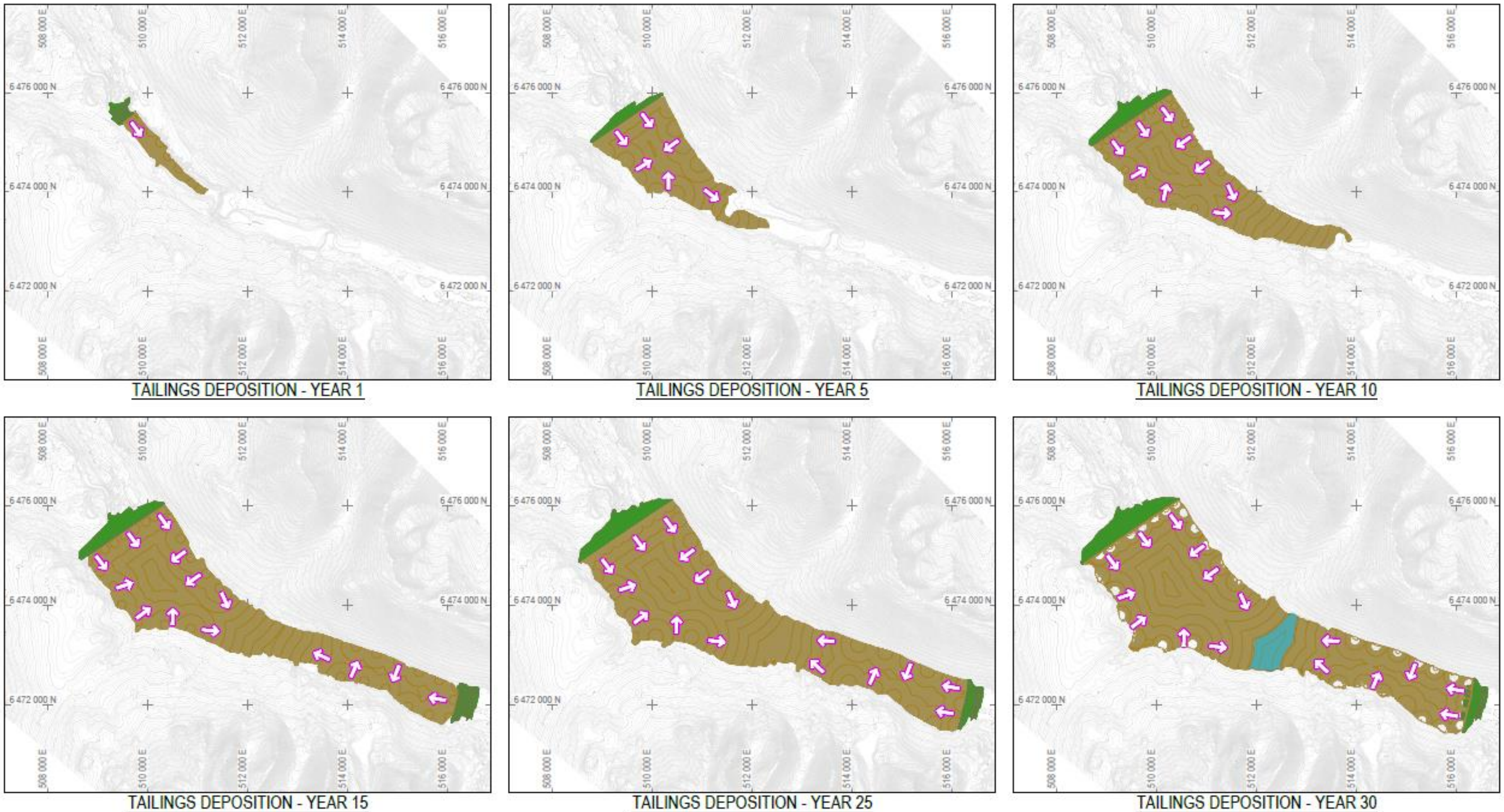


Figure 18-15: Tailing Deposition Progress Over LOM

(Tetra Tech, 2023)

The TMF design aims to maximize the tailings beach length along the embankments by keeping a uniform elevation against them. The supernatant pond will be located at the centre of the TMF, and surface drainage will be directed away from the embankments. A visual representation of the final deposited tailings surface and supernatant pond is presented in Figure 18-13.

18.6.2.2 Embankments

The TMF will be created by constructing two embankments across the Flat Creek Valley: the Main Dam on the northeast side and the Saddle Dam on the southwest side, as shown in Figure 18-13. Both embankments will be designed as zoned rockfill structures with a low permeability core zone.

The Main Dam will initially be constructed using the downstream method and later raised to its final height using the centreline method. In Year 12 of the mine operations, the Saddle Dam will be constructed on the southwest side of the TMF using the downstream method, gradually reaching its final height over the course of the mine's life. Figure 18-16 presents a representative cross-section of the Main Dam.

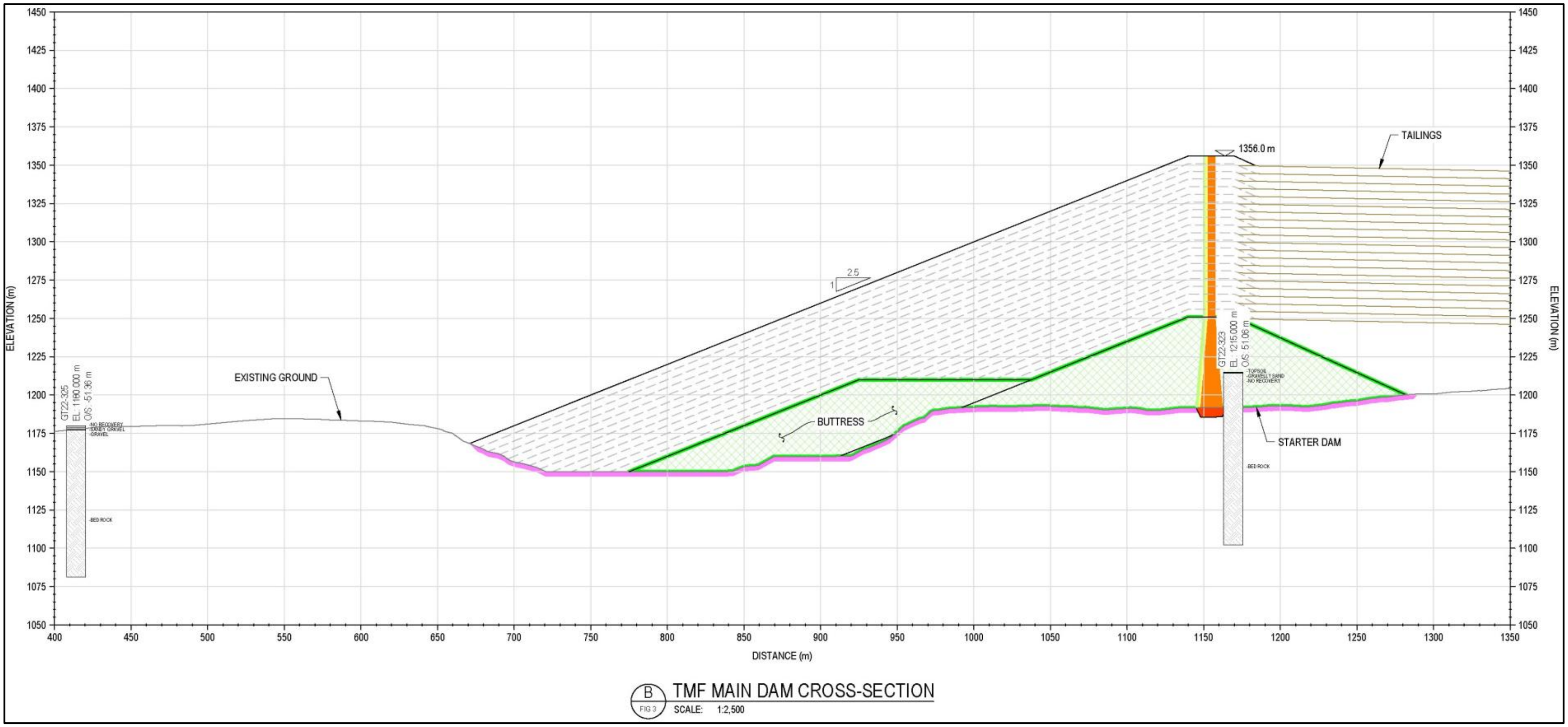


Figure 18-16: A Representative Cross-Section of the Main Dam

18.6.2.3 Access Roads

An access road will be constructed on the northeast side of the TMF to facilitate equipment access and tailings deposition operations to the TMF site. Figure 18-17 illustrates a representative cross-section of the access road and ditch, which will serve to collect diverted water flow. Trail roads will be developed and utilized for accessing the southwest side of the TMF.

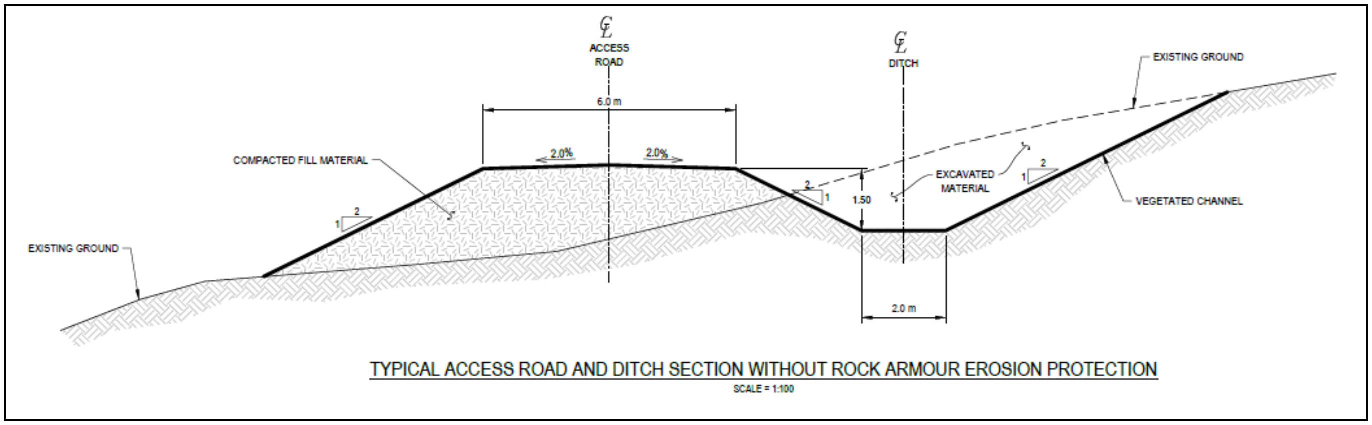


Figure 18-17: Typical Cross Section of Access Road and Ditch

18.6.2.4 Surface Water Diversion Channels

This study incorporates the design of diversion structures to intercept runoff water. Details of water diversion channels is presented in Section 18.8.3.2.

18.6.2.5 Seepage Collection Structure

Seepage collection ponds will be constructed downstream of each TMF embankment to intercept potential seepage from the facility. The design details of the seepage collection pond incorporate required containment, suitable design considerations and mitigation controls. The seepage collection pond sizing and discharge structure based on water management and geotechnical requirements will be further evaluated and refined in future studies.

18.6.2.6 Borrow Sources

It was assumed that suitable materials for embankment construction would be sourced nearby. Future studies will confirm the location and character of borrow materials based on existing surficial geology and proposed field investigation for the FS. In the next stage of the study, borrow sources will be identified using surficial geology maps, conducting field investigations and performing laboratory testing.

18.6.3 Foundation Characterization

18.6.3.1 Geotechnical Site Investigation

In the summer of 2022, KP conducted a site investigation program to collect geotechnical and hydrogeological information. The program included five drill holes.

Geotechnical field investigations were conducted at the proposed locations for the Main Dam and Saddle Dam. The purpose was to collect data and samples for the characterization of the foundation, including overburden soils and bedrock. Four boreholes were completed at the Main Dam, while one borehole was completed at the Saddle Dam during the drilling program. The overburden material predominantly consisted of layers of sand and gravel, occasionally with sandy silt and cobble materials. The bedrock in the proposed Main embankment footprint was found to be strong, moderately fractured and fresh to slightly weathered bedrock (KP 2023).

18.6.3.2 TMF Foundation Conditions

According to the Factual Geotechnical Report by KP (2023), the surficial deposits encountered during the 2022 campaign consisted of layers of sand and gravel with occasional sandy silt and cobble materials. Beneath these surficial sands and gravels, there were interbedded fine-grained layers containing varying amounts of silts, clays and some coarse-grained soil. KP reports that the fine-grained material encountered below the Saddle Dam is potentially a Glaciolacustrine Unit (GLU).

18.6.4 Geotechnical Assessment

The geotechnical assessment for the proposed embankment design was conducted based on the tailings deposition model and foundation characterization performed. Seepage and stability analyses were completed as part of the geotechnical assessment of the embankments.

As part of the seepage analysis, a steady-state phreatic surface was modelled for the TMF embankments. The stability analysis was conducted in accordance with the guidelines outlined by the CDA (2019) and considering the embankment's preliminary consequence classification as "High." The results of the stability analyses demonstrate that the embankment design satisfies the required safety factors.

Further seepage assessments are recommended to determine potential seepage volumes at different stages of the project's lifespan. These assessments will be conducted during the next phase of the study.

18.6.5 Geotechnical Monitoring Program

Geotechnical instrumentation will be installed in the TMF embankments and foundations during the construction and throughout the project's lifespan. These instruments will be monitored to assess embankment performance and identify any conditions different from the design assumptions.

The proposed geotechnical instrumentation will include vibrating wire piezometers, slope inclinometers and survey monuments. These will be installed along instrumentation planes within each embankment. Groundwater monitoring wells will be installed at suitable locations downstream of each embankment. Flow and level monitoring instruments will also be installed in the embankment foundation drainage and seepage collection ponds.

Routine monitoring of the instrumentation will be carried out during both construction and operation. Regular measurements will be taken and analyzed to track the response of foundations and embankments to fill loading, ensuring their stability and performance are maintained.

18.6.6 Environmental Risk Controls

Environmental risk control measures will include dust control and seepage quality management. Several measures will be undertaken to mitigate dust emissions, including windbreak installation, such as fences or vegetation, to reduce wind speed and prevent dust dispersion. Other control measures may include water spraying on exposed tailings surfaces and establishing vegetation cover. Monitoring air quality and implementing traffic control measures are also key in managing dust.

Seepage quality management is key to prevent contamination of groundwater or nearby water bodies. Constructing the foundation using a low permeable zone and cutoff trench walls are proposed to mitigate seepage. Effective water management practices, such as collection, treatment and recycling, can minimize contact water with the tailings. Erosion control measures, like vegetative covers and erosion-resistant liners, help minimize erosion and potential seepage pathways. Regular monitoring of water quality and having an emergency response plan are essential components of seepage quality management.

18.6.7 Closure and Reclamation

Closure and reclamation activities will be implemented in phases, where possible, to promote physical and geochemical stability and ultimately establish post-mining land use based on defined closure objectives. It is important to recognize that the final structures of the facility should be able to meet the required performance standards throughout its lifespan. Some key closure design elements for the TMF are:

- Impoundment dewatering and diversion upgrades,
- Closure spillway design and construction,
- Tailings drying/stabilization and grading,
- Cover placement,
- Drainage and seepage controls.

18.6.8 TMF Embankment Construction Methodology

The staging and scheduling of TMF embankment construction were planned to ensure that the embankment dam crest elevation is adequately designed to accommodate the storage of slurry tailings and to effectively manage the runoff from design storm events. This consideration involved various factors such as assessing the volume of tailings generated, required capacity for containment, anticipated rainfall and runoff during design storm events. Additional considerations included maintaining adequate freeboard at each dam raise stage and constructing a spillway channel during the final embankment raise. A comprehensive analysis of these factors determined the tailings surface and embankment crest elevation for each stage and closure phase of the impoundment construction.

The construction of the proposed embankments will include the following activities:

- Site establishment,
- Starter dam construction,
- Ongoing dam raise construction.

18.6.8.1 Site Establishment

Prior to commencing the construction of the Main embankment's starter dam, it is necessary to undertake the following activities to establish the site:

- Performing logging activities (removal of trees) for the impoundment site,

- Developing trail roads to the main embankment area to develop sufficient site access for the construction equipment,
- Establishing any temporary camps, maintenance shops, or other infrastructure that the construction activity may require within reasonable proximity to the site,
- Preparing suitable laydown areas for equipment and clearing timber,
- Construction of the initial starter dam at the outlet of the TMF,
- Preparation for the best management practices for sediment control and erosion protection (sediment control ponds, silt fences, straw bales).

Site establishment and foundation preparation embankments will include:

- Best management practices for silt and sediment control,
- Construction of water management ponds and pump-back systems downstream of the embankment,
- Clearing and grubbing of the initial embankment footprint,
- Excavation of unsuitable overburden material,
- Foundation improvement using dynamic compaction.

18.6.8.2 Starter Dam Construction

Starter dam construction will involve:

- Clearing and grubbing the footprint of the starter dam for the Main embankment,
- Foundation excavation and removal of unsuitable overburden material for the scheduled embankment footprints,
- Overburden stockpile development for the starter dam and access road,
- Preparing and placing suitable fill material for the foundation as per design,
- Commencement of construction of the diversion channels, access road and trail road to the TMF,
- Foundation excavation and removal of unsuitable overburden material for scheduled embankment footprints expand with the proposed raises,
- Quarrying rockfill material for starter dam embankment construction,
- Ongoing construction of diversion channels, access and trail road to the TMF,
- Installation of tailings and reclaim pipelines, pump stations, power supply and controls.

18.6.8.3 Dam Raise Construction

Dam raise construction will involve multiple embankment raises for both Main Dam and Saddle Dam over the LOM. During this period, installation of additional tailings deposition pipelines and associated infrastructure will be required.

Construction materials will be transported to the TMF site and equipment such as an excavator, dozer, grader and compactors will be used to place, spread and compact the fill material during the embankment raises.

The following activities will be included:

- Continued logging of the impoundment as required,
- Continued grubbing, stripping and excavation of unsuitable overburden beneath the extended embankment footprints,
- Centreline embankment raises using suitable earth fill materials hauled from a borrow source,
- Placement of rockfill, low permeability core, filter zones and transition zones,
- Installation of an additional tailings pipeline to extend along the full extent of the embankment,
- Expansion of construction and maintenance of access and trail roads.

18.7 Reclaim Water System

The supernatant from the TMF will be reclaimed by reclaim water pumps and sent to the process water tanks through three pumping stages. The reclaimed water will be used as process water for grinding and flotation circuits. The average elevation of the tailings supernatant pond will increase steadily over the Project life, with seasonal variations due to snowmelt, runoff, precipitation and evaporation. The rising elevation will reduce the pumping head requirements over the LOM and allow modifications to the pumps, or their mode of operation, to reduce power consumption.

A 69 kV overhead distribution will supply power to the reclaim water barge and booster pumps with local substations to step down the voltage from 69 kV to the local distribution voltage.

18.7.1 Reclaim Barge

The reclaim pumps will be mounted on a floating barge in the TMF supernatant pond. The proposed barge is designed to support four 932 kW vertical turbine pumps equipped with VFD. The pumping philosophy is to install and operate two pumps during the ramp-up activities in year 1 and install two additional pumps during plant expansion. All four pumps will be operating at the 90,000 t/d processing rate.

The barge will include an electric agitator de-icing system around the perimeter to prevent ice buildup and will be supplied with a building consisting of rigid frame building components and materials for installation on the barge deck. The building will house and protect the pumps, motors and electrical equipment. The building will have two rooms, one for the pumps and piping and one for the electrical equipment.

The barge will be secured to the shore by mooring lines, a hinged access walkway and a pontoon-supported reclaim discharge line with connecting ball joints. The stations will be periodically relocated closer to shore as the elevation of the supernatant pond changes.

18.7.2 Booster Stations

Two booster stations will be required to overcome the total dynamic head required for the reclaim water pumping. Similar to the barge, each booster station is designed to support four 670 kW vertical turbine pumps equipped with

VFD. The pumping philosophy is to install and operate two pumps in the first year during ramp-up activities and install two additional pumps during plant expansion. All four pumps will be operating at the 90,000 t/d processing rate.

The booster stations will be supplied with a building consisting of rigid frame building components and materials for installation on a structural steel skid. The building will house and protect the pumps, motors and electrical equipment. Similar to the barge, the building will have two rooms, one for the pumps and piping and one for the electrical equipment.

18.7.3 Reclaim Pipelines

The reclaim water line from each phase will be a 36" diameter, 0.625" wall-thickness carbon steel pipe and will include an isolation valve and a check valve to facilitate barge relocation and maintenance. Reclaim water pipelines will run parallel to the tailings pipelines.

18.8 Overall Site Water Management

Tetra Tech completed a flood inundation study and developed a site-wide water balance model as a part of the overall site water management plan, along with designing a network of drainage systems.

18.8.1 Flood Inundation Study

Tetra Tech completed the flood inundation study utilizing a two-dimensional hydraulic model developed by the Hydrological Engineering Centre – River Analysis System (HEC-RAS). HEC-RAS is used to analyze flood routes during flood events. Three different return periods, 2-year, 100-year and 200-year events, were analyzed.

The resulting flood inundation extent for the 2-year, 100-year and 200-year return period events are depicted below in Figure 18-18 to Figure 18-20. The 2-year flood inundation extent was used to detail the typical in-stream water level within the Turnagain River at any given time of the year. This water level is often used to set riparian and aquatic boundaries. The 100-year and 200-year flood inundation extents were also developed to delineate areas prone to flooding and areas where development should be limited. Of particular value to the project is defining the extent of flooding and possible conflicts with the development of the pit. As detailed, it is unlikely that the mining pit shell will be impacted by a flood event along the Turnagain River.

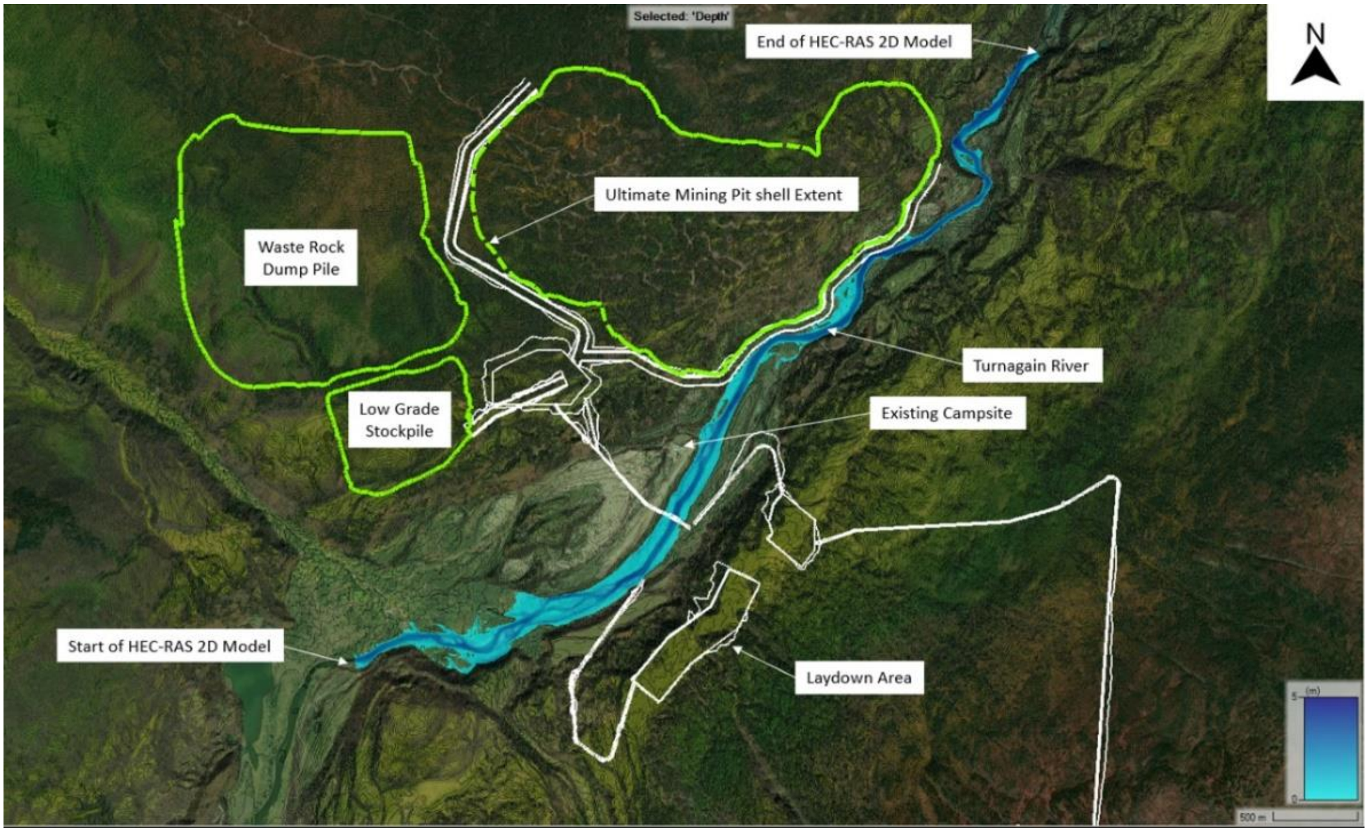


Figure 18-18: HEC-RAS 2D Flood Inundation Result for a 2-Year Return Period

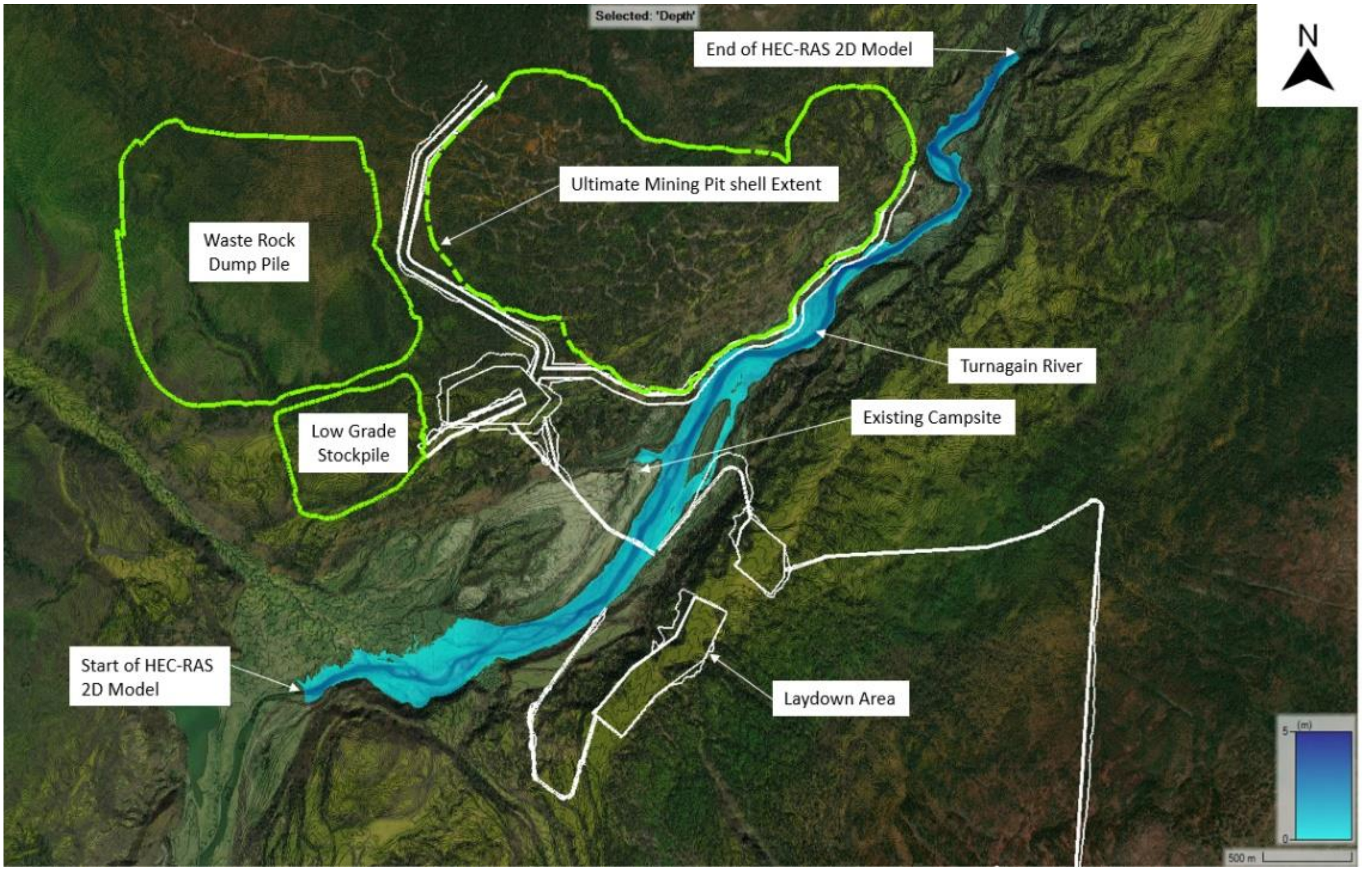


Figure 18-19: HEC-RAS 2D Flood Inundation Result for a 100-Year Return Period

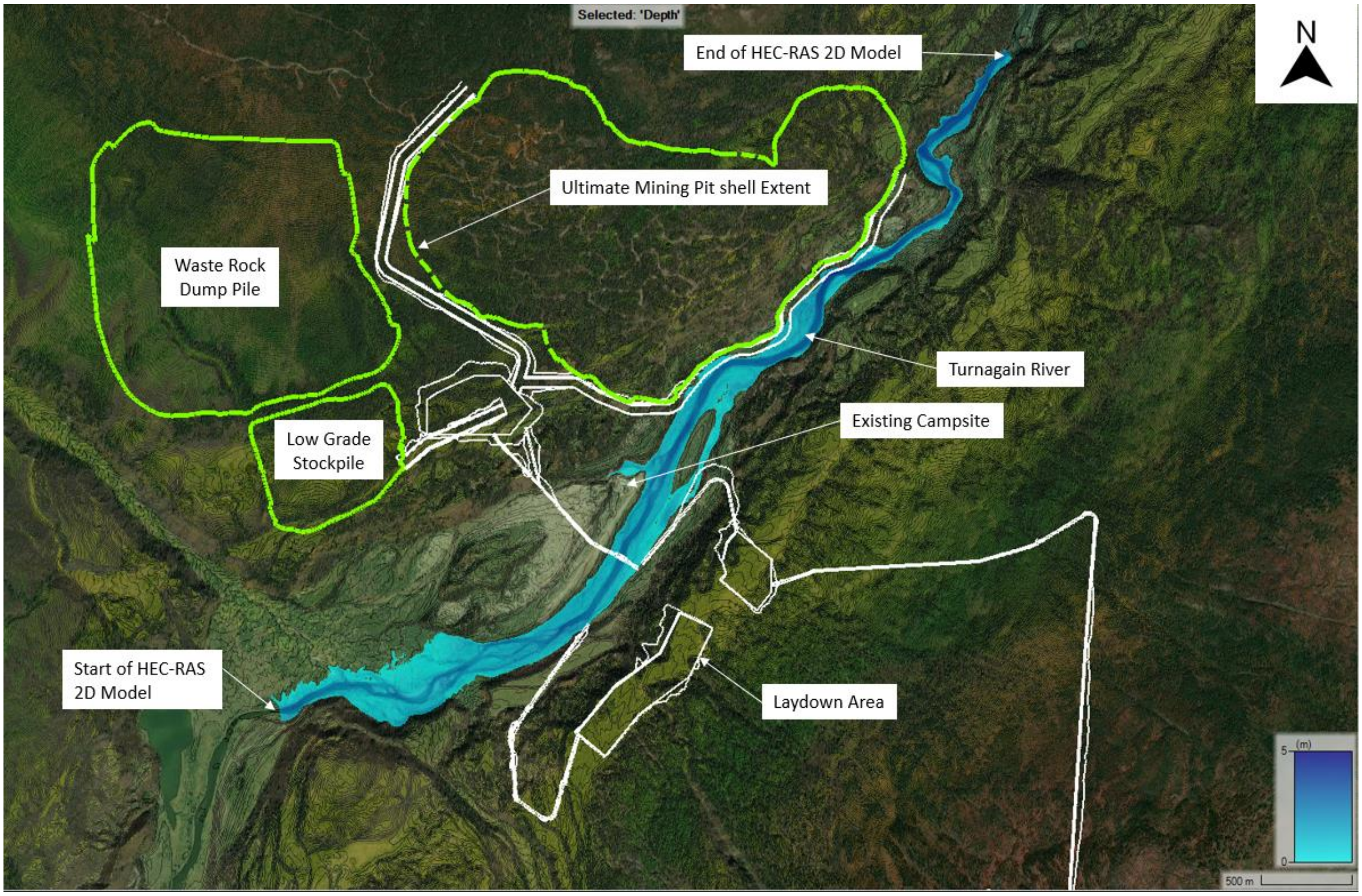


Figure 18-20: HEC-RAS 2D Flood Inundation Result for a 200-Year Return Period

18.8.2 GoldSim Site Wide Water Balance Model

A site-wide water balance model was developed using GoldSim. GoldSim is a comprehensive program for dynamic and probabilistic simulations to support management and decision-making for various engineering projects. The built-in Monte Carlo simulations allow future forecasting based on the selected probability distribution for various input parameters.

The forecasting results for the deterministic model are based on the following data/assumptions:

- Precipitation and rainfall are based on monthly maximum, minimum and average values as summarized at the BC400972 climate station for the project site described within the 2023 Hydrometeorological Characterization of the Turnagain Project report (Swiftwater, 2023).
- Groundwater inflow of 0.064 m^3/s is taken as the estimated stream baseflow for the Flat Creek River measured at the existing stream monitoring station as stated in the 2023 PFS Level Open Pit Slope Design report completed by BGC (BGC, 2023).
- A constant water seepage loss rate of 10^{-7} m/s (or 0.00864 m/day) is assumed over the entire TMF footprint. Tetra Tech recommends that a 2D/3D transient ground seepage model be developed to estimate seepage rates more accurately for the next study phase, including available volumes of water that could be recycled for mine operations.

- The density of settled tailings within the TMF remains constant at 72% (by weight) throughout the entire 30 years of mine life.
- No spillway is incorporated into the GoldSim model.

For the stochastic model, a uniform probabilistic distribution is assigned to the inflow components of precipitation and rainfall where there is an equivalent chance for either an average, wet, or dry season to occur every year.

At this project stage, estimated water quantities in both deterministic and stochastic models are based on the assumption of a 30% diversion rate from upstream catchments of the diversion ditches and recycling of 50% of the seepage through the TMF. These percentages would be adjusted to properly manage the water levels within the TMF to prevent water excess or deficiency scenarios. Forecasting tools could be developed to better manage the movement of water to maximize storage for operational needs.

Based on the results forecasted in the deterministic and stochastic models, mining operations should not be impacted by a lack of water. During extreme conditions, when minimum recorded precipitation occurs every month through the year, local sources of water (up to 0.3 m^3/s) will likely be required to make up the difference. However, it is worth noting that the GoldSim model is likely underestimating the water that could be captured along the seepage collection system. A greater seepage volume will likely be available and pumped back into the TMF for reuse. This will reduce the amount of water needed from other local sources. The water deficit can be alleviated with a proper seepage collection system and seepage recycling. Seepage will be minimized by proper seepage collection and recycle system and the water requirements will be addressed as necessary by varying the degree of diversion of catchment water.

Tetra Tech also explored using a stochastic model to review the results. The stochastic model was developed to capture the more extreme climatic conditions. The stochastic method also confirmed that a small amount of additional water (up to 0.3 m^3/s) will likely be needed to match the water demand during extreme conditions. The model also confirmed that wetter seasons during the first few years may force operations to impose greater control on the amount of water being managed. Figure 18-3 shows the elevation within the tailings pond for the first 10 years of operation with the sequence and timing of dam raises and its associative crest elevation.

It is important to note that the results presented are based on the initial preliminary data. As more site-specific information is collected, the model will be updated to reflect a better understanding of the water cycle within the site and its effect on the proposed operations during the next phase of the study. Overall, with appropriate management of the seepage collection system, diversion ditches capturing a portion of the runoff from the upstream catchments of the TMF and local sources of water, the TMF supernatant pond is expected to meet the water demand of the process plant.

It should be noted that the analysis completed to date was based on typical weather conditions likely to affect the project area. To estimate the consequence of the tailings dam, a more detailed analysis must be completed to meet CDA guidelines. These types of investigations are specifically designed to review the resilience of the dams during extreme events, which are often larger than a 1:1,000-year event. The suggestions made in this report are not intended to capture these more extreme events.

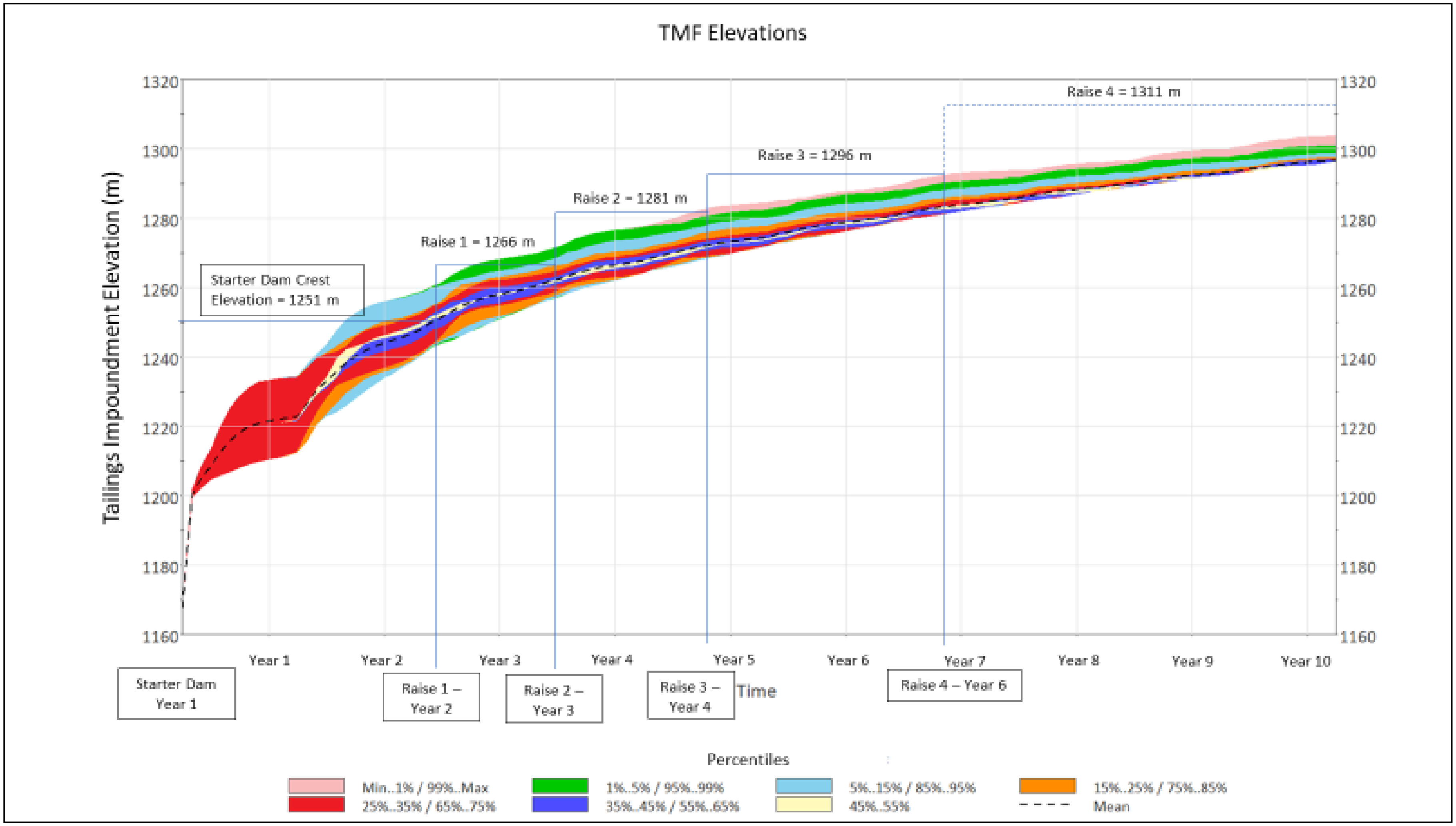


Figure 18-21: Elevation and Water Depth within TMF for the First 10 Years of Operation

18.8.3 Internal Drainage Conveyance System to Support Mining Plans

Overall site water management is a critical aspect of responsible mining practices. Effective water management is essential to ensure the safe storage, treatment and disposal of the water used in mining operations and minimize the potential environmental impacts associated with tailings storage and water discharge. The subsections below describe the drainage conveyance infrastructures that are being proposed within the two key areas where mining activities take place.

18.8.3.1 Mine-Influenced Area

Two separate ditch systems have been proposed. The first ditch system is intended to collect and divert non-contact water away from the active areas of the mine. The second ditch system is designed to capture contact water impacted by the mining activities and convey contact water to a settling pond. These areas are typically along the mine pit haul roads and within the footprint of waste rock storage facility, low-grade stockpile and mining pit shells. Reducing the amount of contact mine water generated decreases the contact water influx entering the onsite water treatment plant, reducing environmental impacts and minimizing costs. Approximately 5.2 km of clean water intercept ditches and 5.8 km of contact water intercept ditches are proposed.

Drainage swales will be constructed with Class-50 kg riprap underlaid by a non-woven geotextile to protect against fines migration. A settling pond is proposed to capture surface runoff and promote fine settlement. Any stormwater surface runoff and groundwater generated within the mine pit shell will be captured and pumped to the settling pond. The water from the settling pond will either be pumped to the TMF or processed at the onsite water treatment plant as needed prior to return to the environment.

18.8.3.2 Tailing Management Facility

Tetra Tech has proposed constructing diversion ditches along the outside perimeter of the proposed TMF to capture surface runoff from the upstream catchments, contributing runoff towards the valley where the TMF facility will be constructed. The proposed ditches divert runoff into Flat Creek to the west and Blick Creek to the east. Figure 18-22 shows an overview of the proposed diversion ditches and their associative catchments. The purpose of the diversion ditches is to:

1. Reduce flood risk within the TMF by minimizing stormwater surface runoff entering the tailings pond,
2. Protect the water sources feeding runoff/baseflow to Flat Creek and Blick Creek,
3. Divert excess runoff to the TMF during the freshet months to provide water needed for operations.

It is important to note that diverting surface runoff from the upstream catchments of the diversion ditches will have to be done in conjunction with a better understanding of the local hydrology. During future phases of development, a detailed hydrological model should be developed to better estimate the allowable withdrawal rates and excess runoff during freshet that could be diverted towards the TMF facility without impacting the downstream environment.

The diversion ditches are sized to capture storm events equivalent to a 1:200-year. The proposed ditches are to be lined with Class-100 kg riprap and where the profile of the ditches is steeper than 10% with check dams further protecting these ditches from erosion. Based on initial design plans, the slope of the diversion ditches will vary from a gentle slope of 0.5% to 1.0% for the sections running parallel to the tailings pond just before meeting the crest of either the saddle or the main dams to a much steeper slope of up to 20% for sections tying into the existing creeks.

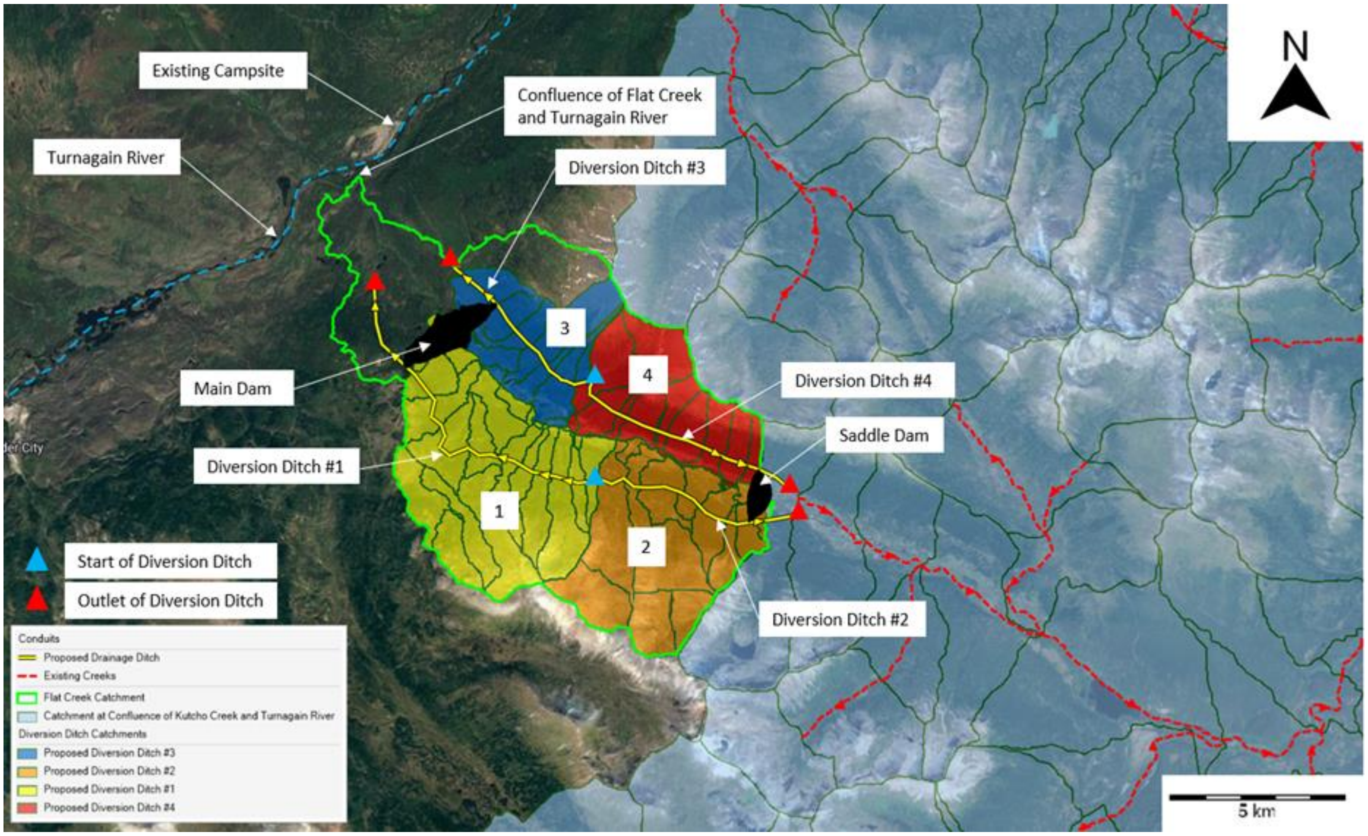


Figure 18-22: Catchment Areas Contributing to TMF and Diversion Ditches

18.9 Ancillary Buildings and Facilities

Ancillary buildings and facilities supporting mine production and ore processing have been designed using pre-engineered and modular construction to reduce cost and site construction. The ancillary buildings and facilities will be located to practically minimize the overall footprint and excavation effort and enhance operational efficiency. Wherever possible, the layout takes advantage of the local topography.

18.9.1 Maintenance Complex

The maintenance complex will consist of a 126 m long x 46 m wide pre-engineered building designed to accommodate facilities for repairing, maintaining and rebuilding mining equipment, haul trucks, light vehicles, and mobile equipment. The facility will also provide warehousing for spare parts and consumables, offices, lunchroom, washrooms and dry for truck shop personnel, first aid, emergency response station and necessary equipment storage.

The complex will be located near the mine site. The total usable ground floor area of the building will be approximately 5,800 m^2, including six heavy vehicle service bays, one wash bay, one tire change and lube bay, one light vehicle repair bay, first aid and emergency response station (where the fire truck and ambulance are stationed), a welding area, a machine shop, a warehouse, lockers, dry area and office spaces.

The vehicle service and wash bays will have vehicle access doors on both north and south sides to facilitate vehicle drive-throughs and eliminate the need for backing up vehicles or making U-turns, enhancing traffic safety for other road users.

The first aid and emergency response station will include a first aid room and separate ambulance and fire truck bays. It will also have storage for emergency response equipment and spill response trailer/equipment.

The machine shop will be outfitted with machine tools and cutting equipment. Ventilation fans and flash shields will be provided in the welding area for personal protection. Air compressors and receiver tanks inside the truck shop complex will provide compressed air for pneumatic tools.

A modularized lubricant storage enclosure will house tanks for storing lubricants, coolants and waste oil for the mine and plant mobile equipment fleets. The lubricant storage enclosure will also contain air-operated transfer pumps for supplying lubricants to the truck shop dispensing reels in the service bays. An enclosed and insulated pipe rack will connect the truck shop to the lubricant storage building. A separate modular exterior storage unit for waste oil and spent coolants will be provided. Waste lubricant recovery systems will pump used oil and coolant to holding tanks at the lubrication storage facility for recycling or disposal. A bermed spill containment area, sorbents and spill kits will be provided where the new and used fluids are stored. Fire-proof containers will be provided for storing used oily rags before disposal.

The warehouse integrated into the truck shop complex will house materials, service parts and supplies for mine and plant mobile equipment maintenance. The warehouse will be serviced by electric forklifts. A ready line outside the truck shop complex will provide parking for mine mobile equipment units awaiting service or repairs.

A fresh/firewater system will be provided at the northeast side of the truck shop. A modular self-framing building will house all the pumps and required ancillary equipment for the fresh/firewater system. The fresh/fire water storage tank will be located outside the building.

Change facilities with lockers, showers and washroom facilities will be provided for truck shop crews and will be located in the office and administration area. A lunchroom equipped with fridge, stove, microwave, dishwasher and cupboards will also be in the office and administration area.

18.9.2 Fuel Storage and Distribution

Diesel will be used for general site equipment, surface and mine mobile equipment, backup generators and other ancillary services. Modular diesel fuel tanks (known as "ISO tanks") will be used for fuel storage and transported to the site. The ISO tanks are double-walled. Each tank is protected by a boxy roll cage consisting of welded steel beams that protect the tank from external impact. The flow controls of the tank are valved. The valves will stay closed to prevent fuel leakage or escapement of fuel vapour. The tanks will be routinely inspected and tested for preventive maintenance. Each tank will have leak detection instruments that measure the vacuum between the tank walls. Tanks with a lower-than-normal vacuum reading will be removed from operation and sent to the maintenance shop for diagnosis and repairs.

The ISO tanks will be placed in a designated fuel farm area adjacent to the truck shop complex, providing approximately one week of fuel storage capacity. A modular fuel dispensing station will provide a means of fuelling mobile equipment. The ISO tanks will be transported to and removed from the site by the fuel supply vendor for refuelling. Spill containment berms and fuel-resistant liners will protect the ISO tank storage area. The designed containment volume of the spill containment area will be at least 110% of the capacity of the largest fuel storage tank in the containment area. Any fugitive fuel within the containment area will be remediated immediately. The containment areas will be instrumented with monitoring devices, alerting the control centre of any detected leakage or spillage. Spill response vehicles and equipment will be stationed at the truck shop complex, on standby 24/7 and dispatched immediately when required.

Propane storage vessels will be provided for field maintenance and space heating fuel.

18.9.3 Administration Building and Mine Dry

The administration building will be a 50 m x 24 m two-storey modular building with a total floor area of 2,400 m^2 to accommodate administrative, engineering, mining, geology and environmental personnel. The building will have a lunchroom, offices, workstations and conference rooms for mine personnel. The lunchroom will have a fridge, stove, microwave, coffee maker, dishwasher and cupboards. The office spaces shall have furniture such as desks, chairs, computers and telephones. The ground floor will house separate lockers for men and women, restrooms, change space and janitorial, electrical and mechanical rooms.

18.9.4 Construction and Operation Accommodation Camp

Onsite camp accommodation for construction personnel will be provided during the construction phase. The camp will consist of modular building sections for reception, office space, storage, utilities, kitchen, dining hall, single-occupancy rooms and recreational space and will be connected with prefabricated fire-rated egress corridors.

The accommodation camp area will be fence-secured and have dedicated fresh and fire water tanks. The other support facilities will also be located around the camp building, including parking, an electrical house, a waste incinerator, a potable water supply and treatment, a modular rotatable biological contactor sewage treatment unit and a septic pond.

Appropriate fire detection, suppression and communication equipment will be installed. The camp will be built for occupancy, with all electrical, communication, lighting, mechanical, sprinklers, plumbing equipment and fixtures, finishes, furniture and related items, as well as inspected, tested, pre-wired, pre-piped and pre-assembled as much as practically possible before shipment to site. All dorm rooms will be single occupancy only. Each dorm room will have a bathroom, plumbing fixtures, light fixtures, windows, bed, desk, chair, closet, baseboard heater, 110 V outlets, internet/WiFi and cable TV.

After construction, the camp will be refurbished for the operations staff. During operation, six 50-person dormitories (300 single-occupancy rooms) will be required.

All construction and operation personnel will be flown in regularly to Dease Lake Airport by a flight service contractor and then transported on the ground from Dease Lake Airport to the site.

18.9.5 Medical/First Aid

First aid posts will be provided at the accommodations camp, processing plant and truck shop complex. A full-time nurse will be in attendance at the first aid station at the camp. A fully equipped ambulance with advanced life support will be located at the truck shop complex. Emergency Med-Evac air ambulance services will be contracted out to registered services in the nearby communities. A helipad will be located near the accommodation camp.

18.9.6 Security/Gatehouse

Access to the Project site will be monitored and controlled by security on site. A security gatehouse will be provided near the site entrance. The gatehouse will be a 6.1 m x 3.6 m single-storey modular building with a waiting area for visitors, a reception counter and a washroom and will be staffed by the site security 24/7. The gatehouse will control all incoming traffic and supply deliveries. All personnel coming to the site will report directly to the gatehouse.

18.9.7 Cold Storage

A cold storage building is required for the short and long-term storage of consumables requiring protection from environmental elements such as rain and snow. The building will be a 32 m x 16 m insulated, unheated, single storey sprung structure. The building will have light vehicle truck access doors at each end and accompanying main access doors adjacent to the vehicle doors. The building will be provided with interior and exterior lighting.

18.9.8 Onsite AN Storage

Blasting accessories will be stored in magazines adjacent to the mining areas suitably located to meet federal and provincial regulations and to avoid potential geohazards. Loading of the explosives will be done with bulk explosives loading trucks provided by the explosive supplier. The detailed information is provided in Section 16.9.1.

18.9.9 Laydown Area

Open area storage areas will be provided for construction laydown, operations and maintenance storage for equipment and materials.

18.10 Power Supply

KWL was retained in 2020 to investigate power supply options to support the development and operation of the Turnagain Mine, located about 65 km east of Dease Lake in northwestern BC. Those investigations confirmed that a transmission line connection to BC Hydro's electrical grid is preferred, from both a cost and a GHG emissions perspective, over onsite generation fueled by Liquified Natural Gas (LNG).

HCNC subsequently retained KWL in late 2021 to further analyze that transmission line connection to BC Hydro's electrical grid to supply the power to operate the mine. This power supply analysis was based on technical issues relevant to transmission line routing, design and construction. In addition, it did not have the benefit of field investigation, detailed mapping or BC Hydro design drawings. Other important considerations, such as environmental and social impact studies, public consultation, involvement of Indigenous groups, continuing discussions with BC Hydro and discussions with appropriate government agencies (e.g., Ministry of Transportation and Infrastructure, Ministry of Forests, BC Parks) were not part of KWL's scope of work. While adequate for this PFS phase, the next phase will require field investigations, detailed mapping and more definitive tower design information (either from BC Hydro, from other sources or to be developed).

The voltage of the proposed transmission line from BC Hydro's Tatogga Substation (near Iskut, BC) to the Turnagain Mine site is assumed to be 287 kV, constructed to the same (or similar) design as BC Hydro's 287 kV NTL between Bob Quinn Substation and Tatogga Substation. This 287 kV transmission line voltage is sufficient for the full buildout power loads of Turnagain Mine. It is noted that the use of appropriate 287 kV tower and foundation designs (acceptable to BC Hydro) would preserve the option of transferring ownership of the transmission line, or parts of it, to BC Hydro upon completion of construction if that is desired by the parties.

A transmission line route 160 km in length from BC Hydro's Tatogga Substation to the Turnagain Mine Site was developed. This route, generally along the Highway 37 and Boulder Access corridors (which preserves the option for a subsequent power line connection to the community of Dease Lake), is shown in Figure 18-23.

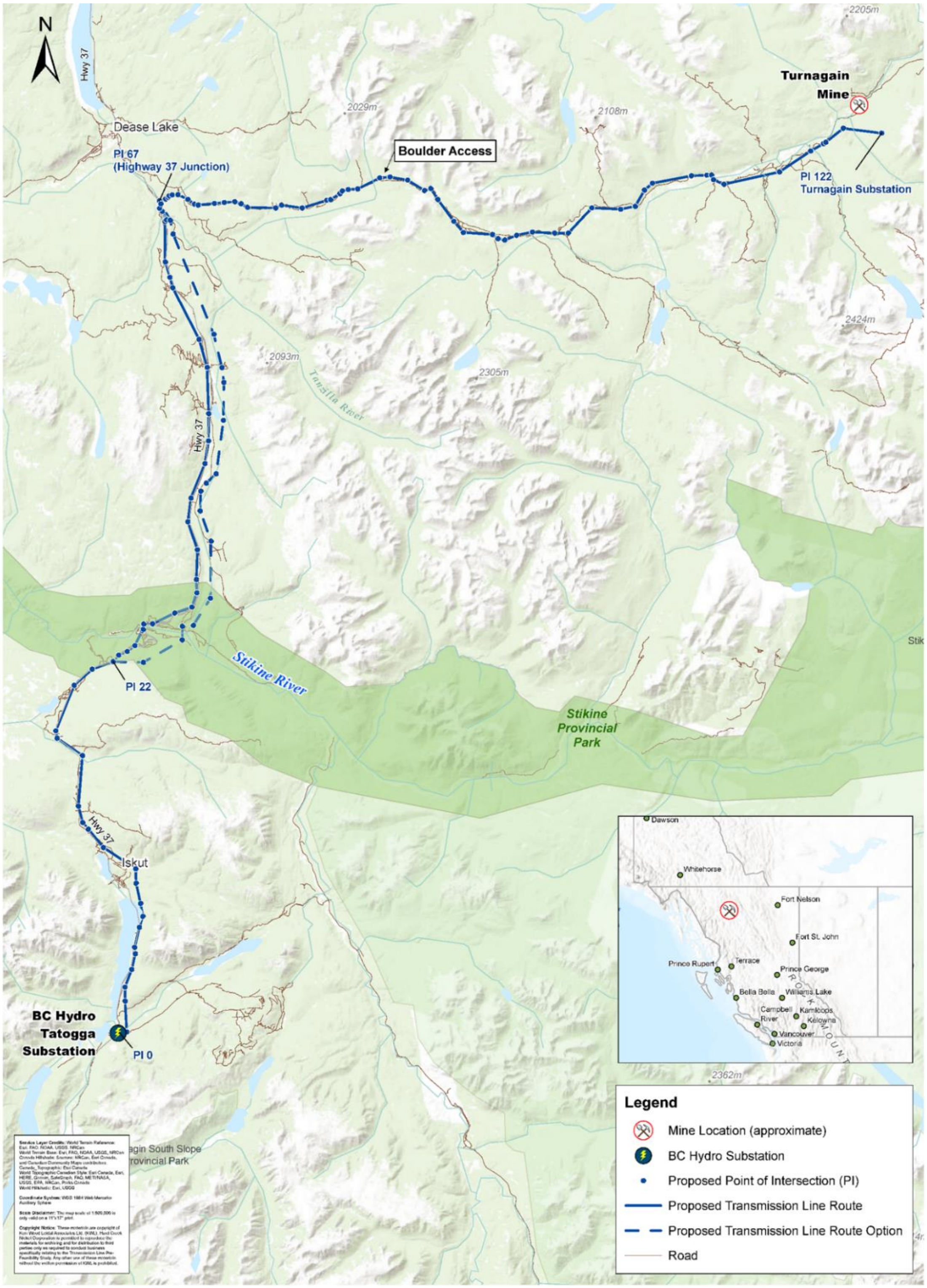


Figure 18-23: Turnagain Mine Preliminary Transmission Line Route (KWL, 2023)

The preliminary layout of towers along this route resulted in a total transmission line tower count of approximately 525 towers, comprising both guyed and self-supporting tower types (Figure 18-24 and Figure 18-25). It is possible that a different route, generally in a north-easterly direction from the Tatogga Substation to the Turnagain Mine Site, may also be an option. Technical and environmental/social impact studies and other considerations (e.g., Indigenous groups' involvement, government/public involvement and regulatory review) on both the selected route and the alternate route would determine the final (preferred) route.

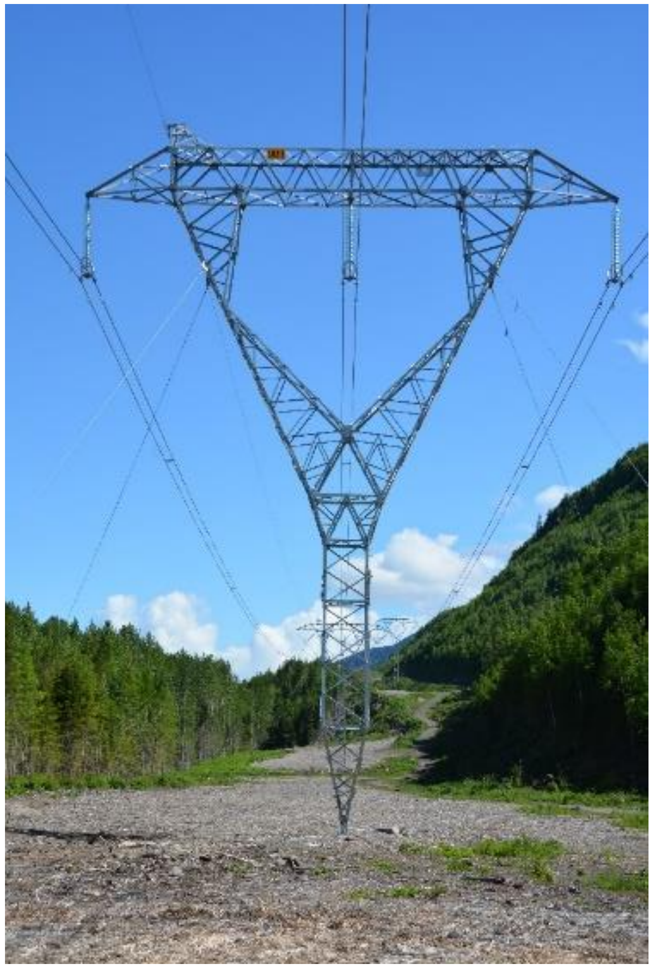


Figure 18-24: Typical 287 kV Guyed Tower

Figure 18-25: Typical 287 kV Self-Supporting Tower

Based on the preliminary route, KWL prepared a summary of transmission and substation component quantities, along with other related items such as the hectares of transmission line right-of-way to be cleared of vegetation and the kilometres of access roads required to access the tower sites for construction and maintenance. This would facilitate the preparation of a cost estimate for the proposed transmission line to serve the Turnagain Mine. Tetra Tech was responsible for the preparation of that cost estimate for the power supply based, in part, on KWL's transmission line analysis.

In 2022, HCNC initiated a conceptual study with BC Hydro to investigate upgrades required to the BC Hydro system to supply the power to the Turnagain Mine from the Tatogga Substation. The results of this study will provide a preliminary analysis of reinforcements required to the BC Hydro electrical system to accommodate the Turnagain Mine power requirements.

At present, there is likely sufficient available power on the BC Hydro electrical system at Tatogga to serve the Turnagain Mine electrical load. However, there are numerous large potential mines, LNG and other loads in the confidential BC Hydro Transmission Queue. If some of those projects proceed, upgrades to the BC Hydro system may be required. Further, BC Hydro is building three series capacitor stations between Prince George and Terrace to increase transfer capacity and has announced that planning for a second 500 kV power line from Prince George to Terrace has started. If other loads are developed on the NTL between Terrace and Tatogga, upgrades may be required to the NTL.

For the FS of the Mine, HCNC will need to initiate a System Impact Study with BC Hydro to reserve a spot in the Transmission Queue. In addition, BC Hydro has issued a Request for Expressions of Interest by future loads in northwestern BC to assist in establishing justification for power line upgrades in the region. HCNC is engaged in this process.

18.11 Power Distribution

The annual average energy consumption for the mine and processing plant is estimated to be approximately 1,294 GWh, with a running load demand of approximately 150 MW for the processing plant.

18.11.1 Main Substation

The 287 kV transmission line will terminate at the main 287 kV substation near the processing plant. The fenced 287 kV substation will contain an incoming tower structure, isolation switches, circuit breakers, transmission line compensation reactor, provision for utility metering and bus work for the 287 kV - 69 kV main power transformers and 69 kV distribution. The main substation will step down from 287 kV to 69 kV for site power distribution.

The substation will be an air-insulated design since the main substation has no size restrictions. The 287 kV incoming and transformer circuit breakers will use point-on-wave switching as required by BC Hydro.

The main substation will include the following major equipment:

- Two (2) 287 kV to 69 kV, primary 150/200 MVA ONAN/ONAF, secondary 100/125 ONAN/ONAF and tertiary 50/75 ONAN/ONAF oil-filled power transformers with automatic online tap changers. The main transformers are redundant with both transformers in operation. Each transformer is sized to fully handle the plant loads,
- One (1) 287 kV, 35 MVAR transmission line compensation reactor,
- Seven (7) 287 kV rated point-on-wave incoming and transformer circuit breakers,
- Sixteen (16) 69 kV live tank feeder circuit breakers and associated bus work,
- Twenty-six (26) 287 kV rated motorized disconnect switches/ground switches,
- Twenty-two (22) 69 kV rated motorized disconnect switches/grounding switches,
- Five (5) 180 kV MCOV surge arresters,
- Four (4) 73 kV MCOV surge arresters,
- Four (4) neutral grounding resistors,
- 287 kV open bus work and support structures,
- 69 kV open bus work and support structures.

18.11.2 Site Power Distribution

69 kV

Power will be delivered to the site via an overhead 69 kV, 3 phase – 3 wire, low resistance grounded system.

The primary crusher will be fed from a 69 kV to 13.8 kV substation connected to the 69 kV overhead system.

The processing plant area will be fed by a 69 kV to 13.8 kV substation connected to the 69 kV overhead system. The substation will have two redundant 69 kV - 13.8 kV, 25/30 MVA ONAN/ONAF oil-filled power transformers. Each transformer is sized to fully handle the processing plant area loads.

The mining electric shovels and drills will operate at 7.2 kV. Power will be provided by portable 69 kV to 7.2 kV substations fed from the perimeter pit 69 kV pole line. 600 V power supply will be available at the portable substation for pit dewatering.

A 69 kV overhead distribution will supply power to remote loads, including the truck shop, water treatment plant, water pumps from the water collection pond, explosives facility, reclaim water barge and booster pumps, permanent camp and other ancillary buildings. Local substations will step down the voltage from 69 kV to the local distribution voltage as required.

The trolley assist system will be fed from the 69 kV overhead distribution. The trolley assist system structures will be designed to also support the 69 kV overhead lines to the DC substations. The DC substations will step down from the 69 kV voltage to the required voltage for rectification to DC for the trolley assist system.

The ball mills are the major power consumers for the processing plant. The four ball mills will be fed via dedicated 69 kV overhead feeders and step-down transformers to 13.8 kV. The ball mills will each be equipped with two 11,000 kW water-cooled low-speed synchronous motors and VFD.

13.8 kV

13.8 kV, 3 phase – 3 wire, low resistance grounded system will be used to distribute power within the plant process area. The power to the 13.8 kV substation at the main processing plant and the cone crusher / HPGR building will be delivered via 13.8 kV medium voltage power cables.

4.16 kV

The ball mills will be fed directly at 13.8 kV. Other large motors (rated 224 kW and greater) will be fed at 4.16 kV, derived from 13.8 kV to 4.16 kV substation, using outdoor liquid-filled step-down transformers. The 4.16 kV system will be 3 phase – 3 wire, low resistance grounded.

600 V

Motors rated from 0.37 kW to 224 kW will be fed from one of several 600 V systems. Generally, these systems will consist of FR3 liquid insulated 13.8 kV to 600 V step-down transformers, feeding a 600 V power distribution centre, which feeds a series of 600 V MCCs. The 600 V distribution system will be 3 phase – 3 wire, high resistance grounded.

120/208 V

Small motors rated below 0.37 kW, general power and lighting will be fed from 208 / 120 V systems. Generally, indoor, dry-type transformers convert voltage from 600 V to 120 V in electrical rooms.

18.11.3 Construction and Emergency Power

Modular diesel generator sets will provide power for camps, plant construction sites and other initial construction-related facilities. The construction generating stations will be modular, with switchgear and designed for PLC automatic unattended operation. Each backup power station will include environmentally approved double-walled fuel storage tanks and associated piping.

After initial construction, several construction gensets will be retained and reconfigured to serve as future standby/emergency generation for the mine, processing plant and accommodation centres.

18.12 Communication System

For permanent communications, a fibre optic cable will be installed over the 70 km transmission line from Highway 37 to the mine site. Tahltan Communications (a partnership between Tahltan Nation Development Corporation (TNDC) and CityWest Cable and Telephone Corporation) is constructing over 200 kilometres of new fibre optic cable in unison with fibre optic strands that are part of the BC Hydro NTL to provide high-speed Gigabit connectivity to the communities of Iskut and Dease Lake. An interconnection to this line will provide communications to the Turnagain site over the fibre on the 287 kV transmission line. Fibre optic cable and microwave tower will allow for the installation of dedicated cellular service.

A site-wide fibre optic communication system will be installed in conjunction with the power distribution system at the Turnagain site. The system will provide wireless communication for voice, internet and intranet traffic for all occupied buildings. The communication system will include:

- Voice over Internet Protocol technology using wide area network (WAN) links for voice communications and video conferencing,
- Ultra-high frequency (UHF) radio system with provision for handheld and mobile units,
- A telephone PBX system and cellular phone service for telephone communications,
- Television for camp,
- A base and client station to provide wireless connection to the network system, including a smart card access system to enable secure login to the network for desktop and laptop users.

In addition, uninterruptible power supplies will be used to provide backup power to communication and critical control systems to facilitate the orderly shutdown of process equipment and backup computers and control systems.

18.13 Fresh Water Supply

Freshwater for the Turnagain site will be pumped from groundwater wells. Two separate freshwater supply systems will be used to provide fresh and potable water, one at the mine site (near the truck shop) and the other at the plant site. All freshwater pipelines outside heated buildings will be buried below frost level. The freshwater will primarily be used for the following:

- Firewater for emergency use,
- Reagent preparation,
- Mill cooling water,
- Dust suppression,
- Potable water,
- Make-up water for process, if needed.

Fresh/firewater will be stored in separate fresh/fire water storage tanks at the plant site and at the mine site, both with a fire water reserve. Both tanks will always be full and capable of providing at least two hours of firewater in an emergency at 2,000 US gal/min at a 110-psi boost. A firewater loop will be installed throughout the site with a backup diesel pump and jockey pump to supply water to the fire hydrants. Fire extinguishers and automatic sprinkler systems will also be installed throughout the facilities. Emergency showers and eyewash stations will be established at predetermined locations. Fire alarm systems will report to the emergency response/first aid unit located at the truck shop complex, which will be monitored 24 h/d. Dedicated fire mains complete with hydrants will be provided at the accommodation camp.

The potable water will be treated via chlorination and ultraviolet lamps and stored in a potable water tank at the plant site before delivery to various service points. Potable water for the mine site will be provided as bottled water from the plant site system. Potable water for the accommodation camp will be supplied by groundwater wells near the camp with dedicated water treatment units and storage tanks.

18.14 Waste Disposal

18.14.1 Sewage Treatment and Disposal

Sewage from the accommodation camp and other site facilities will be collected and treated using a rotating biological contactor (RBC)-based sewage treatment module. The treatment module will consist of a preliminary sedimentation tank, RBC, a secondary sedimentation tank and finally, UV disinfection. The treated water will be recycled or discharged to the environment per the requirements of the Environmental Impact Assessment and effluent permits or approvals. Residual solids/sludge will be shipped offsite twice a year by a specialized licensed contractor for final disposal. Washroom and dry facilities in remote buildings will be serviced by a vacuum truck.

18.14.2 Hazardous Waste

All the hazardous waste will be segregated and placed into designated containers at the point of generation. All the collected waste will be temporarily stored onsite and shipped offsite to a recycling or disposal facility. Some of the typically generated hazardous waste handling protocols are listed below:

- Waste oil and organic waste liquids such as antifreeze, solvents and grease will be shipped to an offsite recycling facility,
- Old tires will be used to construct vehicle protection barriers on the haul roads; where necessary, any excess tires will be shipped to an offsite recycling facility,
- End-of-life electronics, light bulbs and batteries will be collected and shipped to an offsite recycling facility,

- Soil contaminated with hydrocarbon will be collected and treated in a bioremediation land farm near the onsite landfill. In the land farm, the contaminated soil will be spread 30 cm to 45 cm thick layer and tilted and treated with fertilizer to promote bacterial growth and activity. Soils will be monitored for pH, water content, nitrogen compound concentrations, microbial population density and others to ensure optimal conditions for biodegradation. The land farm will be lined and runoff water will be collected and treated before being sent to the tailings facility. Bioremediated soil will be stockpiled in the waste rock facility or used in progressive reclamation projects.

18.14.3 Non-hazardous Waste

Non-hazardous waste will be separated into putrescible and non-putrescible waste. The putrescible waste, such as food, will be segregated and incinerated at an onsite facility, with clean, efficient combustion supported by electric dual chamber incinerator.

Non-putrescible, recyclable waste will be collected and stored in an onsite landfill or shipped to an offsite recycling facility. The landfill will be periodically covered under a layer of NAG waste rock to reduce windborne pollution from the waste. The runoff water from the landfill will be collected and treated at the onsite water treatment facility. All avenues of reuse, reduction and recycling of materials will be examined and implemented before waste disposal.

19.0 MARKET STUDIES AND CONTRACTS

19.1 Overview

Market information is derived from a number of sources, including a study on metals supply, demand, pricing and payability commissioned from Benchmark (2023).

Nickel (in sulphide concentrate) is the primary revenue product of the Turnagain Project, making up 85–90% of the projected revenue. Nickel demand is forecast to grow strongly over the coming decades due to growth in both traditional markets (primarily stainless steel) and new energy markets (primarily EV batteries). Total demand is forecast to grow by 150% by 2040, with ~70% of the growth coming from EV demand growth and ~20% from stainless steel demand growth. The Compound Annual Growth Rate (CAGR) forecast is 5.3% for nickel total, with 13% CAGR for batteries and 2.3% for traditional uses. Nickel metals pricing is projected to remain robust, the base case is selected as **$21,500/t Ni**, which is 19% below the inflation-adjusted 20-year historical value (average $26,700/t). Nickel content in sulphide concentrate is typically 8–15% and payability for the high-grade Turnagain concentrate (18% Ni) is forecast at **78% of contained nickel** net of smelting and refining charges.

Cobalt is a secondary revenue product projected at <10% of total project revenues. Cobalt demand is also expected to grow strongly despite efforts to thrift cobalt from batteries over the last few years. Cobalt metal pricing is forecast at **$58,500/t Co**, slightly below the inflation-adjusted 20-year historical value (average $60,000/t). Cobalt is often considered to be priced as a function of nickel: based on the nickel forecast price above, the 5-year, 10-year and 20-year historical price ratios would deliver cobalt price projections of $58,200, $63,700 and $54,100/t, respectively, approximately bounding the forecast price by +/-10%. Smelter payability for Turnagain's relatively high cobalt in concentrate is forecast at **50% of contained cobalt** net of smelting and refining charges.

Although the Turnagain deposit contains copper and a portion of this is demonstrated to deport to the concentrate, copper has not been included in the resource and reserve modelling and no payability for copper is assumed at this time.

PGM price forecasting is challenging due to changing markets. A historical price analysis shows the counter-cyclical behaviour of platinum and palladium and a lower variability for an average price than the individual prices. An average PGM price of **$1,200/oz Pd or Pt** is recommended. This is 10% below the 20-year historical average inflation-adjusted price, which is itself lower than the 5-year and 10-year averages. PGM payability tends to be on a deduction basis and is recommended at **90% payability after a 1 g/t deduction** (each metal) with a $50/oz refining charge.

PGMs are expected to be of generally low value to the Turnagain project. Due to the uneven distribution of PGMs through the deposit, the PGM value will at times be more significant and the approach to PGM payability will deliver more-than-proportional revenue gains for higher-grade concentrates but may deliver zero or near-zero payable metals for lower-grade concentrates.

Nickel and cobalt payability is expected to be higher for hydrometallurgical treatment of concentrate due to higher recoveries than smelting, but PGM payability is expected to be zero.

19.2 Nickel Markets - Demand

Nickel is predominantly used in the production of stainless steel (~65–70% of nickel demand), with the balance being consumed for batteries, high nickel alloys and other chemicals uses. Consumption estimates for 2022 (3.0 Mt) and 2040 (7.6 Mt) are given in Figure 14-1.

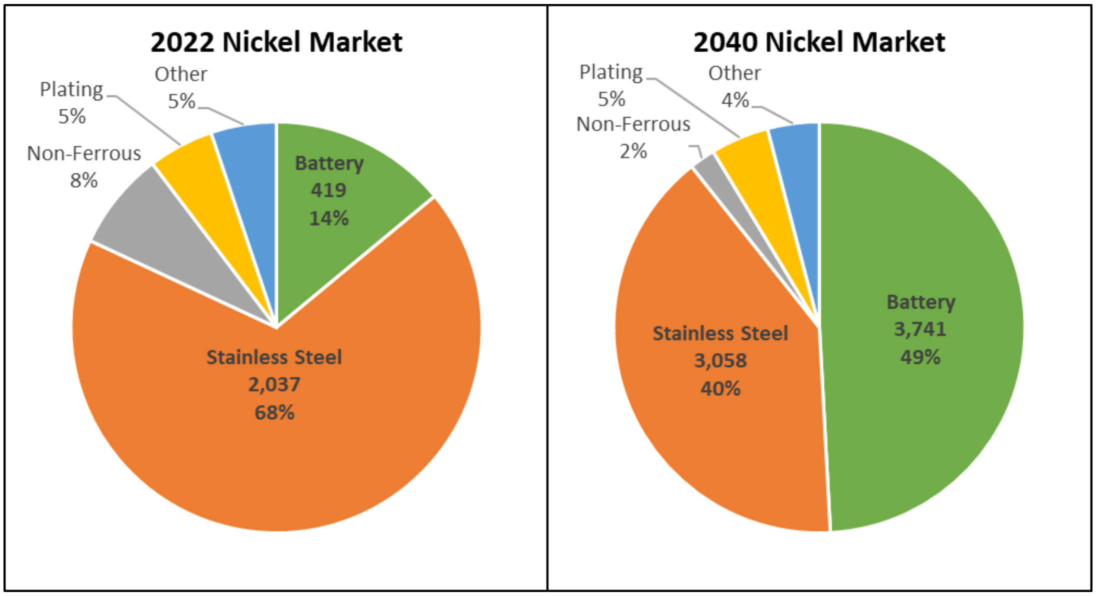


Figure 19-1: Nickel Consumption and Expected Growth

(Source: Giga Metals, 2023, based on data from Benchmark)

Although all sectors are growing, the batteries sector is growing very rapidly—from a smaller current consumption level—while the stainless-steel sector is growing more slowly from a large consumption base. The CAGR for batteries is forecast at 13% vs. 2.3% for stainless steel and other uses. Figure 19-2 shows the expected growth in nickel demand to 2040, with 1.3 Mt/y of growth in the stainless steel and other market from 2022 and 3.3 Mt/y of growth in the batteries segment.

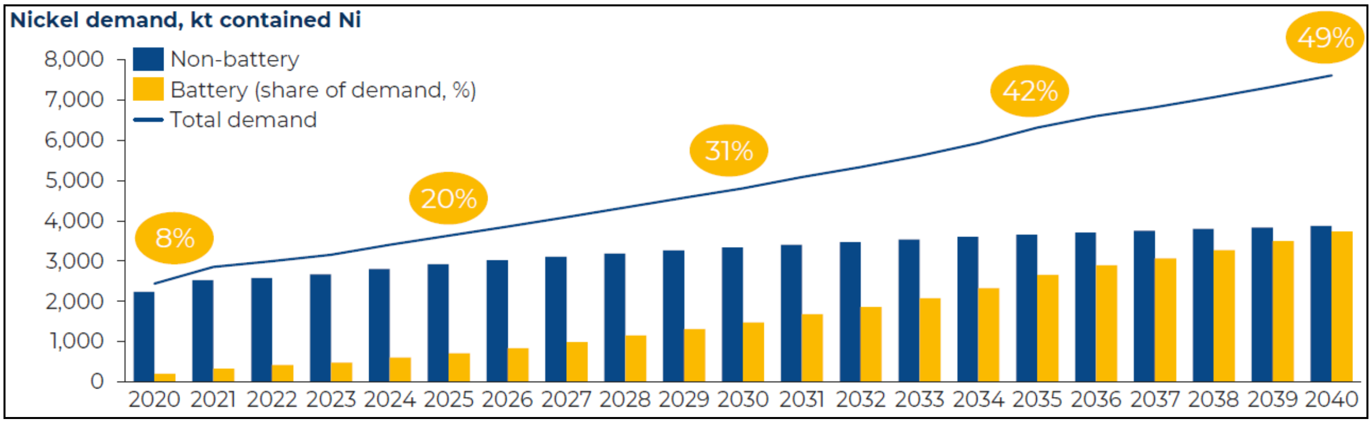


Figure 19-2: Nickel Demand and Expected Growth

(Source: Benchmark, 2023)

The International Energy Agency (IEA) publication "Global EV Outlook 2022" agrees with this rapid rise in nickel demand. The report shows demand rising sharply under the two development scenarios (Stated Policies – STEPS and Announced Pledges – APS) as shown in Figure 19-3, with a growth between 1.6 to 2.3 Mt/y by 2030—or 40 to 60 new mines of 38 kt/y globally-significant mine scale. The APS scenario is only slightly higher than the Benchmark forecast shown in Figure 19-2.

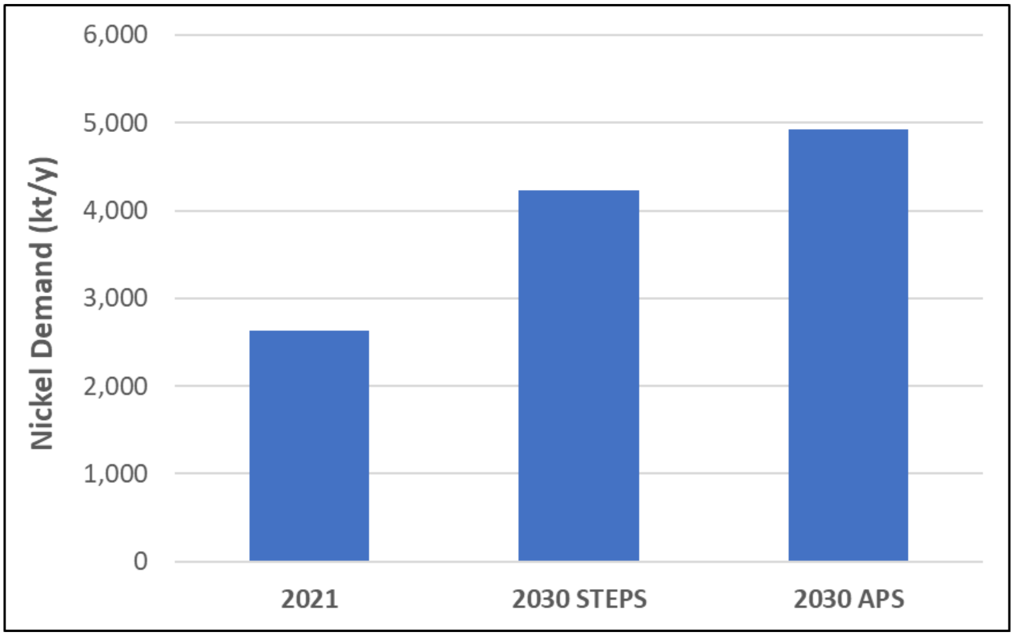


Figure 19-3: Forecast Nickel Demand Growth

(Source: Giga Metals, 2023; data from Global EV Outlook 2022, IEA [https://www.iea.org/reports/global-ev-outlook-2022])

This is a marked step up from the expectations set just one year earlier in the IEA publication "The Role of Critical Minerals in Clean Energy Transitions", where the 2030 and 2040 nickel demand estimates were forecast in the STEPS Scenario as 3.5 Mt (2030) and 4.0 Mt (2040). The more aggressive Sustainable Development Scenario showed demand rising to 6.3 Mt by 2040. The change in demand by 2030 forecast by the IEA for the STEPS Scenario (1.56 Mt vs 0.86 Mt) is an 81% increase in the forecast growth this decade.

19.2.1 EV Demand

Given that the majority of the increased demand is expected from EVs, a more detailed analysis is provided below.

The IEA Global EV Outlook report shows demand for EV battery use is forecast to rise sharply to meet the decarbonization agenda. The expected growth in vehicle-only battery demand to 2030 is shown in Figure 19-4, showing growth across all vehicle types and regions in both the STEPS and APS development scenarios.

The Benchmark analysis shown in Figure 19-5 broadly agrees with the IEA analysis. The figure provides a longer-term demand forecast out to 2040. The forecast is similar to the IEA forecast for 2030 (2.8 TWh vs. 2.2 TWh STEPS and 3.5 TWh APS). Benchmark forecasts that the majority of demand will remain nickel-based, with Lithium-Iron Phosphate (LFP) batteries accounting for 30–40% of the market. Of the Nickel-Cobalt-Manganese (NCM) batteries, high-nickel forms are expected to dominate, with over 80% of the NCM share after 2030. The Benchmark analysis factors in both growth in LFP for entry-level vehicles and the use of nickel-manganese battery forms; Benchmark does not expect a rapid penetration of high-manganese batteries. All market participants reviewed suggest significant growth in nickel demand regardless of the level of penetration of LFP and low-nickel batteries.

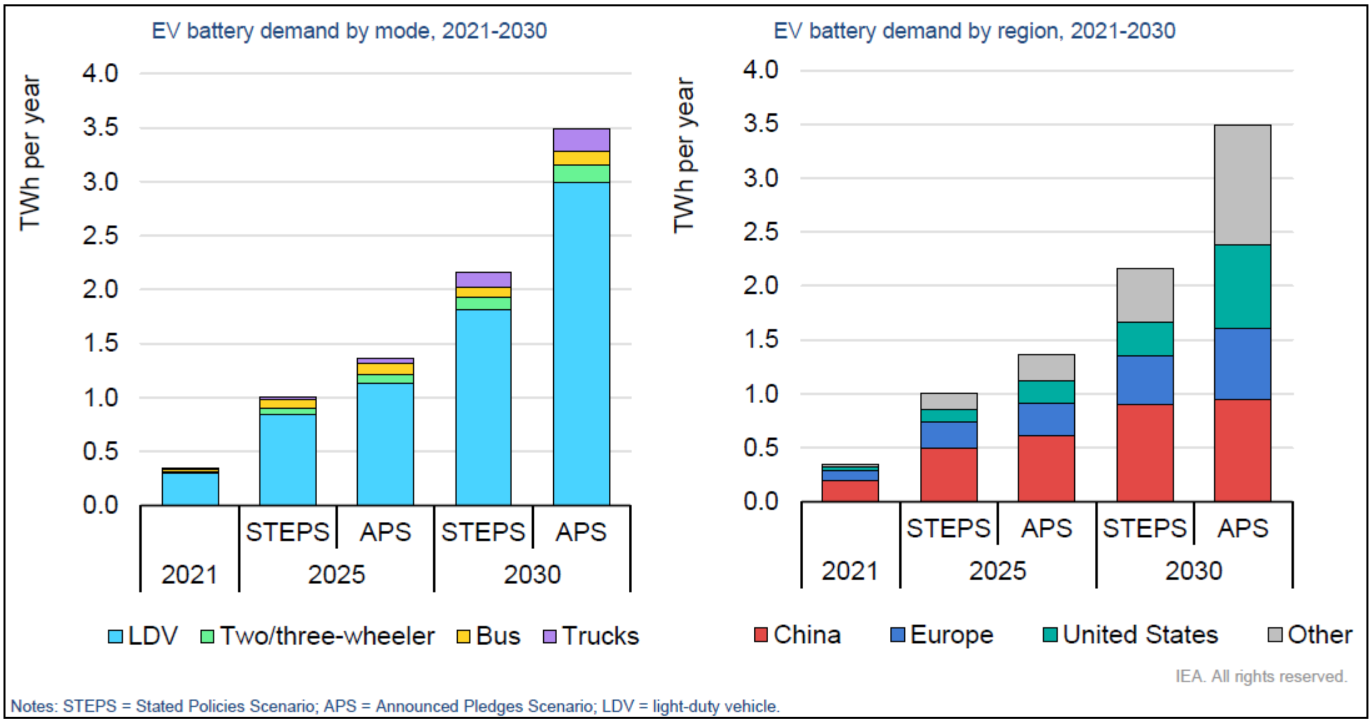


Figure 19-4: Forecasted EV Battery Growth by Mode and Region

(Source: Global EV Outlook 2022, IEA [https://www.iea.org/reports/global-ev-outlook-2022])

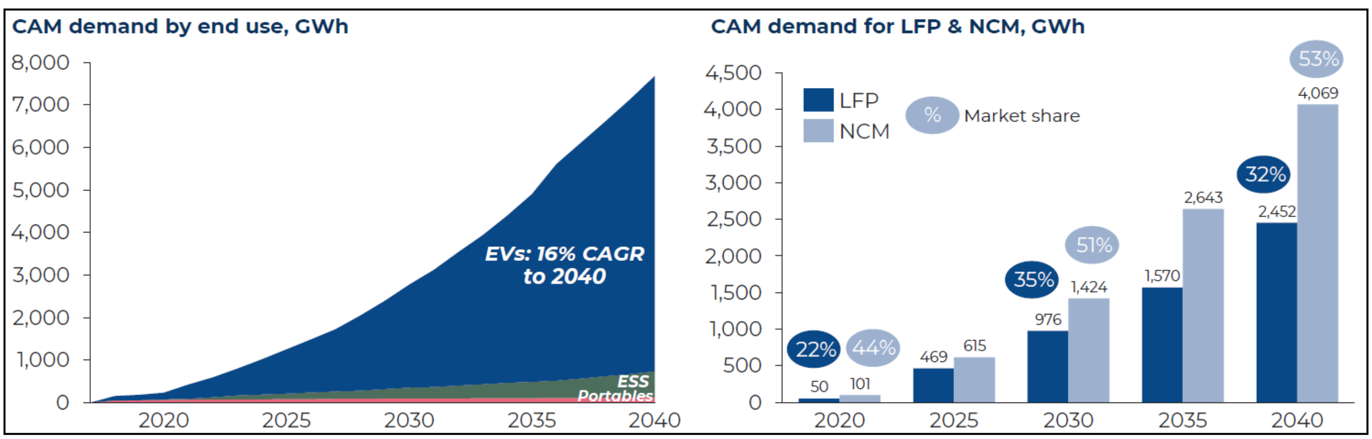


Figure 19-5: Forecasted EV Battery Growth by End Use

(Source: Benchmark, 2023)

Due to recognized Environmental, Social and Governance (ESG) concerns with Asian nickel production (carbon footprint, deforestation, biodiversity, etc.), the development of most new nickel supply in Asia may provide a significant incentive for new supply from high-ESG producers in certain jurisdictions: those with low environmental footprints (particularly carbon dioxide emissions) operating in recognized jurisdictions with tight regulatory systems.

This preference is expected to be positive for Turnagain and other Canadian nickel projects. A second potentially significant development flagged by Benchmark in their analysis is the proposal in the European Union for mandating recycled material supply in new batteries. This is considered beneficial for high-nickel batteries as the economics of recycling nickel-containing batteries, particularly NCM and (Nickel-Cobalt-Aluminum) NCA is significantly better than for LFP batteries.

19.3 Nickel Supply

World supply has been growing strongly over the past 20 years, primarily to support stainless steel demand growth with battery demands only recently becoming a significant feature. Much of this growth has come from Indonesian laterite projects, both nickel pig iron and, more recently, high-pressure acid leaching projects. Mined nickel supply from Indonesia has risen from 32% of 2.5 Mt/y in 2019 to a 48% of 3.4 Mt/y in 2022 and is forecast to rise to 55% of 4.3 Mt/y in 2025 and 65% in 2030 (Benchmark, 2023). The Wood Mackenzie (2023) short-term outlook indicates total Asia mined nickel supply is expected to rise from 50% in 2019 to 69% by 2025. The Asian dominance is even higher in finished nickel capacity, where Asian-controlled supply is expected to rise from 61% (2019) to 75% (2025). Total finished nickel supply from Western and allied Asian countries (Europe, North America, Oceania, Japan, Korea) is forecast to remain relatively stable in absolute terms (~875 kt/y) while falling from 35% to 23% in relative terms. This geographic disparity is causing significant concern about potential supply risks among Western consumers, especially for the high-purity nickel products required for battery use.

The forecast growth over the next 20 years is shown in Figure 19-6, by source material. The supply is shown as lower than demand in Section 19.2 due to the impact of recycled material, both stainless steel and battery materials.

The expected growth (1.8 Mt/y from 2022 to 2040) is expected to come primarily from laterite sources, although growth in operating sulphide smelters and new facilities is expected as well—with 174 kt/y of additional nickel supply from sulphides. Note that this figure is classified by end-product facility not mine source, thus the indicated growth in sulphide operations is at the smelter/refinery level, not the mine level; the limited increase shown with sulphide projects reflects new nickel smelting capacity, not new mining capacity.

Of particular importance to the Western EV industry is that the ESG characteristics of nickel supply are not expected to improve significantly over the next 20 years. Figure 19-7 reflects Benchmark's view on the ESG profile of the nickel supply. The proportion of the market ranked as high-ESG performance is expected to shrink.

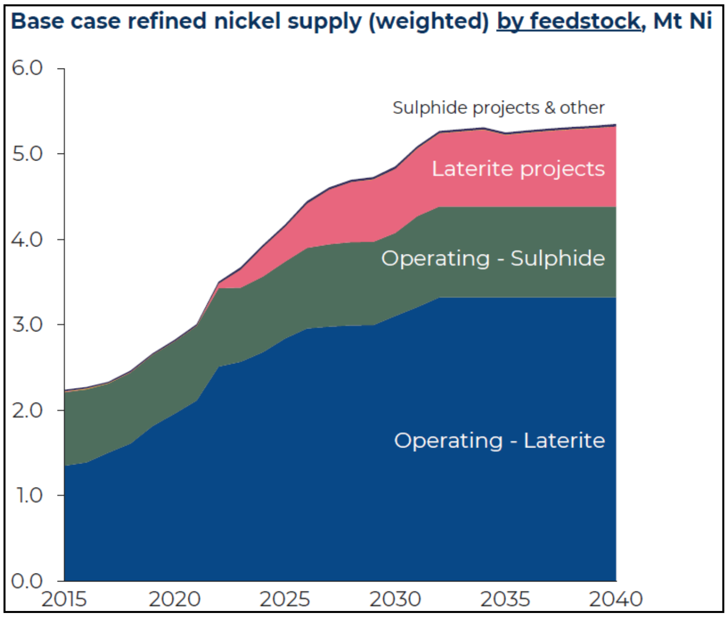


Figure 19-6: Nickel Supply by Source

(Source: Benchmark, 2023)

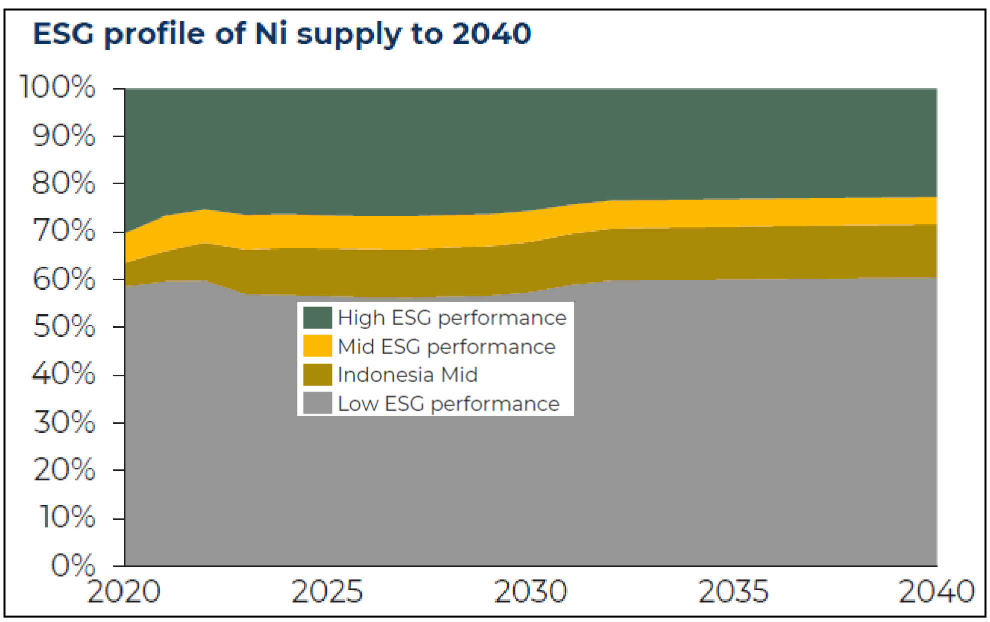


Figure 19-7: Nickel Supply by ESG Rating

(Source: Benchmark, 2023)

Benchmark's review of nickel market balance shows an anticipated significant deficit for nickel sulphate for EV battery use post-2030.

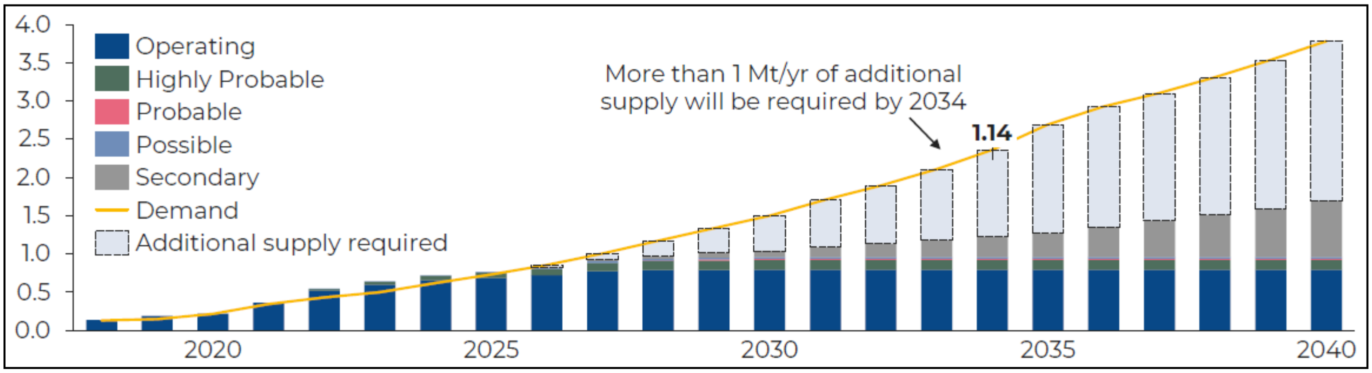


Figure 19-8: Nickel Sulphate Market Balance

(Source: Benchmark, 2023)

Although it may be possible that the market balance can be preserved by continuing expansion of Asian, particularly Indonesian and Philippine, supply, this will create significant tensions for Western EV producers looking to secure supply from high-ESG sources. Domestic supply, meeting the requirements of the US Inflation Reduction Act, is expected to be a preferred arrangement for North American EV production. Work by Mudd and Jowitt has shown that although sulphide resources are keeping pace with production, laterite resources are declining with production, implying that laterite resources are more fully delineated and have less scope for expansion than sulphide resources. This is an expected outcome of the historical exploration for nickel; surface deposits were identified and well-characterized in prior decades, while deeper sulphide resources are only characterized as required to maintain reserve profiles.

19.4 Nickel Price

Nickel pricing is expected to be robust in the long term to supply the increasing market demand. Giga Metals has surveyed price forecasting from a number of sources over the mid to long-term periods, including the dedicated nickel sulphide concentrate market study from Benchmark Mineral. The 2023 study noted a likely price range of $17,000 to $22,000/t nickel over the 2030 and onwards timeframe. In Benchmark's analysis, the high case represents a situation where marginal production is from the conversion of nickel pig iron to nickel matte. This is a technology now being adopted in Indonesia and which was previously used in New Caledonia where the facility was closed in 2016 due to high costs. The low case represents successful Chinese buildout of high-pressure acid leach capacity in Indonesia beyond EV needs.

Through the end of 2022 and into early 2023, most market participants have been raising forecast prices. Sources are forecasting higher prices in the latter part of the 2020s; four sources reviewed ranged from $22,000 to $28,000/t nickel. Pricing for Class 1 and battery-supply materials is expected to be stronger than for Class 2 nickel and given the demands placed on EV supply chains, pricing for North American derived nickel is expected to be at a premium to general LME deliverable material. **The base case for this study is selected as $21,500/t or $9.75/lb nickel LME basis.**

No premium for North American or high-ESG supply is applied in the base case. Benchmark notes that competition for high-ESG nickel units will be fierce and that during the high parts of the metal cycle, good ESG credentials may increase nickel premiums, while during the low parts of the metal cycle, poor ESG credentials may create nickel discounts. Although a true and marketable ESG premium is expected only after regulatory changes (i.e., carbon border adjustment mechanisms) which impose costs on low-ESG producers, the preference of EV manufacturers for high-ESG credentialled material will create significant stickiness of demand for those producers.

Figure 19-9 shows the long-term nickel price in both current dollars (dollars of the day) and constant dollars (inflated to 2023 using global inflation measures) and the base case pricing (green line). The base case price is 19% below the 20-yr average constant dollar price and 20% below the 2022-23 (Jan-May) average price. The constant-dollar price statistics are as shown in Table 19-1. Sensitivity analyses should span the Q1 to Q3 inflation-adjusted price range, which will also encompass the 2022-23 average price case.

Table 19-1: Comparison of Inflation-Adjusted and Base Case Nickel Price

Statistic	Inflation-adjusted 20-yr Price	Base Case Price Ratio
Q1	$17,700/t	121%
Q2	$23,700/t	91%
Average	$26,700/t	81%
2022-23 Avg	$27,000/t	80%
Q3	$30,300/t	71%

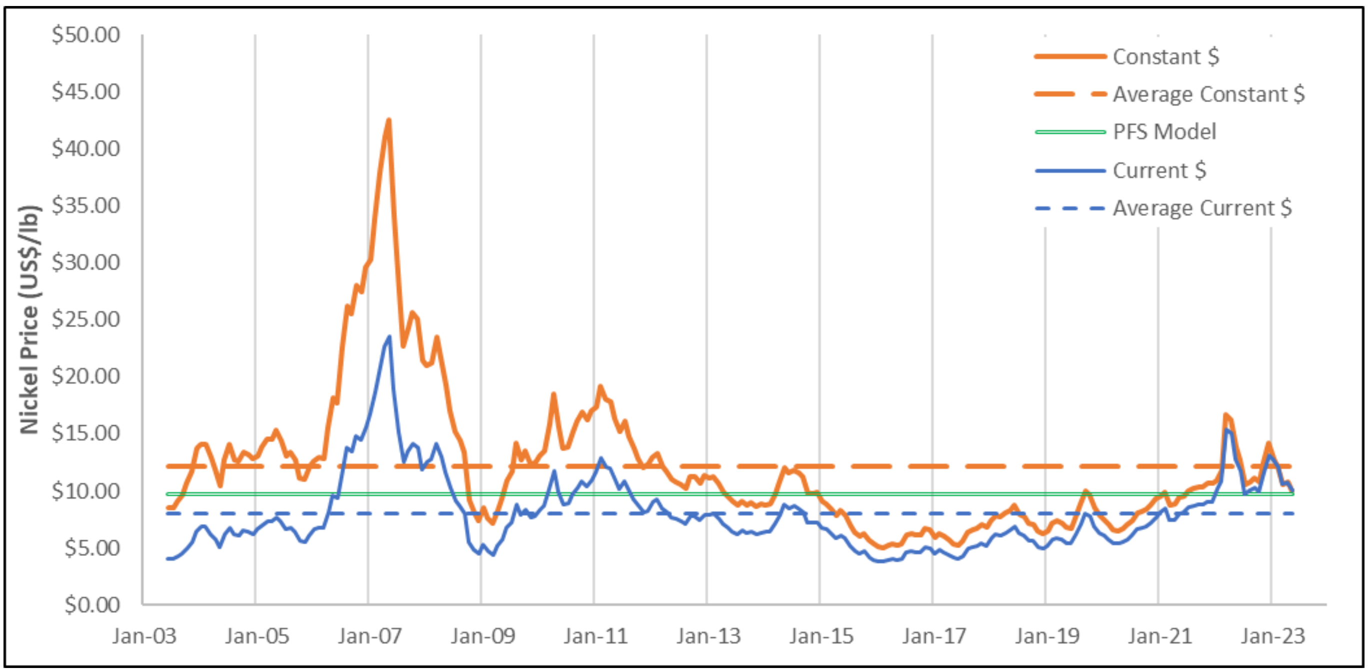


Figure 19-9: Historical Nickel Price

(Source: Giga Metals Internal Analysis, 2023)

19.5 Cobalt Markets and Pricing

19.5.1 Cobalt Demand

Cobalt is used in a variety of applications broadly split into two groups: metallurgical (superalloys, high-strength steels, magnets, cemented carbides) and chemical (batteries, catalysts, paints, ceramics). Both magnets and battery chemicals are sensitive to an increasing rise in EV production, while magnets are also sensitive to increasing deployment of wind energy and alloy consumption is sensitive to increasing power generation. The rechargeable lithium-ion battery sector accounts for the largest share of consumption at present and has the greatest growth potential.

Wood Mackenzie has examined the prospects for cobalt demand under two scenarios – their base case (Energy Transition Outlook – ETO) compatible with a long-term 2.5 to 2.7°C global temperature rise and a more aggressive climate scenario focused on limiting climate change to a 1.5°C rise (Accelerated Energy Transition – AET-1.5). The base case ETO outlook has 360 kt/y of cobalt demand in 2050, with 66% of that demand arising from batteries. The battery demand trajectory is shown in Figure 19-10 for both scenarios.

The total forecast cobalt requirement is shown in Figure 19-11. The Wood Mackenzie ETO forecasts demand at 258 kt/y in 2030, rising to 317 kt/y in 2040 and 360 kt/y in 2050 (red line). The 2030 ETO total demand forecast is very similar to battery demand alone in the IEA STEPS scenario (Figure 19-12). Were the accelerated transition to occur, total demand in 2040 is 32% higher than for the ETO case.

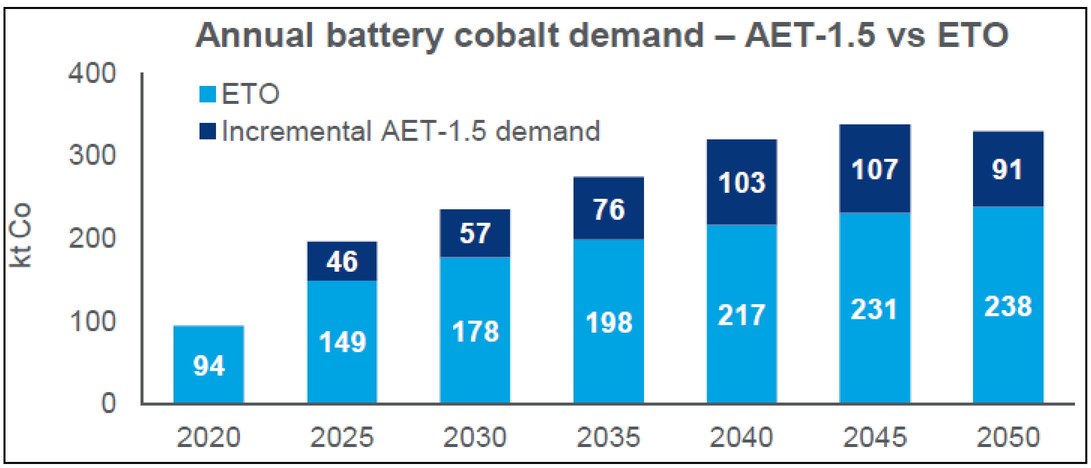


Figure 19-10: Forecast Cobalt Demand in Batteries

(Source: Cobalt outlook under an accelerated energy transition, Wood Mackenzie, 2022)

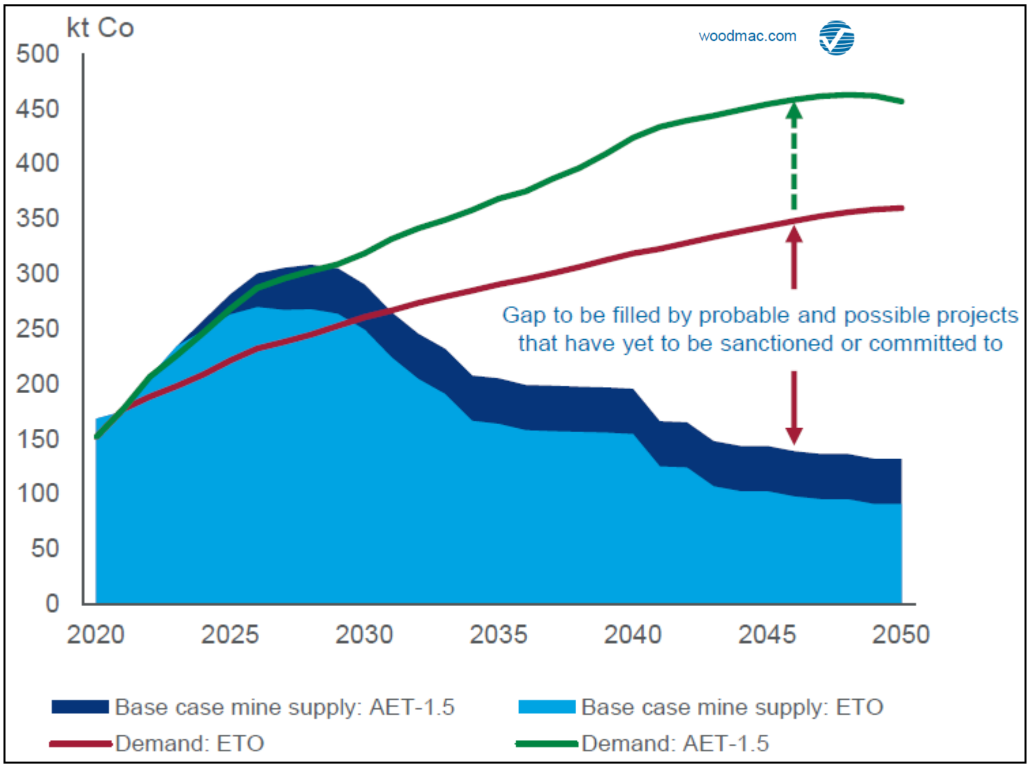


Figure 19-11: Forecast Cobalt Demand

(Source: Cobalt outlook under an accelerated energy transition, Wood Mackenzie, 2022)

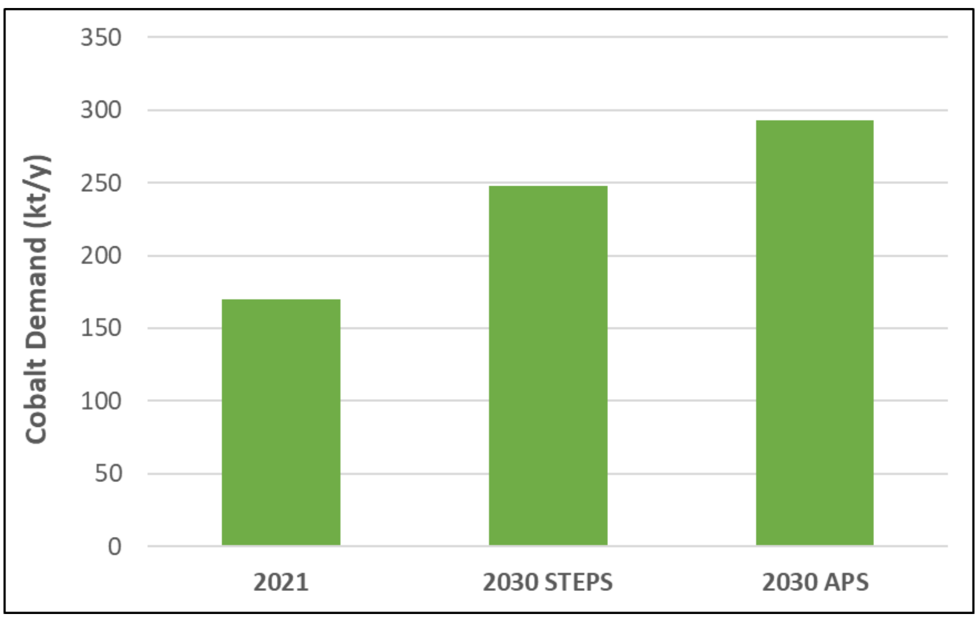


Figure 19-12: Forecast Cobalt Demand Growth

(Source: Giga Metals, 2023; Data from Global EV Outlook 2022, IEA [https://www.iea.org/reports/global-ev-outlook-2022])

Cobalt demand growth forecasts have declined over the last few years due to the continued thrifting of cobalt from battery formulations (i.e., IEA 2021 forecast of 270 kt/y cobalt in batteries in 2030 under STEPS), countered by the overall rising battery capacity forecasts.

19.5.2 Cobalt Supply

Cobalt mineralization is focused around the African copper belt spanning the Democratic Republic of Congo (DRC) and Zambia; sulphide ore deposits in Canada, Scandinavia, Russia and Australia; and laterite ore deposits in Cuba and Asia Pacific. Though it is widespread, cobalt typically occurs at such low concentrations it is uneconomical to produce on its own. As such, it is mined mainly as a byproduct of other metals, primarily copper and nickel. For the last several years, the DRC has been the dominant supplier, with up to 70% of world supply. The identification of significant ESG challenges has created significant supply chain transparency pressure. Increasing production from Indonesian high-pressure acid leaching facilities has propelled Indonesia into the second-largest producer slot. ESG issues with Indonesian production are identical with nickel production but differ from the concerns with DRC sourcing.

19.5.3 Cobalt Pricing

The rapid expansion noted above has driven prices down from a spring 2022 peak of $81,800/t. The historical current dollar and inflation-adjusted prices are shown in Figure 19-13. Benchmark Mineral has recommended a **long-term cobalt price of $58,500/t or $26.54/lb**, shown as the PFS model (green line) in Figure 19-13.

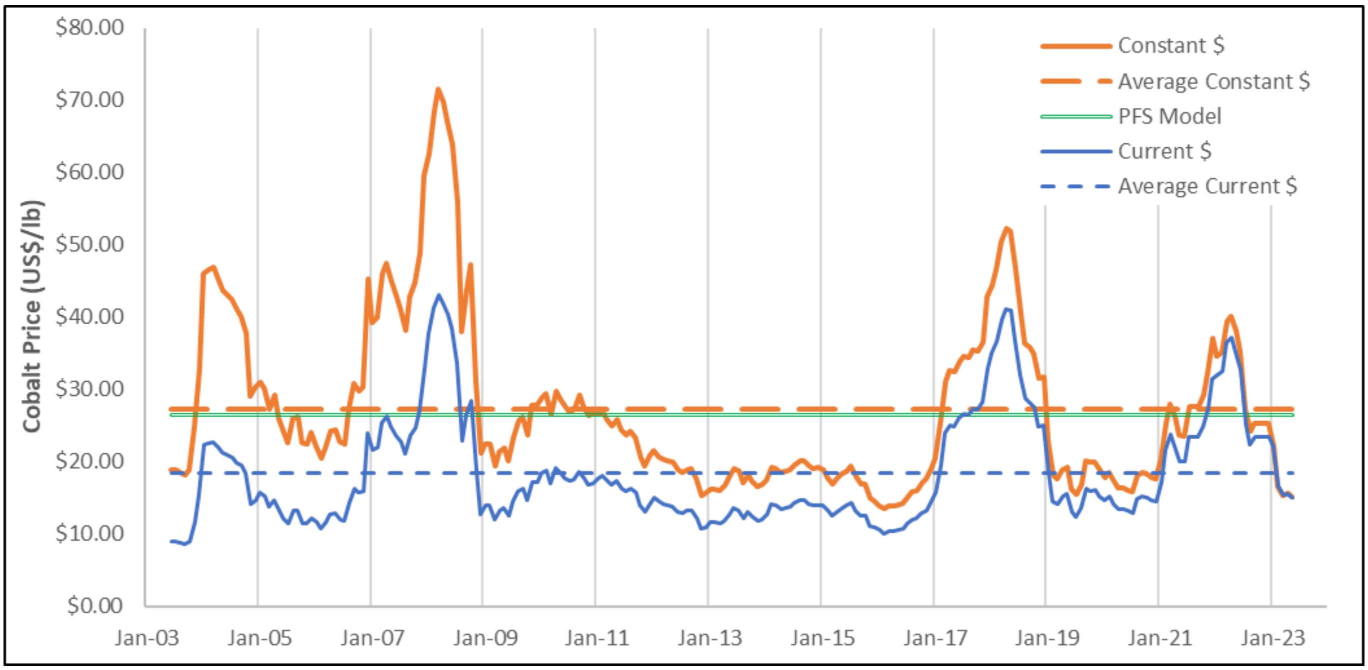


Figure 19-13: Historical Cobalt Price

(Source: Giga Metals internal analysis, 2023)

The base case price in Figure 19-13 is slightly below the 20-yr average constant dollar price and the 2022-23 average price. The constant-dollar price statistics are as shown below. Sensitivity cases should span the Q1 to Q3 inflation-adjusted price range, which will include the 2022-23 average case.

Table 19-2: Comparison of Inflation-Adjusted and Base Case Cobalt Price

Statistic	Inflation-adjusted 20-yr Price	Base Case Price Ratio
Q1	$41,000/t	143%
Q2	$52,600/t	111%
Average	$60,000/t	98%
2022-23 Avg	$59,600/t	98%
Q3	$71,200/t	82%

For comparison purposes, the cobalt price is often considered to be proportional to nickel price. The base case nickel and cobalt prices show a price ratio of 2.72. Historical data shows Co:Ni price ratios of 2.71, 2.96 and 2.51 over 5, 10 and 20 years.

19.6 PGM Pricing

PGMs are minor contributors to the Turnagain economic model (<2%). Consequently, only a high-level overview of markets is supplied here. Palladium and platinum are the two most significant PGMs and the only ones known to have relevance in the Turnagain deposit.

Palladium's dominant use (>80%) is in the automotive sector where it is seeing some pressure from substitution with platinum (less expensive since 2018) and increasing production of EVs, with smaller uses in electronics and chemical uses. Short term expectations are for a market rise with recovering vehicle production and production disruptions at South African producers. Long-term demand for palladium is uncertain with growing EV production, although there is potential for increasing requirements for some new energy technologies. Palladium production is dominated by southern Africa primary production (40-45%) and Russian secondary production (40-45%), with about 15% of production from North American primary and secondary production. Long-term, significant price pressure would likely result in primary producers exiting the market, while secondary producers such as Russia and Canada would continue to supply with reduced profitability.

Platinum has a more diversified demand base, with about 30% in automotive use and 20-25% in jewellery and with significant usage in chemicals, electronics, glass, petroleum refining and medical devices. Supply is dominated by southern Africa primary production (~80%), with about 10% from Russian secondary production and 5% North American primary and secondary production.

Long-term PGM forecasts are challenging, as the markets are smaller than base metals and can be more variable. Historical pricing for the relevant PGMs is shown in Figure 19-14 and Figure 19-15.

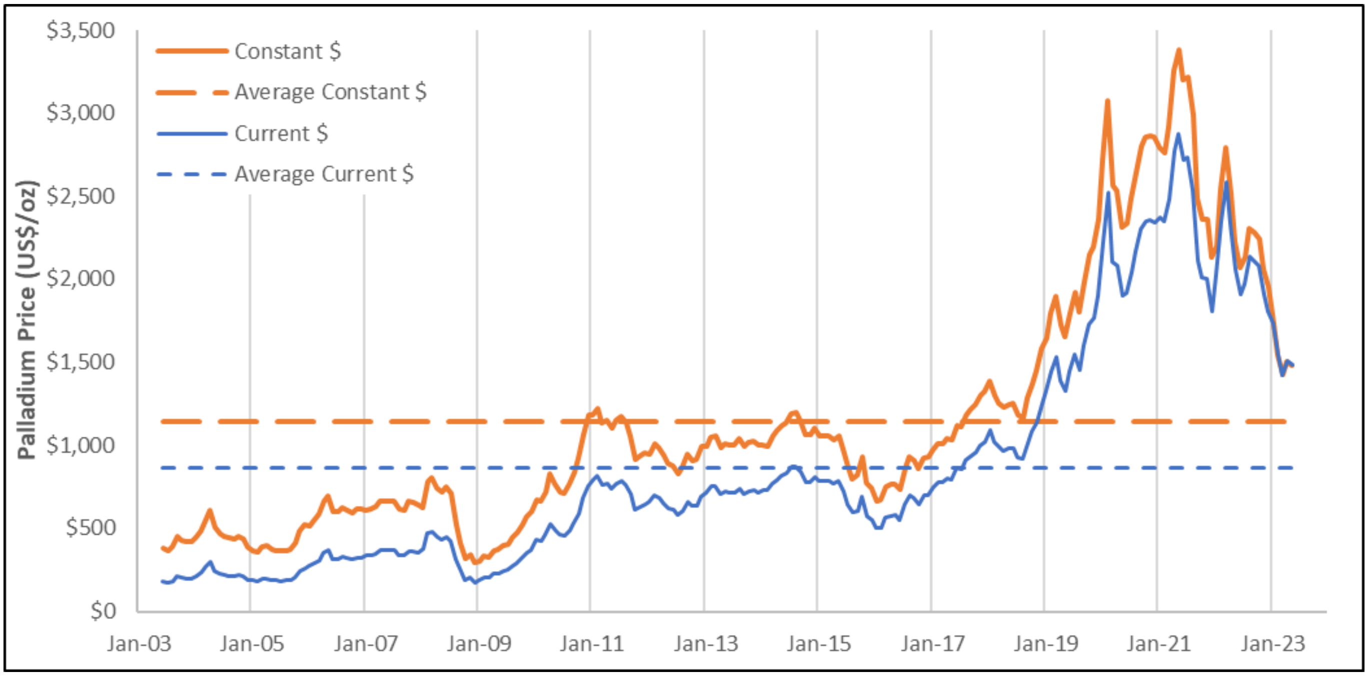


Figure 19-14: Historical Palladium Price

(Source: Giga Metals Internal Analysis, 2023)

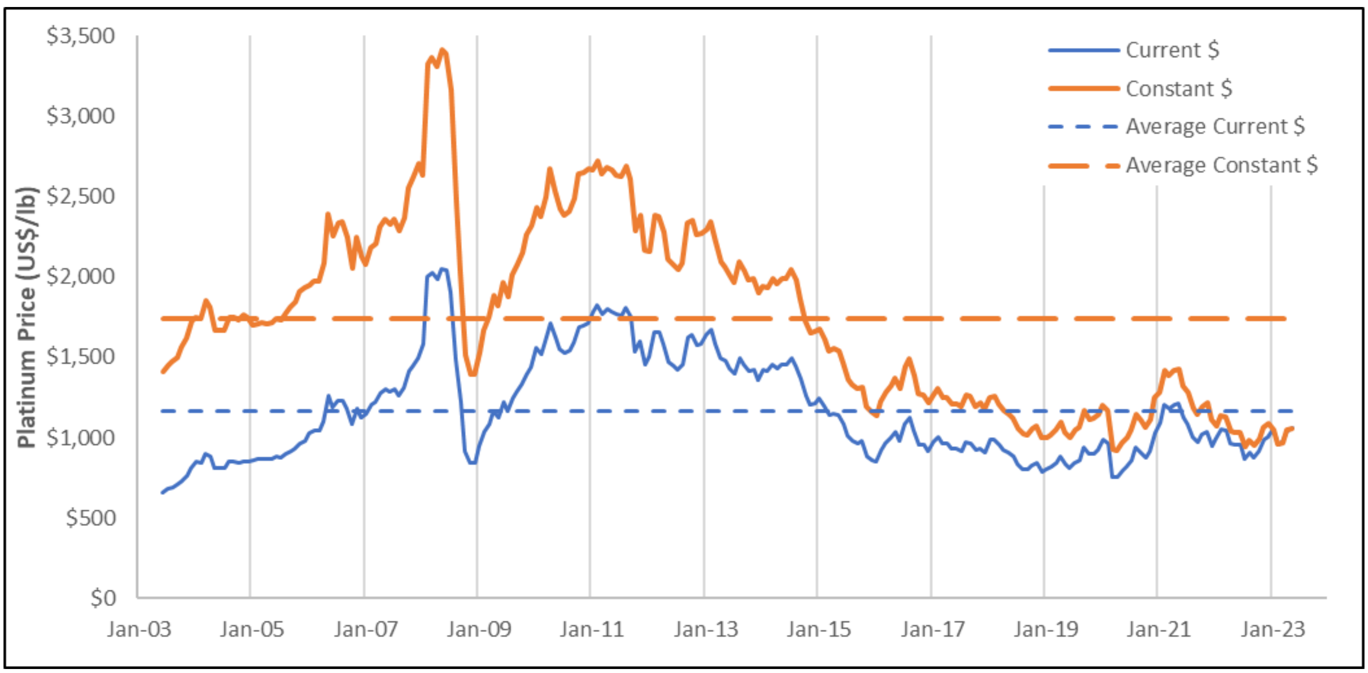


Figure 19-15: Historical Platinum Price

(Source: Giga Metals Internal Analysis, 2023)

Variability for the various metal products is calculated as the 20-yr standard deviation as a percentage of average price. This variability is 43% for nickel and cobalt, 28% for platinum and 81% for palladium. Palladium has the highest historical variability; prices rose strongly from 2016 to mid-2021 before receding over the ensuing 18 months. Platinum prices have remained relatively stable since 2016, at prices below the long-term average.

As there has been a tendency for platinum and palladium to react counter-cyclically to each other (Figure 19-16), the average price performance can provide more stability (Figure 19-17). The 20-yr standard deviation of the average Pt+Pd price is 35%, similar to the base metals. With minor impact on the Turnagain project revenue, the pricing model selected is therefore an average price applied to both metals at $1,200/oz for each metal. This price is below the historical inflation-adjusted average (-22% and -10% to the 5-yr and 20-yr averages).

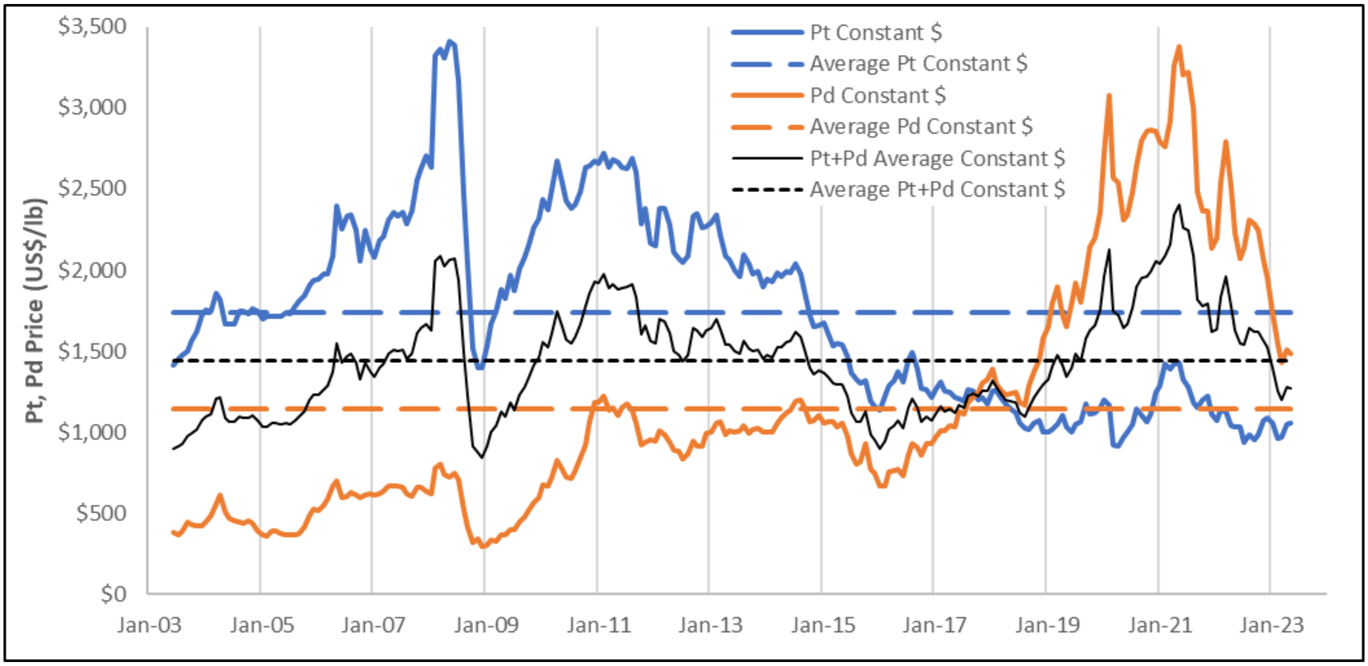


Figure 19-16: Historical Platinum and Palladium Prices (Inflation-adjusted)

(Source: Giga Metals Internal Analysis, 2023)

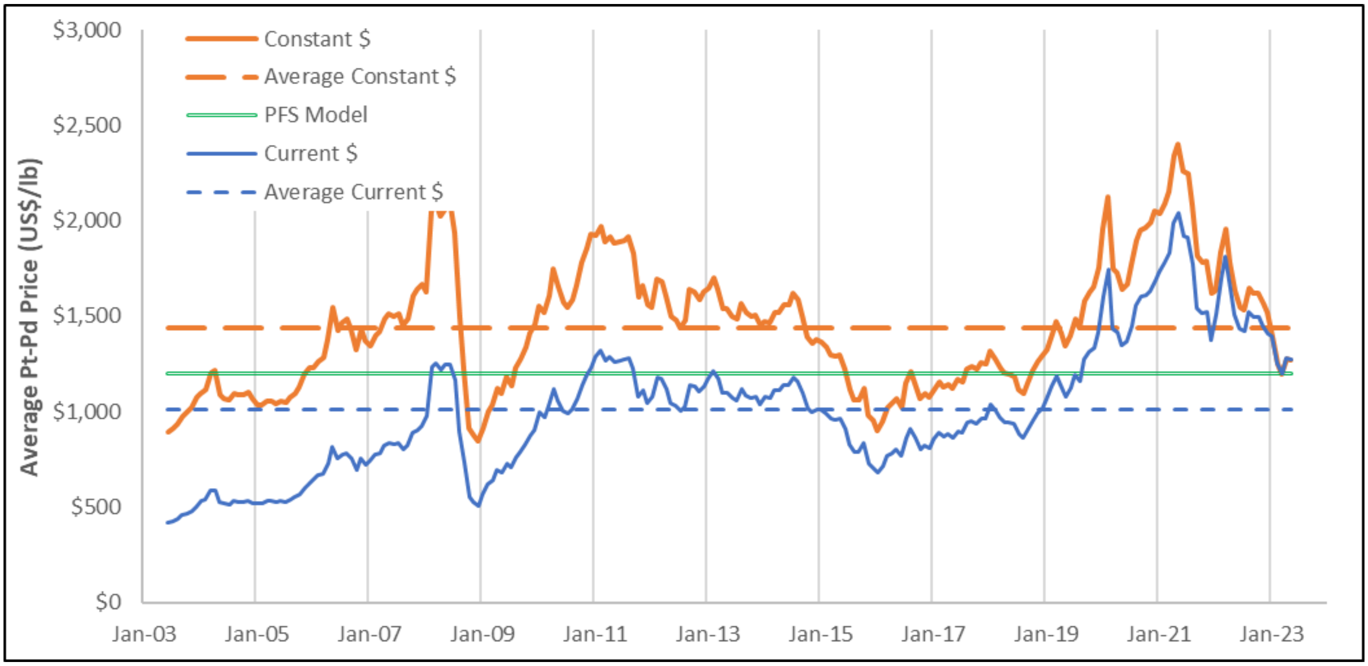


Figure 19-17: Historical Average PGM (Platinum + Palladium) Prices

(Source: Giga Metals Internal Analysis, 2023)

19.7 Concentrate Markets

19.7.1 Nickel Sulphide Concentrate Smelter Supply/Demand

As outlined in the 2021 Turnagain Preliminary Economic Assessment, there are several smelters which could be interested in the Turnagain nickel-cobalt concentrate. No new nickel sulphide smelters have been opened and none have closed since that time. No significant new nickel sulphide concentrate projects have been commercialized, hence smelter availability is broadly as indicated in the 2020 PEA. In the longer term, without significant new nickel sulphide mined production brought to market, most smelters are expected to be under capacity due to expected depletion of reserves from existing sources (tonnage and/or ore grade).

19.7.2 Indicative Terms for Turnagain Concentrate

Historically, contracts were developed to match the specific smelter's abilities with respect to metal recoveries and detrimental elements. For example, BHP's Kwinana refinery has no cobalt, copper or PGM recovery circuit, other than as a copper sulphide and mixed Ni:Co sulphides. Therefore, the plant has offered lower cobalt, copper and PGM payment terms than, for example, those offered by Glencore or Vale, both of which have cobalt, copper and PGM refining capability.

What is apparent from the available information is that tenders for concentrate have become more favourable to the miner in recent years. This appears to be due to two factors: smelters needing additional feed and the minimally variable smelting and refining costs relative to rising metal prices. As smelting and refining are generally market services, the cost of smelting and refining is connected more closely to input costs (labour, energy) than to metals prices, although price participation has been a feature of traditional smelting contracts based on a $/t treatment charge approach – which is no longer the dominant approach in the nickel market.

A global smelter terms review was undertaken for Giga Metals by Benchmark Mineral. This review concluded the following:

- Turnagain nickel sulphide concentrate is quite high grade and should attract payment at the upper end of the 70-80% global payability range, expected to be in the 75-80% range,
- Turnagain cobalt grade of 1% is higher than many concentrates and should achieve the upper range of 40-60% cobalt payability,
- Turnagain indicated copper grade of 0.4% is near the low end of payability and should not be expected to exceed 40%,
- Turnagain indicated PGM grade is near the low end of payability. Smelters with well-performing PGM circuits would be expected to pay in the 30-40% range.

The nickel payability is consistent with the 2020 PEA, while the cobalt payability is moderately increased. PGMs were not considered in the prior study. As PGMs are traditionally paid on a deduction basis, i.e. pay 90-95% of (Pt – 1 g/t) less a small refining charge, the payment for PGMs is expected to be significantly grade-dependent.

For the PFS, the following payment values will be used:

- Ni: 78%,
- Co: 50%,
- PGMs: Pay 90% of Pt, Pd above a 1 g/t deduction each less $50/oz refining charge.

Turnagain concentrate is expected to have higher levels of MgO than some other nickel sulphide concentrates. Test work has demonstrated the ability to deliver marketable concentrates from all feed types. A smelter MgO penalty framework has been applied to the financial modelling. The penalty framework applied is as follows:

- For MgO content <6% (by wt.): no penalty is applied,
- For MgO content ≥6% and <10% (by wt.): For each 1% MgO over 6% MgO, a penalty of $8/dry tonne is applied,
- For MgO content ≥10% (by wt.): For each 1% MgO over 10% MgO, a penalty of $12/dry tonne is applied.

19.7.3 Direct Refining

With the growing battery supply chain there is increasing interest in direct hydrometallurgical refining of nickel sulphide concentrates. The Sherritt Fort Saskatchewan (1954) and BHP Kwinana (1970) refineries were originally constructed to process nickel sulphide concentrate directly to Class 1 metal using the ammonia leach process and more recently the Vale Long Harbour refinery has become operational using a sulphate-chloride leach process. A heap leach of sulphide ores is also operating in Finland, producing nickel sulphate as an end product. Direct refining to intermediates or final products has been promoted for several projects more recently, but none have yet been commercialized.

Conceptually, the flowsheet is relatively straightforward, utilizing one of 3 acid leaching approaches: fine grinding with low temperature leaching below the melting point of sulphur, medium-temperature leaching with additives to control molten sulphur (similar to zinc pressure leaching) and high-temperature leaching to convert all sulphur to the fully oxidized sulphate form (similar to gold pressure oxidation circuits). Both zinc pressure leaching (medium-temperature) and gold pressure leaching (high-temperature) have been commercialized in multiple jurisdictions globally, ranging from North America and Europe to Papua New Guinea and the Dominican Republic.

Recovery of intermediates such as mixed hydroxide or mixed sulphide precipitates after neutralization and impurities (iron, copper) removal is straightforward and already practiced at much lower concentrations in the nickel laterite industry. If selected, direct processing to high-purity chemical or metal products would include industry-standard techniques such as solvent extraction and ion exchange. The ammonia leach flowsheet is not expected to be adopted in a new refinery approach due to its higher complexity, capital cost and operating cost; although it is well-proven, newer techniques are lower capital cost and more energy efficient.

Any of these flowsheets could achieve high recovery of nickel and cobalt (>95%) and could therefore offer significantly higher payables depending on the further downstream supply chain dynamics. Copper could be similarly recovered to a high degree, but PGMs would not be recovered without significant additional expense.

With no commercial facilities in operation or development needing concentrate supply, this approach is not considered further in the market analysis, however it is considered a fully valid and proven approach which could be used to treat Turnagain concentrate instead of, or in addition to, traditional smelting. Significant development work would still be required for any selected nickel sulphide concentrate.

20.0 ENVIRONMENTAL STUDIES, PERMITTING AND SOCIAL OR COMMUNITY IMPACT

20.1 Environmental Studies

Environmental studies that have been initiated and are ongoing are summarized below. The programs listed are in various stages of advancement. The Project will require an environmental assessment and the data being collected will support the regulatory process. Much of the information will also be used to inform Project design as well as closure and reclamation planning.

20.1.1 Climate Information

Climate information for the Project area and regional surroundings has been compiled from Swiftwater (2023) and Hatch (2020). The climate of the local Project area is characterized by a meteorological station that was initially installed in 2004 at the end of the airstrip before being relocated and upgraded in 2018 to its current position southwest of the Hard Creek campsite. Data collection has occurred primarily from 2004 to 2011 and from mid-2018 to the present. Regional data is compiled from the Dease Lake climate station, which has been operational since 1944.

The average annual air temperature at the Project site is -2.3°C and ranges from an average low of -17.8°C in January to an average high of 11.2°C in July. These air temperatures correlate well with data compiled from the long-term climate station at Dease Lake.

Mean annual precipitation at the Project site is 548 mm, with approximately 230 mm (42%) falling as snow and 318 mm (58%) as rain. Minimum monthly precipitation occurs in April, while maximum monthly precipitation occurs in July and August. Rain can typically fall in any month.

Average and maximum wind speed and direction recorded at the local climate station indicate wind speeds are typically fastest in March/April and slowest in November/December. Wind direction is predominantly from the west-southwest and minorly from the northeast.

Preliminary estimates of additional climate-related attributes, including the potential effects of climate change, are being developed and would further inform Project design and the environmental assessment.

20.1.2 Terrain and Soils

The surficial geology of the Turnagain project area is generally characterized by thin colluvial veneers (<1 m thick) and exposed rock on steeper valley slopes, transitioning to till veneers and blankets (>1 m thick) and thicker colluvial blankets (up to 3 m thick) and fans at mid and lower-slope positions and finally to thick glaciofluvial and till deposits in valley bottoms.

Rockfalls, rockslides and debris slides have the potential to occur within the area. Rockfalls and rockslides initiate at higher slope positions in steep areas devoid of vegetation and may channelize to form debris slides at lower elevations. Debris slides are shallow, consisting of a mass of soil, vegetation and surficial material that is comparatively dry and largely unconsolidated. At rest, the resulting landform is in an irregular, hummocky deposit. Debris slides may develop into downstream debris flows that form fans at the base of the mountain slopes. Debris flows generally involve the mobilization of saturated colluvium on the slopes or surficial materials that have accumulated behind obstructions in gullies. They flow rapidly down a steep gully, becoming slower when slope angles lessen. The flow contains a combination of various surficial materials, including soil, bedrock and organic material. Most debris slides are inferred to be relatively shallow and located along over-steepened walls or sparsely vegetated upper slopes.

Baseline studies characterizing local and regional terrain and soils have yet to be completed and will be required to inform the environmental assessment and closure and reclamation planning.

20.1.3 Ecosystems and Vegetation

The ecosystems and vegetation of the Project area are characterized by data compiled from various sources, as noted, but largely from Meidinger and Pojar (1991) and references authored by the BC Ministry of Forests (BCMOF). The general ecology of the Project area is characterized by four biogeoclimatic zones in order of increasing elevation: the Boreal White and Black Spruce Dry Cool (BWBSdk) subzone, the Spruce-Willow-Birch moist cool (SWBmk) and moist cool scrub (SWBmks) subzones and the undifferentiated Boreal Altai Fescue Alpine (BAFAun) zone.

The BWBSdk is a subzone with long, extremely cold winters and warm but short growing seasons. Elevations generally range from valley bottoms to over 1,000 masl; the majority of the zone is situated above 600 masl. Ecosystems are typically a mix of upland forests, peat-dominated bogs and nutrient-poor fens (BC MOF 1996). Forest fires are a relatively frequent occurrence which results in many forests being maintained in various stages of succession. On well-drained sites, forests of trembling aspen and white spruce dominate the landscape (Meidinger and Pojar, 1991). On drier sites, forests consist of open lodgepole pine with a lichen understory. On level, gently sloping, or north-facing sites, forests are characterized by mixed pine and black spruce stands, while on imperfectly drained sites, dense black spruce forests with a mossy understory develop. Poorly drained lowland sites are often mosaic forests and wetland ecosystems. In the Project area, the BWBSdk occupies lower elevations primarily adjacent to the Turnagain River.

The SWBmk and SWBmks are subalpine zones characterized by cold, snowy winters and short, cool summers (BC MOF, 1998) and Meidinger and Pojar (1991). Elevations range between approximately 1,200 masl to 1,700 masl. Vegetation is a mix of open canopy forest and shrub-dominated ecosystems ranging in relative moisture from wetlands to dry shrublands. Many of the valley bottoms are non-forested, which could be the result of cold air drainage that can restrict productive tree growth (BC MOF, 1998). Tree species are commonly a mix of white spruce and subalpine fir with varying amounts of lodgepole pine and trembling aspen. Shrubs are most often characterized by willows and scrub birch.

The BAFA zone is one of the most extensive high-elevation, alpine areas in the province (BC MOF, 2006). Temperatures are generally low year-round, and summers are brief. The physical environment, particularly snow depth and topography, plays a strong defining role in shaping the vegetation present. Vegetated areas are often interspersed with bare rock, snow and ice. Alpine vegetation tends to be more lush near the tree line but becomes more sparse as the elevation increases. The presence of stunted conifers marks the transition between subalpine parkland and true alpine. Low-growing, evergreen dwarf shrubs, grasses, sedges and lichens are common in BAFA ecosystem types.

Baseline studies characterizing local and regional ecosystems and vegetation have yet to be completed and will be required to inform the environmental assessment and closure and reclamation planning.

20.1.4 Wildlife and Wildlife Habitat

The wildlife and wildlife habitat of the Project area are characterized by data compiled primarily by Environmental Dynamics Inc. (EDI) (2022, 2020). The ecosystems of the Project area provide habitat for various wildlife species and the identification of priority areas for wildlife management is a key interest in regional management planning (e.g., within the Dease-Liard Sustainable Resource Management Plan) as well as the environmental assessment. Numerous wildlife species have the potential to occur, given the ecosystems present. A Wildlife Mitigation Plan (EDI 2020) has also been developed for the Project that identifies wildlife values within proposed exploration areas and outlines general wildlife mitigation measures that work to reduce the effects of anthropogenic activities on wildlife and wildlife habitat.

Baseline data collection programs characterizing wildlife and wildlife habitat in the Project area were initiated in 2018 and consisted of various assessments of local habitat features, pre-clearing nest surveys and the installation of remote cameras. Efforts to date have focused on compiling a list of potential species present in the area, identifying the presence and extent of valuable habitat features (such as mineral licks and lichen habitat), mapping wildlife trails and deploying remote cameras to confirm species present in the area as well as seasonal timing and use.

Over four years of camera deployment, 14 wildlife species/groups have been confirmed in the area (EDI, 2022). Of these, 11 are considered common (i.e., observed every year), while three species/groups (elk, mule deer, coyote) have only been reported in one or two of the four year period. Other species/groups identified include snowshoe hare, lynx, red fox, black bear, grizzly bear and small mustelids (e.g., pine marten and fisher). Wildlife observed most often over the four-year period include (in order) moose, wolf, caribou, porcupine and snowshoe hare.

The baseline studies and the existing wildlife mitigation plan will inform the environmental assessment as well as closure and reclamation planning.

20.1.5 Hydrology

The hydrology of the Project area is characterized by data compiled from Swiftwater (2023) and Hatch (2020). The Project is adjacent to the Turnagain River, which is the primary water body flowing through the area. The Turnagain River flows into the Kechika River, which then flows into the Liard and Mackenzie rivers and ultimately, the Arctic Ocean. Hydrologic conditions of the Turnagain River and several of its tributaries are characterized using a combination of local and regional hydrometric stations as well as manual and automated data collection methods (Table 20-1).

Average monthly and annual runoff values calculated for the Turnagain River and Project tributaries indicate that the majority of annual runoff occurs during spring freshet beginning in May, reaching a peak in June. Average, minimum and maximum daily discharges for the Turnagain River and tributaries are also being calculated to support Project infrastructure design, along with average seven-day low flows and peak flows.

Table 20-1: Project-area Hydrometric Stations

Watercourse	Station ID	Period of Record*	Length of Record
Turnagain River	TUR-168.1	2018–current	4+
	-	2008–2011	3
Hard Creek	HDC-0.5	2018–current	4+
	Lower Hard Creek	2005–2008 2011–2012	4
	Upper Hard Creek	2006–2009	3
	Farthest Hard Creek	2008–2011	3
Flat Creek	FLC-3.0	2018–current	4+
		2006–2011	5
Blick Creek	BLC-4.1	2018–current	4+
Faulkner Creek	FKC-2.3	2018–current	4+
		2006–2011	5

*Some datasets are not all continuous during periods shown due to instrument failures

20.1.6 Hydrogeology

Limited hydrogeologic information exists for the Project area and is characterized primarily by Hatch (2020) and BGC (2020a). Four monitoring wells (one in bedrock, three in alluvium) were installed in 2007 and 2008 to varying depths. Two wells were drilled in the vicinity of Hard Creek, while two were adjacent to the Turnagain River near the proposed open pit. More recent installations include five monitoring wells in the Flat Creek area (KP, 2022) and five in the pit area (BGC, 2023). All ten wells were equipped with vibrating wire piezometers to monitor groundwater elevation.

The groundwater flow regime within the Project area is recharged from higher elevations. Groundwater flow is topographically driven with shallower flow paths discharging to surface water in valley bottoms. Deeper groundwater represents the regional groundwater flow system. Additional groundwater information will be required to support Project design and the environmental assessment process.

20.1.7 Water Quality

Water quality information exists for the Project area and is characterized primarily by Hatch (2020) and KP (2008a). More intensive water quality sampling resumed in 2018 and continued through 2022. In 2008, ten surface water sites were sampled, with results indicating a neutral pH, low to moderate hardness and alkalinity and low concentrations of total dissolved solids and total suspended solids (KP, 2008a). Of the metals analyzed, copper was above Canadian Council of Ministers of the Environment - Protection of Aquatic Life (CCME-PAL) water quality criteria the most often. Other metals, such as aluminum, cadmium, nickel and selenium, were also above CCME-PAL criteria at select locations.

Three groundwater sampling locations were established at various drillhole sites in the vicinity of the proposed open pit. Samples were analyzed for physical parameters, anions, nutrients and total and dissolved metals between 2004 and 2011; limited sampling was conducted in 2018 and 2019 (Hatch, 2021). Groundwater was seen to have a more basic pH with variable hardness and buffering capacity (KP, 2008a). Anions and nutrients were typically low. Metals above CCME and BC criteria included copper, aluminum, iron and selenium.

Additional surface water and groundwater data will be required for the environmental assessment to provide a more complete characterization of baseline water quality.

20.1.8 Fisheries and Aquatics

Limited water quality information exists for the Project area and is characterized primarily in Tahltan ERM Environmental Management (TEEM) (2022), Hatch (2020) and KP (2008a). Fish and fish habitat studies were initiated in 2007 and provided preliminary characterizations of fish habitat (including the presence of potential barriers to fish passage), fish presence (including sampling using eDNA), fish age and fish tissue metal concentrations.

Recent assessments of the Turnagain River and nearby tributaries confirm fish are present, though some results generated using eDNA sampling were ambiguous and would benefit from further investigation (TEEM 2022). No permanent barriers to fish passage were identified along the portions of Flat Creek assessed during the aerial survey.

Earlier assessments of Hard Lake indicate it is a low-productivity aquatic environment inhabited by Arctic grayling, lake trout, longnose sucker and mountain whitefish (KP, 2008a). The populations of longnose sucker and lake trout were relatively old, based on fish ageing results. Levels of total mercury and methylmercury in fish tissue were above CCME Tissue Residue Dietary Guidelines, however, whether the sources of these metals are natural or anthropogenic and if the concentrations are affecting fish health have yet to be determined (KP, 2008a). Hard Creek and select tributaries support populations of Arctic grayling, bull trout and longnose sucker.

20.1.9 ARD/ML

Static test work characterizing ARD and ML potential of tailings material, waste rock and low-grade ore has been initiated with findings summarized below largely from Tetra Tech (2021) and BGC (2020a, b). Barrel tests (five barrels in total) have also been established at site to test the weathering of different materials exposed to natural conditions. Leachate was collected from the barrels in 2009, 2010 and 2011. The system was reconditioned in 2021 while retaining the original samples; leachate was collected again in 2022.

Ten lithologies have been identified within the mine area. Initial ARD/ML characterization was completed concurrently with process analysis and was preferentially biased towards ore samples. Using current best practice criteria for classification (i.e., Price 2009), the majority of ore and waste rock types classify as Non-Potentially Acid Generating (NPAG), representing approximately 85% of the static test work conducted to date. Of the samples remaining, 8% were classified as PAG and 7% as uncertain. Two rock types (clinopyroxene units 101 and 102) classify as PAG and are considered “minor” components of the project rock overall (KP, 2008b; MESH 2009). These volumes, however, should be reassessed once mine designs are progressed to the point of confirming available expected volumes of PAG waste rock.

The classification of waste rock as NPAG, however, requires some caution as the dominant form of NP is derived from slower-reacting silicates. Further testing to assess the reactivity of minerals and to confirm the time to onset of ARD and ML for PAG materials has been recommended (BGC 2020b). Low-grade ore is largely classified as NPAG, however the pyroxenite component is considered PAG.

ARD/ML studies have also been initiated on expected tailings material for two samples, one ROM and the other high sulphide tails. Analyses completed using the Modified Sobek approach indicated the Neutralization Potential Ratio (NPR) values classify the material as NPAG; however, analyses also show that nearly all of the NP is derived from slower-reacting silicates. Kinetic testing should be completed to confirm the reactivity of the silicates and their ability to provide NP (BCG 2020a).

Aging tests used to characterize water quality over the short term were also conducted on the tailings samples and were assessed over a period of 30 days (BGC 2020a). Results were compared against BC Water Quality Guidelines (BCWQG) for the protection of freshwater aquatic life and suggested that Se may be mobile under circum-neutral to alkaline pH conditions.

Information characterizing ML potential is limited at present but kinetic testing over a minimum of 12 months is expected to be required to inform project design and the environmental assessment.

20.2 Regulatory and Permitting Requirements

It is expected the Project, as currently proposed, would require an environmental assessment provincially (per the *Environmental Assessment Act* 2018) and federally (per the *Impact Assessment Act* 2019), given the anticipated production capacity would be greater than both of the thresholds identified by legislation:

- 75,000 t/year of mineral ore per Part 3, Table 6 of the Reviewable Projects Regulation of the BC *Environmental Assessment Act* (2018),
- 5,000 t/day or more ore production capacity per Section 18(c) of the Physical Activities Regulations (SOR/2019-285) of the *Impact Assessment Act* (2019).

Given the likely involvement of both the federal and provincial governments, the environmental assessment would proceed in accordance with one of the cooperation options (coordination or substitution) in place between the BC Environmental Assessment Office (EAO) and the Impact Assessment Agency of Canada (the Agency). Most often, projects follow a substituted process in BC.

Both the federal and BC governments have made renewed commitments to improving relationships with Indigenous groups (Government of Canada, 2017; Ministry of Indigenous Relations and Reconciliation, 2017) and have endorsed the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) (United Nations, 2007), recognizing the need to consult with Indigenous Nations. Efforts would be made throughout the baseline data collection stage and environmental assessment process to incorporate Indigenous Knowledge.

The project will also require additional licences, permits and authorizations, including (but not limited to) an authorization under Section 35(2) of the federal *Fisheries Act* for the Harmful Alteration, Disruption, or Destruction (HADD) of fish habitat and an amendment to Schedule 2 of the Metal and Diamond Mining Effluent Regulations (MDMER) of the *Fisheries Act* to allow the deposition of tailings into a tailings impoundment area in water or as listed in Schedule 2. Other permits/authorizations are anticipated under Canada's *Species at Risk Act*, *Explosives Act* and *Navigation Protection Act* and BC's *Mines Act*, Health, Safety and Reclamation Code for Mines BC, *Environmental Management Act*, *Water Sustainability Act*, *Heritage Conservation Act*, *Forest and Range Practices Act* and *Land Act*.

20.3 Social Setting

Information describing the social setting of the Project has been compiled primarily from Hatch (2020). The Project is located within the traditional territories of the Tahltan First Nation and the Kaska Dena. It is located approximately 65 km east of the community of Dease Lake. HCNC is looking to establish and sustain meaningful, constructive dialogue and relationships with Indigenous groups, communities, regulators and other interested parties through the development of a consultation and engagement strategy which will include:

- Communication of information in a timely, consistent manner throughout the life cycle of the Project,
- Early identification and understanding of project issues and concerns,
- Early, frequent, open and honest communication,
- The fostering of strong, collaborative, long-term partnership.

Consultation and engagement with Indigenous groups, communities, regulators and other interested parties is ongoing. Further discussions will be required as baseline programs are developed, particularly those based on the social sciences and the consideration of Traditional Knowledge and Indigenous perspectives.

20.3.1 Archaeology and Heritage Resources

Pre-clearing assessments were completed in support of exploration activities in 2018 and 2019. Archaeological impact assessment studies are also underway with assistance from Tahltan and Kaska members.

20.3.2 Indigenous Groups

The information describing Indigenous groups has been compiled from Hatch (2020).

20.3.2.1 Tahltan First Nation

The Tahltan Nation is represented by the Tahltan Central Government (TCG), which is responsible for the protection of ecosystems and natural resources, the management of sustainable economic development and the strengthening of cultural wellness of the Tahltan Nation within the Tahltan traditional territory (TCG, 2023). The Iskut Band and the Tahltan Band continue to govern Tahltan interests with respect to the *Indian Act* but have endorsed the TCG as the representative government of the Tahltan Nation for matters of inherent Aboriginal title and rights (TCG, 2023). Over half the residents in Tahltan territory are Tahltan, living between the three main communities of Telegraph Creek, Dease Lake and Iskut.

Tahltan territory is unceded and comprises roughly 95,933 km², or 11% of BC (TCG, 2023). Tahltan territory includes the Stikine Watershed and headwaters and ranges from the lower Yukon boreal forest to the Cassiar Mountains to the east, the Skeena and Nass River headwaters in the south and the Central Mountains in the west.

20.3.2.2 Kaska Dena

The Kaska Dena include descendants of five groups of Kaska people dispersed throughout communities in the Northwest Territories, Yukon and BC. In BC, the Kaska are represented by the Dease River First Nation, located in Good Hope Lake, the Daylu Dena Council, located in Lower Post and the Kwadacha Nation located in Kwadacha (Fort Ware). In the Yukon and Northwest Territories, the Kaska are represented by the Liard First Nation and the

Ross River First Nation. Kaska Dena traditional territory is 24 million ha, reaching north of Faro, in the Yukon Territory, east into the Northwest Territories and as far south as Kwadacha, BC (Kaska Dena Council, 2023).

20.3.2.3 Treaty 8 First Nations and Métis Nation of BC

Treaty 8 First Nations and the Métis Nation of BC may also be interested in the Project. The Project is located inside the western boundary of Treaty 8 traditional territory, as recently determined by the BC Supreme Court (*West Moberly First Nations v. British Columbia*, 2017). Treaty 8 representatives participated as observers on the BC Muskwa-Kechika Advisory Board.

20.3.3 Traditional Land Use (TLU) and Traditional Ecological Knowledge

As part of the Project's environmental assessment, Indigenous Knowledge and TLU studies will be completed in partnership with Indigenous groups. Indigenous Knowledge studies completed previously for the Project (e.g., Dena Kayeh Institute, 2010) will be updated as required. A Tahltan Land Use and Occupancy Study is currently ongoing. All archaeological and heritage assessments will be conducted in partnership with Indigenous groups. HCNC will respect and work in partnership with Indigenous groups to incorporate into baseline data, the environmental assessment and mitigation and management plans information provided by Indigenous knowledge holders and keepers, land guardians, elders and representatives.

20.3.4 Consultation and Engagement Activities with Indigenous Groups

Engagement with the Tahltan Nation and Kaska Dena was initiated in 2004 during the development of the preliminary environmental baseline program. Engagement since then has included in-person meetings, telephone calls, letters and email correspondence.

HCNC has entered into a Communications Agreement with the TCG that is renewed annually, that establishes a framework for communications with the Tahltan Nation. HCNC also has an Opportunities Sharing Agreement with the TCG that establishes a framework for communications and cooperation on employment, contracting and community opportunities.

In October 2008, the Daylu Dena Council, Dease River Band Council, Kwadacha First Nation and Kaska Dena Council and HCNC entered into a Cornerstone Agreement that outlined the intentions and obligations of the parties regarding BC Kaska's initial participation in the Turnagain Project. The Cornerstone Agreement expired on December 31, 2010. HCNC is in the process of negotiating an exploration agreement with the Kaska Dena Council, with Dease River First Nation leading the negotiations on behalf of the Kaska Dena Council.

HCNC had also entered into a Protocol with the Daylu Dena Council, Kaska Dena Council, Dease River Indian Band, Kwadacha First Nation and the Dena Keyeh Institute (signed June 9, 2009), which included commitments by the parties regarding environmental protection, economic opportunities and benefits and Kaska knowledge, education and training. This Protocol expired when the Cornerstone Agreement expired.

Giga Metals has shared draft management plans with the Tahltan Nation and Kaska Dena for their review and input. For example, a draft Wildlife Mitigation Plan prepared by EDI (2020) on behalf of Giga Metals and an Archaeological Chance Find Procedure were provided to the Tahltan, Kaska Dena and provincial government for review.

20.3.5 Local Communities and Interested Parties

The closest community to the Project is Dease Lake (unincorporated), located on Highway 37 at the south end of Dease Lake. Other local communities include Telegraph Creek, Iskut and Good Hope Lake. The cities of Terrace and Smithers are 580 km and 600 km to the south of Dease Lake, respectively. There are no residences near the Project. HCNC will engage with local and regional communities and interested parties throughout the environmental assessment process.

20.3.6 Consultation and Engagement with Government Agencies

Consultation and engagement with federal and provincial government agencies will continue during the environmental assessment process through construction, operations and decommissioning. Table 20-2 presents a record of consultation and engagement activities with government agencies to date.

Table 20-2: Consultation and Engagement Record to Date

Organization*	Communication Method	Date	Summary
TCG Job Fair	Presentation, In-person meetings	February 2018 April 2019 April 2023	Poster presentation and discussions with community
Muskwa Kechika Management Advisory Board	Presentation	October 23, 2018	Introduction to Giga Metals and the Turnagain Project
TCG Industry Meetings	Presentation	January 2019 January 2020 January 2022 January 2023	Provide update on Turnagain project to leadership, discuss hiring and contracting, answer questions.
CIM North Central District Presentation	Presentation	June 2019	Introduction to Giga Metals and the Turnagain Project
Indigenous Business Opportunities Conference	Attendees	February 2020	Meetings to discuss Turnagain project.
Covid 2020 – 2021			
BC Ministry of Energy, Mines and Low Carbon Innovation	Virtual Presentation	January 2021 January 2022	Introduction to Turnagain project, discuss carbon sequestration research, involvement of provincial government, state of battery supply chain in BC.
BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development	Virtual Presentation	July 2021	Introduction to Turnagain project, discuss carbon sequestration research, involvement of provincial government.
BC Ministry of Jobs, Economic Recovery and Innovation	Virtual Presentation	September 2021	Introduction to Turnagain project, discuss carbon sequestration research, involvement of provincial government.
Dease River First Nation	In-person	January 2022 January 2023	Update on Turnagain project, planned work, community donations and discussed site visits.
DRDC Contract Awards	In-person	February 2022	Discussed catering services and camp logistics.

Organization*	Communication Method	Date	Summary
TCG Contracts and Employment	Virtual Meeting	March 2022 May 2022	Discussed strategies for hiring more Tahltan contractors and employees at Turnagain, status of contractors.
BC Ministry of Jobs, Economic Recovery and Innovation Energy, Mines and Low Carbon Innovation Innovative Clean Energy Fund	Virtual Meeting	April 2022	Discussed provincial and federal involvement in critical mineral projects like Turnagain.
Natural Resources Canada BC Ministry of Energy, Mines and Low Carbon Innovation	Virtual	May 2022	Discussed provincial and federal involvement in critical mineral projects like Turnagain and the future of BC's battery supply chain.
Panasonic and Embassy of Canada in Japan	In-person	May 2022	Discussed government support for Turnagain project, relationships between Canada and Japan to develop major critical mineral projects.
Canadian Infrastructure Bank	Virtual	November 2022	Introduction to Turnagain project, discuss funding support for the northern transmission line extension to Dease Lake and project funding.
BC Ministry of Energy, Mines and Low Carbon Innovation	In-person	November 2022	Discuss provincial government support for the northern transmission line extension to Dease Lake.
BC Ministry of Jobs & Economic Recover, Foxconn Delegation	In-person	December 2022	Introduction to company and Turnagain project.
Natural Resources Canada Trade Mission to Japan	In-person	January 2023	Trade delegation to Japan, introduced company and Turnagain project, discussed federal support for the northern transmission line extension.
Daylu Dena Council, Dease River First Nation	In-person	January	Update on Turnagain project, planned work and discussed the northern transmission line.
Daylu Dena Council	Virtual	February 2023	Introduction to Turnagain project, discuss northern transmission line extension to Dease Lake and upcoming milestones.
BC Ministry of Energy, Mines and Low Carbon Innovation	Virtual	February 2023	Introduction to Giga Metals and the Turnagain project, discuss provincial funding support for the northern transmission line extension to Dease Lake, community relations. First meeting with new Minister Josie Osborne.

*Organization names reflect the naming conventions of the dates shown; organization names may have since changed.

20.4 Closure and Reclamation

Closure objectives will be developed that aim to return disturbed areas to conditions consistent with an agreed upon end land use. Preliminary closure planning will be carried out concurrently with various stages of Project development and design in order to integrate closure objectives into the design, construction and operation of mine infrastructure and activities. The closure and reclamation plan will be developed in consultation with the Project team, Indigenous groups, interested parties and appropriate regulatory agencies.

The following considerations will be incorporated into the Project design, so the features involved better align with expected closure and reclamation practices:

- Long-term stability of the embankments and other engineered structures, including the waste rock storage facilities,
- Long-term preservation of water quality within and downstream of decommissioned operations,
- Construction of a spillway at the TMF,
- Construction of a protective berm or wildlife fence around the open pits,
- Removal and proper disposal of pipelines, structures and equipment not required beyond the end of mine life,
- Long-term stabilization of exposed erodible materials,
- Integration of disturbed lands into the surrounding landscape and restoration of the natural appearance of the area after mining ceases, to the extent possible,
- Establishment of a self-sustaining vegetative cover consistent with identified end land uses,
- Routine monitoring to evaluate the performance of reclaimed land.

Post-closure requirements will include annual inspections of the TMF and waste rock storage facilities and ongoing evaluation of water quality, flow rates and instrumentation records to confirm the design assumptions adopted for closure. Groundwater monitoring wells and geotechnical instrumentation will be retained for long-term monitoring and performance assessment.

Approximate security requirements for premature closure, final closure and post-closure have been included in the economic analysis based on the anticipated closure and reclamation activities required.

20.5 Environmental Management

It is expected that a comprehensive Environmental Management System (EMS) will be required for the construction, operation and closure phases of the Project. The EMS will consist of a series of written plans that align with compliance expectations set by regulatory requirements as well as the environmental policies of HCNC.

20.5.1 GHG Management

In addition to the EMS, HCNC has been looking at ways to manage and mitigate their GHG production, specifically through the sequestration of carbon dioxide (CO_2) and fleet electrification.

20.5.1.1 Sequestration of Carbon Dioxide with Mine Tailings

The host rocks of the Turnagain deposit contain a variety of minerals, such as brucite, serpentine and olivine, which are known to react with CO_2 under atmospheric conditions to sequester the GHG as mineral carbonates over geological timeframes. For individual minerals, the reaction rate is influenced by a variety of factors, including particle size (specific surface area), temperature, CO_2 pressure, moisture and water chemistry.

With the fine grinding of the Turnagain material for froth flotation and deposition of the tailings sub-aerially in a large TMF, carbonation is expected. The company is actively working on quantifying CO_2 sequestration rates through ongoing independent scientific research, including three test programs conducted at UBC by Dr. Greg Dipple. The goal of the test programs is to better define the quantity of CO_2 that can be sequestered and the optimal tailings management strategies.

The first test program (Scheuermann and Dipple, 2021a) tested screened coarse rejects from a 2006 drill hole in a laboratory setup using CO_2 flux meters and inorganic carbon determination. The samples were assayed at about 2% brucite and designated as control and "churned". The churned sample had the mineral material periodically mixed to expose new reactive material. The control sample demonstrated sequestration at an average of 27 t/ha/y through a 30-day test. The churned sample demonstrated substantially improved sequestration rates immediately following the mixing, leading to an average sequestration rate of 34 t/ha/y. Only a fraction of the brucite—the most easily carbonated material—was converted during the test program, indicating that with continued exposure, additional sequestration would be possible. However, continued exposure would be difficult in an operating TMF.

The second test program (Scheuermann and Dipple, 2021b) was a field pilot run over 65 days, testing the same approach on a larger scale. Two control samples of different particle sizes were used, and a churned cell was used. The two control samples returned similar rates of sequestration, around 10 t/ha/y. Churning was much more effective on the larger scale, with an average sequestration rate of 32 t/ha/y, very similar to the laboratory-based work. The reduced sequestration rate for the control samples may be related to a substantially higher moisture level compared to the laboratory testing. Again, only a fraction of the brucite reacted.

The third test program (Wynands and Dipple, 2022) was set up to test the impact of CO_2 injection and temperature, a critical element for a project in the northern temperate regions. This program was laboratory-based, with smaller-scale equipment to allow testing in temperature-controlled environments. Control and churn samples were tested at 21, 13 and 5°C. Results showed decreasing sequestration rates at lower temperatures, with control samples at 19, 18 and 12 t/ha/y and churned samples at 24, 21 and 16 t/ha/y, respectively. The injection of pure CO_2 was able to increase the reaction rates by a factor of 8.

Although the results are encouraging and the reactivity well-known, HCNC considers these results too preliminary to be relied upon at this time and is not using them to decrease stated project emissions. CO_2 sequestration by the TMF is expected to help achieve the goal of CO_2 neutrality in future years.

Substantial work is ongoing in a number of jurisdictions and programs to develop a sequestration offset protocol. HCNC is remaining abreast of developments and cooperating with other industry leaders to ensure that sequestration is properly credited for new mine development.

20.5.1.2 GHG Emissions

Tetra Tech estimated the GHG footprint of the Project considering Scope 1 (direct site-based) and Scope 2 (related to imported hydroelectric power) emissions. Based on the diesel and electricity consumption for mining and processing activities, the carbon intensity calculated for the operations is estimated to average 57,920 t CO_2e per year, or an average of 1.8 t CO_2e/t Ni. This is a significant reduction from the results reported in the PEA due to the shift from a traditional diesel haul fleet to a trolley-assist haul fleet with autonomous operation. The reduction in emissions associated with this change is 16,500 t CO_2e/y or 0.5 t CO_2e/t Ni. This is not a life-cycle assessment value and does not include Scope 3 emissions related to the production or transportation of inputs to the Turnagain project or the transport of products from the Turnagain project, nor does it consider apportionment of the GHG footprint to by-products.

There is an opportunity to reduce the carbon intensity through further electrification of the mining fleet. The mining industry is clearly moving towards fully electric haul equipment. The most efficient form of this is expected to be a trolley plus battery, where the trolley-assist infrastructure is utilized for powering the loaded trucks out of the mine and to charge smaller batteries used for moving the trucks in the limited non-trolley areas. Regenerative braking on the descent into the mine pit will also charge the onboard batteries.

The Scope 2 portion of the GHG footprint above is calculated based on the 2020 BC Best Practices Methodology for Quantifying Greenhouse Gas Emissions figures for BC hydro. A figure of 10.6 t CO_2e/GWh is used for the estimate.

21.0 CAPITAL AND OPERATING COSTS

21.1 Initial Capital Cost Estimate

The total estimated initial capital cost for the design, construction, installation and commissioning of the Project is $1,893.5 million. This total includes all direct costs, indirect costs, owner's costs and contingency for achieving a mill feed rate of 90,000 t/d. A summary of the initial capital cost estimate is provided in Table 21-1.

Table 21-1: Initial Capital Cost Summary

Description	Cost (million $)
Site Preparation & Site Roads	29.6
Mining	132.4
Processing Plant	623.4
TMF and Water Management	177.3
Site Services and Utilities	74.4
On-site Infrastructure	48.5
Off-site Infrastructure	179.5
Total Direct Initial Capital Cost	**1,265.0**
Indirect Initial Capital Costs	374.2
Owner's Costs	38.5
Contingencies	177.4
Total Capital Cost	**1,855.0**
Capitalized Pre-production Cost	38.4
Total Initial Capital Cost	**1,893.5**

Note: Total may not add due to rounding.

21.1.1 Estimate Information

21.1.1.1 Class of Estimate

This Class 4 cost estimate has been prepared according to AACE International (2020) standards. The expected accuracy range of this initial capital cost estimate is ±25%.

21.1.1.2 Estimate Base Date

This estimate was prepared with a base date of Q1/Q2 2023. The estimate does not include any escalation past this date. Budget quotations were obtained for major equipment from suppliers who provided prices, delivery lead times and spare allowances. Costing is based on in-house data and budgetary quotes for non-major equipment and construction materials. The quotations used in this estimate were obtained in Q1/Q2 2023 and are budgetary and non-binding. Approximately 80% of the mining and processing equipment costs were based on vendor quotations.

21.1.1.3 Currency

All capital costs are expressed in US dollars. No provision was made for future fluctuations in the currency exchange rates. The currency exchange rates used in the estimate are shown in Table 21-2.

Table 21-2: Currency Exchange Rates

Currency	Exchange
1.00 CAD	0.77 US$
1.00 EUR	1.13 US$
1.00 AUD	0.67 US$

21.1.2 Assumptions and Exclusions

21.1.2.1 Assumptions

In developing the capital cost estimate, Tetra Tech assumed that:

- Concrete aggregate and suitable backfill material will be locally available,
- Construction activities will be continuous,
- Bulk materials such as cement, reinforcing steel, structural steel and plate, cable, cable tray and piping will be available when required,
- All the permits required for the project construction will be available.

21.1.2.2 Exclusions

All vendor quotations are budgetary and not binding. These quotes may change without notice. Amid increasing uncertainty in global economics and trade, fluctuations in global commodity prices and exchange rates could cause a rapid change in the cost of items presented in this cost estimate.

The following items are not included in the capital cost estimate:

- Force majeure,
- Schedule delays, such as those caused by:
    - Major scope changes,
    - Unidentified ground conditions,
    - Uncertainties in geotechnical or hydrogeological conditions,
    - Labour disputes,
    - Environmental permitting activities,
    - Abnormally adverse weather conditions.
- Schedule acceleration costs,

- Cost of financing (including interest incurred during construction),
- Corporate expenses,
- Working or deferred capital (included in the financial analysis),
- Receipt of information beyond the control of the EPCM contractors,
- Salvage value for assets only used during construction,
- Taxes and duties (PST, GST and HST),
- Land acquisition,
- Project sunk costs (exploration programs, etc.),
- Cost of this study and future FS,
- Closure and reclamation (included in the financial model),
- Vendor price fixing/gouging,
- Macroeconomic factors,
- Currency fluctuations,
- Geopolitical tensions or war
- Disruptions of global supply and logistical services,
- Pandemics or other natural disasters,
- Royalties or permitting costs, except as expressly defined,
- Forward inflation/deflation,
- Growth factors in design and engineering.

21.1.3 Basis of Cost Estimation

21.1.3.1 Estimate Sources

For 2023 PFS, sources of estimated total initial capital costs, including directs, indirects, Owner's costs and contingencies, can be classified into four categories:

- Budget Quotations,
- Estimated/Historical,
- Allowances/Factoring.

21.1.3.2 Labour Rates

A project labour rate has been estimated and applied to various areas of the 2023 PFS. The estimated project construction labour rate is US$78.00/h, including the estimated labour burdens. The base labour rate of US$36.73/h was estimated from a combination of union/labour rates obtained from collective agreements, including operating mines in BC, published by the unions and BC Labour Relations Board and across all construction crafts.

21.1.3.3 Labour Productivity

Factors impacting productivity included in the buildup were the general economy, production supervision, labour relationship, job conditions, equipment and weather. A field labour productivity factor of 1.30 was used in the cost estimate.

21.1.3.4 Person-hours / Work Week

Tetra Tech assumed the person-hours/work week to be 10 h/d, with a 20-day-on and 10-day-off rotation for the construction labour and supervision roster. This is compliant with the daily maximum and weekly average maximum hours worked (including time off) as per the BC Mines Act (the maximum average is 50 h/wk). This roster also allows for two on-site crews for seven-day continuous construction coverage.

21.1.4 Direct Costs

Direct costs are considered to be the cost of installed equipment, material, labour and supervision directly or immediately involved in the physical construction of the permanent facility. Examples of direct costs include purchase and labour and materials for assembly and installation of mining equipment, process equipment, mills and permanent buildings.

The total Project direct cost is estimated to be $1,265 million.

21.1.4.1 Site Preparation and Site Roads

Overall site includes bulk earthworks, site preparation and site access roads. The quantities were based on the layout drawings. The earthmoving unit rates were estimated based on Tetra Tech's historic information for similar projects in the area. Fuel costs are included in the rates. Concrete aggregates, structural backfill, granular base, road base and sub-base are assumed to be supplied from the borrow pits to be established in the area. The unit costs associated with these materials include borrow pit development (crushing and screening) and transport costs. It is assumed that there is no cost or royalty payable to obtain the borrow pit material.

21.1.4.2 Mining

The mining capital cost estimate provides an evaluation of the capital expenditure required to develop the open pit and waste dumps and acquire the mining mobile equipment. Capital cost estimates are based on a combination of budgetary quotes from equipment suppliers, previous experience of the mining team and benchmarked data from similar mines in northern BC. Table 21-3 summarizes the mine capital cost estimate. Note that all mining capital cost presented in this section does not include indirect costs and contingency.

Surface construction will be assigned to contractors and its costs included the following:

- Overburden liner construction for waste rock dump and low-grade stockpile,
- Tree clearing and grubbing for each pushback, waste rock dump and low-grade stockpile,
- Timber logging.

Costs for primary mining equipment include the following:

- Loading units,
- Hauling units,
- Production drilling units,
- Primary support equipment,
- Scheduled replacement cost.

Costs for secondary equipment include the following:

- Secondary support equipment,
- Scheduled replacement cost.

Costs for mining Infrastructures include the following:

- Trolley-assist infrastructures,
- Autonomous systems,
- Fleet dispatch systems,
- Explosive storage silo and magazine,
- Dewatering pumps,
- Mine electrical substations and power distribution system.

Table 21-3: Summary of Mining Initial Direct Capital Costs

Description	Cost (million $)
Surface Construction Costs	6.2
Primary Mining Equipment	94.7
Secondary Mining Equipment	9.0
Mining Infrastructures (Trolley Assist, Dispatch Systems, etc.)	22.5
Total	**132.4**

Note: Total may not add due to rounding.

21.1.4.3 Processing Plant

The processing plant includes primary crushing, conveying, secondary (by cone crushers) and tertiary (by HPGR crushers) crushing, grinding, classification, flotation, concentrate dewatering, reagent preparation/storage and concentrate handling. Mill building, cone crusher/HPGR building and concentrate handling are included in this area. The cost estimates also include overall process plant control systems.

Tetra Tech prepared a detailed equipment list with the description, size and unit cost for each piece in accordance with the process flow sheets and equipment lists. Budget quotations were obtained for the major mechanical equipment based on preliminary specifications. Costing for non-major equipment is based on in-house data. Electric or hydraulic motors were itemized and priced with the equipment. The standard installation man-hour database was used to calculate the installation hours for mechanical equipment.

The quantities for all plate work and liners for tanks, launders, pump boxes and chutes were estimated based on preliminary drawings and referencing historical data.

Tetra Tech prepared an HVAC equipment list and costs for the major HVAC systems, such as air conditioners, electric heaters, ventilation fans, fire pumps and propane-fired heaters in buildings, were based on in-house data.

The dust collection equipment was sized based on the process flow sheets and good engineering practices. Technical data sheets were prepared and issued to equipment vendors for budgetary quotes.

Concrete quantities were determined from PFS layout drawings and experience from previous projects of a similar nature. The unit rates for concrete placement and finishing were derived from in-house data from similar projects and the rates were cross-checked against unit rates provided by regional industrial contractors. Aggregate was assumed to be sourced locally for use with onsite batch plants. This price is included with the concrete unit prices.

Steel quantities are based on preliminary engineering design and general arrangement drawings. Allowances were included for cut-offs, bolts and connections.

Piping and instrumentation costs were estimated as allowances based on a factored approach. The piping estimate includes pipes, valves, fittings, hangers/supports, testing and installation labour. A budget quotation was obtained for the plant control system based on preliminary specifications.

The electrical cost estimate includes electrical equipment, cables, control wires, bus work, hangers/supports, termination, testing and installation labour. Electrical quantities and costs were developed based on the single-line diagrams, project drawings and sketches outlined in the WBS structure.

21.1.4.4 Tailings Management Facility

TMF area includes site preparation, tailings disposal and reclaim water systems, zoned tailings embankment construction, seepage collection, sediment control, TMF electrical distribution and geotechnical instrumentation. The estimated construction materials and associated quantities for the TMF were measured on the basis of the embankment design shown on the relevant PFS drawings and are “neat line” estimates. The capital cost estimates for the TMF were based on these material and quantity estimates.

Capital cost estimates include the following components of the TMF:

- Earthworks and foundation preparation for the main (northwest) and saddle (southeast) dams,
- Tailings pipelines and fittings,
- Reclaim water system (including barge, pipes, pumps and booster station),
- Local roads for TMF access, construction and borrow source development,
- Seepage control and sediment control for both dams,
- Geotechnical and hydrogeological instrumentation,
- Surface water diversions.

21.1.4.5 Services and Utilities

Site services and utilities include water supply, plant and instrument air, fuel and propane storage, electrical substation and on-site power distribution, site-wide control and communication systems, fire alarm system, yard lighting, sewage treatment, waste management and site fencing.

A fibre optic cable to Highway 37 was included in the estimate. A budget quotation was obtained for the telecommunications package based on preliminary specifications.

21.1.4.6 On-Site Infrastructure

Site infrastructures and ancillary buildings include an administration building, assay laboratory, maintenance complex (truck shop, truck wash and warehouse), gatehouses, cold storage, lube storage and distribution and permanent camp.

Quantities were rolled up into a single line item per WBS sub-area based on the area layout and general arrangement drawings where available.

21.1.4.7 Off-Site Infrastructure

Off-Site Infrastructure includes the transmission line and access road from Highway 37 to the site.

Civil earthwork quantities are developed for the off-site access road. The access road from Highway 37 to the Turnagain project site is approximately 78 km. The road is mostly an upgrade of the existing Boulder trail with some detours to accommodate the BC forest road guidelines and optimize the cut and fill quantities. The earthmoving unit rates were estimated based on Tetra Tech’s information for similar projects in the area.

A summary of materials required to construct the transmission line from the Tatogga Substation to the Turnagain Mine Site was developed by KWL based on the preliminary route selection and layout. It reflects the number of different tower types required for each route segment, along with the right-of-way areas to be cleared of vegetation, the length of access roads required for clearing and construction and a summary of substation requirements. Contractor pricing and Tetra Tech’s in-house data were used to estimate the cost based on the quantities provided.

21.1.5 Indirect Capital Costs

Indirect capital costs consist of costs not directly attributable to the completion of an activity, which are typically allocated or spread across all activities on a predetermined basis. In construction, (field) indirect costs are costs that do not become a final part of the installation, but which are required for the orderly completion of the installation and may include, but are not limited to, field administration, direct supervision, capital tools, start-up costs, contractor’s fees, insurance, taxes, cranage and scaffolding, etc.

The indirect cost is estimated to be $374 million and is presented in Table 21-4.

Table 21-4: Project Indirect Capital Costs

Description	Cost (million $)
Construction Indirects	109.8
Spares	29.8
Initial Fills	25.7
Freight and Logistics	89.5
Commissioning and Start-up	19.2
Engineering, Procurement & Construction Management	99.1
Vendor's Assistance	1.0
Total Indirect Capital Cost	**374.2**

Note: Total may not add due to rounding.

Construction Indirects

This area includes the cost of contractor management and general support and all temporary buildings, utilities and services required during construction and commissioning. The administration and warehouse buildings are assumed to be erected at the start of construction and will be used as offices and temporary storage during construction.

Construction indirects was estimated based on the construction field-labour hours, temporary facilities, construction camp, other temporary services, necessary supplies and fuel requirements.

Spares

Allowances have been made for spares based on the value of the original equipment. The following allowances have been included in the estimate:

- 5% of equipment cost for capital spares,
- 2% of equipment cost for commissioning spares.

Initial Fills

Initial fills were estimated to be $26 million, including initial fills of consumables, such as reagents, liners, grinding media, lubrication and diesel.

Freight and Logistics

Freight and logistics were estimated based on a factor of equipment and bulk material costs. Generally, it includes the following:

- Land and ocean transportation,
- Loading and offloading, including craneage,
- Customs duties and brokerage,
- Bonds and insurance.

Commissioning and Start-Up

This estimate includes an allowance for commissioning and start-up based on 3% of the total mechanical supply cost.

Engineering, Procurement and Construction Management

EPCM cost of $99 million was estimated as a factor of total direct cost, according to Cost Estimator's experience and with inputs from consultants and clients.

Vendor's Assistance

The estimate included an allowance for vendor assistance based on Cost Estimator's experience.

21.1.6 Owner's Costs

Owner's costs are assumed by the Owner to support and execute the Project. The Project execution strategy, particularly for construction management, involves the Owner working with an EPCM organization and supervising the general contractor(s). The Owner's costs include field staffing, field travel, general field expenses, community relations and Owner's contingency.

The total Project Owner's cost is estimated to be $38.5 million.

21.1.7 Contingency

When estimating costs for a project, there is always uncertainty as to the precise content of all items in the estimate, how work will be performed, what work conditions will be encountered during execution, etc. These uncertainties are risks to a project and these risks are often referred to as "known-unknowns", which means that the estimator is aware of the risks and, based on experience, can estimate the probable costs. A contingency for each activity or discipline was estimated based on the level of engineering effort, the consensus from the consultants, as well as experience on past projects. The values applied range from 10% to 17.5% over the direct capital costs.

The total Project contingency allowance is $177 million.

21.2 Sustaining Capital Costs

The sustaining capital costs are all required from Year 1 of operations to sustain the mining operation for the LOM and are estimated to be $1,643 million for the LOM, including the closure and reclamation cost. Details of the total sustaining cost are presented in Table 21-5.

Table 21-5: Sustaining Capital Costs Summary

Description	Cost (million $)
Mining	666.0
Process and Infrastructure	55.0
TMF	617.1
Total Direct Sustaining Capital Cost	**1,338.1**
Indirect Sustaining Capital Costs	61.3
Contingencies	165.2
Total Sustaining Capital Cost	**1,564.6**
Closure & Reclamation	78.4
Total	**1,643.0**

Note: Total may not add up due to rounding.

21.2.1.1 Mining

Sustaining capital is based on fleet expansions, unit replacements, haul road extension and trolley line expansion over the LOM. Capital replacement costs for mobile equipment were calculated based on the expected life of the equipment, the cost of the unit and the utilization of that equipment. The mining sustaining capital cost was estimated at $666 million as presented in Table 21-6.

Table 21-6: Summary of Mining Sustaining Direct Capital Costs

Description	Cost (million $)
Surface Construction Costs	16.5
Primary Mining Equipment	504.2
Secondary Mining Equipment	8.3
Mining Infrastructures (Trolley Assist, Dispatch Systems, etc.)	137.1
Total	**666.0**

Note: Total may not add due to rounding.

21.2.1.2 Process and Infrastructure

Process and infrastructure sustaining capital costs include a replacement allowance for equipment. The process and infrastructure sustaining capital cost was estimated at $55 million. Most process equipment is expected to have a life exceeding the project life.

21.2.1.3 Tailings Management Facilities

The sustaining capital for the TMF is estimated at $617 million.

The dam raising for the North dam is accounted in the sustaining capital expenses. The south dam construction is expected to start in Year 13 of the operation. Ancillary expenses such as monitoring are included as sustaining capital expenses throughout the LOM.

21.3 Operating Cost Estimate

The operating cost estimate for the Project consists of mining, processing, G&A and site services costs. The LOM operating costs are summarized in Table 21-7, which shows the LOM costs based on the mine plan. The average operating cost (average of years 3 to 28) is estimated at $9.09/t ore processed, or $3.85/lb nickel recovered in the concentrate. The LOM average operating cost (average of years 1 to 30) is estimated to be $9.04/t ore processed, or $3.89/lb nickel recovered in the concentrate. Unit cost data are expressed for a typical full operating year (average of years 3 to 28). All operating costs are expressed in US $ unless specified. The currency exchange rates used in the estimate are shown in Table 21-2.

Table 21-7: Project Operating Cost Summary

Description	LOM Cost (million $)	Unit Cost ($/t processed)	Unit Cost ($/lb Ni Recovered to Concentrate)
Mining	2,739.6	3.02	1.28
Processing	4,935.5	5.29	2.24
G&A	533.9	0.57	0.24
Site Services	206.2	0.22	0.09
Total Operating Cost	**8,415.2**	**9.09**	**3.85**

Note: Total may not add due to rounding.

Project operating cost includes all recurring costs for payroll, service contractors, camp operations, maintenance parts and supplies, reagents, consumables, supplies, freight, personnel transportation, etc. The operating cost estimates are based on budget prices obtained in Q2 2023 together with the costs from internal databases. The expected accuracy range of the operating cost estimate is ±25%.

The operations schedule is as follows:

- Two 12-hour shifts per day,
- Work rotation schedule: 2 weeks on / 2 weeks off.

21.3.1 Mining Operating Cost

Open pit operating costs, including operating and maintenance salaried staff and hourly labour, equipment major component and running repairs, fuel, power and all other consumable goods, were derived from a combination of supplier quotes and historical data collected by Tetra Tech. The quantities of consumables were determined for each specific open pit mining activity from vendor input and in-house experience. Labour factors for operations and maintenance of the open pit mining equipment were also estimated based on vendor input and Tetra Tech's experience.

The costs for electric power and diesel are $0.05/kWh and $0.99/L (including 0.1 US$/L BC Carbon Tax), respectively. Over the LOM, there will be a total of 450 million litres of diesel consumed. Table 21-8 shows a summary of diesel consumption. Electric power consumption for mining activities is largely contributed by trolley assist haul trucks, drills and electric rope shovels and will consume 2,884 GWh over the entire mine life.

Table 21-8: Summary of Diesel Consumption

Diesel Usage	LOM (million L)
Hauling Units	259
Loading Units	35
Ops Support	110
Secondary Mining Equipment	32
Blasting	14
Total	**450**

Note: Total may not add due to rounding.

The average mine operating cost is estimated to be $2.12/t of material mined (excluding LOM rehandling costs) or $2.94/t milled over the LOM. (Table 21-9).

Table 21-9: Summary of Mining Operating Costs

Diesel Usage	LOM Cost (million $)	$/t Mined
Labour	789	0.61
Diesel	427	0.33
Maintenance	769	0.59
Electrical Power	143	0.11
Blasting	611	0.47
Total	**2,740**	**2.12**

Note: Total may not add due to rounding.

21.3.2 Processing Operating Cost

Annual average processing operating cost is estimated to be $174 million per year, or $5.29/t ore milled. Included in this cost estimate are the following:

- Hourly and salaried personnel requirements and costs,
- Crusher and grinding mill liner and grinding media costs,
- Maintenance supplies,
- Reagents,
- Operation consumables,
- Electrical power consumption.

The processing cost for a 90,000 t/d nominal operation is summarized in Table 21-10.

Table 21-10: Summary of Processing Costs

Description	Unit Cost ($/t milled)	Annual Cost (million $)
Labour	0.32	10.4
Power	1.81	59.4
Consumables		
Liners	0.36	11.7
Grinding Media	1.71	56.2
Reagents	0.72	23.7
Supplies		
Maintenance Supplies	0.36	11.7
Operating Supplies	0.02	0.7
Total	**5.39**	**173.8**

Note: Total may not add up due to rounding.

21.3.2.1 Labour Cost

Total process labour costs at the full process rate of 90,000 t/d are estimated to be $10.4 million per year, or $0.32/t of ore milled. Salary/wage levels are based on current rates at similar operating mines in BC. The payments include base salaries/labour rates and various burdens. The processing plant will be staffed with 117 personnel, including 12 in general supervisory and technical services, 48 in operational roles, 44 in maintenance roles and 13 for the metallurgical laboratory and assay laboratory.

21.3.2.2 Power Cost

Based on the average processing rate of 90,000 t/d of ore milled, the average annual power consumption is estimated to be 1,188 GWh/a. At an average power unit cost of $0.05/kWh (BC Hydro Electric Tariff 2023, Rate Schedule 1823), the annual power cost is estimated to be $59.4 million, or $1.81/t of ore milled.

21.3.2.3 Major Processing Consumables Costs

Major processing consumable costs are estimated to be $91.7 million annually or $2.79/t milled. Major consumable unit prices were quoted from suppliers.

Major processing consumables include the following:

- Grinding media and liners: estimated from the Bond ball mill work and abrasion index equations for ball mills and inhouse data for crusher liners,
- Reagents: based on metallurgical test results.

21.3.2.4 Maintenance and Operating Supplies Costs

Maintenance and operating supplies are estimated to be $0.38/t of ore milled. Maintenance supplies are estimated to cost $11.7 million per year or $0.36/t of ore processed. Operating supplies are estimated to be $0.7 million annually, or $0.02/t of ore processed.

Maintenance supplies are based on approximately 6% of major equipment capital costs. Operation consumables include allowances for laboratory, filtering cloth and service vehicle consumables.

21.3.3 General and Administrative Operating Costs

G&A costs do not relate directly to mining or processing operating costs. These costs include:

- Personnel: executive management, staffing in accounting, supply chain and logistics, human resources, external affairs functions and other G&A departments (36 on-site, 11 off-site positions),
- Expenses: insurance, off-site offices, administrative supplies, medical services, legal services, human resource-related expenses, travelling, community and environmental programs, accommodation/camp costs, air/bus crew transportation, regional and property taxes and external assay/testing.

Average G&A operating costs are estimated at $18.6 million annually or $0.57/t milled. G&A operating costs are summarized in Table 21-11.

Table 21-11: Summary of G&A Operating Costs

Description	Unit Cost ($/t milled)	Annual Cost (million $)
On-site G&A Labour	0.11	3.5
On-site G&A Expenses	0.11	3.7
Off-site G&A Labour	0.04	1.2
Off-site G&A Expenses	0.03	1.0
Camp & catering	0.16	5.1
Crew Transportation	0.13	4.2
Total	**0.57**	**18.6**

Note: Total may not add up due to rounding.

21.3.4 Site Services Cost

The overall site service cost was estimated at $0.22/t milled or approximately $7.1 million annually. The estimate is based on requirements for this remote site in northern BC and in-house data. The estimate includes the following:

- Personnel: general site service personnel (34 positions),
- Site mobile equipment and light vehicle operations,
- Potable water and waste management,
- Transmission line maintenance,
- General maintenance for yards, roads, fences and buildings,
- Building heating.

21.3.5 Tailings Management

The costs for ongoing tailings dam raise and other tailings facility construction-related costs are included in sustaining capital costs. Tailings and reclaim water operations, including power supply, labour and pipeline and water reclaim barge maintenance, is accounted for in processing costs.

21.3.6 Operating Cost Estimate Exclusions

The following items are not included in the operating cost estimate:

- Pre-production,
- First fills,
- Closure and reclamation,
- Escalation.

22.0 ECONOMIC ANALYSIS

22.1 Introduction

Tetra Tech prepared an economic evaluation of the Turnagain PFS based on a pre-tax and a post-tax basis in a single financial model. Taxes and depreciation for the Project were modelled based on the inputs from tax consultants engaged by Giga Metals. For the 30-year mine life and 950 Mt Mineral Reserve, the following post-tax financial parameters were calculated using the base case metal prices:

- 11.4% IRR,
- 5.7-year payback period,
- $574 million NPV at 7% discount rate.

The post-tax IRR is higher than the pre-tax value in some cases due to the impact of the Canadian refundable Clean Technology Manufacturing Investment Tax Credit.

Sensitivity analyses and additional metal price scenarios were developed to evaluate the economics. Table 22-1 shows the economic analysis comparison for varying nickel price without changing other base case parameters. The base price, upper case and lower case are 19%, 7% and 32% below the 20-year inflation-adjusted average price of $26,700/t Ni as stated in Section 19.0, respectively.

Table 22-1: Post-Tax Economic Result Comparison for Different Nickel Prices

Description	Unit	Base Case	Spot Price[1]	Upper Case[2]	Lower Case[2]
Nickel Price	$/t	21,500	20,343	24,725	18,275
Undiscounted Cash Flow	million $	3,419	2,877	4,940	1,924
NPV (at 7%)	million $	574	378	1,112	21
IRR	%	11.4	10.0	14.9	7.2

[1]Spot price: closing price on September 14, 2023; [2]15% higher or lower than base case nickel price.

22.2 Forward-looking Statements

This document contains “forward-looking information” within the meaning of Canadian securities legislation and “forward-looking statements” within the United States Private Securities Litigation Reform Act of 1995. This information and these statements, referred to herein as “forward-looking statements”, are made as of the date of this document. Forward-looking statements relate to future events or future performance and reflect current estimates, predictions, expectations, or beliefs regarding future events and include, but are not limited to, statements with respect to:

- The estimated amount and grade of Mineral Reserves and Mineral Resources,
- Estimates of the capital costs of constructing mine facilities and bringing a mine into production, operating the mine, sustaining capital and the duration of payback periods,
- The estimated amount of future production, both material processed, and metal recovered,

- Estimates of operating costs, the LOM costs, net cash flow, NPV and economic returns from an operating mine,
- The assumptions on which the various estimates are made are reasonable.

All forward-looking statements are based on the authors' current beliefs, their various assumptions and information currently available to them. These assumptions are set forth throughout this Report and some of the principal assumptions include:

- The presence of and continuity of metals at estimated grades,
- The geotechnical and metallurgical characteristics of rock conforming to sampled results,
- The water quantities and quality available during mining operations,
- The capacities and durability of various machinery and equipment,
- Anticipated mining losses and dilution,
- Metallurgical performance,
- Reasonable contingency amounts.

Although the QPs consider these assumptions reasonable based on currently available information, they may prove incorrect. Many forward-looking statements assume the correctness of other forward-looking statements, such as statements of NPV and internal rates of return, based on most other forward-looking statements and assumptions herein.

By their very nature, forward-looking statements involve inherent risks and uncertainties, both general and specific and risks exist that estimates, forecasts, projections and other forward-looking statements may not be achieved or that assumptions do not reflect future experience.

22.3 Base Case Assumptions and Inputs

22.3.1 General Assumptions

The following general assumptions and criteria form part of this analysis:

- Real 2023 US Dollars; no inflation applied.
- Exchange rate – Cdn$1.00 to US$0.77,
- 3-year initial construction from Year -3 through Year -1 (excluding certain pre-construction activities included in the estimate as of Year -3) and a 1-year construction in Year 1 for installation of second processing train,
- 100% equity financing,
- Closure and reclamation costs from 2020 PEA were reviewed and adapted with appropriate escalation factor.

22.3.2 Metal Pricing

The 2023 Base Case results apply the following key inputs:

- Nickel – $21,500/t,
- Cobalt – $58,500/t,
- Platinum and Palladium – $1,200/oz.

22.3.3 Mine and Metal Production

The production statistics is presented shown in Table 22-2.

Table 22-2: LOM Production Statistics

Description	Unit	Y 3 to 28 (full production)	Y 1 to 30 (LOM)
Duration	years	26	30
Ore Mined	Mt	888	931
Waste Mined	Mt	351	379
Strip Ratio	-	0.40	0.41
Ore Processed	Mt	854	931
Ore Processed (Annual)	Mt/y	32.85	31.04
Ni Head Grade	% Ni	0.207	0.205
Co Head Grade	% Co	0.013	0.013
Pd Head Grade	g/t	0.022	0.022
Pt Head Grade	g/t	0.022	0.022
Concentrate Produced	dry kt	5,088	5,458
Concentrate Moisture	% (by wt.)	9	9
Ni Recovery	%	51.8	51.4
Co Recovery	%	49.5	49.0
Pd Recovery	%	38.8	38.4
Pt Recovery	%	30.3	29.9
Ni Recovered	kt	915.8	982.5
Co Recovered	kt	53.7	58.0
Pd Recovered	t	7.3	7.8
Pt Recovered	t	5.8	6.1
Concentrate Ni Grade	% Ni	18	18
Concentrate Co Grade	% Co	1.05	1.06

22.3.4 Payability, Transportation Cost and Other Cost

The metal payability, estimated transportation costs for the concentrate and costs related to the marketing and insurance are listed in Table 22-3.

Table 22-3: Concentrate Terms & Transportation Costs

Description	Unit	Value
Nickel Payable	%	78
Cobalt Payable	%	50
PGE Payable	%	90% above a 1 g/t deduction, each less $50/oz refining charge
Treatment Charges	$/dry t	Part of payable deductions
MgO Penalty	$/dry t	$8 for each 1% MgO over 6% MgO
Concentrate Transportation	$/wet t	189
Concentrate Loss	%	0.08
Marketing and others	$/wet t	0.50
Insurance	% of value	0.15

22.3.5 Royalties

The following royalties are applied:

- Conic Metals royalty is equal to 2% of net smelter return (NSR) for the LOM,
- Giga Metals' buyout of the Schussler-Hatzl royalty discussed in Section 4 of this Report: C$4.0 M (US$3.1 M) in Year 1.

22.4 Assumption on Taxes

The post-tax financial estimates consider all applicable Canadian Federal and BC Provincial taxes including:

- Canadian Federal Income Tax,
- BC Provincial Tax,
- BC Mineral Tax,
- Provincial Sales Tax.

22.4.1 Canadian Federal and BC Provincial Income Tax Regime

The federal and BC provincial corporate income taxes are calculated using the currently enacted rates of 15% for federal and 12% for BC. For both federal and provincial income tax purposes, capital expenditures are accumulated in tax pools that can be deducted against mine income at different prescribed rates, depending on the type of capital expenditures.

22.4.2 Clean Technology Manufacturing Investment Tax Credit

The tax model also includes the application of the announced Clean Technology Manufacturing Investment Tax Credit (CTMITC). Legislation regarding the CTMITC has not yet been presented, but the federal government has announced that it will be a 30% refundable ITC. It is assumed that, as with other refundable ITCs, the CRA will follow a protocol of auditing claims before paying any refund and that refunds will be paid 12-18 months following the due date for filing the claim (i.e.: in the 2nd taxation year following the taxation year in which the claim arises). For income tax purposes, the amount of the ITC is deducted from the undepreciated capital cost of the assets in the year following the year of claim. It is assumed that all depreciable capital costs associated with the project will qualify for the CTMITC, except for site preparation and access road costs, offsite infrastructure and owner's costs. The CTMITC applies to qualifying costs of capital assets incurred through 2034 and is 30% for qualifying costs incurred through 2031, 20% for 2032, 10% for 2033 and 5% for 2034.

22.4.3 BC Mineral Tax Regime

The BC Mineral Tax regime is a two-tier tax regime, with a 2% tax and a 13% tax.

The 2% tax is assessed on "net current proceeds", which is defined as gross revenue from the mine less mine operating expenditures. The 13% tax is assessed on "net revenue", which is defined as gross revenue from the mine less any accumulated expenditures.

BC Mineral Tax is deductible for federal and provincial income tax purposes. With regards to the BC Mineral Tax, the following assumptions have been made:

- The amount of the CTMITC is deducted from the cumulative expenditure account (CEA) in the year of the ITC claim (the year it becomes receivable).
- The New Mine Allowance is in effect for new or expanded mines where production of minerals commences before December 31, 2025. Historically, new mine allowances have been reintroduced before the program has concluded. It is assumed that the new mine allowance will continue to be available after December 31, 2025.
- The tax model assumes a 3.75% imputed interest rate used in determining the investment allowance for BC Mineral Tax purposes. This percentage is calculated as an average of the monthly Bank of Canada rate, multiplied by 1.25 and again multiplied by the days in the filing period (normally 365/365). While the current BOC rate is 5%, 3% is a historically reasonable LOM rate.

22.5 Working Capital

Working capital is based on 30 days of accounts receivable and 90 days of accounts payable. Working capital is reflected in the cash flow as changes in net working capital.

22.6 Results of Economic Analysis

Table 22-4 provides a summary of the LOM cash flow.

Table 22-4: Cash Flow Summary

Description	Unit	Y 3 to 28 (Average)	Y 1 to 30 (LOM)
Nickel Revenue	Million $	591	16,476
Cobalt Revenue	Million $	60	1,695
Palladium Revenue	Million $	3	82
Platinum Revenue	Million $	1	28
Total Revenue	Million $	655	18,281
Off-site Charges	Million $	(47)	(1,323)
Net Smelter Return	Million $	607	16,958
Royalties	Million $	(12)	(342)
Site Operating Cost	Million $	(299)	(8,415)
Site Operating Cost	$/t milled	(9.09)	(9.04)
Site Operating Cost	$/lb Ni in concentrate	(3.85)	(3.89)
Total Overall Operating Costs[1]	$/lb Ni metal paid	(5.72)	(5.76)
Net Overall Operating Costs (net of byproduct sales)[1]	$/lb Ni metal paid	(4.65)	(4.70)
EBITDA	Million $	297	8,201
Initial Capital Cost	Million $	-	(1,893)
Sustaining Capital Cost (inc. Closure)	Million $	-	(1,643)
Salvage Value	Million $	-	63
Pre-tax Cash Flow	Million $	-	4,728
Federal Tax	Million $	-	(710)
Provincial Tax	Million $	-	(568)
Less: CTMITC	Million $	-	544
Total Corporate Tax	Million $	-	(734)
Provincial Resource Tax	Million $	-	(574)
Total Tax	Million $	-	(1,308)
Post-tax Cash Flow	**Million $**	**-**	**3,419**

[1]including onsite and offsite operating costs, excluding royalty costs.

The post-tax discounted annual cash flow and cumulative net cash flow are presented in Figure 22-1.

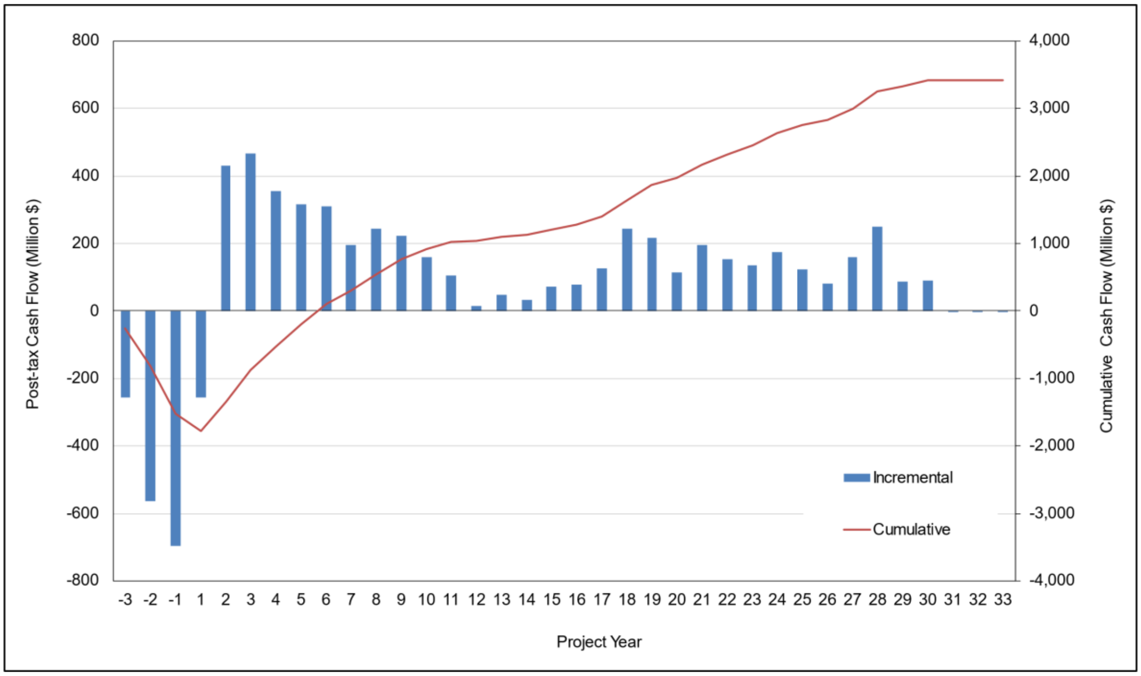


Figure 22-1: Undiscounted Post-Tax Annual and Cumulative Cash Flow

The financial model was established on a 100% equity basis, excluding debt financing and loan interest charges. The financial results for the base case are presented in Table 22-5.

Table 22-5: Summary of Pre-Tax Economic Analysis

Description	Unit	Pre-tax	Post-tax
Undiscounted Net Cash Flow	Million $	4,728	3,419
NPV @ 5% Discount Rate	Million $	1,333	1,026
NPV @ 7% Discount Rate	Million $	717	574
NPV @ 10% Discount Rate	Million $	143	139
IRR	%	11.1	11.4
Payback Period	years	6.9	5.7

Table 22-6 and Table 22-7 show the cash flow for the PFS base case.

Table 22-6: PFS Base Case Cash Flow Summary (Year -3 to Year 15)

Project Year	Unit	LOM	Y -3	Y -2	Y -1	Y 1	Y 2	Y 3	Y 4	Y 5	Y 6	Y 7	Y 8	Y 9	Y 10	Y 11	Y 12	Y 13	Y 14	Y 15
Production Schedule																				
Mill Feed Tonnes	Mt	931.2				11.5	31.2	32.8	32.9	32.8	32.8	32.8	32.9	32.9	32.8	32.8	32.8	32.9	32.8	32.8
Waste Tonnes Mined	Mt	362.9				5.4	6.2	5.5	7.3	4.7	5.1	9.2	8.1	7.8	12.7	12.5	21.1	20.5	21.4	20.7
Strip Ratio	-	0.39				0.37	0.21	0.16	0.22	0.13	0.15	0.30	0.25	0.24	0.39	0.39	0.62	0.59	0.63	0.61
Head Grade																				
Nickel - 4A-Ni	% Ni	0.205				0.256	0.237	0.225	0.213	0.224	0.227	0.212	0.209	0.205	0.197	0.205	0.163	0.184	0.189	0.200
Cobalt	% Co	0.013				0.015	0.014	0.015	0.014	0.014	0.014	0.013	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.013
Palladium	g/t	0.022				0.028	0.023	0.024	0.023	0.026	0.026	0.027	0.022	0.019	0.018	0.019	0.017	0.024	0.022	0.020
Platinum	g/t	0.022				0.026	0.022	0.022	0.021	0.024	0.024	0.026	0.023	0.018	0.018	0.018	0.018	0.028	0.025	0.023
Concentrate Production																				
Concentrate (Dry)	kt	5,458				65	179	214	220	230	237	189	205	209	198	203	164	164	152	163
Concentrate (Wet)	kt	5,998				71	196	235	241	253	261	208	225	230	218	224	180	181	167	179
Nickel Grade	Ni %	18.0				18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
Cobalt Grade	Co %	1.1				1.0	1.1	1.1	1.1	1.1	1.1	1.0	1.0	1.0	1.1	1.0	1.2	1.1	1.1	1.1
Palladium Grade	g/t	1.4				1.8	1.5	1.5	1.5	1.7	1.6	1.7	1.4	1.2	1.2	1.2	1.1	1.6	1.4	1.3
Platinum Grade	g/t	1.1				1.3	1.1	1.1	1.1	1.2	1.2	1.3	1.2	0.9	0.9	0.9	0.9	1.4	1.3	1.2
Magnesium Oxide (MgO)	% MgO	9.2				9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2
Metal Content In Concentrate																				
Nickel	kt	982.5				11.7	32.2	38.4	39.5	41.5	42.7	34.0	36.9	37.7	35.6	36.6	29.6	29.6	27.3	29.3
Cobalt	kt	58.0				0.6	1.9	2.4	2.5	2.5	2.5	1.9	2.0	2.1	2.1	2.1	2.0	1.9	1.7	1.8
Palladium	t	7.8				0.1	0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.3	0.2	0.3	0.2	0.3	0.2	0.2
Platinum	t	6.1				0.1	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Operating Costs																				
Mining	M$	($2,740)				($47)	($67)	($72)	($78)	($79)	($80)	($82)	($79)	($79)	($88)	($88)	($111)	($117)	($118)	($120)
Processing	M$	($4,936)				($68)	($166)	($174)	($174)	($174)	($174)	($174)	($174)	($174)	($174)	($174)	($174)	($174)	($174)	($174)
G&A	M$	($534)				($16)	($17)	($17)	($18)	($18)	($18)	($18)	($18)	($18)	($18)	($18)	($19)	($19)	($19)	($19)
Site Services	M$	($206)				($7)	($7)	($7)	($7)	($7)	($7)	($7)	($7)	($7)	($7)	($7)	($7)	($7)	($7)	($7)
Total	**M$**	**($8,415)**				**($138)**	**($257)**	**($270)**	**($277)**	**($278)**	**($279)**	**($281)**	**($278)**	**($278)**	**($287)**	**($287)**	**($311)**	**($317)**	**($318)**	**($320)**
Gross Recovered Value																				
Nickel	M$	$21,123				$251	$691	$827	$850	$892	$919	$732	$792	$810	$766	$787	$635	$636	$587	$629
Cobalt	M$	$3,390				$38	$111	$141	$145	$147	$149	$111	$119	$125	$122	$123	$115	$110	$99	$103
Palladium	M$	$300				$5	$10	$13	$12	$15	$15	$13	$11	$10	$9	$10	$7	$10	$8	$8
Platinum	M$	$237				$3	$8	$9	$9	$11	$11	$10	$9	$7	$7	$7	$6	$9	$8	$7
Total	**M$**	**$25,051**				**$296**	**$821**	**$990**	**$1,016**	**$1,065**	**$1,094**	**$866**	**$932**	**$953**	**$904**	**$927**	**$763**	**$765**	**$702**	**$748**
Net Revenue From Sales																				
Nickel	M$	$16,476				$196	$539	$645	$663	$695	$717	$571	$618	$632	$598	$614	$496	$496	$458	$491
Cobalt	M$	$1,695				$19	$56	$71	$73	$74	$74	$56	$60	$62	$61	$61	$58	$55	$50	$52
Palladium	M$	$82				$2	$3	$4	$3	$5	$5	$5	$3	$1	$1	$2	$1	$3	$2	$2
Platinum	M$	$28				$1	$1	$1	$1	$2	$2	$2	$1	$0	$0	$0	$0	$2	$1	$1
Total	**M$**	**$18,281**				**$217**	**$599**	**$720**	**$739**	**$776**	**$798**	**$633**	**$682**	**$696**	**$660**	**$677**	**$554**	**$557**	**$511**	**$545**
Offsite Costs	**M$**	**($1,323)**				**($16)**	**($43)**	**($52)**	**($53)**	**($56)**	**($58)**	**($46)**	**($50)**	**($51)**	**($48)**	**($49)**	**($40)**	**($40)**	**($37)**	**($39)**
Net Smelter Return	**M$**	**$16,958**				**$201**	**$555**	**$669**	**$686**	**$720**	**$741**	**$587**	**$632**	**$645**	**$612**	**$628**	**$514**	**$517**	**$474**	**$505**
Royalities	**M$**	**($342)**				**($7)**	**($11)**	**($13)**	**($14)**	**($14)**	**($15)**	**($12)**	**($13)**	**($13)**	**($12)**	**($13)**	**($10)**	**($10)**	**($9)**	**($10)**
Project Income Value (EBITDA)	**M$**	**$8,201**				**$56**	**$288**	**$385**	**$396**	**$428**	**$446**	**$295**	**$342**	**$355**	**$313**	**$328**	**$193**	**$189**	**$147**	**$176**
Capital Investment																				
Direct Cost	M$	($1,265)	($171)	($376)	($481)	($237)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indirect Cost	M$	($374)	($51)	($112)	($143)	($67)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Owner's Costs	M$	($39)	($5)	($11)	($14)	($10)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Contingencies	M$	($177)	($24)	($53)	($68)	($31)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capitalized Pre-production Costs	M$	($38)	($0)	($6)	($32)	($0)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Initial Capital Cost	**M$**	**($1,893)**	**($252)**	**($558)**	**($738)**	**($346)**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Sustaining Costs	M$	($1,565)	($0)	($0)	($0)	($84)	($45)	($38)	($31)	($32)	($44)	($30)	($27)	($52)	($79)	($141)	($127)	($106)	($90)	($71)
Closure Cost	M$	($78)	($5)	($5)	($5)	($6)	($6)	($6)	($6)	($6)	($1)	($1)	($1)	($1)	($1)	($1)	($1)	($1)	($1)	($1)
Salvage Value	M$	$63	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)
Working Capital	M$	($0)	($0)	($0)	($0)	($17)	($0)	$6	($0)	$2	$1	($13)	$4	$1	($5)	$1	($15)	($1)	($4)	$2
Total Capital Cost	**M$**	**($3,473)**	**($257)**	**($564)**	**($743)**	**($454)**	**($51)**	**($38)**	**($37)**	**($36)**	**($44)**	**($44)**	**($24)**	**($52)**	**($85)**	**($141)**	**($143)**	**($108)**	**($94)**	**($70)**
Pre-tax Annual Cash Flow	**M$**	**$4,728**	**($257)**	**($564)**	**($743)**	**($397)**	**$236**	**$347**	**$358**	**$392**	**$402**	**$251**	**$318**	**$303**	**$228**	**$187**	**$49**	**$81**	**$53**	**$105**
Taxes																				
Federal	M$	($710)	$0	$0	$0	$0	$0	$0	($7)	($42)	($48)	($29)	($38)	($42)	($36)	($34)	($13)	($12)	($6)	($10)
Provincial	M$	($568)	$0	$0	$0	$0	$0	$0	($5)	($33)	($39)	($23)	($31)	($33)	($29)	($27)	($11)	($9)	($5)	($8)
Less: ITC	M$	$544	$0	$0	$47	$141	$198	$128	$15	$9	$4	$2	$0	$0	$0	$0	$0	$0	$0	$0
Total Corporate Tax	**M$**	**($734)**	**$0**	**$0**	**46.97**	**140.66**	**198.48**	**127.97**	**3.39**	**($66)**	**($83)**	**($50)**	**($69)**	**($75)**	**($64)**	**($61)**	**($24)**	**($21)**	**($11)**	**($18)**
Provincial Resource Tax Payable	M$	($574)	$0	$0	$0	$0	($5)	($7)	($7)	($8)	($8)	($6)	($7)	($6)	($5)	($22)	($10)	($12)	($9)	($15)
Total Resources and Corporate Taxes	**M$**	**($1,308)**	**$0**	**$0**	**46.97**	**140.66**	**193.53**	**120.88**	**($4)**	**($74)**	**($91)**	**($56)**	**($75)**	**($81)**	**($69)**	**($83)**	**($34)**	**($33)**	**($19)**	**($33)**
Post-tax Annual Cash Flow	**M$**	**$3,419**	**($257)**	**($564)**	**($696)**	**($257)**	**$430**	**$468**	**$354**	**$318**	**$311**	**$195**	**$242**	**$221**	**$159**	**$104**	**$16**	**$48**	**$33**	**$73**
Post-tax Cumulative Cash Flow	**M$**	**$3,419**	**($257)**	**($820)**	**($1,516)**	**($1,773)**	**($1,343)**	**($875)**	**($521)**	**($204)**	**$107**	**$303**	**$545**	**$766**	**$925**	**$1,029**	**$1,045**	**$1,093**	**$1,126**	**$1,199**

Table 22-7: PFS Base Case Cash Flow Summary (Year 16 to Year 33)

Project Year	Unit	LOM	Y 16	Y 17	Y 18	Y 19	Y 20	Y 21	Y 22	Y 23	Y 24	Y 25	Y 26	Y 27	Y 28	Y 29	Y 30	Y 31	Y 32	Y 33
Production Schedule																				
Mill Feed Tonnes	Mt	931.2	32.8	32.9	32.9	32.8	32.9	32.9	32.9	32.9	32.8	32.9	32.9	32.9	32.8	32.9	1.6	-	-	-
Waste Tonnes Mined	Mt	362.9	20.1	18.2	16.0	20.7	19.3	17.8	19.7	13.9	10.6	11.9	11.2	13.5	1.7	-	-	-	-	-
Strip Ratio	-	0.39	0.58	0.50	0.41	0.60	0.63	0.55	0.65	0.38	0.27	0.36	0.33	0.43	0.04	-	-	-	-	-
Head Grade																				
Nickel - 4A-Ni	% Ni	0.205	0.212	0.218	0.247	0.225	0.205	0.222	0.205	0.189	0.196	0.186	0.198	0.201	0.227	0.115	0.115	-	-	-
Cobalt	% Co	0.013	0.013	0.013	0.014	0.013	0.012	0.013	0.013	0.011	0.012	0.012	0.012	0.012	0.013	0.009	0.009	-	-	-
Palladium	g/t	0.022	0.020	0.022	0.028	0.024	0.024	0.027	0.022	0.020	0.021	0.018	0.019	0.018	0.023	0.011	0.011	-	-	-
Platinum	g/t	0.022	0.021	0.021	0.025	0.025	0.026	0.029	0.023	0.022	0.021	0.020	0.020	0.017	0.022	0.013	0.013	-	-	-
Concentrate Production																				
Concentrate (Dry)	kt	5,458	171	172	231	219	194	215	193	178	197	176	183	183	227	121	6	-	-	-
Concentrate (Wet)	kt	5,998	188	189	253	240	213	237	212	196	217	193	201	202	249	133	6	-	-	-
Nickel Grade	Ni %	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	-	-	-
Cobalt Grade	Co %	1.1	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.0	1.4	1.4	-	-	-
Palladium Grade	g/t	1.4	1.3	1.4	1.8	1.6	1.5	1.7	1.4	1.3	1.3	1.2	1.2	1.2	1.5	0.7	0.7	-	-	-
Platinum Grade	g/t	1.1	1.0	1.1	1.3	1.3	1.3	1.5	1.2	1.1	1.1	1.0	1.0	0.9	1.1	0.7	0.7	-	-	-
Magnesium Oxide (MgO)	% MgO	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	-	-	-
Metal Content In Concentrate																				
Nickel	kt	982.5	30.9	30.9	41.5	39.3	34.9	38.8	34.8	32.1	35.5	31.7	33.0	33.0	40.8	21.8	1.0	-	-	-
Cobalt	kt	58.0	1.8	1.8	2.2	2.2	2.0	2.2	2.0	1.9	2.0	1.9	1.9	1.9	2.2	1.7	0.1	-	-	-
Palladium	t	7.8	0.2	0.2	0.4	0.3	0.3	0.4	0.3	0.2	0.3	0.2	0.2	0.2	0.3	0.1	0.0	-	-	-
Platinum	t	6.1	0.2	0.2	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.1	0.0	-	-	-
Operating Costs																				
Mining	M$	($2,740)	($123)	($124)	($121)	($113)	($109)	($110)	($111)	($103)	($102)	($96)	($95)	($94)	($91)	($39)	($8)	-	-	-
Processing	M$	($4,936)	($174)	($174)	($174)	($174)	($174)	($174)	($174)	($174)	($174)	($174)	($174)	($174)	($174)	($174)	($8)	-	-	-
G&A	M$	($534)	($19)	($19)	($19)	($19)	($19)	($19)	($19)	($19)	($19)	($19)	($19)	($18)	($18)	($16)	($1)	-	-	-
Site Services	M$	($206)	($7)	($7)	($7)	($7)	($7)	($7)	($7)	($7)	($7)	($7)	($7)	($7)	($7)	($7)	($0)	-	-	-
Total	**M$**	**($8,415)**	**($323)**	**($324)**	**($321)**	**($313)**	**($308)**	**($310)**	**($311)**	**($303)**	**($302)**	**($295)**	**($294)**	**($293)**	**($290)**	**($236)**	**($18)**	**-**	**-**	**-**
Gross Recovered Value																				
Nickel	M$	$21,123	$663	$665	$892	$846	$750	$834	$747	$691	$763	$681	$709	$710	$877	$468	$22	-	-	-
Cobalt	M$	$3,390	$108	$105	$130	$128	$117	$129	$118	$108	$119	$110	$113	$113	$130	$98	$5	-	-	-
Palladium	M$	$300	$8	$9	$16	$13	$11	$15	$11	$9	$10	$8	$9	$8	$13	$3	$0	-	-	-
Platinum	M$	$237	$7	$7	$11	$11	$10	$12	$9	$8	$8	$7	$7	$6	$10	$3	$0	-	-	-
Total	**M$**	**$25,051**	**$786**	**$787**	**$1,050**	**$998**	**$889**	**$989**	**$885**	**$815**	**$901**	**$806**	**$838**	**$838**	**$1,030**	**$572**	**$27**	**-**	**-**	**-**
Net Revenue From Sales																				
Nickel	M$	$16,476	$517	$519	$696	$660	$585	$650	$583	$539	$595	$531	$553	$554	$684	$365	$17	-	-	-
Cobalt	M$	$1,695	$54	$53	$65	$64	$59	$64	$59	$54	$59	$55	$56	$57	$65	$49	$2	-	-	-
Palladium	M$	$82	$2	$3	$6	$4	$3	$6	$3	$2	$2	$1	$2	$1	$4	$0	$0	-	-	-
Platinum	M$	$28	$0	$0	$2	$2	$2	$4	$1	$1	$1	$0	$0	$0	$1	$0	$0	-	-	-
Total	**M$**	**$18,281**	**$573**	**$574**	**$770**	**$730**	**$649**	**$724**	**$646**	**$595**	**$658**	**$587**	**$611**	**$611**	**$754**	**$414**	**$20**	**-**	**-**	**-**
Offsite Costs	**M$**	**($1,323)**	**($41)**	**($42)**	**($56)**	**($53)**	**($47)**	**($52)**	**($47)**	**($43)**	**($48)**	**($43)**	**($44)**	**($44)**	**($55)**	**($29)**	**($1)**	**-**	**-**	**-**
Net Smelter Return	**M$**	**$16,958**	**$532**	**$532**	**$714**	**$677**	**$602**	**$671**	**$599**	**$552**	**$610**	**$545**	**$567**	**$567**	**$699**	**$385**	**$18**	**-**	**-**	**-**
Royalities	**M$**	**($342)**	**($11)**	**($11)**	**($14)**	**($14)**	**($12)**	**($13)**	**($12)**	**($11)**	**($12)**	**($11)**	**($11)**	**($11)**	**($14)**	**($8)**	**($0)**	**-**	**-**	**-**
Project Income Value (EBITDA)	**M$**	**$8,201**	**$198**	**$198**	**$379**	**$351**	**$282**	**$348**	**$277**	**$238**	**$295**	**$238**	**$262**	**$262**	**$395**	**$141**	**$0**	**-**	**-**	**-**
Capital Investment																				
Direct Cost	M$	($1,265)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indirect Cost	M$	($374)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Owner's Costs	M$	($39)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Contingencies	M$	($177)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capitalized Pre-production Costs	M$	($38)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Initial Capital Cost	**M$**	**($1,893)**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Sustaining Costs	M$	($1,565)	($80)	($23)	($32)	($20)	($81)	($48)	($31)	($27)	($32)	($38)	($108)	($23)	($24)	-	-	-	-	-
Closure Cost	M$	($78)	($1)	($1)	($1)	($1)	($1)	($1)	($1)	($1)	($1)	($1)	($1)	($1)	($1)	($1)	($1)	($1)	($1)	($1)
Salvage Value	M$	$63	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	($0)	$63	($0)	($0)	($0)
Working Capital	M$	($0)	$1	($0)	$16	($1)	($5)	$5	($6)	($2)	$5	($4)	$2	$0	$12	($12)	$27	($0)	($0)	($0)
Total Capital Cost	**M$**	**($3,473)**	**($79)**	**($24)**	**($18)**	**($22)**	**($87)**	**($44)**	**($38)**	**($31)**	**($28)**	**($43)**	**($107)**	**($24)**	**($14)**	**($13)**	**$89**	**($1)**	**($1)**	**($1)**
Pre-tax Annual Cash Flow	**M$**	**$4,728**	**$119**	**$174**	**$361**	**$328**	**$195**	**$304**	**$239**	**$208**	**$267**	**$195**	**$155**	**$239**	**$381**	**$128**	**$89**	**($1)**	**($1)**	**($1)**
Taxes																				
Federal	M$	($710)	($14)	($14)	($40)	($37)	($30)	($37)	($28)	($24)	($32)	($25)	($29)	($26)	($45)	($13)	$0	$0	$0	$0
Provincial	M$	($568)	($11)	($11)	($32)	($30)	($24)	($30)	($23)	($19)	($26)	($20)	($23)	($21)	($36)	($10)	$0	$0	$0	$0
Less: ITC	M$	$544	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Corporate Tax	**M$**	**($734)**	**($25)**	**($25)**	**($71)**	**($67)**	**($53)**	**($67)**	**($51)**	**($44)**	**($58)**	**($46)**	**($51)**	**($48)**	**($80)**	**($23)**	**$0**	**$0**	**$0**	**$0**
Provincial Resource Tax Payable	M$	($574)	($17)	($24)	($47)	($45)	($28)	($41)	($33)	($29)	($36)	($27)	($21)	($32)	($50)	($19)	$0	$0	$0	$0
Total Resources and Corporate Taxes	**M$**	**($1,308)**	**($41)**	**($49)**	**($118)**	**($112)**	**($81)**	**($108)**	**($85)**	**($72)**	**($94)**	**($73)**	**($73)**	**($80)**	**($130)**	**($42)**	**$0**	**$0**	**$0**	**$0**
Post-tax Annual Cash Flow	**M$**	**$3,419**	**$77**	**$125**	**$243**	**$217**	**$114**	**$196**	**$154**	**$136**	**$173**	**$122**	**$82**	**$159**	**$250**	**$86**	**$89**	**($1)**	**($1)**	**($1)**
Post-tax Cumulative Cash Flow	**M$**	**$3,419**	**$1,276**	**$1,401**	**$1,644**	**$1,861**	**$1,974**	**$2,171**	**$2,325**	**$2,460**	**$2,634**	**$2,756**	**$2,838**	**$2,997**	**$3,248**	**$3,334**	**$3,423**	**$3,421**	**$3,420**	**$3,419**

22.7 Sensitivity Analysis

Tetra Tech investigated the sensitivity of NPV and IRR to the key variables. Using the 2023 PFS Base Case as a reference, each key variable was changed between -30% and +30% in 10% increments while holding the other variables constant.

Sensitivity analyses were carried out on the following key variables:

- Nickel price,
- Cobalt price,
- Capital costs,
- Operating costs.

The analyses are presented graphically as financial outcomes regarding post-tax NPV and IRR. The NPV and IRR are most sensitive to nickel price, followed by operating and capital costs. Generally, sensitivity to metal price is roughly equivalent to sensitivity to metal grade. Financial outcomes are relatively insensitive to PGE prices. The NPV and IRR sensitivities are presented in Figure 22-2 and Figure 22-3, respectively.

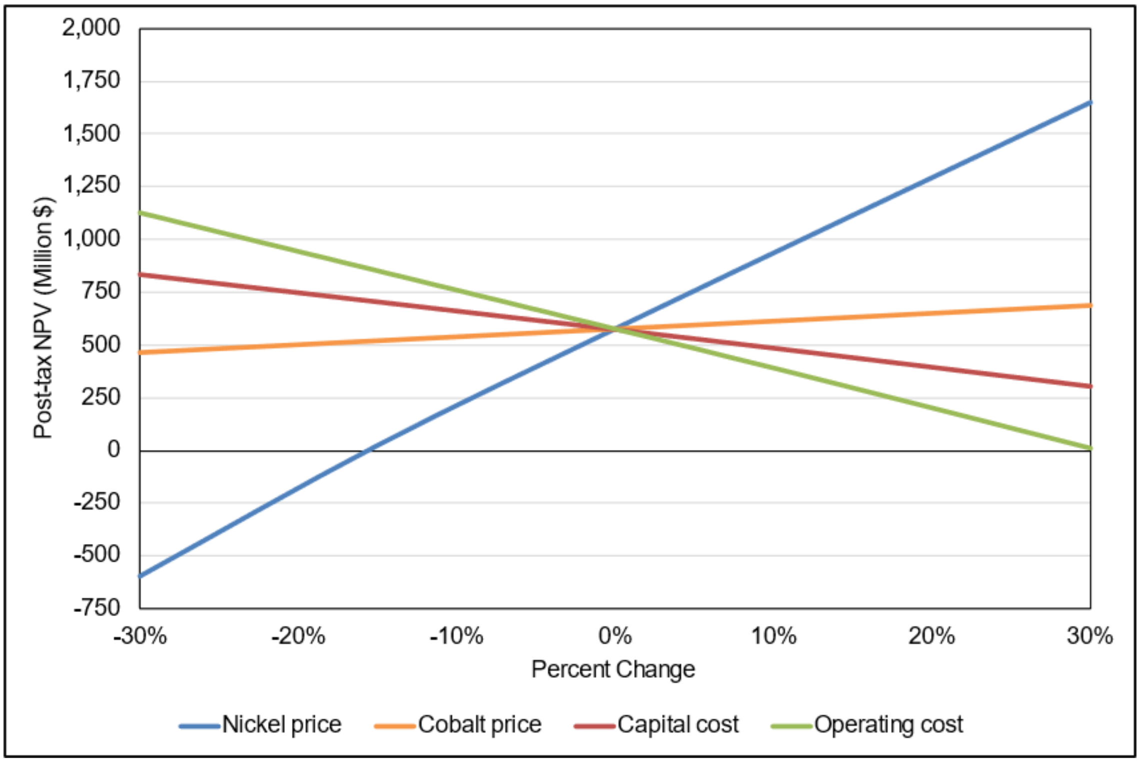


Figure 22-2: Sensitivity Analysis of Post-Tax NPV

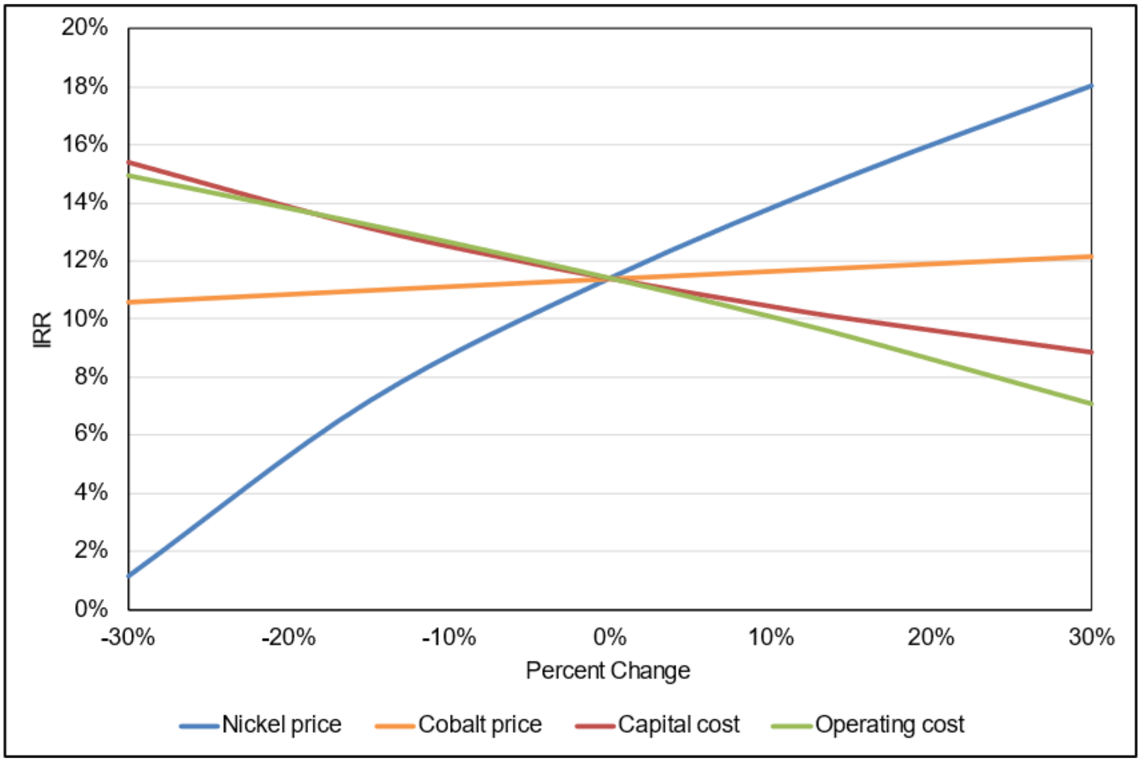


Figure 22-3: Sensitivity Analysis of Post-Tax IRR

23.0 ADJACENT PROPERTIES

There are no adjacent properties that meet the definition of NI 43-101.

There are two nearby properties that could be relevant to further project development. These are described briefly in the subsections below.

In addition, there are a number of jade and placer mining operations in the area. These facilities are not expected to provide any significant benefit or risk to the Turnagain Project.

23.1 Kutcho Copper-Zinc-Silver-Gold Deposit

The Kutcho copper-zinc-silver-gold deposit lies approximately 40 km southeast of the Turnagain deposit. Kutcho Copper Corporation (Kutcho) owns 100% of the project as of March 2023.

An FS was completed on the Kutcho project by CSA Global with an effective date of Nov 8, 2021. The company is intending on re-entering the environmental assessment process (source: Feb 07, 2023, Corporate Update).

If both the Kutcho and Turnagain facilities are constructed, approximately 65 km of road access will be shared, depending on the final route selected for each company.

23.2 Eaglehead Copper-Molybdenum-Gold Deposit

The Eaglehead copper-molybdenum-gold deposit lies approximately 14 km west of the Turnagain deposit. Copper Fox Metals Inc owns a 100% interest in this porphyry Cu-Mo-Au project, which was the subject of a 2019 Technical Report (source: District Copper Corporation SEDAR filing, effective date October 21, 2019).

Should Eaglehead and Turnagain proceed to development, approximately 70 km of road access will be shared, depending on the final route selected for each company.

It is important to note that the author is not implying similarities in geology, commodity type, or Mineral Resource. The author is not relying on any technical information, so verification and validation were not performed. However, these projects may benefit from shared infrastructure and community relationships that may assist in advancing to sustainable development.

24.0 OTHER RELEVANT DATA AND INFORMATION

24.1 Project Execution Plan

The Project Execution Plan (PEP) is a high-level strategic description of the current plans and assumptions for developing the Turnagain project, as determined at the end of the PFS phase. The PEP will be revised to include updated plans and assumptions as the project progresses. It should be noted that the development approach will be dictated by the majority owner or operator of the Project when it goes into construction and may deviate from that described herein.

24.1.1 Introduction

The Turnagain Project will require three years for initial construction to achieve 45,000 t/d of processing capacity. During the first year of operation, the processing plant capacity will be increased to 90,000 t/d. The full build to 90,000 t/d is included in the capital cost and execution plan. Certain early works, such as site clearing and off-site access road upgrading, may be commenced in the year preceding the first construction year. The construction scope is intended to meet the following key objectives:

- Deliver an optimized, safe and environmentally compliant constructed project following the systems and procedures in place,
- Perform construction activities safely, striving for zero recordable incidents,
- Expedite factory site and process components, preassembly, modularization and testing to minimize site construction hours and hazards,
- Maximize contracting opportunities of major scope components for local communities, stakeholders and Indigenous groups,
- Ensure that regulations, license agreements, applicable specifications and standards are met,
- Complete construction within the agreed schedule, not exceeding the budget and deliver the full scope described in the construction authorization.

24.1.2 Construction Schedule

The PFS construction schedule was compiled per the AACE recommended scheduling guidelines with a Class 2 definition. The construction schedule has been designed to accommodate major seasonal and environmental constraints. The overall on-site construction duration is estimated at 36 months. The high-level schedule is shown in Figure 24-1.

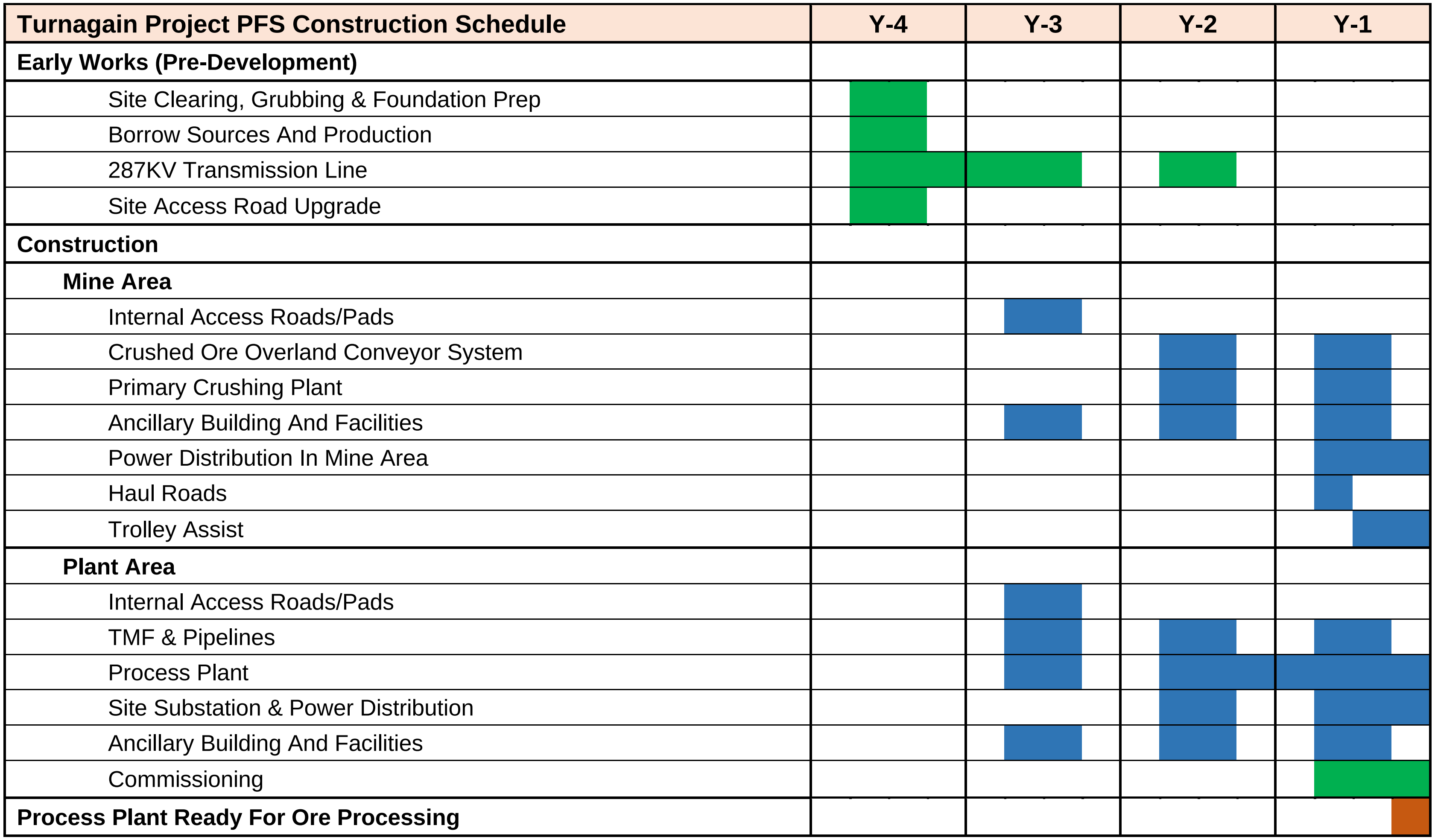


Figure 24-1: Construction Schedule Summary (Level 2)

Clearing, grubbing and cutting/filling/compacting the site for early works efforts are projected to occur in Year -4. The concrete pour for the process plant is planned to occur in spring Year -3, with all concrete being poured in the warm weather months of Year -3, followed by erecting the building envelope to allow the construction for winter months. As buildings are closed, the mechanical, piping, HVAC, electrical and instrumentation trades can begin construction in a staggered sequence.

The site preparation for the TMF will commence in Year -3, followed by the commencement of the main embankment (north dam) construction.

24.1.3 Feasibility Study

The FS will be considered the "Refine" stage of the project. The main goal of the FS will be to conduct necessary work that will advance and optimize the PFS and produce additional plans, reports, documents, drawings and designs to a level that supports the production of (and to produce) an FS Level AACE Class 3 estimate with an expected accuracy of ±15% and meets the NI 43-101 Standards of Disclosure for Mineral Projects.

The study will also be required to complete the FS-level design of the site access road from Highway 37, the transmission line from the Tatogga substation to the mine site, supporting infrastructure and accommodations and supporting services, unless these components (or portions thereof) are taken on by other groups, in which case HCNC's FS-level works will consist of co-ordination with such groups.

24.1.4 Engineering and Procurement

Engineering and procurement activity will be managed by teams of professionals who will report through the EPCM contractor's directorate. The engineering team will provide the required drawings, specifications and documents to the procurement team to purchase all equipment and materials for the construction and to allow field construction of the scope to the design intent. The EPCM contractor's scope will include process facility and infrastructure engineering, including managing specialty contractors for TMF construction. Mine designs will be developed and delivered by the Owner's team.

In general, the engineering team will complete the following major tasks:

- Detailed design,
- Cost estimates,
- Schedule development,
- Production of construction drawings,
- Review of tenders for technical merit and design compliance,
- Technical supervision of vendors,
- QA/QC,
- Assistance with contractor claims.

The procurement team will receive the engineering documentation, obtain multiple quotations that meet engineering specifications and provide a purchase recommendation to the EPCM director. Standard procurement terms and conditions approved for the Project will be utilized for all equipment and material Purchase Orders (POs). Suppliers will be selected based on location, quality, price, delivery and support service. After the EPCM director's approval, the procurement team will purchase equipment and materials and arrange all logistics to deliver the items to the construction site ready for installation. The procurement team will also establish engineering and field construction service contracts. Both materials and labour contract development will respect any agreements which have been developed with local communities and Indigenous groups. In general, procurement tasks will include:

- Compilation of work packages,
- Production of tender and contract documents and the issue of tender documents,
- Pre-qualification of tenderers,
- Review of tenders for tender compliance and commercial aspects,
- Legal and commercial aspects of contract award and execution,
- Logistics interface with construction management,
- Payment of contractor and vendor invoices,
- Contractor claims and dispute resolution,
- Contract completion and close-out.

24.1.5 Early Works Planning

An Early Works Plan will be developed to ensure that the key infrastructure and support services are in place early during construction and functioning efficiently for a successful construction program. The following planning and areas must be addressed in the Early Works Plan:

- Permit review and renewal plans,
- Construction procedures and develop construction work packages,
- Supply chain management plan for planning, tendering, evaluating and purchasing equipment and materials,
- Staffing, recruiting and labour relations plan,
- Contracting strategy and plan for lump sum and unit rate contracts, vetted and approved by the Owner,
- Health, safety and security management plan and manual,
- Logistics supply and materials management plan for early material requirements,
- Site access plan,
- Establish explosive supply storage and controls,
- Identifying and proving borrow pits,
- Sourcing road materials and aggregates,
- Develop fuel supply and storage locations on-site,

- Identify the supply of cement and aggregates,
- Site-wide general services plan, including waste transfer operation, generator operation and maintenance, site garbage removal and sanitary pump-out services,
- Site rules and regulations plan, including site security,
- Environmental and cultural sensitivity awareness training plan,
- Health and hygiene program,
- Site safety and security orientation program,
- Natural hazards management plan,
- Employee transportation plan for early construction program; air and ground planning required,
- Environmental management plan to manage sediment control, waste, spills, fueling, etc. and wildlife management plan for early construction activities,
- Community relations plan,
- Quality management system,
- Safety and emergency response plans, including content related to medical facilities and medical attention, emergency medevac, etc.
- Final development execution plan.

24.1.6 Construction Camp

The Early Works phase will utilize the existing exploration camp. Development of a full-service modular, single-storey, propane-heated camp for construction contractors will begin before the start of Year -3. The new construction camp will support the initial workforce in Year -3. HCNC's operating personnel (including mining pre-production operators) will also use the camp.

Contractors with construction crews working on the high-voltage power line and main access road will be responsible for providing their crew camps close to their work area. These workers will not require accommodation at the mine site construction camp.

24.1.7 Construction Equipment

Construction equipment will generally be the responsibility of individual contractors. Contractor equipment safety and operability must comply with the applicable laws, regulations and standards. The Owner's safety personnel will perform spot checks to ensure compliance. To reduce costs and duplication of construction equipment, the Owner may supply large construction equipment (e.g., cranes) to be managed by the construction management team.

24.1.8 Construction Power

Approximately 2 MW of construction power will be required. This power will be supplied by low noise, low emission generator sets. By Year -1, the permanent power line will be completed, and the power will be used for all mining equipment and the remainder of the construction phase, as required. After construction, some generator sets will supply emergency power for the mine life.

24.1.9 Construction Management

The construction management team will manage all activities related to the construction management scope, including all construction activity in the mine, process and infrastructure areas. Mining activity, environmental monitoring and reporting and community affairs will be the accountability of the Owner's Team. The construction management team will oversee the installation of all materials and equipment according to engineering and manufacturers' specifications and build the facilities to satisfy the design intent and be fully operable. The construction management team is also accountable for construction activity and site management until handed over to the Owner following dry commissioning.

Construction management tasks will include:

- A constructability review of designs and contract documents,
- Schedule development,
- Logistics,
- Coordination and management of site operations,
- Health, safety, first aid and medical evacuation,
- Fire protection/emergency response,
- Site security,
- Camp management and maintenance,
- Site-wide labour relations,
- Site cleanup and snow removal,
- Warehousing,
- Document control,
- Contract administration,
- Reviewing contractor invoices for forwarding to the procurement team,
- Cost tracking and forecasting,
- Scheduling continuous updates and compliance reviews,
- Certification of contract completion for close-out,
- Input to contractor claims and dispute resolution,
- Commissioning.

24.1.10 Construction Supervision and Contractor Management

The objective of all site construction activities is the timely and cost-effective completion of the construction facilities safely to the design intent and required standards following the schedule. While ensuring standards are maintained, construction supervision staff will provide all contractor oversight management to achieve this objective.

The contracts management group will fall under the site procurement manager's responsibilities, using an integrated data management system to track contractor invoicing, changes and requests for information. The EPCM contractor will develop a comprehensive set of procedures in conjunction with and approved by the Owner. These procedures will outline the requirements for the execution of the administrative activities.

24.1.11 Contracting Packaging and Strategy Overview

The preliminary construction strategy includes dividing the construction into contract packages. During the contractor expression of interest and pre-qualifications phase and the advancement of detailed engineering, the contract packages will be combined to reduce the total number of contracts and form a final contracting strategy for the construction.

24.1.12 Site Organization Structure

The EPCM site organization structure has been developed to provide a balanced combination of senior managers, area managers, engineers, superintendents and discipline specialists, to provide the Owner and contractors with continuous support during the installation period. A high-level organizational chart is provided in Figure 24-2.

The site organization and staffing plan have been designed by work type (e.g., engineering vs. cost controls) with the geographical constraints of a construction site incorporated. The construction site will have a dedicated health and safety manager and multiple health and safety representatives to assist contractors with the daily issues and training requirements.

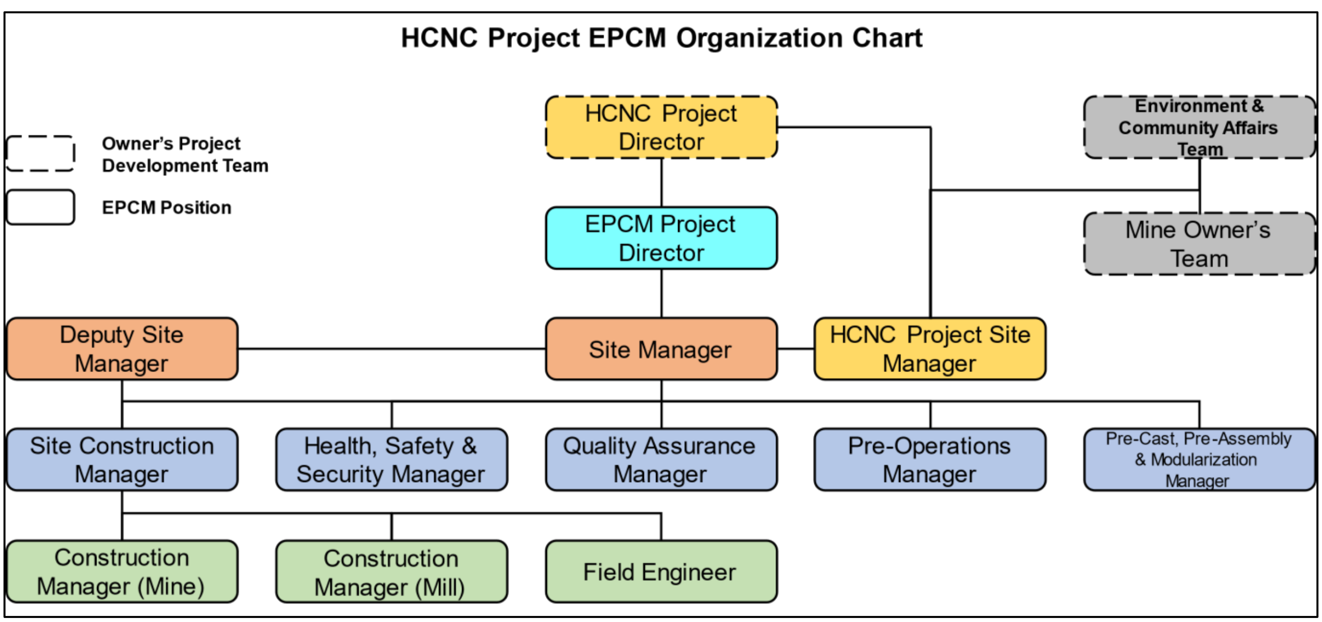


Figure 24-2: EPCM Organizational Chart

24.1.13 Field Construction

The scope of construction activities scheduled to commence in early Year -4 (including early works) is outlined in the following sections.

24.1.13.1 Main Access Road

The main site access (existing Boulder access trail) is from provincial Highway 37, approximately 78 km long and includes three bridges. The main access road upgrade will commence in Year -4 (early works) and will likely be completed in one year. The exploration camp on site will be upgraded to provide sufficient accommodation for workers. The temporary camps for access road construction will be placed in a strategic location for use as winter refuge stations for truckers and maintenance workers.

24.1.13.2 287 kV Transmission Line

The 287 kV power line will be connected at the Tatogga substation, which is anticipated to be completed by Year -2. The power line will mostly run parallel to Highway 37 and the main site access road.

24.1.13.3 Tailing Management Facility

The TMF will be constructed in staged lifts throughout the mine life. Construction of the TMF will commence three years before the mill start-up to ensure sufficient water collection from the spring freshets for use in the mill process. Initial construction of the TMF will begin with a starter embankment of the Main Dam at the north end of the TMF by a contractor. The starter embankment will be constructed using materials from local borrow sources.

Construction within the TMF will involve the following activities:

- Establishment of TMF pioneer access road,
- Initial TMF logging, cleaning and grubbing as required,
- Sediment controls will be established within the TMF using diversions and ditches as required,
- The Main Dam embankment will be constructed following the excavation work noted above,
- On the north side of the TMF, the pioneer access road will be upgraded so that trucks can haul the material required to build the Main dam.

24.1.13.4 Mine and Plant Site

The following construction tasks will be carried out in and around the plant site in two phases. The first phase will be called the Early Works Phase, which will be conducted in Year -4. The second phase will begin after the completion of the Boulder access trail upgrade, so major construction and process equipment can be delivered to the site.

Initial construction will comprise the following activities:

- The existing exploration camp will be upgraded,
- Explosive supply storage and controls will be established,
- The borrow pits will be developed,

- Crushing and screening facilities will be set up,
- The aggregate, aggregate wash and concrete plants will be installed,
- Temporary construction power will be installed – standalone power supply systems (gensets) in containers with fuel systems,
- The forested area will be logged, cleared and grubbed for site infrastructure construction areas, including processing plant, ancillary building, site utilities and site roads,
- Starting from the existing camp, the site roads will be developed to the construction level to provide access to all major areas,
- The maintenance complex, camp and laydown areas will be rough-excavated and graded and the surplus cut material will be used as fill material where needed,
- The plant site will be progressively blasted to the plant site elevation and will advance through the cone crusher/HPGR area, grinding area toward the flotation area and concentrate dewatering area,
- The primary crusher foundation area will be blasted/excavated,
- The auxiliary fuel tanks will be constructed near the maintenance complex.

The second construction phase will begin after Boulder Road is completed, allowing large construction equipment and processing plant equipment to be delivered to the site. The second phase will comprise the following activities:

- All bulk earthworks will be completed after the access road is finished,
- Detailed excavation and concrete works will start in the cone crusher/HPGR and grinding areas and follow bulk excavation closely through the flotation area and, ultimately, the concentrate dewatering area. It is anticipated that concrete works within the grinding area will be completed in Year -2, except for internal slab-on-grade work,
- The grinding and flotation areas and the concentrate dewatering system will be completed and commissioned in late Year -1 to achieve 45,000 t/d production capacity by Year 1.

24.1.13.5 Permanent Power

Permanent 287 kV power will be available in Year -1. The power line from Tatogga is scheduled to be completed at the same time as the main substation at the plant site. The main substation will start after the Boulder access trail upgrade is completed and the main components (i.e., transformers, switch gear, etc.) can be delivered by truck to the site. Temporary power will be required for the early construction period before the permanent power is energized.

24.1.14 Pre-commissioning/Commissioning

The commissioning period starts in any specific work area after all materials and equipment have been installed to design specifications and the EPCM contractor certifies that installation is complete and hands the area to the commissioning team. Commissioning starts after equipment or material installation for a system or work area is complete and ends when ore starts to be processed to yield a revenue stream.

The EPCM contractor's scope includes dry commissioning after which work areas are handed over to the Owner's commissioning team. The Owner's commissioning team executes wet and process commissioning with select operating staff and professionals that are separate in reporting line and accountable from the operations staff. When these commissioning phases are complete, they will be handed over to Owner's operations staff, who will operate the facilities in year 1 and on to normal operation.

24.2 Owner's Implementation Plan

The Owner's implementation plan described provides a preliminary outline of the key responsibilities and actions the Owner's Team will take, including interaction with EPCM contractors during construction.

The implementation plan described in this section highlights some key tasks required for execution by the Owner's team throughout construction. There are two initial critical tasks for the Owner's Team, starting with identifying and hiring the HCNC project director, who will initially select a team and do the same for their respective teams. This process is expected to be repeated throughout construction until the entire organization has been built while directing and supporting construction in various roles.

The second initial critical Owner's team task is engaging an EPCM contractor early in the development schedule to drive most of the scope outside the Owner's direct responsibility. The type of contractual arrangement between the Owner and EPCM contractor has yet to be established.

The Owner will manage any early engineering work required to prepare design documents that support permit applications or renewals and compliance reports for permits issued by the Province of BC and the Government of Canada.

An onboarding plan for specific G&A functions will be developed before the turnover of constructed areas of the site from EPCM to the Owner's team and is intended to be well before the turnover. This will allow sufficient time for developing internal HCNC Project processes and procedures to facilitate a smooth mine start-up. The early onboarding plan is intended to cover gaps in service areas that may have yet to be detected in this early design stage.

24.3 Health, Safety, Environmental and Security

Health, Safety, Environmental and Security (HSES) programs and initiatives are essential to project success. These programs will be in accordance with the conditions of the provincial EA certificates, any necessary certificates under the Health, Safety and Reclamation Code for Mines in BC, 2022, the BC Employment Standards 2023 and other regulatory approvals as they are obtained. A fully integrated program will be implemented to achieve a "zero-harm" goal. To achieve this, key project stakeholders will be asked to share the responsibility by providing the leadership and commitment to attain the highest HSES standards and values. A high level of communication, motivation and involvement will be required to develop HSES practices, including alignment with site contractors on topics such as safety training, occupational health and hygiene, hazard and risk awareness, safe systems of work and job safety analysis. Tools will be implemented for performance tracking and accountability, including procedures for incident management.

All design and engineering stages incorporate criteria for responsible management of process flows, effluent and waste products to meet established capture and containment guidelines. The design also incorporates basic clean plant standards, including operational safety and maintenance access requirements. The project design team will conduct a Hazard and Operability Analysis (HAZOP) and/or other suitable risk assessment study during the detailed design stage for each area of the plant. This systematic team approach will identify operability-related hazards that require attention to eliminate undesirable consequences. Environmental protection will be incorporated in the design of the main processes of the plant, as well as in the transportation, storage and disposal of materials within and outside the plant's boundaries.

HCNC's HSES management system will include the following elements:

- An HSES policy,
- Planning, implementation and operation,
- Occupational health and hygiene,
- Incident investigation,
- Emergencies and contingencies,
- Verification and corrective actions,
- Environmental monitoring,
- Review by management.

HCNC will provide a well-equipped first-aid facility, ambulance and fire engine for project-wide use. The first aid facility will be staffed with medical practitioners and nurses available 24 h/d to ensure continuous coverage. Contractors will be expected to provide basic first aid stations for their workers at the site. The main first aid station will be located by the maintenance complex and satellite first aid stations will be located by the process plant and at the camp. HCNC will supply a 24-hour staffed site security program during initial field mobilization. All personnel required to be at the site must complete safety induction training; personnel will only be allowed at the site with this training.

The Owner will develop HSES policies and procedures that, at a minimum, address the following requirements for all future stages of the project and operation:

- Permit to work,
- Ground disturbance,
- Driving,
- Confined spaces,
- Hot work,
- Working at height,
- Lifting operations,
- Radiation protection,
- Energy isolations,
- Pressure testing,
- Plant and equipment,

- Housekeeping,
- Machine guarding,
- Employee health and wellness (including fit for work).

24.4 Logistics

The Turnagain site is accessible via a 900 m gravel airstrip and a seasonal exploration trail from Highway 37, suitable for off-highway vehicle use during the summer months. The exploration trail, known as the Boulder Trail, will be used by large, articulated four- and six-wheel drive vehicles to transport equipment, supplies and personnel to the site before completing the all-season access road. Site roads will be developed to pioneering roads level to provide access to all major areas. Once surface routes are established, construction equipment, materials, personnel and consumables will be imported to various work fronts across the Turnagain site.

For this PFS, Tetra Tech estimated that the nickel sulphide concentrate would be shipped in bulk and the average annual output of nickel sulphide concentrate at full production, at a nominal processing rate of 90,000 t/d, will be approximately 202,000 dmt/a.

Nickel sulphide concentrate will be transported from the Project site by trucks to a deep-water port facility in Stewart, BC and then loaded onto oceangoing vessels. Two full-service ports exist at Stewart, each with roll-on/roll-off freight handling capacity and would be capable of concentrate storage and handling to ship loading by the time operations begin.

The port is at the head of the Portland Canal, a 150 km fjord that is the northernmost ice-free port in North America. Concentrates from other northern BC mines are currently shipped from this port. In addition, other regional operations are interested in concentrate handling services at the port.

The concentrate can also be trucked to a rail connection at Kitwanga for domestic processing. The Kitwanga facility can store approximately 4,000 t of concentrate. There is a load capacity of two railcars in the shed and seven railcars are stored outside. Further studies may be needed to determine if the rail system and facility require any upgrade to handle the anticipated concentrate volumes from the Turnagain Project.

25.0 INTERPRETATION AND CONCLUSIONS

25.1 Conclusions

Based on the outcomes of this PFS, the contributors have drawn the following key conclusions.

25.1.1 Geology & Mineral Resources

The Turnagain ultramafic Alaskan-type complex comprises a central core of dunite with bounding units of wehrlite, olivine clinopyroxenite, clinopyroxenite, representing crystal cumulate sequences, hornblende clinopyroxenite and hornblendite. The complex is elongated and broadly conformable to the northwesterly-trending regional structural grain.

The ultramafic rocks are generally fresh to mildly serpentinized; however, more intense serpentinization and talc-carbonate alteration are common along faults and restricted zones within the complex. The central part of the ultramafic body is intruded by granodiorite to diorite and hornblende–plagioclase porphyry dykes and sills.

The sulphide mineralization, which is unusual for an Alaskan-type deposit, is thought to be associated with meta-sediment wall-rock inclusions which provided the sulphur source. The sulphides are mainly pentlandite and pyrrhotite with minor amounts of chalcopyrite and pyrite and trace bornite. Anomalous levels of platinum and palladium are also present.

The mineral resources were estimated in conformity with CIM's "Estimation of Mineral Resources and Mineral Reserves Best Practices Guidelines" (December 2019) and are reported in accordance with NI 43-101 guidelines.

The 382 drill holes in the database were supplied in electronic format by Giga Metals, 326 of which had assay values. However, for the purpose of the resource estimation, 254 drill holes which includes 15 holes drilled in 2021, are used as they lie within the study area and are supported by QA/QC data, validation and verification. This drillhole subset forms the basis for the resource estimation, herein. This included collars, downhole surveys, lithology data and assay data of varying vintages and analysis types.

Prior to 2004, samples were analyzed for nickel, copper, cobalt and approximately 20 major and minor elements by aqua regia digestion followed by an ICP-ES finish. Samples collected from the 2004 to 2021 programs were subjected to a four-acid (HNO_3-$HClO_4$-HF and HCl) digestion followed by ICP-ES analyses to determine values for total nickel, copper, cobalt and 22 other elements, including sulphur. Drill holes drilled prior to 2018 were also analyzed by a 'sulphide-specific, partial leach' ammonium citrate-hydrogen peroxide method, followed by ICP-ES finish for Ni, Co, Cu, Mg and S (the AC method).

In 2004 and 2005, sulphur content was analyzed by the Leco furnace method. In 2006, sulphur content was analyzed by ICP-ES after a four-acid digestion. Since 2007, sulphur content has been analyzed by both ICP-ES after a four-acid digestion and Leco furnace. Some exploration drill holes prior to 2004 and all drill holes since 2004, were analyzed for platinum, palladium and gold by lead-collection fire-assay (FA) fusion followed by ICP-ES.

The primary economic contributor is shown to be nickel (Ni%) content and the secondary is cobalt (Co%). Sulphur (S%) has similarly been analyzed and estimated on a block-by-block basis. Assay values were composited to 4.0 m within the mineralized domains: (1) Du-Wh-Sp (dunite, wehrlite, serpentinite); (2) cPx-oPx (clinopyroxenite, olivine, magnetite and hornblende clinopyroxenite); (3) overburden.

Statistics were run to evaluate the elements of primary potential economic and geometallurgical interest namely Ni%, NiAC%, Co%, CoAC%, Cu%, CuAC%, Mg, MgAC%, Fe%, Pt ppb, Pd ppb, S%, S% (Leco), Au and Ag. The primary economic contributor is shown to be nickel content whilst the secondary is cobalt. In addition, platinum and palladium also offer enough economic benefit such that they warrant quantification and are thereby estimated as co-product metals. However, in the case of copper, it was decided that at the concentrations present, estimation is not warranted at this point for inclusion but may be considered in the future.

Furthermore, gold and silver are very low and considered not to be economic at this time and although not the subject of this resource estimate and not reported, they have been estimated. However, they may be payable depending upon mineral processing and concentrate treatment methods and terms. The NiAC%, Mg, MgAC%, Cu, CuAC%, CoAC%, Fe%, S% and S%(Leco) have similarly been analyzed which are useful from a geometallurgical standpoint. However, they are not reported within the resource statement.

The mineral resource estimate is based on the validated drill hole database, interpreted three-dimensional geological model and topographic data. The geologic modelling was completed using the commercially available software Seequent Leapfrog Geo 4.3. The estimation of mineral resources was completed using commercial three-dimensional block modelling and mine planning software Hexagon Minesight™ MS3D Version 15.50.

Solid models were created from coded drill hole intersections based primarily on lithology and site knowledge. It is important to note that the understanding and interpretation has evolved to be that of relatively flat lying units intruded by late dykes and bounding volcanics.

Mineral resources are classified under the categories of measured, indicated and inferred according to CIM guidelines. The author evaluated the resource in order to ensure that it meets the condition of “reasonable prospects of eventual economic extraction” as suggested under NI 43-101. The criteria considered were confidence, continuity and economic cut-off in addition to considering constringed the resources within an optimized pit shell.

Using a cut-off grade of 0.1% Ni, the Turnagain property contains an estimated 1,574 Mt of measured and indicated resources at 0.21% Ni and 0.013% Co. An additional 1,164 Mt grading 0.21% Ni and 0.012% Co is classified as inferred. The resource estimate is presented in Table 25-1.

Table 25-1: Mineral Resource Estimate Statement for Turnagain Deposit (Effective Date: September 22, 2023)

Classification	Tonnage (kt)	Ni Grade (%)	Contained Ni (kt)	Co Grade (%)	Contained Co (kt)	Pd Grade (g/t)	Contained Pd (koz)	Pt Grade (g/t)	Contained Pt (koz)
Measured	454,552	0.215	977	0.014	64	0.023	336	0.022	320
Indicated	1,119,387	0.207	2,317	0.013	146	0.019	679	0.021	770
Measured + Indicated	**1,573,939**	**0.210**	**3,305**	**0.013**	**205**	**0.020**	**1,015**	**0.022**	**1,090**
Inferred	1,163,830	0.206	2,397	0.012	140	0.016	583	0.018	674

Notes:

1. All mineral resources have been estimated in accordance with Canadian Institute of Mining and Metallurgy and Petroleum definitions, as required under National Instrument 43-101.
2. Mineral resources are reported in relation to a conceptual pit shell in order to demonstrate reasonable expectation of eventual economic extraction, as required under NI 43-101; mineralization lying outside of these pit shells is not reported as a mineral resource. Mineral resources are not mineral reserves & do not have demonstrated economic viability.
3. Open pit mineral resources are reported at a cut-off grade of 0.1% Ni. Cut-off grades are based on a price of US $9.00 per pound, nickel recoveries of 60%, mineralized material and waste mining costs of $2.80, along with milling, processing and G&A costs of $7.20.
4. Inferred mineral resources are considered too speculative geologically to have economic considerations applied to them that would enable them to be categorized as mineral reserves. However, it is reasonably expected that the majority of inferred mineral resources could be upgraded to indicated.
5. Due to rounding, numbers presented may not add up precisely to the totals provided and percentages may not precisely reflect absolute figures.

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25.1.2 Metallurgical Test Work

Considerable testing has been conducted in the past on samples from the Turnagain project. This has included more than 100 Bond Ball Mill Work Index tests and substantial other comminution work. It also included extensive and largely successful LCT on a flowsheet designed to create a direct saleable concentrate.

The metallurgical test program conducted for the PFS was primary designed to achieve two objectives:

1. To demonstrate at a pilot scale the amenability of Turnagain ores to HPGR comminution,
2. To systematically build a comprehensive picture of mineralogy and flotation metallurgy across the Turnagain deposit, using geometallurgical principles to allow for the resulting metallurgical data to interface with the resource model to enhance the quality of the metallurgical forecast.

Both these objectives were achieved. HPGR testing showed Turnagain to be highly amenable to the use of HPGR. This likely eliminates a sizeable source of technical risk to the project that could have been present with the use of SAG milling.

Also, the geometallurgical model built a high-resolution and high-confidence picture of projected metallurgical variability throughout the deposit. While the ultimate aim of using AC-Ni assays to predict metallurgical performance in the PFS study was not achieved due to shortcomings in the drill hole database, an acceptable substitute algorithm was developed. LCT showed that materials of different metallurgical amenabilities could respond to closed circuit cleaner flotation, although more work is needed to eliminate risk of producing concentrates that fail to meet target Mg levels.

The past work, coupled with the recent work described in this report, has built a picture of a deposit that will respond well to conventional mineral processing.

- There are no geometallurgical drivers that create the need for either widely different treatment approaches or create issues with blending.
- Comminution using crushing, HPGR and ball milling should be relatively energy efficient and should produce a good product for flotation.
- Turnagain sulphide nickel is almost entirely contained as pentlandite, which is the best understood and most widely floated nickel sulphide in the industry.
- Pyrrhotite levels are generally low and the pyrrhotite responds poorly to flotation. Elsewhere, pyrrhotite can interfere with pentlandite flotation and reduce nickel recoveries. This is rarely the case for Turnagain.
- Silicate gangue minerals are generally non-floatable, so depressants are only sparingly needed, or often not at all. Even the most troublesome silicates appear to be quite easily controllable.
- Grinding does not create excessive slimes, a problem with many nickel projects.

All this has served to substantially reduce risk in the processing of Turnagain materials and built confidence in the associated metallurgical projections.

25.1.3 Mineral Reserve Estimate

Estimations of Mineral Reserves for the Turnagain deposit are based on Measured and Indicated Resources and meet the definitions of Proven and Probable Reserves. The Mineral Reserve estimates were prepared with reference to the 2014 CIM Definition Standards (2014 CIM Definition Standards) and the 2019 CIM Best Practice Guidelines.

Geotechnical investigations were conducted by BGC. Characterization of structural domains was completed for slope stability and pit design considerations. Overall slope angles and bench parameters were provided from the geotechnical analysis as inputs to the pit optimization study.

Reserves are based on a nickel price of US $21,500/t, cobalt price of US $58,500/t, ore mining cost of $2.24/t mined, waste mining cost $2.41/t mined, mining sustaining capital of $0.57/t mined, milling costs of $5.35/t feed, TMF sustaining capital of 0.7/t feed and G&A cost of $0.76/t feed. Mineral Reserves are mined tonnes and grade, includes consideration for a 2 m dilution width between ore-waste contact and mining losses of 1%. Ore-waste cut-off was based on $6.63/t of NSR.

Proven and Probable Reserves total 950 Mt of ore, with an estimated contained 1,949 kt of nickel, 121 kt of cobalt, 727 koz of palladium and 739 koz of platinum.

25.1.4 Mining Methods

The mine plan will deliver an annual processing plant feed rate of 32.85 Mt/y (90 kt/d) after the installation of the second processing train in Year 1. Over the LOM, the pit will produce 931 Mt of ore and 380 Mt of waste rock. The LOM average nickel grade is 0.21% with a 0.41 stripping ratio.

The Turnagain open-pit deposit will be developed using large haul trucks and electric shovels to minimize unit costs. Trolley-assist technology and autonomous haulage technology have been selected to reduce overall operating costs and GHG emissions. The mining operations are scheduled for a 28-year mine production period to support a 30-year processing plant operating period. The orebody is mined as a single main pit with five pushback phases through the LOM and a small satellite pit for the Duffy zone. An LG stockpile will be utilized to provide higher grade ore early in the mine life. Waste rock will be stored in a waste rock dump located to the west of the open pit.

25.1.5 Process Plant

Tetra Tech completed the process plant design using conventional and proven technologies supported by extensive metallurgical test programs. The processing plant has been designed to process the ore at a nominal throughput of 90,000 t/d to produce market-grade nickel sulphide concentrate.

A gyratory crusher will be used as the primary crushing unit and the crushed ore will be conveyed to a stockpile with overland conveyor. Two parallel lines of two conventional cone crusher and HPGR circuits will reduce the particle size to approximately 80% passing 3.5 mm for grinding. Two parallel two-stage ball mill circuits will further reduce the particle size to approximately 80% passing 80 µm. A series of rougher flotation and three stages of cleaner flotation will be used to produce the final Ni concentrate grading approximately 18% Ni. The plant tailings will be disposed of in the TMF.

25.1.6 Infrastructure

The Project will require the development of several infrastructure items. The locations of Project facilities and other infrastructure items take into consideration local topography, environment and capital and operating costs. The Turnagain project infrastructure will include the following major items:

- Offsite and onsite access roads, including bridges,
- An open pit mining operation,
- A network of site haul roads,
- A waste rock pad and a low-grade stockpile,
- Processing plant and ancillary facilities
- A TMF, along with diversion ditches and channels, tailings transport and disposition systems, plus a reclaim water system,
- Fresh water supply and distribution system,
- Sewage treatment plant and waste disposal,
- Power supply and distribution network,
- Communication system.

25.1.6.1 Site Layout

There will be three major separate areas of infrastructure associated with the Turnagain PFS: the open pit mine area, the camp/office area and the processing plant area. The open pit mine area is the centre of mining activity and includes the primary crushing facilities and the overland crushed ore conveyor loading station. The accommodation camp area consists of the permanent accommodation camp, mine dry and administration building and is about 1 km south of the ultimate pit boundary. Process facilities and the TMF will be located in the processing plant area, approximately 4.5 km southeast of the mine site. The overland conveyor will be constructed from the south side of the primary crusher into the crushed ore stockpile at the processing plant. The onsite Turnagain River crossing will be located approximately 1 km southeast of the primary crusher along the overland conveyor route. The TMF is located in a valley located approximately 1.5 km south of the processing plant.

The overall site, the open pit mine area and the processing plant area layouts are presented in Section 18.1.

25.1.6.2 Access Road

The site access road will be a year-round, radio-controlled, single-lane road between BC Highway 37 and the Project site with pullouts capable of carrying the legal axle loading for trucks on BC highways. The road is required to provide vehicle access for the development of the mine site and year-round road access for supplies, equipment and personnel transport.

The route will mostly follow the existing Boulder trail from Highway 37 to the Turnagain River crossing for approximately 59 km and the existing trail south of the Turnagain River to the Project site for approximately 19 km. The access road from Highway 37 to the Turnagain project site is approximately 78 km. The general design criteria for the offsite access road and the road profiles are presented in Section 18.2.

The road will require 16 culvert crossings of varying diameters and 3 clear-span bridges. The bridge lengths are anticipated to be 20 m to 25 m each. For every 300 m of the access road, smaller cross-drain culverts are also provided to maintain natural drainage as prescribed in the Ministry of Forests Engineering Guidebook (2002).

25.1.6.3 TMF

The TMF design incorporates two earth-fill embankments, a network of deposition pipelines, seepage collection ponds, surface water diversion and runoff management features and a perimeter access road. The facility will be constructed in stages to suit the tailings production schedule.

The TMF design was completed to the PFS level based on hydrological and geotechnical studies, including drilling and field investigation programs and laboratory characterization of subsurface conditions. These studies will need to be advanced and refined as part of the next phase of the Project. The design considerations were evaluated as part of this assessment to optimize design elements and ensure that performance will meet design criteria and regulatory requirements.

Tailings deposition from the perimeter was optimized by maintaining a consistent embankment crest elevation for the tailings beach and sloped to the inside to maintain a central water pond away from the embankments.

Geotechnical assessments indicate that the stability of the TMF will meet regulatory and guideline requirements. Expected seepage will be controlled through the till core, till blanket and cut-off wall features incorporated in the embankment design. Seepage volumes and associated seepage collection structures will be designed and advanced in the next phase to mitigate potential seepage.

Water collected in the seepage collection pond will be reclaimed and pumped back into the TMF depending on water quality or treated and released to the environment as required.

25.1.6.4 Overall Site Water Management

The preliminary GoldSim water balance model suggests that mining operations should not be impacted by a lack of water. During extreme conditions, when minimum recorded precipitation occurs every month through the year, local sources of water (up to 0.3 m^3/s) will likely be required to make up the difference. However, with appropriate management of the seepage collection system, diversion ditches capturing a portion of the runoff from the upstream catchments of the TMF and local sources of water, the TMF supernatant pond is expected to meet the water demand of the process plant.

25.1.6.5 Power Supply

Connection to the BC Hydro electrical system by the design and construction of a 287 kV transmission line from BC Hydro's Tatogga Substation to the Turnagain Mine (together with related substation components) will provide power (with low greenhouse gas emissions) from BC Hydro to the Turnagain Mine. BC Hydro's Tariff Supplement 37 for the NTL was rescinded in 2021 by government direction. This significantly reduces projected BC Hydro interconnection fees.

This analysis is based on technical issues relevant to transmission line routing, design and construction. It should be viewed as adequate for this PFS phase. The next phase will require field investigations and more detailed mapping.

25.1.7 Environmental Studies and Permitting

Environmental studies have been initiated and include programs for climate/meteorology, terrain and soils, ecosystems and vegetation, wildlife, hydrology, hydrogeology, water quality, fisheries and aquatics and geochemistry. Climate change and GHG management are also being incorporated into Project design. Social considerations are being evaluated including archaeology and heritage resources, traditional land uses and consultation and engagement with Indigenous groups. The Project is located within the traditional territories of the Tahltan First Nation and the Kaska Dena.

The Project will require an environmental assessment and the environmental and social data being collected will support the regulatory process, in addition to informing Project design and closure and reclamation planning. Closure objectives will be developed that aim to return disturbed areas to conditions consistent with an agreed upon end land use. Preliminary closure planning will be carried out concurrently with various stages of Project development and design in order to integrate closure objectives into the design, construction and operation of mine infrastructure and activities. The closure and reclamation plan will be developed in consultation with the Project team, Indigenous groups, interested parties and appropriate regulatory agencies.

The GHG footprint of the Project considering Scope 1 (direct site-based) and Scope 2 (related to imported hydroelectric power) emissions was estimated based on the diesel and electricity consumption for mining and processing activities. The carbon intensity calculated for the operations is estimated to be approximately 57,920 t CO_2e/y or 1.8 t CO_2e/t Ni in concentrate. This is not a life-cycle assessment value and does not include Scope 3 emissions related to the production or transportation of inputs to the Turnagain project or the transport of products from the Turnagain project, nor does it consider apportionment of the GHG footprint to by-products.

25.1.8 Capital and Operating Costs

The total estimated initial capital cost for the design, construction, installation and commissioning of the Project is $1,893.5 million. This estimate has been prepared in accordance with the AACE Class 4 cost estimate standards with the expected accuracy of ±25%. The LOM sustaining capital cost is estimated at $1,643.0 million, including closure cost. The average unit operating cost (average of years 3 to 28) is estimated at $9.09/t ore processed, or $3.85/lb nickel recovered in the concentrate.

25.1.9 Economics

Economic analysis of the PFS demonstrates that the Project is economically viable using the stated price assumptions, cost estimates and technical parameters generated by the PFS. Using an annual discount rate of 7%, the Project base case post-tax cash flow evaluates an NPV of $574 million and an IRR of 11.4%. The post-tax payback period is 5.7 years based on the metal price of $21,500/t for nickel and $58,500/t for cobalt.

25.2 Risk and Opportunities

There are certain risks that may affect the viability of the project going forward that should be studied and addressed. Opportunities also exist that could have a positive impact on the project going forward. These risks and opportunities are outlined below.

25.2.1 Project Risks

Potential project risks are outlined in the subsections below.

25.2.1.1 Geology and Mineral Resources

- Further studies related to lithological and geometallurgical characteristics may require refined domain models that restrict the amount of recoverable resources and decrease the size of the mineral resources.
- Varying resource classification methods and criteria may vary as more data is considered.
- COVID-19 (or other outside events) may pose a risk to timelines and availability of personnel needed for project advancement and completion.
- There is no guarantee that further drilling will result in additional resources or increased classification.
- The optimized pit that constrains the resources (which defines the ‘reasonable prospects of eventual economic extraction’) may be adjusted with new data and adjusted parameters.
- Lower commodity prices will change the size and grade of the potential targets.
- Further work may disprove previous models and therefore result in condemnation of targets and potential negative economic outcomes.

25.2.1.2 Mining

- Mineral Reserve Calculations – Mineral Reserve figures are estimates. The volume and grade of Reserves mined and processed, and the recovery rates may not be the same as currently anticipated. A decline in the commodity prices may render Mineral Reserves containing relatively lower grades of mineralization uneconomic and may in certain circumstances ultimately lead to a restatement of reserves.
- Proven AHS and trolley assist technology are implemented independently in mining operations around the world. Although Tetra Tech is not aware of any mining operation that has adopted both technologies simultaneously, number of mining equipment suppliers are trialing on the integration. As such, there might be unexpected operational and design considerations that may impact haul truck performance.

25.2.1.3 Geotechnical and Hydrogeology

- Proximity of the pit crest to the Turnagain River: A setback incorporating geotechnical and hydrogeological risks has not been completed at this level of study. The potential for toppling was identified in design sectors HTU-130 and HTU-168 which can develop very large obsequent scarps and can easily propagate from the benches to the inter-ramp and overall slopes. Potential mitigation of a hydraulic connection between the Turnagain River and the open pit may be required and may include groundwater water interception infrastructure and/or barriers between the river and the open pit.
- Depressurization of the northeast pit slopes: Two depressurization target areas were identified behind the northeast pit slopes to help mitigate against a potential slope instability caused by a planar discontinuity set. If these respective depressurization targets cannot be met, there is a risk that slope angles in these design sectors may need to be flattened to meet the design acceptance criteria.
- Potential for toppling: The potential for toppling along discontinuity sets with wider spacing was identified in design sectors NWU-316, NWU-345, NWU-025 and NWU-165 and were not considered primary kinematic design controls at this level. There is a risk that the slopes may need to be flattened if toppling is identified as a primary control in future studies.
- Slope designs for the Duffy Mineral Zone: No detailed geotechnical drilling was completed in the Duffy Mineral Zone (Pushback 6). As a result, the Duffy Zone slopes were considered to be part of the HTU structural domain for this study.
- Open pit access: The current open pit design appears to have only one access in and out of the pit bottom. Multiple pit bottom access points reduce the risk of one ramp becoming impassable due to slope instability.
- Pit-scale faults: Given the limitations of the current fault model, pit-scale faults with lower confidence and interpreted vertical orientations should be targeted in future studies to understand the effects on slope stability, slope depressurization needs and groundwater inflows and mitigations. At the time of this study, shear strength of fault zones did not include field-scale waviness.

25.2.1.4 Recovery Methods

- Long-term stockpiling of lower grade material may expose material to metallurgical degradation and may negatively impact mineral processing metal recoveries.
- The impact of the Turnagain plant feed on HPGR roll wear has yet to be determined through HPGR pilot test work. There is potential that HPGR equipment wear rates may be higher than estimated in this study, which may adversely impact project economics through increased operating expenditure.
- There is a potential that the HPGR performance for some of the geometallurgical units is lower than expected and thus impacting the project economics.
- The flotation performance for the low rougher recovery composites may not be well understood and it might require higher than expected reagent doses.
- The impact of recycled process water and quality of make-up water for local sources on flotation has not yet been studied and the impact may be negative for the flotation performance.
- Potential of hazardous dust generation in the crushing area and will require a significant degree of engineering design for dust suppression and dust capture.

25.2.1.5 Project Infrastructure

- Sub-surface ground conditions have not yet been evaluated at bridges, permanent camp and process plant locations which can significantly affect the foundation requirements and increase project cost.
- A list of project infrastructure related risk and their overall impact is presented in Table 25-2.

Table 25-2: List of Project Infrastructure Risks and Mitigation Measures

Risks	Mitigation Measures	Overall Risk
Access Road - avalanche	Install fences, berms or shelter in high-risk areas. Active avalanche monitoring and control.	Low
Access Road - mud slide	Apply appropriate geotechnical measures in high-risk areas. Active monitoring.	Low
Access Road - downhill gradients	Soft berms on sides. Runaway lanes.	Low
Access Road - soft ground	Adequate survey for sections near water bodies. Avoid swamps.	Low
Access Road - flooding/culverts	Consider a more frequent event than 1-in-100 year due to effect of climate change.	Low
Access Road - traffic control	Make pull-outs. Improve gradient/curve radius to enhance traffic safety.	Low
Turnagain River Crossings - schedule delay	Robust construction scheduling and on-time delivery of equipment and consumables.	Low
Turnagain River Crossings - cost overrun	Detailed cost estimate and analysis. Increase contingency/reserve.	Low
Wind on overland conveyor	Robust design, detail analysis on structure and harmonics.	Low
Site development - labour productivity	Early off-site worker training by computer simulations or a scale model.	Low
Site development - unable to obtain permit for site clearing	Early engagement of all stakeholders and governmental agencies.	Low
Site development - adverse geotechnical conditions	Sufficient site investigation and geotechnical evaluation.	Low
Site development - schedule delay due to weather	Robust construction scheduling and on time delivery of equipment and consumables.	Low
Site development - logistics of equipment	Robust planning. Use heli-lift where appropriate.	Low
Site development - surface water runoffs	Build trenches and collection ditches prior to site activities. Portable gensets and pumps.	Low
Site development - inadequate drainage	Consider a more frequent event than 1-in-100 year due to effect of climate change.	Low
Site security - unauthorized traffic on site and access road	Install check gates and surveillance at highway 37 junction and at site.	Low
Diesel tank/pipe leakage	Good quality welding joints. Leak monitor devices with wireless transmit. Sufficient containment. Berms around fuel tank farm. Geotextile liners.	Low
Inadequate camp capacity	Adequate staff load planning and forecast. Make allowances.	Low

25.2.1.6 Tailings Management Facility

A list of TMF-related risk and mitigation strategy is presented in Table 25-3.

Table 25-3: List of TMF Risks and Mitigation Measures

Factors	Risks	Mitigation
TMF dam failure	A breach can release a massive volume of tailings, leading to severe consequences including loss of life, contamination of the environment and water bodies downstream of the TMF.	▪ Complete comprehensive geotechnical investigation and engineering studies, ▪ Include robust assessment and incorporate adequate design consideration, ▪ Use suitable materials and construction techniques, ▪ Continuous monitoring and inspection of dam safety, ▪ Incorporate safety factor and redundancies on the design.
Seepage and leakage	Water seepage through the dam can lead to internal erosion (piping) and potentially compromise the integrity of the structure.	▪ Implementation of cutoff walls and high-quality, impermeable materials, ▪ Use of filter to control the seepage, ▪ Regularly monitoring seepage rates and water level.
Borrow sources	If suitable materials are not readily available nearby, it may require long-distance hauling and increase cost of transportation, energy consumption and environmental disturbances.	▪ Identify multiple borrow sources based on available surficial geology map and field investigations as early as possible during the different phases of the project development.
Material quality, suitability and compatibility	Unsuitable and incompatible materials can compromise durability, performance and quality of the embankment.	▪ Characterize available materials through laboratory testing and determine alternative steps if challenging in obtaining or producing proposed materials to construct the embankment.
Quantity and reserve	Not having enough quantity and reserve of required construction materials can disrupt construction and lead to delays, cost overruns and complications.	▪ Identify multiple borrow sources and determine the material quantity, plan alternative borrow sources or material to complete the work.
Environmental Impact (EI)	Inadequate environmental assessments and management of borrow sites can result in ecological damage, erosion and water quality issues.	▪ Include EI assessment for the borrow sources and plan to reduce the environmental impact as much as possible.
Rehabilitation and closure	Unforeseen costs related to material quality, transportation, or environmental mitigation can lead to budget overruns.	▪ Determine and update costs associated with material quality, transportation and environmental mitigation plans at each stage and revise the plan accordingly at each stage.

25.2.1.7 Environmental

- Schedule risks could be incurred during Project execution as a result of the Environmental Assessment (EA) process. The EA process requires the collection of data in sufficient detail to allow for the characterization of baseline conditions and potential effects, which often results in multiple years of data collection. Additionally, consultation with the public, stakeholder and Indigenous groups is required. Once the Project formally enters the EA process, the Project timeline should be reviewed to reflect the probable duration of the EA process, including potential uncertainties associated with regulatory and consultation aspects.

- Schedule risks could be incurred depending on how supporting infrastructure and aspects ancillary to the Project, such as the access road and transmission line, are handled as part of the EA process (e.g., included as part of the overall Project requiring assessment or as separate projects unto themselves).
- Schedule risks could also occur if substantial changes are made to the Project after it has formally entered the EA process. Design changes can affect the assessment of potential Project effects as well as messaging delivered as part of public and Indigenous consultation; early and regular communication between all team members will be imperative to maintain an efficient and transparent regulatory process.

25.2.2 Opportunities

Potential project opportunities are outlined in the subsections below.

25.2.2.1 Geology and Mineral Resources

- A systematic exploration program could provide an excellent opportunity for successfully uncovering new discoveries.
- An increased understanding and derivation of alternative theories may result in further discovery and significant expansion for the project.
- Higher commodity prices will change the size and grade of the potential targets.
- Potential for expansion and classification upgrade of resources contained within the ultimate pit and in the immediate proximity.
- The optimized pit that constrains the resources (which defines the ‘reasonable prospects of eventual economic extraction’) does not traverse the river. This option has not been ruled out; however, it is not the selected option in this design.
- Additional resources in the Hatzl and Cliff areas, with the latter offering potential for additional platinum and palladium values.
- Enhanced geometallurgical knowledge of mineralization will aid in detailing and segregating higher grade recoverable resources.
- Further metallurgical improvements are possible, particularly in relation to geological modelling and recovery.

25.2.2.2 Mining

- Mineral Reserves: Mineral Reserves are sensitive to all the associated costs for the pit optimization, especially to the TMF sustaining capital cost to construct the TMF over the LOM. As part of the TMF development, the TMF sustaining capital costs are higher in the first 20 years of the LOM, then decrease towards the end of the mine life. During the pit optimization stage, Tetra Tech evaluated three scenarios of different TMF sustaining capital costs to determine the sensitivity of the LOM RF shell to these costs:

  - Low-side scenario: $0.4/t of processed ore,
  - Base Case: $0.7/t of processed ore,
  - High-side scenario: $1.1/t of processed ore.

  The evaluation showed that the addition of the TMF sustaining capital cost does not significantly impact ore quantities which also means there is limited quantity of ore that is sensitive to this additional cost. However, in the later years of the LOM, there is an opportunity to reduce the TMF sustaining capital costs which would result in more low-grade ore material. Tetra Tech has used the LOM average of $0.7/t processed as a conservative approach.

- As Pushbacks 3 and 4 involve multiple haul road switchbacks which may pose challenges to install trolley powerlines or increase truck cycle time, integrating Pushbacks 3 and 4 will reduce switchback requirements and increase haul truck performance.
- Non-diesel haul trucks or fully electric trucks are expected to be a commercial reality before the Turnagain mine is commissioned. With the low cost and lower carbon footprint of hydroelectricity, this would offer cost savings and GHG reductions for the project. Tetra Tech suggests that Giga Metals continue to engage with vendors for the latest technology and pursue opportunities currently available to the mining industry.
- Due to the remote project location, Tetra Tech recommends continuing to engage with vendors for blasting material logistics and further refining the cost.
- If conditions in the open pit are drier than assumed, there could be an opportunity for using more ANFO product and less emulsion product, contributing to lower overall blasting costs.
- Utilizing fully automated drills for blasthole drilling in the open pit could result in increased drilling productivity and lower labour costs for the project.
- Trolley-assist infrastructure cost and maintenance cost should be further refined by a local technology leader in the mining electrification industry.
- Due to limited operation data collected from vendors, mechanical maintenance and wear parts costs for the trolley haul truck should be further refined.
- The Hatzl zone deposit was not considered as part of the mine plan which could positively contribute to the project economics.

25.2.2.3 Geotechnical and Hydrogeology

- Depressurization of the northeast pit slopes: In future studies, if the planar discontinuity set is found to be less pervasive than identified in this study, there may be an opportunity to steepen these slopes.
- If the Duffy Zone is considered a separate structural domain in future studies, the slope angles may need to be updated.
- Pit-scale faults: The addition of further fault characterization and waviness may provide an opportunity to increase the frictional strength at inter-ramp and overall scales if slope stability is controlled by fault strengths.

25.2.2.4 Recovery Methods

- Opportunity to utilize the recent developments in the HPGR and vertical stirred milling technology to further reduce the comminution energy requirement by utilizing two stage HPGR-stirred mill circuit to prepare flotation feed.
- Opportunity to utilize the recent developments in new flotation technologies, such as the Jameson flotation cells to improve flotation recovery while reducing energy consumption and plant footprint.
- Evaluation of strategies to recover nickel locked in silicates from the tailings. Atmospheric acid leach of the flotation tailings could be studied to produce battery grade nickel sulphate. The project economics needs to be verified for this opportunity.

- Recent development in the in-pit crush and convey technology could further reduce haulage related energy consumption and CO_2 emission.

25.2.2.5 Project Infrastructure

- Shared access road development costs with the potential development of the other mining projects in the nearby areas.
- Future geotechnical site investigations could provide insight for the most optimal surface infrastructure site location to minimize the foundation requirements.
- Forest harvesting prior to site clearing. Forestry service road to site funded/built by government or logging companies.
- Power transmission lines funded by BC Hydro or financed by a utility contractor.
- Optimization of construction schedule. Early mobilization and modularization to shorten construction schedule.

25.2.2.6 Tailings Management Facility

- Tailings deposition methodology and schedule will undergo further refinement and optimization once advanced tailings characterization is completed.
- Waste rock materials generated can be utilized in constructing the planned embankments.
- After conducting further field investigation and laboratory characterization of the foundation and tailings, the design for the TMF embankment will undergo optimization.
- Additional assessment of paste and thickened tailings deposition methods should be undertaken or considered, as they have the potential to be more cost-effective than the proposed embankments after determining suitable borrow sources.

25.2.2.7 Power Supply

- There is potential to negotiate the connection to the BC Hydro system in the context of helping the government to achieve its climate goals (by avoiding on-site power generation using liquefied natural gas and implementing a non-diesel mining fleet). In this regard, discussions are underway with BC Hydro with respect to any electrical system improvements that may be necessary to provide the power to the Turnagain Mine.
- Continued participation in BC Hydro's Request for Expressions of Interest by future loads in northwestern BC will provide additional opportunities to engage with BC Hydro regarding potential system reinforcements.
- Base case considerations included ensuring the ability to transfer the transmission line to BC Hydro. Lower cost tower designs may be possible for any portion of the transmission line which is intended to remain owned and operated by Giga Metals.

25.2.2.8 Environmental

- Potential to provide economic opportunities to Indigenous groups with infrastructure ownership and operation as well as contracting opportunities.
- Potential to monetize the sequestration of carbon in the TMF.

- There is an opportunity to reduce the carbon intensity through further electrification of the mining fleet. The most efficient form of this is expected to be a trolley plus battery, where the trolley-assist infrastructure is utilized for powering the loaded trucks out of the mine and to charge smaller batteries used for moving the trucks in the limited non-trolley areas. Regenerative braking on the descent into the mine pit will also charge the onboard batteries.

26.0 RECOMMENDATIONS

26.1 Introduction

The PFS result shows robust economics for Turnagain Nickel Project at a 90,000 t/d of mill feed with a 30-year mine life producing a nickel-cobalt concentrate. Overall, the Project is considered to be technically and economically viable based on PFS parameters and results.

It is recommended that Giga Metals focuses on advancing development of the Turnagain Nickel Project as described in the PFS by completing the data collection required to conduct a FS. It is recommended to continue and the Project permitting process, planning, scheduling and source financing.

Based on the outcomes of this PFS, the contributors have drawn the following key recommendations.

26.1.1 Geology & Mineral Resources

To advance the Turnagain Project and further evaluate the potential adjacent deposits, the following work program is recommended:

- Carry out geometallurgical analysis and lithological domain modelling to support updated resource estimation and improved metallurgical modelling,
- Explore significant Hatzl and Cliff deposits for potential to expand resources,
- Completion of the recommended Turnagain deposit drilling and resource studies.

26.1.2 Mining Methods

- Upon completion of future grade control drilling or infill drilling, the mining block model should be updated.
- Continue to engage with primary mining equipment vendors for the latest technology and pursue opportunities currently available to the mining industry, including fully electric mining trucks and autonomous hauling systems.
- The capital cost of trolley-assist infrastructure and maintenance cost should be further refined by a local technology leader in mining electrification.
- Engage with explosive providers to further refine the explosive logistics, service and material costs.
- Redesign or integrate Pushbacks 3 and 4 to reduce switchback requirements and truck cycle time.
- Additional ARD/ML testing should be completed for Hatzl zone so that mine waste rock can be utilized as TMF dam construction material.
- Geotechnical stability analysis should be conducted for the mine waste dump to confirm the 50m bench lift.

26.1.3 Geotechnical and Hydrogeology

Engineering work at the next stage of design should focus on improving the confidence level of the slope design criteria and reducing the Project risks. The following are recommendations for future work to advance the geotechnical and hydrogeological aspects of the Project to the FS level.

- Additional geotechnical drilling to fill the gap in geotechnical drill hole spacing and orientation blind zones, characterize pit-scale faults, confirm and refine the initial structural domain boundaries and assess the existence of a separate structural domain for the Duffy Mineralization Zone, further characterize structural geology fabric and to complete additional geotechnical laboratory testing.
- Additional hydrogeological data collection to update the conceptual hydrogeologic model, by further defining and constraining hydraulic properties and pre-mining pore pressure conditions. This would include:
  - Conducting packer testing and installing VWP sensors in drill holes to be completed as part of the geotechnical portion of the pit slope design work.
  - Constructing a test well and adjacent nested VWP sensors in the northeast wall of the proposed open pit and complete a pumping test.
  - Constructing test wells and adjacent nested VWP sensors within the alluvium and fractured bedrock near the southeast crest of the proposed open pit, adjacent to the Turnagain River and complete pumping tests.
  - Conducting a surface geophysical investigation to better constrain the lateral and vertical extents of the alluvium between the southeast pit crest and the Turnagain River.
- Due to the proximity of the southeast wall of the open pit to the Turnagain river and identification of toppling as the anticipated primary failure mechanism, it is recommended that a numerical model be completed to assess the potential extent of deformation behind the pit. This assessment will inform the potential need for an additional setback distance from the Turnagain River as well as possible changes to the slope design.

26.1.4 Metallurgy

Comminution:

- A geometallurgical modelling evaluation of ore hardness using existing hardness data. It is not expected that additional work index testing will be needed but the comminution data should undergo the same geometallurgical evaluation as the flotation data has during the PFS.
- It is possible that holes may be exposed in the ore hardness database. These are not envisioned at this time but a small budget for follow-up Bond Ball Mill hardness testing should be included.
- Follow-up testing on HPGR is recommended, including the development of a geometallurgical model through piston press tests and limited additional piloting.

Flotation and product dewatering testing:

- More cleaner testing of low rougher recovery composites should be undertaken. Current cleaner test data specifically on the low recovery material is limited and may be unnecessarily penalizing the projected overall recovery of this material. Work would include batch rougher and cleaner testing; plus LCT and work should also include the optimization of reagent doses.
- Similarly, more cleaner and LCT of high nickel recovery samples. The aim of this work and the work in the above bullet is to establish more confidence in the cleaner stage recovery prediction.
- Test impact of recycled process and make-up water on flotation performance through LCT.
- Bulk flotation and concentrate dewatering testing.

- Evaluation of the settling characteristics of tailings from a variety of samples with different mineralogical compositions, simulating the design of tailings management systems from the PFS.

Geometallurgical and metallurgical forecasting:

- Additional in-fill geometallurgical testing.
- Continue evaluation of AC-Ni algorithm-based approaches to predict nickel recovery. Establish robust approach to using AC-Ni assays as predictor of metallurgy through the block model.
- Complete AC-Ni assays on all un-assayed intervals.
- Run another 200 samples previously assayed for AC-Ni at ACME through QC assaying to add further confidence to the link between recent AC-Ni assaying and earlier assaying.

26.1.5 Recovery Methods

- Advance engineering works to optimize the equipment sizing and selection based on future test data and recent development in the processing technologies.
- Further optimize the processing plant layout.

26.1.6 Infrastructure

- Geotechnical investigations of surface infrastructure facilities.
- A comprehensive geotechnical study at the selected bridge locations to determine soil properties and provide recommendations for foundation options.
- Perform a logistics study for the Project.
- Investigation and possible adaptation of newest building technologies for enhancing the energy efficiency of buildings and mechanical equipment.
- Applications of risk mitigation measures as listed in Section 25.0.
- Start consultation with government and/or third parties to seek infrastructure funding or financing.
- Early planning and initiating conversations with government and nearby potential mining projects for infrastructure sharing.
- Planning for the access road and site pre-development and construction activities.

26.1.6.1 Tailings Management Facility

The following items are recommended to advance the current PFS design of the TMF facility to the FS design level:

- Perform a detailed subsurface geotechnical investigation and laboratory testing program within the footprint of the TMF, proposed embankments and seepage collection ponds to further assess foundation conditions at the site.
- Undertake tailings geotechnical and geochemical characterization testing to obtain representative design parameters.

- Identify and assess appropriate borrow sources in the vicinity and perform geotechnical and laboratory testing programs to assess the quantity and suitability of materials that can be used to construct TMF embankments and seepage collection ponds.
- Undertake a dam breach inundation study of the design embankments to support the determination of the TMF consequence classification.
- Refinement of tailings deposition design during the next phase of the study using laboratory-characterized testing parameters and engineering considerations.
- The seepage model should be updated as required with consideration of subsurface condition and laboratory characterization testing plan developed as part of the FS design. Based on this update, the design of containment features should be refined. Seepage assessment will also be required to determine the timeframe of long-term monitoring and potential treatment requirements.
- Design and review updates of TMF water management and seepage control structures with considerations of subsurface condition and laboratory characterization testing plan.
- The stability model should be reviewed and updated as required with consideration of subsurface condition and laboratory characterization testing plan developed as part of the FS design.
- Liquefaction assessment should be performed for the TMF site using revised and updated material properties.
- The TMF closure design should be updated to ensure it is consistent with the anticipated closure and reclamation plan.

26.1.6.2 Overall Site Water Management

As the project progresses into the next phases, Tetra Tech recommends reassessing the following aspects of the site-wide water balance to improve the forecasting results.

- Update the density curve of the settled tailings within the TMF, which affects the release of water through consolidation.
- Develop a detailed analysis of the water seepage through the footprint of the TMF by developing a detailed 2D/3D transient ground seepage model.
- Continue to collect data from the existing climate station to expand the probabilistic distribution of the local precipitation/rainfall data.
- Review the 30% surface run-off capture assumption. Surface runoff capture will be varied and modelled to mitigate the water deficit and discharge scenarios.

26.1.6.3 Power Supply

Recommendations/next steps to address issues and risks which may affect the schedule include the following:

- Carry out more detailed analyses of routing and design components, including field investigation by road and helicopter in the summer period.
- Carry out environmental and social impact studies, also with field work in the summer period.
- Commence/continue analyses and initiatives relevant to the development of the transmission line, such as discussions with appropriate government agencies (e.g., BC Ministry of Transportation and Infrastructure,

BCMOF, BC Parks and the federal government with respect to potential infrastructure funding), First Nations involvement and property research.

- Investigate the provision of 287 kV tower design alternatives.
- Involve BC Hydro as follows:
  - Revise analysis as appropriate after results of BC Hydro's Conceptual Study are available, with a subsequent application to BC Hydro for a System Impact Study (required for the FS phase).
  - Continue to engage in BC Hydro's Request for Expressions of Interest by future loads in northwestern BC.
  - Engage with BC Hydro, particularly at the FS phase, on aspects of the transmission line design and routing and other considerations to preserve the option of BC Hydro assuming responsibility for operation and maintenance of the transmission line, or parts thereof, after construction and commissioning.
- Prepare single-line diagrams with key electrical equipment (e.g., power lines, switches, circuit breakers, transformers) arranged similarly to the way the equipment would be laid out in the substations, with subsequent determination of the details of that layout and equipment.

This course of action:

- Would inform the decision on 287 kV tower types to consider.
- Would affirm the choice of the selected route as described in this analysis as the preferred route from the Tatogga Substation to the Turnagain Mine Site, or recommend a new route based on detailed technical, environmental, First Nations and other considerations.
- Would determine the routing and corridor boundaries/widths for Light Detection and Ranging (LiDAR) flights which must occur during the June-July period to minimize the impact of shadows on the mapping.

26.1.7 Environmental

The primary risks from the environmental components of the Project are schedule-based. Once the Project formally enters the environmental assessment process, clear and regular communication within the team will be required so that an efficient regulatory review can be maintained. Project design changes can affect the assessment of potential Project effects as well as the messaging delivered as part of public and Indigenous consultation. The team conducting the environmental assessment should be informed of any Project design changes so they can determine how those changes might affect the overall regulatory process. A list of activities needed for the baseline study is listed below:

- Conduct baseline studies characterizing local and regional terrain, soils, ecosystems and vegetation to inform the environmental assessment and closure and reclamation planning.
- Conduct additional surface water and groundwater quality data collection for a more complete characterization of baseline water quality.
- Information characterizing ML potential is limited at present but kinetic testing over a minimum of 12 months is expected to be required to inform project design and the environmental assessment.
- Further discussions, consultation and engagement with Indigenous groups, communities, regulators and other interested parties will be required as baseline programs are developed.

26.2 Cost Estimate for Recommendations

The following budget is proposed for work carrying through to the completion of FS level design Table 26-1.

Table 26-1: Cost Estimate for Recommendations

Item	Budget (million US$)
Geology & Mineral Resource	15.5
Geotechnical Studies	7.8
Metallurgy	1.1
Mining	0.2
Infrastructure	1.0
TMF	5.5
Environmental Testing	0.2
Feasibility Study	3.0
Environmental Assessment	10.0
Total	**44.3**

Note: Total may not add due to rounding.

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28.0 CERTIFICATES OF QUALIFIED PERSONS

CERTIFICATE OF QUALIFIED PERSON

I, Hassan Ghaffari, M.A.Sc., P.Eng., do hereby certify:

- I am a Director of Metallurgy with Tetra Tech Inc. with a business address at Suite 1000, 10th Floor, 885 Dunsmuir Street, Vancouver, BC, V6C 1N5.
- This certificate applies to the technical report entitled "Turnagain Nickel Pre-Feasibility Study, NI 43-101 Technical Report", with an effective date of September 22, 2023 (the "Technical Report").
- I am a graduate of the University of Tehran (M.A.Sc., Mining Engineering, 1990) and the University of British Columbia (M.A.Sc., Mineral Process Engineering, 2004).
- I am a member in good standing of the Engineers and Geoscientists British Columbia (#30408).
- My relevant experience includes more than 30 years of experience in mining and mineral processing plant operation, engineering, project studies and management of various types of mineral processing, including hydrometallurgical processing for mineral deposits.
- I am a "Qualified Person" for the purposes of National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101) for those sections of the Technical Report that I am responsible for preparing.
- I conducted a personal inspection of the Turnagain Property on July 13, 2022.
- I am responsible for Sections 2, 3, 18 (except 18.6, 18.8 and 18.10), 19, 20, 21.1 (except mining costs), 21.2 (except mining costs), 24 and related disclosure in Sections 1, 25, 26 and 27 of the Technical Report.
- I am independent of Giga Metals Corporation as Independence is defined by Section 1.5 of NI 43-101.
- I have no prior involvement with the Turnagain Property that is the subject of the Technical Report.
- I have read NI 43-101 and the sections of the Technical Report that I am responsible for have been prepared in compliance with NI 43-101.
- As of the date of this certificate, to the best of my knowledge, information and belief, the section of the Technical Report that I am responsible for contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Effective Date: September 22, 2023

Signing Date: October 19, 2023

"Signed and Sealed"

Hassan Ghaffari, M.A.Sc., P.Eng.
Director of Metallurgy
Tetra Tech Canada Inc.

CERTIFICATE OF QUALIFIED PERSON

I, Garth David Kirkham, P.Geo., FGC, do hereby certify:

- I am a consulting geoscientist with Kirkham Geosystems Ltd. with a business address at 6331 Palace Place, Burnaby, British Columbia, V5E 1Z6.
- This certificate applies to the technical report entitled "Turnagain Nickel Pre-Feasibility Study, NI 43-101 Technical Report", with an effective date of September 22, 2023 (the "Technical Report").
- I am a graduate of the University of Alberta in 1983 with a BSc.
- I am a member in good standing of the Engineers and Geoscientists British Columbia (#30043).
- I have continuously practiced my profession since 1988. I have worked on and been involved with a large number of NI 43-101 studies, particularly on the Halilaga deposit, the Selwyn project and the Kutcho Creek and Debarwa poly-metallic deposits, along with multiple Technical Reports and Mineral Resource Estimates on the large scale poly-metallic projects.
- I am a "Qualified Person" for the purposes of National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101) for those sections of the Technical Report that I am responsible for preparing.
- I conducted a personal inspection of the Turnagain Property, including the site, facilities and surrounding areas on October 9 to 10, 2018 and September 29 to 30, 2021.
- I am responsible for Sections 4, 5, 6, 7, 8, 9, 10, 11, 12, 14 and 23 and related disclosure in Sections 1, 25, 26 and 27 of the Technical Report.
- I am independent of Giga Metals Corporation as Independence is defined by Section 1.5 of NI 43-101.
- I have prior involvement with the Turnagain Property, that is the subject of the Technical Report, in acting as a Qualified Person for the "Preliminary Economic Assessment for the Turnagain Project – Amended" technical report dated October 28, 2020.
- I have read NI 43-101 and the sections of the Technical Report that I am responsible for have been prepared in compliance with NI 43-101.
- As of the date of this certificate, to the best of my knowledge, information and belief, the section of the Technical Report that I am responsible for contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Effective Date: September 22, 2023

Signing Date: October 19, 2023

"Signed and Sealed"

Garth David Kirkham, P.Geo., FGC
Consulting Geoscientist
Kirkham Geosystems Ltd.

CERTIFICATE OF QUALIFIED PERSON

I, Christopher John Martin, CEng., MIMMM, do hereby certify:

- I am a consulting metallurgist with a business address at 3573 Shelby Lane, Nanoose Bay, British Columbia, V9P 9J8.
- This certificate applies to the technical report entitled “Turnagain Nickel Project Pre-Feasibility Study, NI 43-101 Technical Report”, with an effective date of September 22, 2023 (the “Technical Report”).
- I am a graduate of Camborne School of Mines and McGill University in 1984 and 1988 with degrees in Mineral Processing Technology (BSc [Hons]) and Metallurgical Engineering (MEng), respectively.
- I am a Registered Member of the Institution of Materials, Minerals and Mining.
- I have been practicing my profession since 1984 and have worked on or been involved in more than 300 flowsheet development and plant optimization studies, mostly in precious and base metal grinding and flotation. I have authored the metallurgical section in numerous NI 43-101’s, including for many polymetallic flotation projects.
- I am a “Qualified Person” for the purposes of National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101) for those sections of the Technical Report that I am responsible for preparing.
- I conducted a personal inspection of the Turnagain Property on October 19, 2010.
- I am responsible for Section 13 and related disclosure in Sections 1, 25, 26 and 27 of the Technical Report.
- I am independent of Giga Metals Corporation as Independence is defined by Section 1.5 of NI 43-101.
- I have prior involvement with the Turnagain Property, that is the subject of the Technical Report, in acting as a Qualified Person for the “Preliminary Economic Assessment for the Turnagain Project – Amended” technical report dated October 28, 2020.
- I have read NI 43-101 and the sections of the Technical Report that I am responsible for have been prepared in compliance with NI 43-101.
- As of the date of this certificate, to the best of my knowledge, information and belief, the section of the Technical Report that I am responsible for contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Effective Date: September 22, 2023

Signing Date: October 18, 2023

“Signed and Sealed”

Christopher John Martin, CEng., MIMMM
President
Sacanus Holdings Ltd.

CERTIFICATE OF QUALIFIED PERSON

I, Maureen E. Marks, P.Eng., do hereby certify:

- I am the Mining Division Manager with Tetra Tech Inc. with a business address at Suite 1000, 10th Floor, 885 Dunsmuir Street, Vancouver, BC, V6C 1N5.
- This certificate applies to the technical report entitled "Turnagain Nickel Project Pre-Feasibility Study, NI 43-101 Technical Report", with an effective date of September 22, 2023 (the "Technical Report").
- I graduated in 2013 from Montana Technical University with a B.Sc. in Mining Engineering.
- I am a member in good standing with Engineers and Geoscientists of British Columbia (#45716).
- My relevant experience includes 12 years of experience working in precious metals, onsite operational experience and consulting. I have been directly involved in mine design and planning, mine production and economic evaluation, Ore and Mineral Reserve estimation, technical reviews of mineral assets and mining capital and operating cost estimation.
- I am a "Qualified Person" for the purposes of National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101) for those sections of the Technical Report that I am responsible for preparing.
- I conducted a personal inspection of the Turnagain Property on July 13, 2022.
- I am responsible for Sections 15 (except pit slope evaluation and hydrogeology), 16 (except waste and stockpile geotechnical design), 21.1 (mining costs only), 21.2 (mining costs only), 21.3 (mining costs only) and related disclosure in Sections 1, 25, 26 and 27 of the Technical Report.
- I am independent of Giga Metals Corporation as Independence is defined by Section 1.5 of NI 43-101.
- I have no prior involvement with the Turnagain Property that is the subject of the Technical Report.
- I have read NI 43-101 and the sections of the Technical Report that I am responsible for have been prepared in compliance with NI 43-101.
- As of the date of this certificate, to the best of my knowledge, information and belief, the section of the Technical Report that I am responsible for contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Effective Date: September 22, 2023

Signing Date: October 19, 2023

"Signed and Sealed"

Maureen E. Marks, P.Eng.
Manager, Mining Division
Tetra Tech Canada Inc.

CERTIFICATE OF QUALIFIED PERSON

I, Ian Stilwell, P.Eng., do hereby certify:

- I am a Principal Geotechnical Engineer with BGC Engineering Inc. with a business address at 234 St. Paul Street, Kamloops, BC, Canada, V2C 6G4.
- This certificate applies to the technical report entitled "Turnagain Nickel Project Pre-Feasibility Study, NI 43-101 Technical Report", with an effective date of September 22, 2023 (the "Technical Report").
- I graduated from the University of British Columbia with a Bachelor of Applied Science degree in Geological Engineering in 1995.
- I am a member in good standing of the Engineers and Geoscientists British Columbia (#27316).
- I have practiced my profession continuously since 1995 and specialize in geotechnical open pit and waste dump design and provide operational support for open pit mining operations. I have worked at mining operations and projects throughout Canada, the United States, Mexico, South America, Africa and Asia.
- I am a "Qualified Person" for purposes of National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101) for those sections of the Technical Report that I am responsible for preparing.
- I conducted a personal inspection of the Turnagain Property from August 17 to 21, 2021.
- I am responsible for Section 15.2 (pit slope evaluation only), Section 16 (waste and stockpile geotechnical design only) and related disclosure in Sections 1, 25, 26 and 27 of the Technical Report.
- I am independent of Giga Metals Corporation as Independence is defined by Section 1.5 of NI 43-101.
- I have prior involvement with the Turnagain Property, that is the subject of the Technical Report, in acting as a Qualified Person for the "Preliminary Economic Assessment for the Turnagain Project – Amended" technical report dated October 28, 2020.
- I have read NI 43-101 and the sections of the Technical Report that I am responsible for have been prepared in compliance with NI 43-101.
- As of the date of this certificate, to the best of my knowledge, information and belief, the section of the Technical Report that I am responsible for contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Effective Date: September 22, 2023

Signing Date: October 19, 2023

"Signed and Sealed"

Ian Stilwell, P.Eng.
Principal Geotechnical Engineer
BGC Engineering Inc.

CERTIFICATE OF QUALIFIED PERSON

I, Matthew Cleary, P.Geo., do hereby certify:

- I am a Senior Hydrogeologist with BGC Engineering Inc. with a business address at 234 St. Paul Street, Kamloops, BC, Canada, V2C 6G4.
- This certificate applies to the technical report entitled "Turnagain Nickel Project Pre-Feasibility Study, NI 43-101 Technical Report", with an effective date of September 22, 2023 (the "Technical Report").
- I graduated from Simon Fraser University with a Bachelor of Science degree in Earth Science in 2001.
- I am a member in good standing of the Engineers and Geoscientists British Columbia (#33011).
- I have 21 years of experience in physical and chemical hydrogeology, including mine-water assessments, water supply assessments, environmental assessments, dam assessments and wastewater disposal. My mining-related experience has been mainly focused on open pit dewatering and depressurization designs, the relationship between pore pressure and pit slope stability and has also included tailings seepage and dewatering evaluation and design aspects. I have conducted hydrogeological assessments for coal mines and numerous precious metal and base metal mining projects in Canada, the United States, Mexico, Peru, Ecuador, Argentina and Chile.
- I am a "Qualified Person" for purposes of National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101) for those sections of the Technical Report that I am responsible for preparing.
- I conducted a personal inspection of the Turnagain Property from July 22 to 25, 2021.
- I am responsible for Section 15.2 (hydrogeology only) and related disclosure in Sections 1, 25, 26 and 27 of the Technical Report.
- I am independent of Giga Metals Corporation as Independence is defined by Section 1.5 of NI 43-101.
- I have no prior involvement with the Turnagain Property that is the subject of the Technical Report.
- I have read NI 43-101 and the sections of the Technical Report that I am responsible for have been prepared in compliance with NI 43-101.
- As of the date of this certificate, to the best of my knowledge, information and belief, the section of the Technical Report that I am responsible for contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Effective Date: September 22, 2023

Signing Date: October 18, 2023

"Signed and Sealed"

Matthew Cleary, P.Geo.
Senior Hydrogeologist
BGC Engineering Inc.

CERTIFICATE OF QUALIFIED PERSON

I, Jianhui (John) Huang, Ph.D., P.Eng., do hereby certify:

- I am a Senior Metallurgist with Tetra Tech Inc. with a business address at Suite 1000, 10th Floor, 885 Dunsmuir Street, Vancouver, British Columbia, V6C 1N5.
- This certificate applies to the technical report entitled "Turnagain Nickel Project Pre-Feasibility Study, NI 43-101 Technical Report", with an effective date of September 22, 2023 (the "Technical Report").
- I am a graduate of North-East University, China (B.Eng., 1982), Beijing General Research Institute for Non-ferrous Metals, China (M.Eng., 1988) and Birmingham University, United Kingdom (Ph.D., 2000).
- I am a member in good standing of the Engineers and Geoscientists British Columbia (#30898).
- My relevant experience includes over 36 years of involvement in mineral processing for base metal ores, gold and silver ores and rare metal ores and mineral processing plant operation and engineering, including hydrometallurgical mineral processing for various mineral mineralization.
- I am a "Qualified Person" for purposes of National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101) for those sections of the Technical Report that I am responsible for preparing.
- I have not conducted a personal inspection of the Turnagain Property.
- I am responsible for Sections 17, 21.3 (except mining costs), 22 and related disclosure in Sections 1, 25, 26 and 27 of the Technical Report.
- I am independent of Giga Metals Corporation as Independence is defined by Section 1.5 of NI 43-101.
- I have no prior involvement with the Turnagain Property that is the subject of the Technical Report.
- I have read NI 43-101 and the sections of the Technical Report that I am responsible for have been prepared in compliance with NI 43-101.
- As of the date of this certificate, to the best of my knowledge, information and belief, the section of the Technical Report that I am responsible for contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Effective Date: September 22, 2023

Signing Date: October 19, 2023

"Signed and Sealed"

Jianhui (John) Huang, Ph.D., P.Eng.
Senior Metallurgist
Tetra Tech Canada Inc.

CERTIFICATE OF QUALIFIED PERSON

I, Bereket Fisseha, Ph.D., P.Eng., do hereby certify:

- I am the Senior Geotechnical Engineer with Tetra Tech Inc. with a business address at Suite 1000, 10th Floor, 885 Dunsmuir Street, Vancouver, BC, V6C 1N5.
- This certificate applies to the technical report entitled "Turnagain Nickel Project Pre-Feasibility Study, NI 43-101 Technical Report", with an effective date of September 22, 2023 (the "Technical Report").
- I graduated from the University of Alberta in 2020 and Carleton University in 2008 in Geo-environmental Engineering (PhD) and Environmental Engineering (MASc), respectively.
- I am a member in good standing with Engineers and Geoscientists of British Columbia (#52053).
- My relevant experience includes over 15 years of experience as a researcher and design engineer in working with standard and advanced geotechnical laboratory testings to characterize tailings and mine waste materials, customized large-scale field integrated research projects, advanced numerical modelling analyses, earthfill dam designs with saturated and unsaturated condition considerations.
- I am a "Qualified Person" for the purposes of National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101) for those sections of the Technical Report that I am responsible for preparing.
- I conducted a personal inspection of the Turnagain Property on July 13, 2022.
- I am responsible for Section 18.6 and related disclosure in Sections 1, 25, 26 and 27 of the Technical Report.
- I am independent of Giga Metals Corporation as Independence is defined by Section 1.5 of NI 43-101.
- I have no prior involvement with the Turnagain Property that is the subject of the Technical Report.
- I have read NI 43-101 and the sections of the Technical Report that I am responsible for have been prepared in compliance with NI 43-101.
- As of the date of this certificate, to the best of my knowledge, information and belief, the section of the Technical Report that I am responsible for contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Effective Date: September 22, 2023

Signing Date: October 19, 2023

"Signed and Sealed"

Bereket Fisseha, Ph.D., P.Eng.
Senior Geotechnical Engineer
Tetra Tech Canada Inc.

CERTIFICATE OF QUALIFIED PERSON

I, David Moschini, P.Eng., do hereby certify:

- I am the Senior Civil/Water Resources Engineer with Tetra Tech Inc. with a business address at Suite 1000, 10th Floor, 885 Dunsmuir Street, Vancouver, BC, V6C 1N5.
- This certificate applies to the technical report entitled "Turnagain Nickel Project Pre-Feasibility Study, NI 43-101 Technical Report", with an effective date of September 22, 2023 (the "Technical Report").
- I graduated from the University of British Columbia in civil engineering (BASc) in 1998.
- I am a member in good standing with Engineers and Geoscientists of British Columbia (#29080).
- My relevant experience includes 20 years of experience working in the design and construction of complex multidisciplinary projects requiring a practical approach to the design of capital projects such as pipe systems and other complex infrastructure, including water, wastewater and stormwater systems.
- I am a "Qualified Person" for the purposes of National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101) for those sections of the Technical Report that I am responsible for preparing.
- I have not conducted a personal inspection of the Turnagain Property.
- I am responsible for Section 18.8 and related disclosure in Sections 1, 25, 26 and 27 of the Technical Report.
- I am independent of Giga Metals Corporation as Independence is defined by Section 1.5 of NI 43-101.
- I have no prior involvement with the Turnagain Property that is the subject of the Technical Report.
- I have read NI 43-101 and the sections of the Technical Report that I am responsible for have been prepared in compliance with NI 43-101.
- As of the date of this certificate, to the best of my knowledge, information and belief, the section of the Technical Report that I am responsible for contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Effective Date: September 22, 2023

Signing Date: October 18, 2023

"Signed and Sealed"

David Moschini, P.Eng.
Senior Civil/Water Resources Engineer
Tetra Tech Canada Inc.

CERTIFICATE OF QUALIFIED PERSON

I, Ronald J. Monk, M. Eng., P.Eng., ICD.D, do hereby certify:

- I am a Principal, Energy and Water Resources Specialist with Kerr Wood Leidal Associates Ltd. with a business address at 200 – 4185A Still Creek Drive Burnaby, BC, Canada V5C 6G9.
- This certificate applies to the technical report entitled "Turnagain Nickel Project Pre-Feasibility Study, NI 43-101 Technical Report", with an effective date of September 22, 2023 (the "Technical Report").
- I am a graduate of the University of British Columbia, where, in 1987, I obtained Bachelor of Applied Science (with Honours) in Civil Engineering through the Civil Engineering Department and, in 1992, a Master of Engineering in Civil Engineering (Water Resources and Construction).
- I am a member in good standing of the Engineers and Geoscientists British Columbia (#16877).
- I have practiced my current profession continuously since 1987. My principal experience relevant to this Technical Report is in the areas of power supply analysis, connection to power utilities, power utility rates and tariffs and the planning of power lines for mines.
- I am a "Qualified Person" for purposes of National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101) for those sections of the Technical Report that I am responsible for preparing.
- I have not conducted a personal inspection of the Turnagain Property.
- I am responsible for Section 18.10 and related disclosure in Sections 1, 25, 26 and 27 of the Technical Report.
- I am independent of Giga Metals Corporation as Independence is defined by Section 1.5 of NI 43-101.
- I have had prior involvement with the Turnagain Property, that is the subject of the Technical Report, in acting as a Qualified Person for the "Preliminary Economic Assessment for the Turnagain Project – Amended" technical report dated October 28, 2020.
- I have read NI 43-101 and the sections of the Technical Report that I am responsible for have been prepared in compliance with NI 43-101.
- As of the date of this certificate, to the best of my knowledge, information and belief, the section of the Technical Report that I am responsible for contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Effective Date: September 22, 2023

Signing Date: October 19, 2023

"Signed and Sealed"

Ronald J. Monk, M. Eng., P.Eng., ICD.D
Principal, Energy and Water Resources Specialist
Kerr Wood Leidal Associates Ltd.