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NR 2026-06

Euro Manganese Announces Filing of NI 43-101 Technical Report and the JORC Code Report for the Preliminary Economic Assessment of the Chvaletice Manganese Project

Sensitivity Analysis updated to reflect market and includes new upside case of post-tax NPV of US$798 million and post-tax IRR of 16.9% using 8% discount rate

Vancouver, British Columbia (June 29, 2026 Vancouver / June 30, 2026 AEDT) Euro Manganese Inc. (TSX-V and ASX: EMN; Frankfurt:E06) and its subsidiary Mangan Chvaletice, s.r.o. (together the "Company", "Euro Manganese" or "EMN") is pleased to announce that the Company has now filed on SEDAR+ the "Preliminary Economic Assessment, NI 43-101 Technical Report for the Chvaletice Manganese Project in Chvaletice, Czech Republic" (the "Technical Report"), prepared in accordance with National Instrument 43-101 – *Standards of Disclosure for Mineral Projects ("NI 43-101")*. Further, the Company will lodge on the ASX Announcement Platform the "Preliminary Economic Assessment, Public Report for the Chvaletice Manganese Project in Chvaletice, Czech Republic" (the "JORC Code Report"), prepared in accordance with the Joint Ore Reserves Committee ("JORC") Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves 2012 Edition. The Technical Report and JORC Code Report will also be available for review on the Company's website at www.mn25.ca

Both reports were prepared by Tetra Tech Canada Inc. with an effective date of May 14, 2026. The results of the Technical Report and JORC Code Report were summarized in the Company's news release dated May 14, 2026, titled "Euro Manganese Announces Positive Preliminary Economic Assessment" (the "Summary Announcement"). The Technical Report and JORC Code Report (together, the "PEA") confirm the economic and technical results disclosed in the Summary Announcement and provide an update the sensitivity analysis used to respond to market conditions.

Highlights

- **base price case unchanged:** post-tax NPV of US$492 million and post-tax IRR of 13.8%, using an 8% discount rate and assumed a high-purity manganese sulphate monohydrate ("HPMSM") price of US$2,888/t

- **upside case:** post-tax NPV of US$798 million and post-tax IRR of 16.9%, using 8% discount rate, assuming HPMSM price of US$3,275/t

Sensitivity Analysis Update

As part of the sensitivity analysis update, Tetra Tech included an upside case based on a report by Marketeye.org indicating a potential long-term HPMSM price of approximately US$3,250 to US$3,300 per tonne. The average expected price was used to highlight the upside case.

The PEA is based solely on Measured and Indicated Mineral Resources and does not include Inferred Mineral Resources. The material assumptions underpinning the production target and forecast financial information in the PEA are set out in Summary Announcement and PEA.

The table below compares the base case, potential upside price case and downside price case.

Table 1: Selected Financial Analysis Parameter Comparison for Different HPMSM Prices (USD)

Metrics	-15% of Base Price Case	Base Price Case	Upside Price Case	+15% Base Price Case	Unit
HPMSM price	2,464	2,888	3,275	3,333	$/t
Magnesium price	800	800	800	800	$/t
Total project revenue	9,402	10,989	12,365	12,577	$ million
Site operating costs	4,906	4,906	4,906	4,906	$ million
Selling and distribution costs	553	561	569	570	$ million
Royalties	269	294	315	319	$ million
Total cost of sales	5,728	5,762	5,790	5,795	$ million
Operating income	3,673	5,228	6,574	6,782	$ million
Total capital costs	964	964	964	964	$ million
Project cash flow	2,750	4,304	5,651	5,859	$ million
Pre-tax net present value 8%	302	740	1,130	1,178	$ million
Pre-tax IRR	11.6	16.0	19.5	19.8	%
Pre-tax payback period	8.5	6.5	5.5	5.5	Years
Post-tax net present value 8%	148	492	798	836	$ million
Post-tax IRR	9.9	13.8	16.9	17.1	%
Post-tax payback period	9.4	7.3	6.2	6.1	Years

The base price case remains the principal case for the Chvaletice Manganese Project (the "Project") economics presented in the PEA. The additional upside price case is presented for sensitivity purposes only to illustrate the potential impact of a higher HPMSM price assumption on the Project economics and should not be interpreted as the Company's base case forecast or as a prediction that the higher price assumption will be achieved.

Under the base price case, the Project shows a pre-tax NPV of US$740 million and pre-tax IRR of 16.0%, and a post-tax NPV of US$492 million and post-tax IRR of 13.8%, using an 8% discount rate.

Under the upside price case, which assumes an HPMSM price of US$3,275/t compared with US$2,888/t in the base price case, the Project shows a pre-tax NPV of US$1.13 billion and pre-tax IRR of 19.5%, and a post-tax NPV of US$798 million and post-tax IRR of 16.9%, using the same 8% discount rate. The results of each case are subject to the preliminary nature of the PEA and the cautionary statements in this news release.

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This news release does not report a new estimate of Mineral Resources, or a change to the mineral resource estimate in the Summary Announcement. The Company confirms that it is not aware of any new information or data that materially affects the Mineral Resource information reported in the Summary Announcement and that all material assumptions and technical parameters underpinning that estimate continue to apply.

Martina Blahova, President & CEO of Euro Manganese, commented:

"The filing of the NI 43-101 Technical Report and JORC Code Report is an important milestone for Euro Manganese and provides additional technical disclosure supporting the preliminary economic assessment for the Chvaletice Manganese Project. These reports include the current preliminary economic analysis, including the base price case and an updated sensitivity analysis, and will help inform our next stages of engineering, permitting, financing and commercial engagement. As Europe and allied markets continue to seek secure and transparent sources of critical battery materials, Chvaletice will contribute to a more diversified manganese supply chain outside of China."

Cautionary Statement

The PEA is a high-level review of potential, is preliminary in nature and in the nature of a Scoping Study, and there is no certainty that the economics in the PEA will ever be realized. Investors are advised to read the Summary Announcement together with the Technical Report or the JORC Code Report. The PEA outcomes, including production target and forecast financial information, are based on low accuracy level technical and economic assessments that are insufficient to support the estimation of Mineral Reserves. The PEA includes estimated costs that are subject to an approximate margin error of plus or minus 35%. No Mineral Reserves have been declared for the Project.

Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability. There is no certainty that the results of the PEA will be realized, that the Project will proceed to development, that any production target will be achieved, or that any Mineral Resources will be converted to Mineral Reserves. The projected process plant design, potential production profile, and project plan are conceptual in nature and additional technical studies will need to be completed in order to fully assess their viability. The PEA results are not equivalent to, and should not be construed as, a Pre-Feasibility Study or Feasibility Study.

The PEA is based on material assumptions, including assumptions regarding product pricing, capital and operating costs, processing recoveries, infrastructure, permitting, market demand, foreign exchange rates, taxation, environmental and social matters, and the availability and timing of funding. While the Company considers that the material assumptions are based on reasonable grounds as at the date of this news release, there is no certainty that those assumptions will prove to be correct or that the outcomes indicated by the PEA will be achieved.

Funding

The Company does not currently have funding committed for the full development of the Project. The Company's funding strategy to comply with JORC requirements is set out the Company's JORC Code Report. There is no certainty that the Company will be able to raise the required

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funding when needed or on terms acceptable to the Company. Any funding may be dilutive to existing shareholders or otherwise affect the value of the Company's securities. The Company may also consider other strategic alternatives, including strategic partnerships, joint ventures, project-level financing or asset transactions, and there is no certainty that any such alternatives will be available or completed on acceptable terms. If such strategies are pursued, it could materially reduce EMN's proportionate ownership of the Project. Given the uncertainties involved, investors should not make any investment decisions solely on the results of the PEA.

Competent and Qualified Person Statement

The Technical Report is the Company's only complete and current technical report under NI 43-101 and supersedes previous technical reports.

All production targets for the Chvaletice Manganese Project referred to in this news release are underpinned by estimated Measured and Indicated Mineral Resources prepared by Competent Persons and Qualified Persons in accordance with the requirements of the JORC Code and NI 43-101, respectively. Additionally, the scientific and technical information included in this news release is based upon information prepared, verified, and approved by Mr. James Barr, P. Geo, Senior Geologist, Mr. Jianhui (John) Huang, Ph.D., P. Eng., Senior Metallurgical Engineer, Mr. Hassan Ghaffari, P.Eng, M.A.Sc., Senior Process Engineer, Mr. Chris Johns, P.Eng, Principal Geotechnical Engineer, and Mrs. Maurie Marks, P.Eng, Senior Mining Engineer, all with Tetra Tech. Mr. Barr, Mrs. Marks, Mr. Ghaffari, Mr. Johns, Mr. Huang are consultants to, and independent of, EMN within the meaning of NI 43-101, and have sufficient experience in the field of activity being reported to qualify as Competent Persons as defined in the JORC Code, and are Qualified Persons, as defined in NI 43-101. Mr. Barr is responsible for the Mineral Resource Estimate, Mr. Huang is responsible for the metallurgical test work results, process engineering, operating cost and capital cost estimates, environmental studies, permitting, and social or community impact. Mr. Ghaffari is responsible for infrastructure, Mrs. Marks is responsible for mining and financial analysis, Mr. Johns is responsible for design of the residue storage facility. Mr. Barr visited the property during the 2017 drilling program and again during the 2018 drilling campaign, on July 30-31st, 2018, during which time he observed the drilling, sample collection and preparation, sample logging and sample storage facilities. Mr. Huang visited the Project site on February 5, 2018 and May 3, 2022, as well as visited the Changsha Research Institute of Mining and Metallurgy Co. ("CRIMM") laboratory and pilot plant facility five times between January 20, 2017 and September 20, 2018 to witness sample preparation and test/assay facilities and to discuss the test program and results with CRIMM's technical team. Mr. Huang also visited the SGS Minerals Services (SGS) laboratory on June 29, 2017, and oversaw the bench scale validation test work completed by BGRIMM. Mrs. Marks, Mr. Johns and Mr. Ghaffari also visited the project site on May 3, 2022. Barr, Huang, Ghaffari, Johns and Marks have no economic or financial interest in the Company and consent to the inclusion in this news release of the matters based on their information in the form and context in which it appears.

In addition, technical information concerning the Chvaletice Manganese Project is reviewed by Dr. David Dreisinger, P. Eng, a Qualified Person under NI 43-101. Dr. Dreisinger has reviewed and approved the information in this news release for which he is responsible and has consented to the inclusion of the matters in this news release based on the information in the form and context in which it appears.

Euro Manganese is dual listed on the TSX-V and the ASX. Neither TSX Venture Exchange nor its Regulation Services Provider (as defined by TSXV policies) accepts responsibility for the adequacy or accuracy of this release.

Authorized for release by the President and CEO of Euro Manganese Inc.

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About Euro Manganese

Euro Manganese Inc. (TSX-V and ASX: EMN; FSE: E06) is a battery materials company developing the Chvaletice Manganese Project in the Czech Republic, Europe's only near-term source of high-purity manganese, a critical ingredient in next-generation electric vehicles, energy storage batteries and defence applications.

The Chvaletice Manganese Project aims to reprocess historic mine tailings to produce high-purity electrolytic manganese metal (HPEMM), and high-purity manganese sulphate monohydrate (HPMSM), establishing a fully traceable, low-carbon supply chain within the European Union.

Euro Manganese is positioned to become Europe's first domestic producer of high-purity manganese, meeting the rising demand for sustainable, strategic battery materials while advancing Europe's clean-energy and supply-chain independence goals.

Forward-Looking Statements

Certain statements in this news release constitute "forward-looking statements" or "forward-looking information" within the meaning of applicable securities laws. Such statements and information involve known and unknown risks, uncertainties and other factors that may cause the actual results, performance, or achievements of the Company, its Chvaletice Project, or industry results, to be materially different from any future results, performance or achievements expressed or implied by such forward-looking statements or information. Such statements can be identified by the use of words such as "may", "would", "could", "will", "intend", "expect", "believe", "plan", "anticipate", "estimate", "scheduled", "forecast", "predict" and other similar

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terminology, or state that certain actions, events or results “may”, “could”, “would”, “might” or “will” be taken, occur or be achieved.

Readers are cautioned not to place undue reliance on forward-looking information or statements. Forward-looking statements are subject to a number of risks and uncertainties that may cause the actual results of the Company to differ materially from those discussed in the forward-looking statements and, even if such actual results are realized or substantially realized, there can be no assurance that they will have the expected consequences to, or effects on, the Company.

Forward looking information or statements include all of the results of the PEA, including sensitivity analysis, estimates of internal rates of return (including any pre-tax and after-tax internal rates of return, payback periods, net present values, future production, estimates of cash cost, assumed prices for HPMSM and by-products, proposed extraction plans and methods, operating life estimates, cash flow forecasts, metal recoveries and estimates of capital and operating costs. Forward looking statements also include the possibility for a two-stage construction strategy, and the potential to allow for further optimization of the Project in phase two, with lower upfront capital requirements, and to enhance project economics by aligning investment with cash flow. The Company has based its assumptions and analysis on certain factors that are inherently uncertain, including (i) the adequacy of infrastructure; (ii) the ability to develop adequate processing capacity; (iii) the price of HPMSM and by-products; (iv) the availability of equipment and facilities necessary to complete development; (v) the size of future processing plants and future tailings extraction rates; (vi) the cost of consumables and extraction and processing equipment; (vii) unforeseen technological and engineering problems; (viii) currency fluctuations; (ix) changes in laws or regulations; (x) the availability and productivity of skilled labour; and (xi) the regulation of the mining industry by various governmental agencies.

All forward-looking statements are made based on the Company's current beliefs including various assumptions made by the Company, including that the Chvaletice Project will be developed and operate as planned, the results of the PEA are reliable, that the Company will have sufficient financing to continue operations, and that the Company will be able to meet the conditions of its secured financing. Factors that could cause actual results or events to differ materially from current expectations include, among other things: results from the PEA are not accurate; insufficient working capital; inability to meet the conditions of its secured financing, risks due to granting security, lack of availability of financing for developing and advancing the Chvaletice Project; no available government funding or incentives; the potential for unknown or unexpected events to cause contractual conditions to not be satisfied; developments in electric vehicle battery markets and chemistries; risks related to fluctuations in currency exchange rates; and changes in laws or regulations by various governmental agencies. For a further discussion of risks relevant to the Company, see “Risk Factors” in the Company's annual information form for the year ended September 30, 2025, available on the Company's SEDAR+ profile at www.sedarplus.ca.

Although the forward-looking statements contained in this news release are based upon what management of the Company believes are reasonable assumptions, the Company cannot assure investors that actual results will be consistent with these forward-looking statements. These forward-looking statements are made as of the date of this news release and are expressly qualified in their entirety by this cautionary statement. Subject to applicable securities laws, the

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Company does not assume any obligation to update or revise the forward-looking statements contained herein to reflect events or circumstances occurring after the date of this news release.

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Preliminary Economic Assessment, Public Report, for the Chvaletice Manganese Project in Chvaletice, Czech Republic

(Rev 00 June 2026)

PREPARED FOR
Euro Manganese Inc.
EFFECTIVE DATE: 2026-05-14
719-26018.00
Tetra Tech Canada Inc.

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UNITS OF MEASURE

above mean sea level	Amsl
acre	ac
ampere	A
annum (year)	a
bank cubic metres	bm^3
billion	B
billion tonnes	Bt
billion years ago	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)	USD$
dollar (Canadian)	CAD$
dry metric ton	dmt
foot	ft or ′
gallon	gal
gallons per minute (US)	gpm
gauge	ga
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

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hour	h
hours per day	h/d
hours per week	h/wk
hours per year	h/a
inch	in. or "
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
kilowatt	kW
kilowatt hour	kWh
kilowatt hours per tonne	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 Baltic sea level	mbsl
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 tonnes	Mt
minute (plane angle)	'
minute (time)	min
month	mo
Neutron	N

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ounce	oz
pascal	Pa
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
Three Dimensional	3D
Three Dimensional Model	3DM
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
troy ounce	t oz
volt	V
week	wk
weight/weight	w/w
wet metric ton	wmt
year (annum)	a

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1.0 SUMMARY

1.1 Introduction

The Chvaletice Manganese Project (CMP) is located in the western area of the Pardubice region of the Czech Republic, approximately 89 km by road east of Prague, on the southern shore of the Labe River (Figure 1-1). The CMP contemplates reprocessing of fine-grained tailings material for production of high-purity manganese sulphate monohydrate (HPMSM), at a hydrometallurgical refinery expected to be located adjacent to the tailings cells. The tailings were deposited into three separate above-ground tailings cells, referred to as Cell #1, Cell #2, and Cell #3, from historical mining and processing activities.

Euro Manganese Inc. and its wholly-owned subsidiary, Mangan Chvaletice s.r.o (Mangan) (collectively referred to in this Public Report as EMN) retained Tetra Tech Canada Inc. (Tetra Tech) to prepare a Public Report and Preliminary Economic Assessment (PEA) based on the data generated from work completed on the CMP by EMN to date and with reference to a Feasibility Study (FS) completed in 2022. This PEA report has been prepared for the CMP in accordance with the Joint Ore Reserves Committee Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (the JORC Code, 2012 Edition) and following Canadian National Instrument 43-101 (NI 43-101) guidelines and following Canadian Institute for Mining, Metallurgy, and Petroleum (CIM) Best Practices. The effective date for this report is May 14, 2026.

1.2 Property Description and Location

The Chvaletice Property (the Property) lies within the Hradec Králové and Pardubice Region District Mining Authority. These authorities administer the Mining Act (44/1988). Mineral tenure is regulated under the Geological Act (62/1988) and administered by the Ministry of Environment in consultation with the Ministry of the Industry and Trade and with the Czech Mining Authority.

Following full legal proceedings, the Regional Mining Authority for the territories of the Hradec Králové, Pardubice, Liberec, and Vysočina Regions issued on December 20, 2024, the authorization establishing the Mining Lease District for the Trnávka Mining Area, deemed legally effective on March 2, 2025. This authorization serves as the essential legal framework for subsequent mining permitting procedures, including the final Mining Permit and necessary construction permits.

It supersedes the two exploration licences, numbered 631/550/14-Hd and MZP/2018/550/386-Hd (together the Exploration Licences) and a Preliminary Mining Permit, numbered MZP/2021/550/92-Hd, which were registered to include mineral rights over an area of 1.2 km^2 (the Protected Area, covering approximately 120 ha and encompassing all three tailings cells) (Figure 1-2).

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Figure 1-1: Location of the Chvaletice Manganese Project

Source: Tetra Tech (2022)

Infrastructure in the vicinity of and accessible to the CMP includes highways, a major rail corridor, a navigable river, water supply, a natural gas line, an 820 MW coal-fired power station, a pre-cast concrete plant, an asphalt plant, and a newly constructed cast iron foundry.

The region surrounding the CMP is rural, yet quite industrialized. Within 25 km of the CMP one can find several automotive plants, chemical plants, metal fabricators, and numerous heavy and light industrial facilities. A significant skilled and trainable labour workforce is accessible in the nearby communities, including the villages of Chvaletice (population of 3,200) and Trnavka (population 250) and the nearby towns and cities of Kutna Hora (population 21,000), Kolin (population 31,000), Pardubice (population 89,000), Hradec Kralove (population 93,000), and Prague (population 1,200,000).

Mining supplies, equipment, services, and technical expertise can be found mainly in Ostrava, Prague, and Pardubice.

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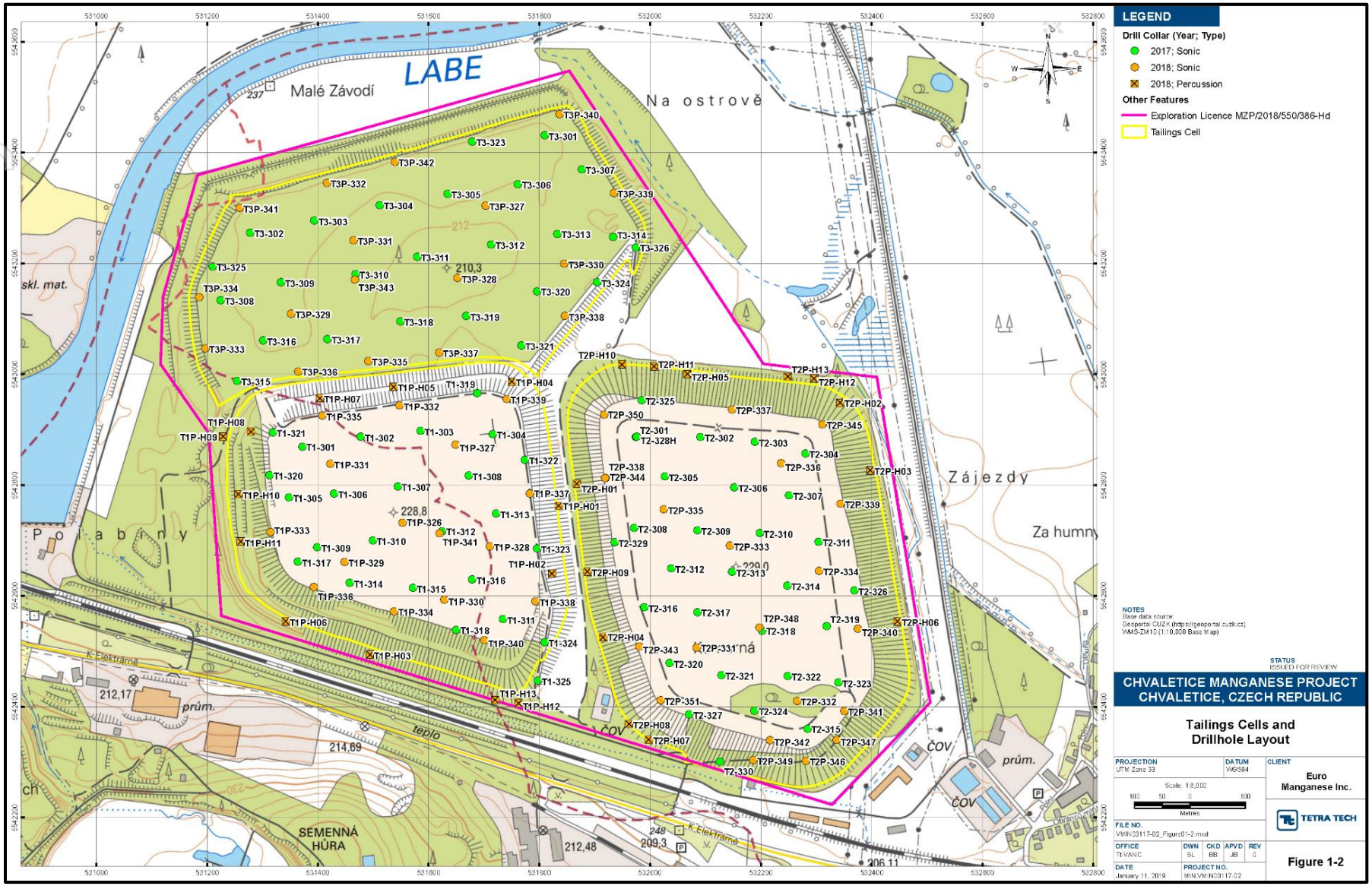

Figure 1-2: CMP Tailings Cells: 2017 and 2018 Drill Hole Layout

Source: Tetra Tech (2022)

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Adjacent to the tailings area, a 2.9 ha (28,957 m²) parcel has a pending municipal land acquisition agreement (signed May 11, 2019) with the Municipality of Trnávka on which the Company plans to construct a visual and acoustic barrier between Trnávka and the Chvaletice Manganese Project tailings as well as a utility corridor. The acquisition will be completed by the end of 2026 upon payment of the final installment.

The formal rezoning of 100% of the land underlying the tailings deposit area and commercial plant site is now complete, following approvals by both the Village of Trnávka and the Municipality of Chvaletice. Additionally, a land package totalling 7.2 ha located on the northern portion of the tailings area has been purchased from Helot (owned by the Vaněk family).

On June 6, 2022, Mangan signed a long-term lease agreement with the Municipality of Chvaletice for a total area of 26.6 ha (266,417 m²), which represents approximately 19% of the total land area required for the Project and approximately 15% of the total tailings area. In addition, Mangan holds an active land lease agreement with ČEZ, a.s. (signed October 30, 2023) covering 56.6 ha of land in the Trnávka area under a royalty-based model.

An aggregated parcel of land located immediately to the south and across the highway from the tailings deposit comprising a total 27.19 ha is proposed for development and construction of a high-purity manganese processing facility and related infrastructure. These land purchases and agreements include 19.94 ha of industrial-zoned land fully acquired through the purchase of EP Chvaletice s.r.o. (completed in December 2023), a 1.7 ha parcel of land purchased by EMN's Czech subsidiary (dated November 2017), a pending acquisition of a 5.0 ha parcel of land including a rail spur extension with MABA Prefa spol. s r.o. (successor to Správa nemovitostí Kirchdorfer CZ s.r.o.), a 0.2 ha section of land encompassing Rail Spur No. 1 purchased from Sev.en EC, a.s. (the owner of the Chvaletice power plant), and an active 30-year lease agreement for a 0.35 ha conveyor route option with KP Chvaletice s.r.o. (successor to Galmet Trade, spol. s r.o.). Mangan is also negotiating access for approximately 85.7 ha with Elektrárna Chvaletice a.s.

EMN had initiated planning and preparation of the CMP's permit application since 2016. The EIA Notification for the Project was published by the MoE in December 2020. The conclusions of the EIA screening procedure did not result in any unexpected requirements.

The Czech Ministry of Environment issued a favourable ESIA Statement for the Chvaletice Manganese Project in March 2024. Following this, the Project was designated as a Strategic Project under the European Union's Critical Raw Materials Act in March 2025, and a key construction permit for infrastructure relocation was obtained in May 2026.

1.3 History

Historical mining in the region dates back to approximately 677 AD through to medieval times according to records of iron (Fe) production from small local mines. Intermittent mining for iron in the region continued through until the mid-19th Century, when iron and manganese (Mn) minerals near Chvaletice were discovered. Systematic underground mining within the Chvaletice Mine produced manganese ore between the years 1915 and 1945. Thereafter, from 1951 to 1975, open pit mining and milling operations occurred for the recovery of pyrite as basic raw material for the production of sulphuric acid and gave rise to the three adjacent CMP tailings deposits. Conversion from underground to bulk tonnage open pit mining occurred during this period, during which time an estimated 32 Mt of material was mined for pyrite, with approximately 20 Mm^3 of waste rock deposited on the spoil heaps, and over 17 Mm^3 of flotation waste was placed into the unlined tailing ponds. These tailings ponds are the target of the CMP and are referred to as Cells #1, # 2, and #3. Mining, milling, and production of tailings material was terminated in 1975.

An extensive evaluation of the tailings material was conducted between April 1986 and July 1988 by Bateria Slany, the former Czechoslovakian, state-owned manufacturer of batteries, for the potential manufacture of electrolytic manganese dioxide (EMD). The results from their investigation included a "reserve calculation", currently registered as the "Řečany – Tailings Pond 3" and "Chvaletice – Tailings Ponds 1, 2" as a "State Reserve" with the Czech Republic Government.

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This historical calculation comprised 27,557,441 t of “reserves”, containing 25,496,299 t at a grade of 5.15% leachable manganese (7.06% total manganese [tMn]) at a “C2” category, and 2,061,143 t of material average grade of 4.97% of leachable manganese (7.39% tMn) at a “C1” category.

The definition of C2 and C1 categories references a system developed in the Union of Soviet Socialist Republics (USSR) for classification of mineral “resources” and “reserves”, where resources classified as C1 are supported in greater detail than those that are classified as C2. The Czech system differs significantly from the classification system defined under the CIM Terms and Definitions as referenced by NI 43-101 and cannot be misconstrued to imply a similar level of confidence. This historical calculation cannot be relied upon as being accurate, particularly since the raw data that served as the basis for these calculations has not been found by EMN, as it appears to have been lost or destroyed following the end of Communism in the Czech Republic.

Mangan acquired licences for the property and commenced preliminary studies and investigations in 2015.

1.4 Mineral Resources

Based on work conducted by EMN under the supervision of Tetra Tech, the three tailings cells are estimated to contain approximately 18.6 Mm^3 of material, with approximately 17.8 Mm^3 comprising silt and clay sized particulate tailings material. The remaining estimated 0.8 Mm^3 is native soils that were used for dam construction, erosion and dust control, and slope stabilization. Cell #1 averages approximately 26.6 m thick, with a surface area of approximately 326,400 m^2, and has a volume of approximately 6,720,300 m3. Cell #2 averages approximately 28.7 m thick, with a surface area of approximately 393,200 m^2, and has a volume of approximately 8,035,200 m^3. Cell #3 averages approximately 11 m thick, with a surface area of approximately 313,200 m^2, and has a volume of approximately 3,035,900 m^3.

EMN began recent exploration activity on the Property in 2014, when a series of near surface samples were collected from auger holes and test pits for preliminary materials characterization. In June 2017, EMN initiated an 80-hole sonic drilling campaign totaling 1,679.3 m within Cells #1, #2, and #3 to evaluate the mineral resource potential both horizontally and vertically through the full tailings profile, referred to as the 2017 Drilling Program. Drill hole spacing was approximately 100 m throughout each cell. The perimeter embankments of each cell were not safely accessible to the sonic drill rig and were not drilled. To verify the composition of the embankments, four additional drill holes were collared on access ramps. Each drill hole intersected a layer of topsoil with average thickness of approximately 1 m, manganese bearing tailings material, and terminated in native basal soils at elevations consistent with other drill holes. During the summer of 2018, EMN conducted a second campaign of drilling at the CMP with a total of 80 drill holes, totalling 1,509.5 m. The program included completion of 35 vertical and 19 inclined 100 mm diameter sonic holes, totalling 1,409.5 m. An additional 26 mobile percussion drill holes, totalling 100 m, were completed around the perimeter embankments of the tailings piles in areas that were not previously accessed for sampling. The tailings material observed, sampled, and analyzed was generally very consistent in terms of total and soluble manganese grade and mineralogy. There has been no additional drilling programs completed since 2018.

Information collected during these drilling investigations is available for the purposes of mineralogy, hydrological, geotechnical, metallurgical, environmental, and process engineering design.

Samples were collected on intervals ranging from 0.925 to 4.1 m with the majority of samples and average length representative of the 2 m core runs. Each sample was logged for lithology, moisture, particle size, wet mass, and recovery in the field. A total of 1,484 samples were split in the field longitudinally along the core. In 2017, a 25% sub-sample split of each sample was shipped to SGS Minerals Services (SGS) laboratories in Bor, Serbia, for analysis and testwork. The remaining 75% sub-sample was shipped to Changsha Research Institute of Mining and Metallurgy Co. Ltd. (CRIMM) in China, for bulk sample metallurgical and process testwork. In 2018, the sample was split with a 25% sub-sample collected for testwork in the Czech Republic, and the remaining 75% collected and stored in vacuum-sealed

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bags, which were then placed in steel barrels in a warehouse located near the CMP site, in order to remain fresh and unaltered, and available for future metallurgical and pilot plant testing.

A rigorous quality assurance (QA) and quality control (QC) program was implemented by EMN, which included use of field duplicates, lab duplicates, insertion of three certified reference materials (CRMs), and insertion of two certified blank materials. Drill hole twins completed in 2018 were used to verify the 2017 sample database. Quality control methods were reviewed by Tetra Tech's Competent Person (CP) James Barr, P.Geo. (Geology CP), during site visits to the Property. Following receipt of analytical results, Tetra Tech undertook compilation of the geological database, the verification of laboratory data, and the QA/QC program for data validation. The CP is satisfied that the sampling method and analytical integrity has been preserved throughout sample handling, preparation, and analytical process.

Analysis and testwork conducted on the samples, included:

- Multi-element assay using aqua regia (as proxy for soluble manganese, sMn) and four acid digestions
- Whole rock analysis using fusion x-ray fluorescence (XRF) for tMn concentrations
- Particle size analysis using laser diffraction and sieve/hydrometer methods
- Mass measurements
- Moisture measurements
- Specific gravity measurements

EMN conducted a preliminary in situ dry bulk density investigation in advance of the 2017 drilling program using a cylinder test method from near surface samples. This work was followed by an in-depth calculation of in situ dry bulk density using core recovery volumes and dry mass using SGS laboratory measurements following both the 2017 and 2018 drilling investigations. Calculated in situ dry bulk density values for individual samples ranged between 0.35 and 3.154 t/m^3, with a 95% probability interval of 0.87 to 2.01 t/m^3, and average value of 1.49 t/m^3 ±0.017 t/m^3.

Extraction of a small bulk sample from an excavation in the eastern portion of Cell 3 was conducted across several campaigns since 2018 to provide feed material for the Pilot Demonstration Plant (DP). The excavation totalled approximately 413 m^3 of which 163.2 m^3, after loss from oversize screening and discard of organics, was transported and stockpiled at the DP. A total of 57 m^3 of the stockpile was processed in the DP. Aqua Regia ICP-AES analysis of this small and localized volume of material corresponds well with the element concentrations interpolated in the block model from drilling samples.

Manganese is primarily hosted in carbonate minerals with lesser amounts as silicate and oxide minerals, as identified by x-ray diffraction (XRD). Mineralogical studies have been completed by EMN in 2015 and reported by AMEC in their initial investigation in 2016 (AMEC 2016), and by CRIMM in 2017. The combined work identified that 80% of the manganese occurs as carbonate and 19% of the manganese occurred as silicate. The primary manganese carbonate is rhodochrosite ($MnCO_3$), with lesser amounts of manganese bearing carbonates having variable proportions of iron, calcium (Ca), and magnesium (Mg) with carbonate to form a wide variety of minerals from the rhodochrosite (Mn)-siderite(Fe)-dolomite(Mg)-calcite(Ca) spectrum. Scanning electron microscopy (SEM) investigation work identified a rare and locally named mineral kutnohorite ($Ca(Mn^{2+}, Mg, Fe^{2+})(CO_3)_2$) found with in this spectrum and identified as a significant manganese bearing carbonate. Manganese bearing silicates include spessartine ($Mn_3Al_2(SiO_4)_3$), rhodonite ($(Mn, Fe, Mg, Ca)SiO_3$), and trace concentrations of sursassite ($Mn_2^{2+}Al_3(SiO_4)(Si_2O_7)(OH)_3$). Trace amounts of the manganese oxide pyrolusite (MnO_2) were also detected. Predominant gangue minerals are quartz, albite, muscovite, pyrite, and apatite.

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Total sulphur concentration in the tailings averages approximately 3.4%, which is sourced form sulphide, sulphate, and organic sulphur origin. Total carbon concentrations average approximately 3.5%, which includes contributions from graphite, organic carbon, and carbonate origins. Figure 1-3 shows photos of core recovered from drill hole T1 312, near the core of Cell #1.

Figure 1-3: Core Photos from Drill Hole T1-312, from Depths 3 to 4 m, 9 to 10 m, and 23 to 25 m

Source: Tetra Tech (2022)

1.4.1 Mineral Resource Estimate

A three-dimensional model was created for Cells #1, #2, and #3 using a digital topographic model (DTM) compiled by GET using data from the 5th generation digital elevation model (DEM) 5G developed by the Land Survey Office in Prague from light detection and ranging (LiDAR) data in the System Jednotne Trigonometricke Site Katastralni (S-JTSK) (Krovak East North) coordinate system and the Baltic Vertical Datum (BPV). The topography has been used to constrain volume estimates for each cell.

Lithology logs were used to construct an upper contacting surface between tailings and topsoil, then used to construct a lower contact surface between tailings and native subsoil. The intervening volume defined the volume of tailings material in each cell and was used to constrain all laboratory analysis and testwork data that was subsequently used to model various physical and chemical attributes of the tailings material.

Data was analyzed in Phinar X10-Geo v.1.4.15.8, Snowden Supervisor v8.9.0.2 and Seequent Leapfrog® Geo v.4.4.2, and models were developed using Seequent Leapfrog® Geo v.4.4.2. All sample data was composited to 2 m, and each cell was modelled separately. No capping was applied to manganese grades as no outliers were identified on the normally distributed data.

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Interpolated block models were developed for physical parameters including grain size, in situ dry bulk density, and moisture content, as well as an additional 18 elements including manganese and magnesium. Grain size was represented using D50, D80, D90, which are the average diameter of the particles at the 50th, 80th, and 90th percentiles within the sample, respectively, and using P75, which is the percentage of the sample that passes a standard 200 mesh, equivalent to a 75 µm nominal mesh. The model results show that particle size transitions from coarse to fine inwards in each of the cells. Average P75 for each cell ranged from 66.48 to 71.29%, indicating that the bulk of the material is silt size or smaller. In situ dry bulk density varies throughout each cell and is a function of the composite mineral densities in addition to the degree of compaction in the soils. Modelled in situ dry bulk density values ranged from 1.10 to 2.15 t/m3, with an overall average of 1.51 t/m3. Moisture content measured from each sample ranges from approximately 1.2 to 39.3% and averaged 21.14% overall. As with particle size distributions, moisture shows a strong zonation towards the center of each cell where the material was observed to be saturated with above average moisture contents.

Element concentrations, including total and soluble manganese and magnesium were interpolated using inverse distance (cubed) (ID3) interpolation method into a sub-block model with 50 m by 50 m by 4 m parent blocks, and 12.5 m by 12.5 m by 2 m sub-blocks. The dry in situ bulk density model was applied to the sub-block model to calculate block tonnages. The block model was classified and validated by the Geology CP, using guidelines set forth by NI 43-101 and CIM Best Practices. The Mineral Resource Estimate (MRE) was classified as Measured and Indicated based on sample spacing and variance assessment. Table 1 1 lists the MREs that have an effective date of April 27, 2026. This MRE supersedes the previous MRE with effective date of July 01, 2022.

Table 1-1: Mineral Resource Estimate for the Chvaletice Manganese Project, Effective April 27, 2026

Cell	Class	Volume ('000 m^3)	Tonnage (kt)	In Situ Dry Bulk Density (t/m^3)	tMn (%)	sMn (%)	Mg (%)
#1	Measured	6,577	10,029	1.52	7.95	6.49	0.95
	Indicated	160	236	1.47	8.35	6.67	1.09
#2	Measured	7,990	12,201	1.53	6.79	5.42	1.11
	Indicated	123	189	1.55	7.22	5.30	1.27
#3	Measured	2,942	4,265	1.45	7.35	5.63	0.96
	Indicated	27	39	1.45	7.90	5.89	0.95
Total	**Measured**	**17,509**	**26,496**	**1.51**	**7.32**	**5.86**	**1.02**
	Indicated	**309**	**464**	**1.50**	**7.85**	**6.05**	**1.15**
Combined	**M&I**	**17,818**	**26,960**	**1.51**	**7.33**	**5.86**	**1.15**

Notes:

- Estimated in accordance with the CIM Definition Standards on Mineral Resources and Mineral Reserves adopted by CIM council, as amended, which are materially identical to the JORC Code.
- The Mineral Resource has been classified as Indicated and Measured Resources based on the level of confidence in the deposit and estimation. Indicated Resources have lower confidence than Measured Resources. Mineral Resources that are not Mineral Reserves do not by definition have demonstrated economic viability. No Mineral Reserves have been defined for the CMP.
- The Chvaletice Mineral Resource is a reasonable prospect for eventual economic extraction. The Mineral Resource has been estimated with Mn as the primary commodity and Mg as a by-product. A break-even grade of 3.78% total Mn has been estimated for the Chvaletice deposit based on preliminary pre-concentration, leaching, and refining operating cost estimates of US$124.93/t feed, total recovery to HPEMM and HPMSM of approximately 46.3% and 44.9%, respectively, and a combined price derived using commodity prices of USD $9.60/kg for HPEMM and USD $2.75/kg for HPMSM (Marketeye Report, April 2026). $MgCO_3$ is produced as a raw product in the processing of HPMSM and would otherwise be discarded. This by-product is presented as total insitu concentration, and has been assessed as being a reasonable prospect for eventual economic extraction based on preliminary and approximate estimated market value for $MgCO_3$ of USD $800/t, process recovery of 45%, and an additional treatment cost of USD $1.00/t feed. The actual commodity price and recovery for these products may vary.

- A cut-off grade has not been applied to the block model and entire volume of the tailings is reported in the Mineral Resource statement. The estimated break-even cut-off grade falls below the grade of most of the blocks (excluding 46,613 tonnes, which have grades less than 3.78% total Mn). It is assumed that material segregation will not be possible during extraction due to inherent difficulty of grade control and selective mining for this deposit type.
- Grade capping has not been applied.
- Numbers may not add exactly due to rounding.
- While the CP is not aware of issues related to environmental, permitting, legal, title, taxation, sociopolitical, marketing, or other relevant issues that may materially affect the estimation of Mineral Resources.

1.5 Mineral Processing and Metallurgical Testing

Starting in 1986, several metallurgical test programs have been carried out to assess metallurgical responses of recovering manganese from the tailings materials that originated from pyrite mining conducted from 1951 to 1975. During 2015, 2017, 2018, and 2019 to 2021, EMN undertook further manganese recovery test programs, including semi-continuous pilot plant testing. The testwork conducted before early 2017 has been discussed in the report titled *Public Report and Mineral Resource Estimate for the Chvaletice Manganese Project, Chvaletice, Czech Republic*, released on June 21, 2018 (Tetra Tech 2018).

A comprehensive test program has been conducted since September 2017 using a total of 743 drilling core interval samples from the 2017 drill program. The main objectives of the test program are to verify the previous test findings and develop and optimize the process flowsheet and conditions to produce HPEMM. A separate testwork program was conducted in 2018 to investigate the generation of HPMSM from the magnetic separation concentrate and from the EMM flakes.

During 2019 and 2021, BGRIMM General Research Institute for Mining and Metallurgy (BGRIMM) conducted a further test program mainly focusing on verifying the previous test results generated from the 2017-2018 test program by CRIMM. The BGRIMM testwork also had potential equipment suppliers to conduct dewatering and magnetic separation testing. BGRIMM's testwork also investigated two types of the reagents sourced from European's suppliers.

In 2021, Jenike & Johanson (Jenike) conducted material handling tests on the raw tailings sample and non-magnetic tailings (NMT)/leach residue (LR) blended samples produced by BGRIMM.

The testwork conducted before early 2022 has been discussed in the report titled *Public Report and Feasibility Study for the Chvaletice Manganese Project, Czech Republic,* released on September 9, 2022 (Tetra Tech 2022).

Following completion of the Feasibility Study in 2022, bulk tailings material was excavated from Cell 3 and transported to the Chvaletice Demonstration Plant for processing and operational testing. The excavation campaigns provided feed material for demonstration-scale verification of the proposed process flowsheet and generated additional information on material characteristics, handling, and metallurgical performance.

In 2026, BGRIMM conducted additional tests to assess the solubility of two residue samples generated during the Demonstration Plant electrowinning tests: material collected from the electrowinning anodes and sludge collected from the bottom of the electrowinning cell. Both the samples were treated using sulphur dioxide (SO_2) reduction leaching to evaluate manganese recoverability. The test results indicate that both the materials respond well to the reduction leaching. More than 98% of manganese in the anode residual materials from the Demonstration Plant can be leached by using sulphur dioxide reduction treatment.

1.6 Mineral Reserve Estimate

There are no mineral reserves estimated for the Project.

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1.7 Tailings Extraction Methods

The CMP mine plan is designed to produce approximately 3,000 t/day of tailings feed over a 26-year project life. The mine plan is based on truck and shovel equipment extracting the tailings in benches from the three tailings cells. The mine design criteria was based on the project and regulatory requirements. The tailings will be extracted at a rate that allows the residue to be placed within the existing footprint. A main haul road between the tailings cells to a plant feed storage area will provide access to all cells and temporary haul ramps will be developed in each cell as they advance. No drilling or blasting will be required to mine the cells.

Tailings are extracted from the cells and transported by truck to the raw tailings receiving area, where they are unloaded into a tailings dumping pocket and conveyed to the tailings storage stockpile in the plant feed and tailings storage and pulping building and then processed to recover manganese and magnesium. The process plant produces NMT and LR as a waste product. This residue is collected from the process plant and conveyed to the NMT/LR temporary storage area within the plant feed and tailings storage and pulping building. The NMT/LR will then be transported by truck back to the tailings cell area. The NMT/LR blend residue is deposited in the original footprint of the tailings cells, in the area that has already been mined out. Once the trucks have unloaded the residue material, they return to the active mining bench to collect raw tailings material to return to the plant feed and tailings storage and pulping building again in a continuous cycle. As shown in Figure 1-4 the tailings extraction will start from Cell #3, followed by Cell #1 and Cell #2 sequentially. The primary drivers of the production schedule are mining the tailings to meet the plant production targets and advancement of the toe of the tailings material to allow storage capacity for the NMT/LR placement. Topsoil growth on the cells will be removed prior to mining the tailings. Mining the tailings cells of the CMP will be completed during two 8-hour shifts, weekdays, in daylight hours to minimize community disturbance. Mining operations will be done 250 days a year, 5 days a week, excluding holidays. The pre-production requirements of the Project are minimal given the absence of significant topsoil that will need to be stripped on an annual basis. Passive depressurization of the tailings cells from the cut slopes of the mining benches will allow mining equipment to operate on the benches without active dewatering during operations.

The amount of equipment required to meet the scheduled tonnages is calculated based on the mine and residue schedules, equipment availabilities, usages, and hauling and loading times for the equipment. Selected mine equipment can be sourced and maintained in close proximity to the Project. On-site infrastructure includes a truck maintenance workshop, fuel station, truck washing facility, and temporary storage areas for tailings and residue.

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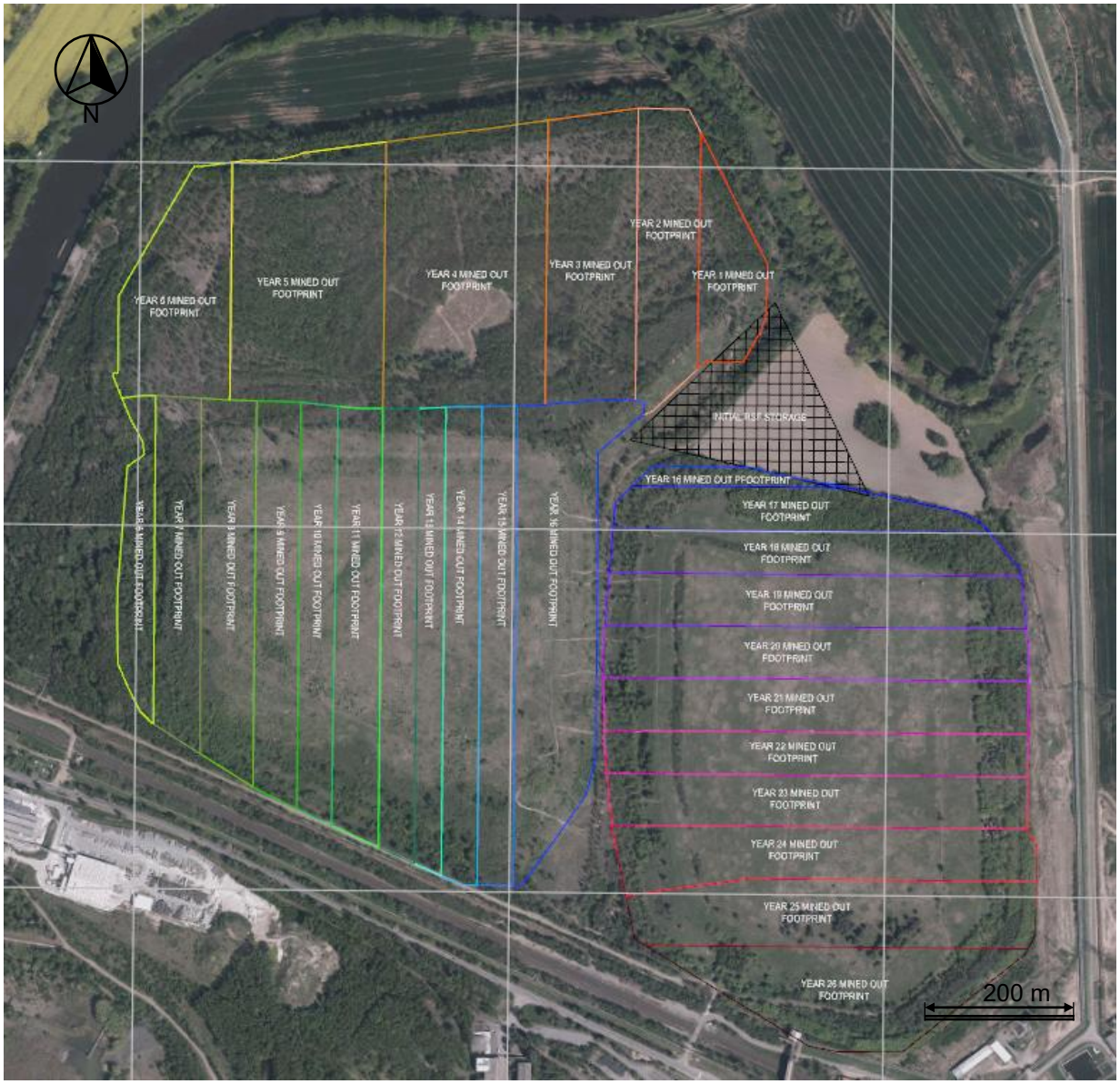

Figure 1-4: Selected Extraction Sequence for the CMP Tailings

Source: Tetra Tech (2026)

1.8 Recovery Methods

The CMP process plant is designed to have a 26-year project life at a nominal production rate of 150,000 t/a of HPMSM, by extracting approximately 1.1 Mt/a of the CMP tailings. This PEA study is based on HPMSM as the final product, and the HPMSM production will start at approximately 50% of the nominal rate (approximately 75,000 t/a) in the initial years (Year 1 to Year 3). The CMP HPMSM product will be designed to contain no less than 99.9% manganese sulphate monohydrate (MSM), a minimum of 32.34% manganese, and will be sold in powder form, produced without the use of fluorine. Figure 1-5 shows the proposed process flowsheet.

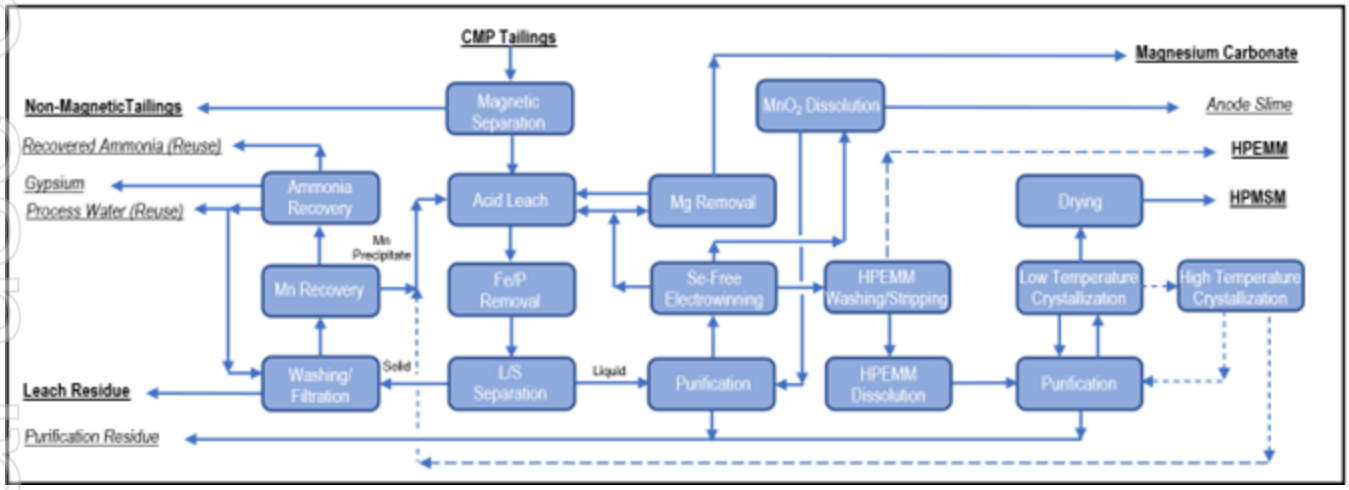

Figure 1-5: Simplified Process Flowsheet

Source: Tetra Tech (2026)

Excavated tailings will be pulped and pumped via a pipeline carried by an overhead bridge that will cross Highway #322, the rail line, and related rail spur that adjoins to the proposed process plant site located south of the CMP tailings cells.

The tailings slurry will be beneficiated in a wet, high-intensity magnetic separation circuit that will upgrade the manganese grade of the leach feed to approximately 15% tMn and, on average, reject approximately 57% of the feed to NMT, with an expected 86% manganese recovery. The magnetic concentrate and NMT produced will be dewatered using thickeners and filters. The concentrate will be fed to the downstream leach process and the dewatered tailings, together with the washed leach residue, will be dry stacked at the residue storage facility (RSF).

The magnetic concentrate cake will be re-pulped using anolyte solution from the electrowinning tank house and leached, together with recovered manganese carbonate from process solutions, using sulphuric acid at 90°C for approximately six hours. Neutralization of the slurry will be achieved using hydrated lime. Air sparging of the neutralized slurry will be used to cost-effectively co-precipitate the substantial quantities of impurities that leach with the manganese. The leach pulp will be filtered in automatic pressure filters to separate the pregnant leach solution from the LR.

The leach residue will then be repulped with the washing water from the downstream filter cake washing process. The slurry will be then dewatered using pressure filtration equipped multi-stage onstream washing using process water. The washed LR filter will be blended with the NMT filter cake and conveyed to the tailings extraction site prior to co-disposal in a lined dry stack tailings storage facility that will be progressively constructed in excavated areas of the CMP tailings cells.

The wash water from the leach residue washing circuit will be treated for manganese and ammonia recovery in order to minimize manganese and ammonia losses. The wash water recovery system will recover manganese units to the leaching circuit in the form of manganese carbonate. The spent wash water solution will be subsequently treated to

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recover ammonia using a conventional lime boil process and will produce a gypsum by-product, the potential value of which is not included in the CMP economics. The recovered ammonia will be re-used in the HPEMM production circuits. The inclusion of the leach residue washing circuit, with its associated wash water recovery circuit, is expected to be a world-leading industry practice for the hydrometallurgical processing of manganese ores. Returning washed tailings to the carefully prepared containment cells in the excavated areas of the CMP tailings progressively remediates the environmental impact risks of legacy mining operations.

The pregnant solution from the leaching circuit will be purified to remove heavy metals and other impurities and stabilized to prevent uncontrolled crystallization of salts to produce a qualified solution for the downstream electrowinning process.

Electrowinning will be conducted in electrowinning cells following the addition of ammonium bisulphite (NH_4HSO_3) as sulphur dioxide (SO_2) source to the tank house feed solution. The tank house would have the capacity to produce 50,000 t/a HPEMM using an energy-efficient and selenium-free process. The proposed electrowinning circuit is designed to have a plating cycle of 24 hours at a cell voltage of 4.2 to 4.4 V and an average cathode-current density of 320 to 370 A/m^2. Cathodes will be harvested using automatic harvesting machines, washed, and stripped of electrodeposited manganese metal using industry-standard automatic cathode plate stripping machines. The design of the CMP tank house includes comprehensive mist emission control and mechanical handling systems that minimize manual handling of cathodes and other processes. Tank house system design features include anode sludge handling, as well as diaphragm cleaning and ongoing cell maintenance operations. The HPEMM flakes would then be used as feed for HPMSM production.

A magnesium removal process has been incorporated into the process plant design to ensure efficient electrowinning operations and high-quality products. The magnesium removal process will maintain the magnesium concentration in the electrowinning solutions at a level that prevents uncontrolled precipitation of salts and scaling. The rejected magnesium as magnesium carbonate ($MgCO_3$) will be filtered. The filter cakes will be washed, dried, and bagged for sale to local consumers.

The PEA production plan proposes to dissolve approximately all the HPEMM flakes using sulphuric acid to produce approximately 150,000 t/a of HPMSM powder in a chemical processing facility. The dissolved HPMSM solution will be further purified to remove trace impurities carried by the HPEMM flakes. The purified mother solution will be concentrated using an energy-efficient, low-temperature mechanical vapour recompression (MVR) crystallization process to generate a single specification of manganese sulphate monohydrate crystals. A portion of the spent mother solution is further crystalized by a high-temperature crystallization unit to reject sodium, potassium, and other light metals that accumulate during the heavy metal removal purification and the low temperature evaporation crystallization processes. The spent solution with elevated sodium, potassium, and other impurities from the high temperature crystallization will be recycled back to the magnetic concentrate leaching circuit. The HPMSM crystals will be separated from the saturated MVR crystal slurry using centrifuges. The dewatered crystals will be dried using disc type dryers to produce the final HPMSM powder, while the spent mother solution will return to the mother solution purification circuit or to the crystallization circuit. The dried HPMSM powder product will be packed prior to being shipped in trucks or containers to customers, which will be mainly located in European countries and USA. Table 1-2 summarizes projected manganese product production and metal recovery for the CMP.

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Table 1-2: Projected Manganese Product Production and Metal Recovery

Year	Tailings Reprocessed	Plant Feed Grade		HPMSM Produced	Mn Recovery	$MgCO_3$ Produced	Mg Recovery
	kt	% tMn	% Mg	kt	% tMn	kt	% Mg
1 to 3 Average	485	7.54	0.92	66.7	59.2	7.1	45.0
4 to 6 Average	1,081	7.45	0.98	149.8	60.4	17.2	46.0
7 to 26 Average	1,113	7.26	1.20	150.1	60.0	21.6	46.0
4 to 25 Average	1,037	7.32	1.15	140.5	60.0	19.4	46.0
Total	**26,960**	**7.32**	**1.15**	**3,651.9**	**60.0**	**505.7**	**46.0**

1.9 Project Infrastructure

1.9.1 General Infrastructure

The CMP is a brownfield project immediately adjacent to existing infrastructure which includes an 820 MW coal-fired power station operated by Severní Energetická a.s. (Sev.en), a pre-cast concrete plant operated by TIBA Chvaletice s.r.o., a main railway, and railway spur lines. A new cast iron foundry by KASI spol.s r.o. and a new asphalt plant by Obalovna Chvaletice a.s., immediately adjacent to the proposed CMP plant site, were recently constructed. Highway #322 connects to Prague, 89 km away by road, via Kolin and Highway #12. The railway acts as a main transportation line from Prague to communities in the Eastern Czech Republic. The proposed location for the high-purity manganese production plant is located at the same site of the former flotation plant that produced the CMP tailings.

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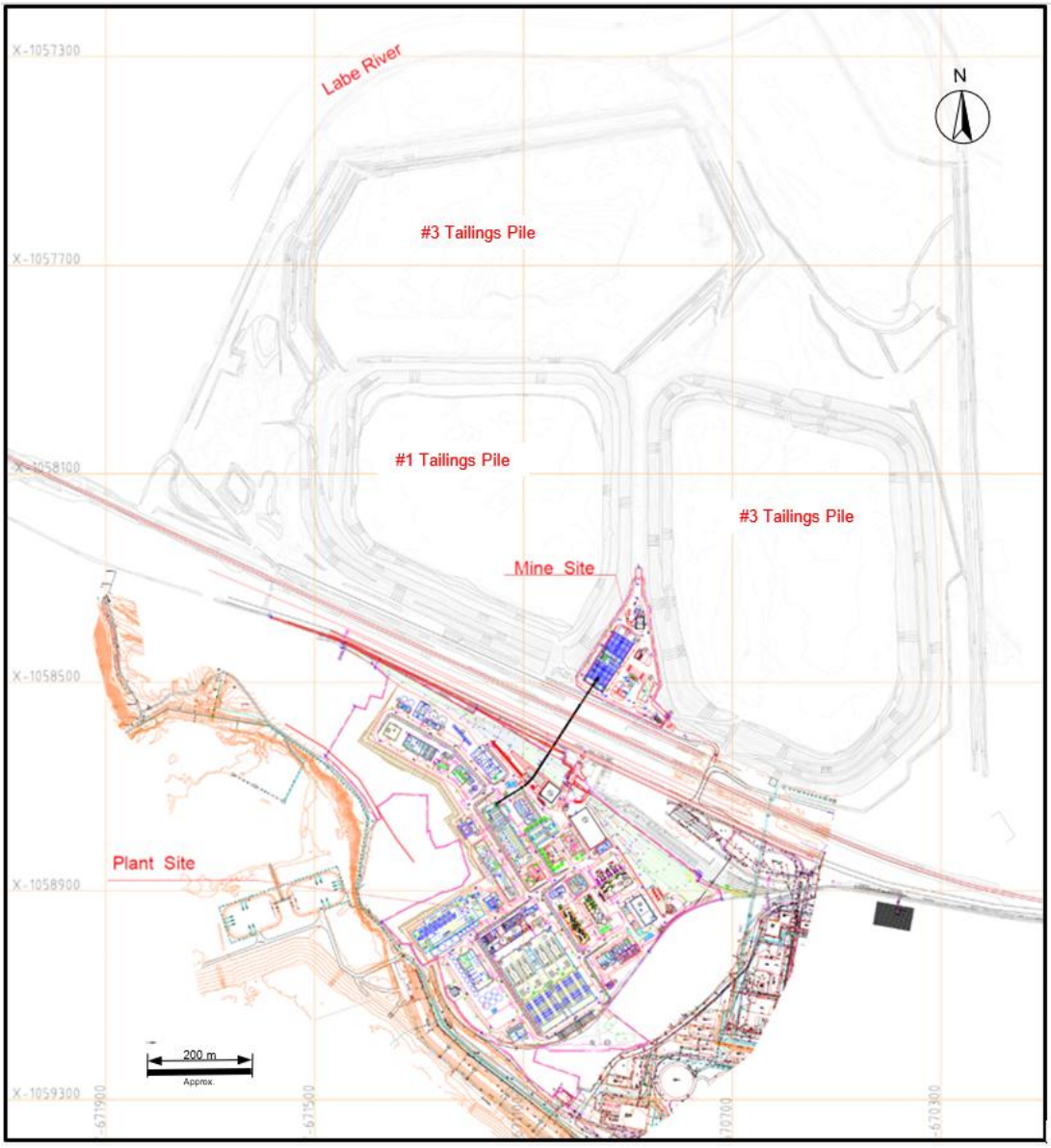

Figure 1-6: CMP Project Site Layout

Source: Tractebel + BGRIMM (2026)

There will be two separate operation sites for the CMP (Figure 1-6). The tailings extraction and reclamation area will be located at the existing CMP tailings site and the process plant will be located immediately south of Highway #322. New infrastructure will be built to service the CMP, including:

- Existing CMP tailings site: CMP tailings excavation and handling facility, including mobile fleet maintenance workshop and office complex, fuel station, sewage treatment plant, the tailings pulping facility, and temporary storage facilities for the plant feed and dewatered NMT/LR for dry stacking on a lined RSF. The NMT/LR blend will be conveyed to the temporary storage area and trucked to the excavated CMP tailings area, which will be lined with a geomembrane liner, including basal sand layer for protection, and drainage of the filtered residue stack.
- South and north site connection bridge (conveyor gallery), which will service the tailings slurry transport from the north site to the south site and the NMT/LR mixture transport by a tube conveyor from the south site to the NMT/LR

temporary storage area at the north site. The bridge will also provide other services, such as power lines and water lines.

- Process plant site: Main process facilities, as shown in the layout in Figure 1-7, will be located at the site, including:
  - Magnetic separation facility, including NMT dewatering circuit
  - Magnetic concentrate dewatering and concentrate re-pulping facility
  - Concentrate sulphuric acid leaching and iron and phosphorus removal facility, including residual manganese recovery (from washing water solution)
  - Leach residue washing and residue dewatering facility
  - Ammonia recovery facility
  - Magnesium removal facility
  - Pregnant solution purification facility
  - HPEMM electrowinning, plate cleaning, stripping, packing, and storage facility
  - HPMSM production facilities, including HPEMM dissolution, solution purification, crystallization, HPMSM crystal dewatering and drying, and product handling facilities
  - Central control system

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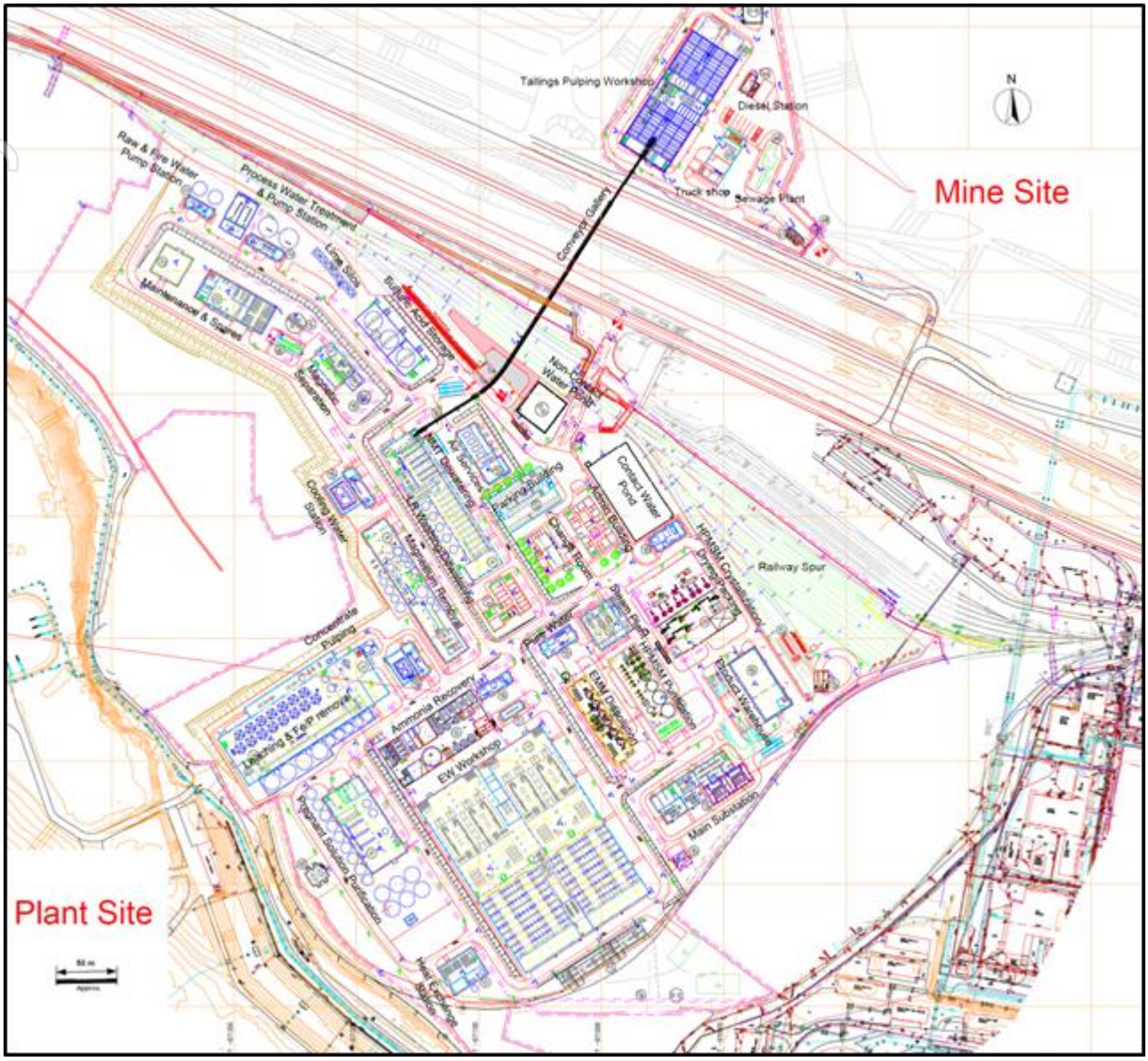

Figure 1-7: Preliminary Process Plant Site Layout

Source: Tractebel + BGRIMM (2026)

There will also be other service infrastructure located at the process plant site, including:

- Two 400 kV/37.5 kV/10 kV step-down substation systems; four 350 V/36 kA rectifier transformers and various local step-down transformers
- Process equipment maintenance workshop, spare part and maintenance supply warehouses, and cold storage facilities
- Water supply and management system, including run-off water collection and treatment, cooling water systems, and process water treatment facilities, and a fire water system
- Assay and metallurgical test laboratories for operation supporting and QA/QC control
- General management office

- Change rooms and dining facility
- Commercial truck and private car parking areas
- Upgraded rail spur system and related loading and unloading facilities, including sulphuric acid storage tanks, lime silos, and sea container storage yards
- Insite road network, servicing overall site facilities
- Waste storage and management facility, including anode sludge storage and other waste material temporary storages prior to being shipped offsite for recycling or disposal
- Three-level parking building and other commercial truck and private car parking areas

Local electrical power is supplied by the Czech electrical grid. There is an 820 MW power coal-fired station which provides the regional power supply to many local communities. The station is a key node in the Czech electrical grid. The estimated power demand of the CMP is approximately 80 MVA. Incoming power will come from the Czech 400 kV electrical grid. The power will feed to two 400 kV/37.5 kV/10 kV step-down substation systems for alternative current power supply and four 350 V/36 kA rectifier transformers for direct current supply. The local step-down transformers feeding the main plant overhead power distribution system will deliver energy throughout the process plant site and tailings excavation site.

The water supply system will consist of process make-up water, cooling circulation water, potable water, and fire water supply systems. The pore water from the existing CMP tailings will be as part of the process make-up water. All the process water used in the process circuits will be directly re-used or treated and re-used as process make-up water, which will be supplemented from blowdown water (green water) from the adjacent Sev.en power plant. In addition, demineralized water for steam generation and hot water (130°C) for process heating and building heating will be also sourced from the power plant.

There are two water management systems at both the north and south sites, one for contact water and one for non-contact water. The surface water management is further discussed in Section 18.

Potable water will be supplied from local water service system.

The steam used for the CMP will be generated from an on-site steam plant fired by the hydrogen gas recovered from the HPEMM dissolution circuit with supplement of natural gas from the local natural gas network immediately adjacent to the project site. Steam will mainly be used for ammonia recovery and HPMSM production circuits.

Compressed air servicing various process circuits, mainly for iron/phosphorus removal circuit and filtration circuits, maintenances, and instrumentation systems, will be supplied from a central compressed air station with supplement by various local compressor stations.

1.9.2 Residue Storage Facility

The residue storage facility (RSF) design involves placement of filtered NMT/LR in an engineered and geomembrane-lined containment area constructed within the same footprint as the existing CMP tailings piles. The prepared RSF foundation will incorporate perimeter surface water diversion and a geomembrane liner for contact water collection from the filtered residue stack. The facility will be constructed in stages to suit residue storage requirements. Progressive cover placement/reclamation will be undertaken during the operational life where possible. The design was developed based on project requirements and technical assessment undertaken as part of the previous study that included geotechnical and hydrogeological site investigation, and geotechnical and geochemical laboratory characterization of the proposed residue.

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1.9.3 Site Wide Water Management Plan

All the water within the plant site will be managed to mitigate potential contamination of the surface and seepage water. Water management for the raw tailings site and the plant site will follow basic principals of keeping clean water clean and managing surface water flows using conveyances, such as collection ditches, ponds and surge tanks, reducing surficial inflow from neighboring properties, and the use of liners to reduce infiltration into groundwater. The proposed water management strategy schematic for the CMP project is shown in Figure 1-8.

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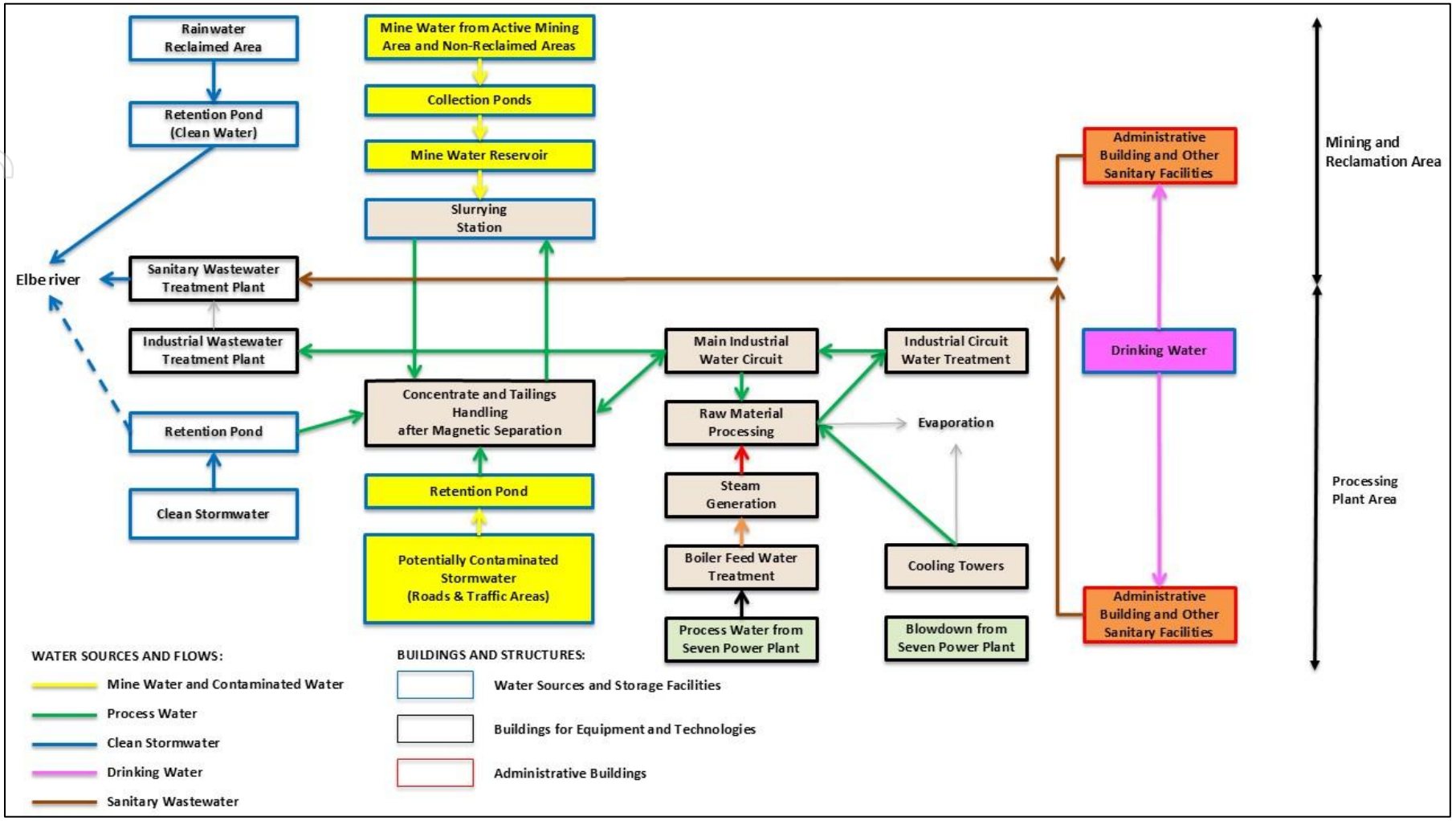

Figure 1-8: Surface Water Management Concept for the Chvaletice Manganese Project Site

Source: ESIA (2024)

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1.9.3.1 Mine Site Water Management

The surface and groundwater drainage from the existing Chvaletice mine area currently enters the natural environment as seepage to groundwater and as runoff to the Labe River.

During the mining activity period, the contact runoff and seepage from the active mining area and the RSF will be collected through collection ditches and then routed into a collection pond and surge tanks at the mine site. The water will be used as process makeup water for the raw tailings pulping process. Flows from any storm event exceeding the capacity of this contact water storage (up to 1:200 year storm event) will be diverted towards the main contact water collection pond in the plant site. The water in the collection pond at the plant site will be treated and then either used as process makeup water or discharged to the environment. The collection ponds and ditches will be lined to control seepage. The seepage from the reclaimed RSF is expected to reduce to a relatively insignificant volume a few years following the completion of installation of the final reclamation cover. Until then and through closure phase, the collected contact water shall be monitored and treated as required prior to being discharged to the environment. The quality of the water that will be discharged into the surrounding environment, including Labe River, is expected to be improved through time as mine contact water is collected and managed.

All the non-contact water will be collected and directed to the non-contact water surge ponds from where the water will be released to the environment at a controlled rate.

1.9.3.2 Plant Site Water Management

The proposed process plant will be constructed south of the mine site within an existing industrial park. All the water within the plant site will be managed to mitigate potential contamination of the surface and seepage water.

The contact water from the site will first be collected and directed to a contact water control pond located at the north edge of the plant site. All ditches and the contact water pond that are used to manage contact water will be lined to mitigate seepage. The collected contact water from the site will be treated and used as process makeup water or discharged into the environment if its quality has met the environmental discharge requirement. Non-contact run-off water from outside of the process plant site will be diverted to the environment. All the non-contact water, including the water from building roofs, will be collected and directed to the site stormwater control pond prior to being released to the environment at a controlled rate or being used as a makeup water source for process use.

1.9.3.3 Sitewide Water Balance

A sitewide water balance analysis for the CMP was based on the balance among the inflows, outflows, and storages associated to the system evaluated at the 2024 ESIA. The water used to estimate includes:

- The amount of contact water available for process use from both the mine and plant site areas
- The makeup water requirement from various sources
- Annual discharge rates from the stormwater ponds to the Labe River

The overall water flow chart is shown in Figure 1-8.

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1.10 Environmental Studies, Permitting, and Social or Community Impact

The CMP entails the reprocessing of mine tailings deposited in close proximity to several communities, farms, light and heavy industrial operations, recreation areas, forested and rural fauna, and flora habitats, as well the Labe River. The tailings cells and proposed process plant area are brownfield sites that have been significantly impacted by past industrial activities. The tailings have been placed directly on former farm fields in the alluvial plain of the Labe Valley without any underlying containment or lining system. These tailings have been leaching metals and minerals into the underlying sediments and aquifer for decades and continue to do so. The proposed plant site contains numerous buildings and infrastructure in various states of disrepair, from when the site was used for the production of sulphuric acid, dating back to 1951-1975. Numerous buildings on this site continue to be occupied by small, light industrial businesses. Mining activity at CMP ended in 1975. Czech law exempts land owners and developers from impacts prior to 1989, when communism ended in the then Czechoslovakia.

Mangan started environmental and social baseline programs for the CMP since the summer of 2016 together with work in support of an EIA Notification. Baseline data and estimated emissions based on the previous studies, including air quality, noise, hydrology, hydrogeology, fisheries and aquatics, ecosystems, vegetation and soils, wildlife and wildlife habitat, and socio-economics were investigated. Local features of interest were identified and recorded, including sensitive and protected areas, vegetation, landscape elements, and areas or sites of historical, cultural, archaeological, or geological importance. Climate, air, water, soil, natural resources, fauna, flora, and ecosystems, landscape, and population of the area were inventoried.

An Environmental Social Impact Assessment (ESIA) was developed and approved on March 27, 2024. The ESIA includes a detailed description of the following:

- The manganese production process and resulting environmental footprint of the Project
- Results of baseline and other studies conducted to date
- Health, safety, and environmental management plans
- Impact assessment, impact mitigation, and avoidance plans/measures
- Socio-economic impacts on local communities
- Reclamation plans/objectives
- Acoustic and dispersion modelling results

1.11 Project Execution Plan

According to the PEA plan, the project will be constructed in two phases: Phase 1 to produce 75,000 t/a HPMSM, starting from Year 2032 and Phase 2 to expand the HPMSM production capacity to 150,000 t/a in Year 4 (2035). The overall project production life is estimated to be 26 years. In order to achieve a commencement of commercial production by Q1, 2032, an aggressive front-end initiative must be established. The project should further assess the project feasibility and then transition to EPCM in the second quarter of 2027. A Level 1 Project Development Schedule was prepared for this PEA in order to outline the overall timeline and key constraints. The critical path of the project currently falls through the FS update, detailed engineering, construction, and commissioning phases. Construction duration of 30 months has been advised due to the small and restricted plant site working area, process complexity, careful interface required with the local community, and labour work hour restrictions in the Czech Republic.

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1.12 Logistics

No logistics study has been conducted for this PEA study. It is expected that the equipment and construction materials would be sourced worldwide, especially process equipment which may be mainly sourced from eastern Asia. The equipment and construction material shipment and transport plan are expected to be similar to the 2022 study (Tetra Tech, 2022). It is recommended that a combination of road, rail, and ocean transportation should be considered and further investigated.

1.13 Capital and Operating Cost Estimates

1.13.1 Capital Cost Estimate

The total estimated initial capital cost for the design, construction, installation, and commissioning of the CMP is USD $825.2 million, including initial capital costs for Phase 1 and Phase 2 to expand the HPMSM production rate to 150,000 t/a. Table 1-3 shows a summary breakdown of the initial capital cost. This total includes all direct costs, indirect costs, Owner's costs, and contingency.

The capital cost estimate produced for the CMP is classified as a Class 5 for the PEA with an expected accuracy of -35% to +35% according to the American Association of Cost Engineering (AACE). All costs are shown in United States Dollars (USD) unless otherwise specified.

Table 1-3: Initial Capital Cost Summary

Area		Cost (Phase 1) (USD$ million)	Cost (Phase 2) (USD$ million)	Cost (Total) (USD$ million)
Direct Costs				
10	Overall Site	61.3	3.0	64.3
30	Tailings Extraction	4.6	-	4.6
35 & 40	Process	283.5	113.7	397.2
50	Residue Management	6.7	-	6.7
70	On-site Infrastructure	74.4	19.0	93.4
Direct Cost Subtotal		**430.5**	**135.7**	**566.2**
Indirect Costs				
90	Project Indirect Costs	108.7	34.3	143.0
98	Owner's Costs	21.5	6.8	28.3
Indirect Cost Subtotal		130.2	**41.1**	171.3
99	Contingency	66.7	21.0	87.7
Total		**627.4**	**197.8**	**825.2**

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Sustaining capital cost for the life of project is estimated at approximately $139 million. The cost is assumed to be used for major equipment replacements for the CMP tailings extraction and process plant. The costs for routine equipment maintenance, including small equipment replacements and spare parts, are included in operating costs.

The base currency of the estimate is USD. Tetra Tech used the foreign currency exchange rates shown in Table 1-4 where applicable. The foreign exchange rates are based on the 2024 and 2025 two-year monthly average foreign exchange rates.

Table 1-4: Foreign Exchange Rates

Base Currency (USD$)	Foreign Currency
1.00	CAD$1.36
1.00	CZK22.57
1.00	EUR€0.91
1.00	RMB¥7.00

1.13.2 Operating Cost Estimate

On average, the life of project (LOP) on-site operating costs are estimated as USD$181.99/t of CMP tailings reprocessed, or USD$4.14/kg manganese metal produced (equivalent). The on-site operating costs are defined as the direct operating costs, including CMP tailings extraction, processing, water treatment, NMT/LR dry stacking, site servicing, and G&A costs, and excluding offsite costs, such as product freight costs, sales related costs, and government royalties, which are included in the economic analysis (Section 22.0).

The estimates are based on an average annual plant feed rate of approximately 1.1 Mt of the CMP tailings, or an average annual manganese metal production of 45.6 kt (tMn equivalent in HPMSM, ranging from 25.1 to 50.4 kt/a of manganese), excluding the first ramp-up year and the last year operation. Table 1-5 shows the cost breakdown for various areas and Figure 1-9 shows the cost distribution. The major cost for the CMP is the HPEMM and HPMSM processing cost, which accounts for approximately 73.4% of the total cost, excluding service costs required for water and steam supply and water treatment. A contingency of 5% is included in the estimate.

Table 1-5: LOP Average HPEMM and HPMSM Production Operating Cost Summary

Area	Unit Operating Cost	
	(USD$/t processed)	(USD$/kg Mn)*
Tailings Extraction	2.11	0.05
Magnetic Separation, HPEMM and HPMSM Processing	138.30	3.15
Site Services and Water Treatment	21.29	0.48
Residue Stacking/Storage	0.61	0.01
G&A	11.01	0.25
Contingency on Operating Costs	8.67	0.20
Total Operating Cost	**181.99**	**4.14**

Note: Unit cost per kilogram manganese metal produced (equivalent) contained in HPMSM.

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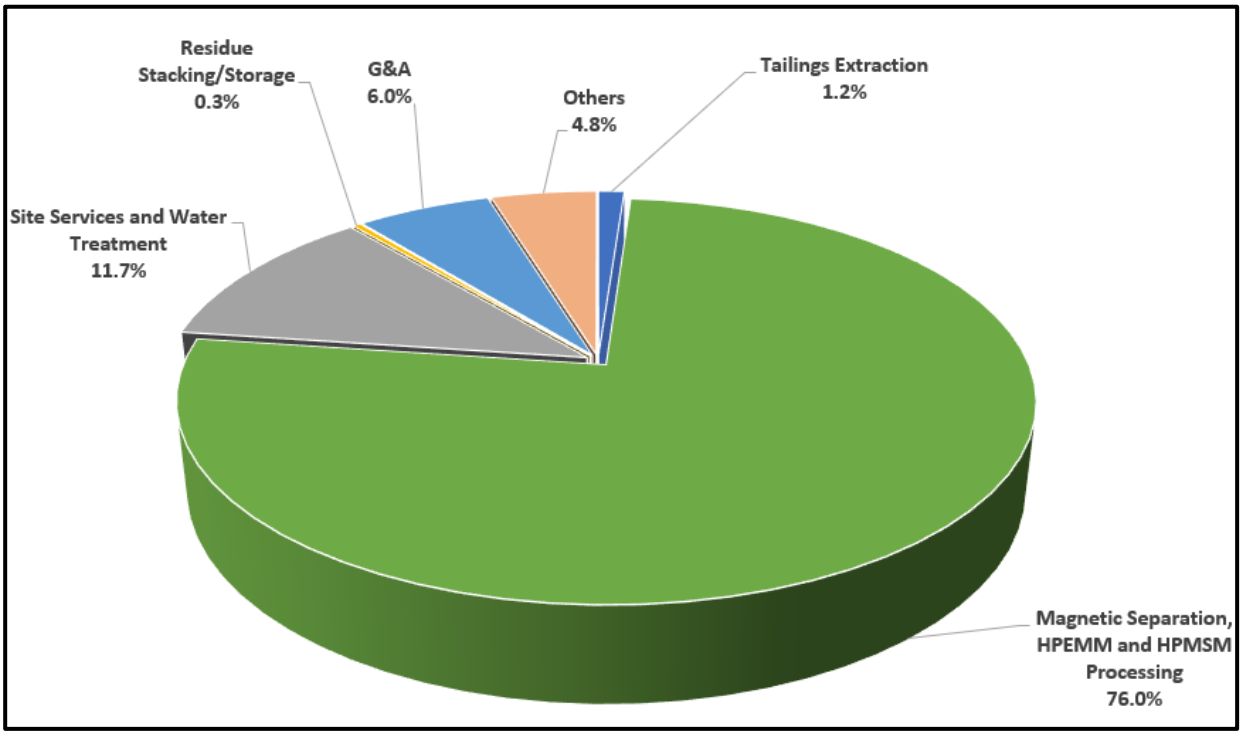

Figure 1-9: LOP Overall Operating Cost Distribution by Area

Source: Tetra Tech (2026)

1.14 Highlights of Independent HPEMM and HPMSM Market Study

As an updated production strategy for this study, EMN plans to convert all the HPEMM produced from the CMP tailings material to HPMSM. The EMN management team has conducted HPEMM and HPMSM market investigations and contacted potential users to better understand market potential and product quality requirements. EMN also generated high purity manganese sample products for their potential customers for testing. EMN also generated high purity manganese products for their potential customers for testing.

EMN commissioned the Marketeye (Marketeye or Marketeye.org) to provide an HPEMM and HPMSM products market outlook study for the CMP, mainly focusing on HPMSM product and its applications in battery industry.

Marketeye is an independent research and consultancy company based in London, UK. Marketeye provides market research and general consultancy as well as expert witness work in mining, mineral exploration, commodities markets, and oil and gas. A comprehensive market research report was prepared by Andrew Zemek of Marketeye on April 20, 2026. The report summarizes market information for high purity manganese products, including manganese applications, market demand, and supply and projected HPMSM prices.

Marketeye's assessment of the supply-and-demand balance for high-purity manganese products (mainly HPMSM) at three future milestone dates: 2030, 2035, and 2040. The 2025 results, calculated using the same principles as for future dates, are included for comparison. The results are shown in Table 19-1. Marketeye sees the HP Mn market tipping into deficit in the very near future.

Marketeye projects that the nominal HPMSM would increase from $1,533 in 2027 to $3,267 in 2035 for the market in Europe and from $1,879 in 2027 to $4,101 in 2035 for the market in USA. The Marketeye's forecast for annual nominal and real prices through 2035 for HPMSM are presented in Chapter 19 of this report.

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No market study for the magnesium carbonate by-product has been conducted excluding preliminary investigations on the local magnesium market conducted by Mangan. The magnesium carbonate by-product price is based on the current market price for industrial-grade magnesium carbonate estimated by Tetra Tech.

1.15 Economic Analysis

Tetra Tech completed a pre-tax economic analysis based on estimated costs and revenues for extracting and reprocessing the tailings from the Chvaletice deposit. The economic analysis is based on the sale of two products: HPMSM and magnesium carbonate by-product. The HPMSM prices used for the analysis were based on the projection by Marketeye. The economic analysis concluded the following pre-tax financial results:

- Pre-tax NPV of USD$740.0 million at an 8% discount rate
- Pre-tax IRR of 16.0%
- Pre-tax payback period of 6.5 years.

Grant Thornton Tax & Accounting s.r.o. (Grant Thornton), based in the Czech Republic, prepared both the Czech tax depreciation calculations based on the capital expenditure information and the allocation of such expenditures into the Czech tax depreciation groups, and the Czech corporate income taxes payable for the CMP economic analysis based on existing income tax legislation in the Czech Republic.

The post-tax economic analysis for the life of the project yielded the following financial results:

- Post-tax NPV of USD$492.1 million at an 8% real discount rate
- Post tax IRR of 13.8%
- Post-tax payback period of 7.3 years

Figure 1-10 shows a summary of the financial modelling results in graphical form.

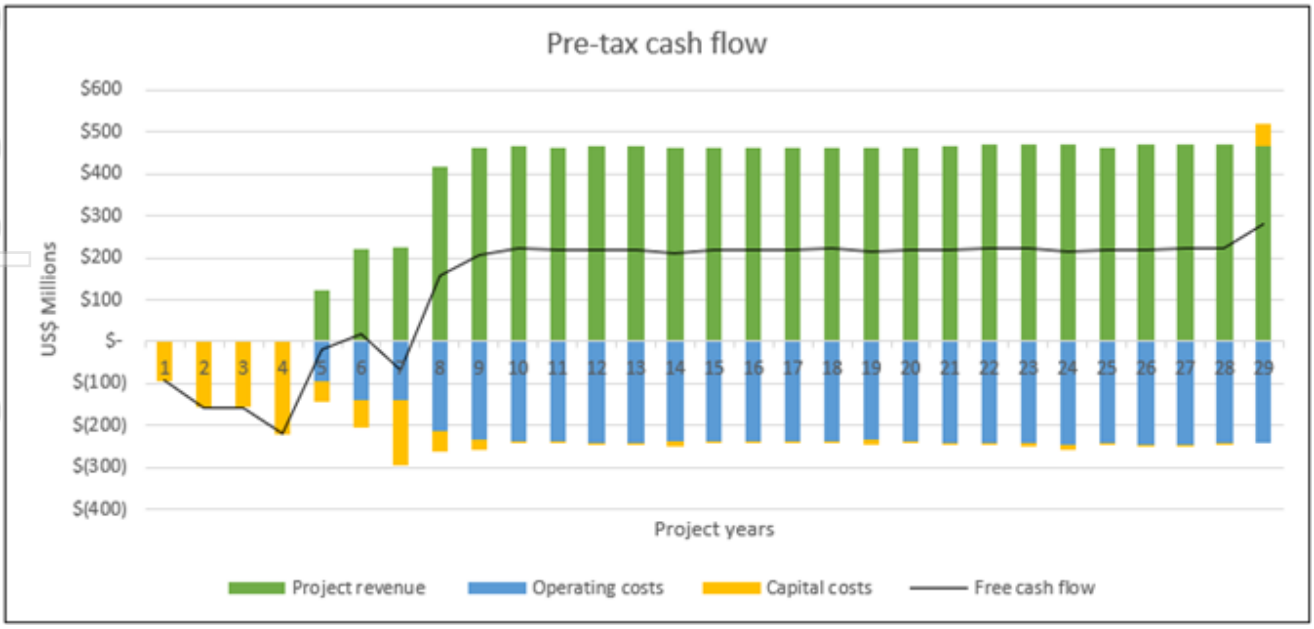

Figure 1-10: Summary of Pre-Tax Financial Results

Source: Tetra Tech (2026)

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1.16 Recommendations

The CMP is considered to be economically viable based on the results of the work presented in this report, and the Project should be proceeded to next phase study (Feasibility Study Update). Tetra Tech recommends additional engineering and testing for refinement of the processing, including the planned demonstration plant campaign, and material properties of both tailings and residue, and investigation into geotechnical data related to next phase engineering work. Also process optimization, potential cost savings, and additional revenue generating opportunities should be further investigated. Table 1-6 shows the cost breakdown by discipline for future recommended work. Recommendations are further detailed in Section 26.0.

Table 1-6: Recommended Costs for Future Work Up for Engineering Design

Area	Estimated Cost (USD$)
Tailings Extraction	400,000
Mineral Processing and Metallurgical Testing*	600,000
Recovery Methods/Trade-off Studies	250,000
Marketing and Transportation Studies	100,000
Infrastructure	200,000
RSF Design Related Work	80,000
Total Cost	**1,630,000**

*Note: *including costs for testing at demonstration plant*

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2.0 INTRODUCTION

Euro Manganese Inc. (TSX Venture Exchange [TSXV]: EMN, and Australian Securities Exchange [ASX]: EMN) retained Tetra Tech to prepare this Public Report and PEA in accordance with NI 43-101 guidelines for the Chvaletice deposit, located in the Pardubice region of the Czech Republic. Mineral tenure for the Property is held by Mangan, a 100% owned subsidiary of EMN, based in Chvaletice, Czech Republic, 89 km by road east of Prague. The effective date for this report is May 14, 2026. The effective date of the MRE is April 27, 2026.

The CMP name is derived from the local Chvaletice community, which was the site of historical, state-owned open pit mining operations and processing of pyrite from 1951 to 1975, which produced sulphuric acid from the pyritic shales. No additional mining or metal production is known to have been conducted on the Property since 1975. The mineral deposit being evaluated for the CMP comprises three tailings material stockpiles placed as a by-product of this historical production. These deposits are referred to as Cell #1, Cell #2, and Cell #3. EMN is evaluating the potential of reprocessing this tailings material for potential production of HPMSM and a magnesium carbonate by-product at a beneficiation-hydrometallurgical refinery.

Since 2014, EMN has conducted various exploration, mineralogical, and materials testing campaigns as part of their preliminary site investigation efforts to characterize the deposits and potential recovery methods. Work to-date has confirmed manganiferous mineralization in carbonate form is present within dry to fully saturated compacted predominantly silty soil that comprises the tailings deposit.

The following terms of reference for the CMP are included throughout this report:

- The CMP tailings materials, CMP tailings deposit, raw tailings, and Cells #1, #2, and #3 all refer to the human-made tailings deposits located near the community of Chvaletice, which comprises the mineralized material that is the subject of this report.
- The Chvaletice bedrock deposit refers to the original bedrock material that was mined historically for pyrite and production of sulphuric acid and is not part of EMN's interest in the CMP.

References used for this document include publicly available government documents, existing project testwork, internal company reports, and verbal communication with EMN personnel. Current work includes a detailed description of technical investigations completed by EMN.

2.1 Site Visits

In accordance with NI 43-101 guidelines, the CPs for this report and their responsibilities are outlined in Table 2-1.

Mr. James Barr, P.Geo., completed a site visit to the Property from July 1 to 3, 2017, and from July 30 to 31, 2018. During the site visits, Mr. Barr reviewed the Property layout, drill operations, sample collection methods, quality control protocols, and collected independent verification samples. Conversations with on-site EMN technical personnel, including Tomas Pechar Jr. (Mining Engineer and Project Implementation Manager) and Jaromir Tvrdý (Senior Project Geologist) of GET and Joseph Simek (geologist) with Geomi, covered topics relating to drilling recoveries, moisture content, soil class interpretation, surface property ownership, mineral tenure, and other project considerations.

Mr. Jianhui Huang, Ph.D., P.Eng., visited the Property on February 5, 2018, and May 3, 2022, for a general overview of the tailings cells and proposed infrastructure sites. Mr. Huang also visited the metallurgical laboratories, including:

- CRIMM laboratory and pilot plant facility five times between January 20, 2017, and September 20, 2018, to witness sample preparation and test/assay facilities and to discuss test program and results with CRIMM's technical team.

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- SGS laboratory on June 29, 2017, for general observation and technical discussion.
- BGRIMM's laboratory four times between September 3, 2019, and January 25, 2020, Mr. Huang oversaw the bench scale validation test work and discussed test work program and results with BGRIMM's technical team.

Mr. Johns, P.Eng., visited the project site on February 5, 2018, and May 3, 2022, for a general overview of the tailings cells and proposed infrastructure sites.

Mrs. Marks, P.Eng., and Mr. Ghaffari, P.Eng., visited the project site on May 3, 2022, for a general overview of the tailings cells and proposed infrastructure sites.

Table 2-1: Competent Person Responsibilities

Report Section		Company	QP
1.0	Summary	Tetra Tech	All CPs
2.0	Introduction	Tetra Tech	Jianhui (John) Huang, Ph.D., P.Eng.
3.0	Reliance on Other Experts	Tetra Tech	All CPs
4.0	Property Description and Location	Tetra Tech	James Barr, P.Geo.
5.0	Accessibility, Climate, Local Resources, Infrastructure and Physiography	Tetra Tech	James Barr, P.Geo.
6.0	History	Tetra Tech	James Barr, P.Geo.
7.0	Geological Setting and Mineralization	Tetra Tech	James Barr, P.Geo.
8.0	Deposit Types	Tetra Tech	James Barr, P.Geo.
9.0	Exploration	Tetra Tech	James Barr, P.Geo.
10.0	Drilling	Tetra Tech	James Barr, P.Geo.
11.0	Sample Preparation, Analyses and Security	Tetra Tech	James Barr, P.Geo.
12.0	Data Verification	Tetra Tech	James Barr, P.Geo.
13.0	Mineral Processing and Metallurgical Testing	Tetra Tech	Jianhui (John) Huang, Ph.D., P.Eng.
14.0	Mineral Resource Estimates	Tetra Tech	James Barr, P.Geo.
15.0	Mineral Reserve Estimates	Tetra Tech	Maurie Marks, P.Eng.
16.0	Mining Methods	Tetra Tech	Maurie Marks, P.Eng.
17.0	Recovery Methods	Tetra Tech	Jianhui (John) Huang, Ph.D., P.Eng.
18.0	Project Infrastructure	Tetra Tech	Hassan Ghaffari, P.Eng. Chris Johns, P.Eng. Jianhui (John) Huang, Ph.D., P.Eng.
19.0	Market Studies and Contracts	Tetra Tech	Jianhui (John) Huang, Ph.D., P.Eng.
20.0	Environmental Studies, Permitting and Social or Community Impact	Tetra Tech	Jianhui (John) Huang, Ph.D., P.Eng.
21.0	Capital and Operating Cost Estimates	Tetra Tech	Jianhui (John) Huang, Ph.D., P.Eng. Maurie Marks, P.Eng.
22.0	Economic Analysis	Tetra Tech	Maurie Marks, P.Eng.
23.0	Adjacent Properties	Tetra Tech	James Barr, P.Geo.

table continues...

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Report Section		Company	QP
24.0	Other Relevant Data	Tetra Tech	Hassan Ghaffari, P.Eng.
25.0	Interpretations and conclusions	All	All CPs
26.0	Recommendations	All	All CPs
27.0	References	All	All CPs

2.2 Project Assumptions for Reporting

The coordinates system used for the CMP is the System Jednotne Trigonometricke Site Katastralni (S-JTSK) (Krovak East North) coordinate system and the Baltic Vertical Datum (Bpv), a system designed for the Czech Republic, as described further in Section 5.5. The accuracy of the topography and surveyed drillhole collar locations as provided is assumed to be reliable. Tetra Tech has approximately verified drill collar surveys in the field using handheld global positioning system (GPS).

Manganese grades are reported as percent elemental manganese (Mn%). Where necessary, they have been converted from manganese (II) oxide (MnO%) using as factor of 1.2912. Manganese grades may not have a direct linear correlation to the amount of manganese product that could be produced. CRIMM and BGRIMM conducted extensive metallurgical testwork and CINF Engineering Co., Ltd. (CINF) and BGRIMM conducted process engineering to evaluate material recovery effectiveness. The assay methods were selected to measure total elemental concentration in addition to measuring partial digestion concentrations of manganese as a proxy for “soluble manganese”. In this report, total manganese refers to the results of the lithium borate fusion and XRF methods, and soluble manganese refers to the results of the aqua regia digestion with inductively coupled plasma mass spectrometry (ICP-MS) or atomic absorption spectrometry (AAS).

Sample collection and handling were observed by the geology CP during two separate site visits. It is assumed that the methods and protocols observed during these periods, and as described in this report, were consistent with those used for the whole duration of the drilling investigation. Metallurgical tests were observed by the metallurgy CP during various laboratory visits. It is assumed that the methods and protocols observed during these periods, and as described in this report, were appropriate.

2.3 Effective Date

The effective date of the mineral resources that support the PEA Update is April 27, 2026. The effective date of the report is May 14, 2026. The CPs are not aware of any new information that is available for this Public Report as of the effective date. The report Release date is June 29, 2026.

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2.4 Previous Public Reports

EMN has previously filed the following public reports on the CMP project:

- Tetra Tech, 2022, Public Report and Feasibility Study for the Chvaletice Manganese Project, Czech Republic. September 12, 2022.
- Tetra Tech, 2019. Public Report and Preliminary Economic Assessment for the Chvaletice Manganese Project, Chvaletice, Czech Republic. January 29, 2019.
- Tetra Tech, 2018. Public Report on Mineral Resource Estimation for the Chvaletice Manganese Project, Chvaletice, Czech Republic. June 21, 2018.
- Tetra Tech, 2017. Public Report on Mineral Resource Estimation for the Chvaletice Manganese Project Chvaletice, Czech Republic. October 14, 2017

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3.0 RELIANCE ON OTHER EXPERTS

3.1 Mineral Tenure and Ownership

EMN provided Tetra Tech with information regarding mineral tenure and ownership of surface rights described in Section 4.0, based on a title opinion provided by PRK Partners s.r.o. in the Czech Republic in a letter dated August 9, 2022. The letter confirms that EMN is the sole shareholder of Mangan, Mangan is registered and in good standing under the laws of Czech Republic, and that Mangan holds valid exploration licences and a Mining License for the CMP. Tetra Tech has not sought legal verification of the information, but believes the information to be true.

The Czech Ministry of Environment approved a new preliminary mining licence in a document dated July 20, 2021, and with reference to MZP/2021/550/92-Hd which is valid until May 31, 2026. Details of this authorization are included in Section 4.1.

3.2 Environmental Studies

Jianhui (John) Huang, Ph.D., P.Eng., relied on EMN/Mangan and Tania Perzoff, R.P.Bio., P.Ag., of Tetra Tech for matters relating to the environmental permitting plan and social or community impact in Section 20.0. Ms. Perzoff reviewed the environmental and permitting related reports/documents prepared by EMN.

3.3 Economic Analysis

Maurie Marks, P.Eng., relied on Grant Thornton Czech Republic s.r.o (Grant Thornton), based in the Czech Republic, for preparation of the post-tax analysis in Section 22.0, including the Czech tax depreciation calculations based on the capital expenditure information and the allocation of such expenditures into the Czech tax depreciation groups, and the Czech corporate income taxes payable for the CMP economic analysis based on existing income tax legislation in the Czech Republic.

The information comes from the letter titled "*Assistance with the tax portion of the economic analysis prepared by Tetra Tech Canada Inc ("Tetra Tech") in connection with the Preliminary Economical Assessment Report (the "Report") on the Chvaletice Manganese project (the "Project")"* and dated May 05, 2026.

3.4 Manganese Product Marketing Study

Jianhui (John) Huang, Ph.D., P.Eng. relied on information pertaining to high-purity manganese sulphate marketing study prepared by Marketeye.org, London, United Kingdom, including the projected prices for HPMSM. The marketing report is titled as *"High-Purity Manganese Market Report"* dated April 20, 2026. A separate note for the upside case is titled as "*HP MSM Price for the PEA Revision Upside Case"* dated June 09, 2026.

3.5 Major Consumable Market and Prices

Jianhui (John) Huang, Ph.D., P.Eng. relied on information pertaining to the major chemical consumables, electricity and diesel prices forecast by Argus Media Group (Argus).

Maurie Marks, P.Eng., also relied on forecast diesel price provided by Argus.

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4.0 PROPERTY DESCRIPTION AND LOCATION

The Property is located in the western area of the Pardubice region of the Czech Republic at approximate latitude-longitude coordinates 15.444279° east (E) and 50.038069° north (N). Communities within the immediate vicinity of the Project include Trnávka, Chvaletice, and Řečany nad Labem. Prague is located 89 km due west (Figure 4-1).

The tailings are deposited in three separate facilities, referred to as cells, which were built upon and are elevated with respect to the natural ground elevation in the region. Cell #1, the oldest deposit, covers a total surface area of approximately 326,400 m2, and has an average thickness of approximately 26.6 m. Cell #2 covers a total surface area of approximately 393,200 m^2 and has an average thickness of approximately 28.7 m. Cell #3 covers a total surface area of approximately 313,200 m^2 and has an average thickness of approximately 11 m. Figure 4-2 shows a plan map of the Property.

4.1 Mineral Tenure

Governing authorities that regulate mineral resources and mining activities in the Czech Republic include the Czech Mining Authority, District Mining Authorities, the Ministry of the Industry and Trade, and the Ministry of Environment of the Czech Republic. The CMP lies within the Hradec Králové and Pardubice Region District Mining Authority. These authorities administer the *Mining Act* (44/1988). Mineral tenure is regulated under the *Geological Act* (62/1988) and administered by the Ministry of Environment in consultation with the Ministry of the Industry and Trade and with the Czech Mining Authority.

Application for the mineral tenure of the “Trnávka Exploration Area” was made by GET in April 2014. The area of interest was considered to have been discovered by State Resource which allowed for competing bids. Following the Ministry of Environment’s review of competing bids, exploration license 631/550/14-Hd which encompasses the “Řečany - Tailings Pond 3” and “Chvaletice - Tailings Ponds 1, 2” was awarded to GET.

Mangan is a private company established in the Czech Republic in 1997. Mangan was used as the corporate vehicle for an incorporated partnership between GET (33%), Geomin (33%), and Orex (34%). On December 15, 2014, an Option Agreement was signed between EMN, Mangan, and its affiliates, granting EMN the right to earn an 80% equity interest in Mangan. In May 2016, the Option Agreement was amended and EMN purchased 100% ownership of Mangan from the Mangan shareholders, for an aggregate share value (EMN common shares) of CAD$1,500,000 and future prorated NSR payments of 1.2% to the original Mangan partners. Conditions precedent to the EMN-Mangan purchase agreement included transfer of the exploration licence number 631/550/14-Hd from GET to Mangan.

Mining Lease District for the Trnávka Mining Area

The establishment of the Mining Lease District for the Trnávka Mining Area currently represents the most significant regulatory decision for the project, surpassing all previously held exploration and preliminary licenses in legal hierarchy and importance.

Mangan submitted the application for the Mining Lease District to the Regional Mining Authority for the territories of the Hradec Králové, Pardubice, Liberec, and Vysočina Regions on December 20, 2024. Following full legal proceedings, the authorization was granted and deemed legally effective on March 2, 2025. This authorization serves as the essential legal framework for subsequent mining permitting procedures, including the final Mining Permit and necessary construction permits.

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Summary of Superseded Licenses and Historical Authorizations

The following licenses and permits are superseded by the Mining Lease District and are maintained here for historical reference and project continuity:

Exploration licence number 631/550/14-Hd is registered to include mineral rights on a total area of 1.2 km^2 (120 ha), of which 0.82 km^2 is located within the Municipality of Trnávka, and 0.16 km^2 is located within the Municipality of Chvaletice. Exploration Licence No. 631/550/14-Hd expires May 31, 2026 (extension reference MZP/2018/550/1484-Hd). On May 4, 2018, the Czech Ministry of Environment issued Mangan an additional exploration Licence No. MZP/2018/550/386-Hd allowing it to drill the slopes on the perimeter of the tailings piles. Exploration Licence No. MZP/2018/550/386-Hd became effective May 23, 2018, and was valid until May 31, 2026.

In December 2017, the Chvaletice tailings manganese resource was accepted in the Czech national register, confirming Mangan as the recognized administrator of these resources.

On April 17, 2018, with effect from April 28, 2018, Mangan was issued a Preliminary Mining Permit by the Ministry of Environment, Licence No. MZP/2018/550/387-HD and referred to by the Ministry of Environment as the prior consent with the establishment of the Mining Lease District (the Preliminary Mining Permit). The Preliminary Mining Permit was valid until April 30, 2023, and covers the areas included in the Exploration Licences and secures Mangan's rights for the entire deposit area. On July 20, 2021, Mangan was issued a new Preliminary Mining Permit, Licence No. MZP/2021/550/92-Hd, valid until May 31, 2026.

The Preliminary Mining Permit provides an exclusivity to proceed with Environmental Impact Assessment and forms one of the prerequisites for the application for the establishment of the Mining Lease District and represents one of the key steps towards final permitting for the CMP. Based on the Preliminary Mining Permit and other documents, including the Environmental Impact Assessment (which may commence after the Preliminary Mining Permit has been issued), Mangan has until May 31, 2026, to apply for the establishment of the Mining Lease District covering the areas included in the Exploration Licences. The establishment of the Mining Lease District, the application for the final Mining Permit, and applications for permits relating to the construction of infrastructure required for the project, are required prior to mining at the CMP. The Preliminary Mining Permit bounds are shown in Figure 4-3.

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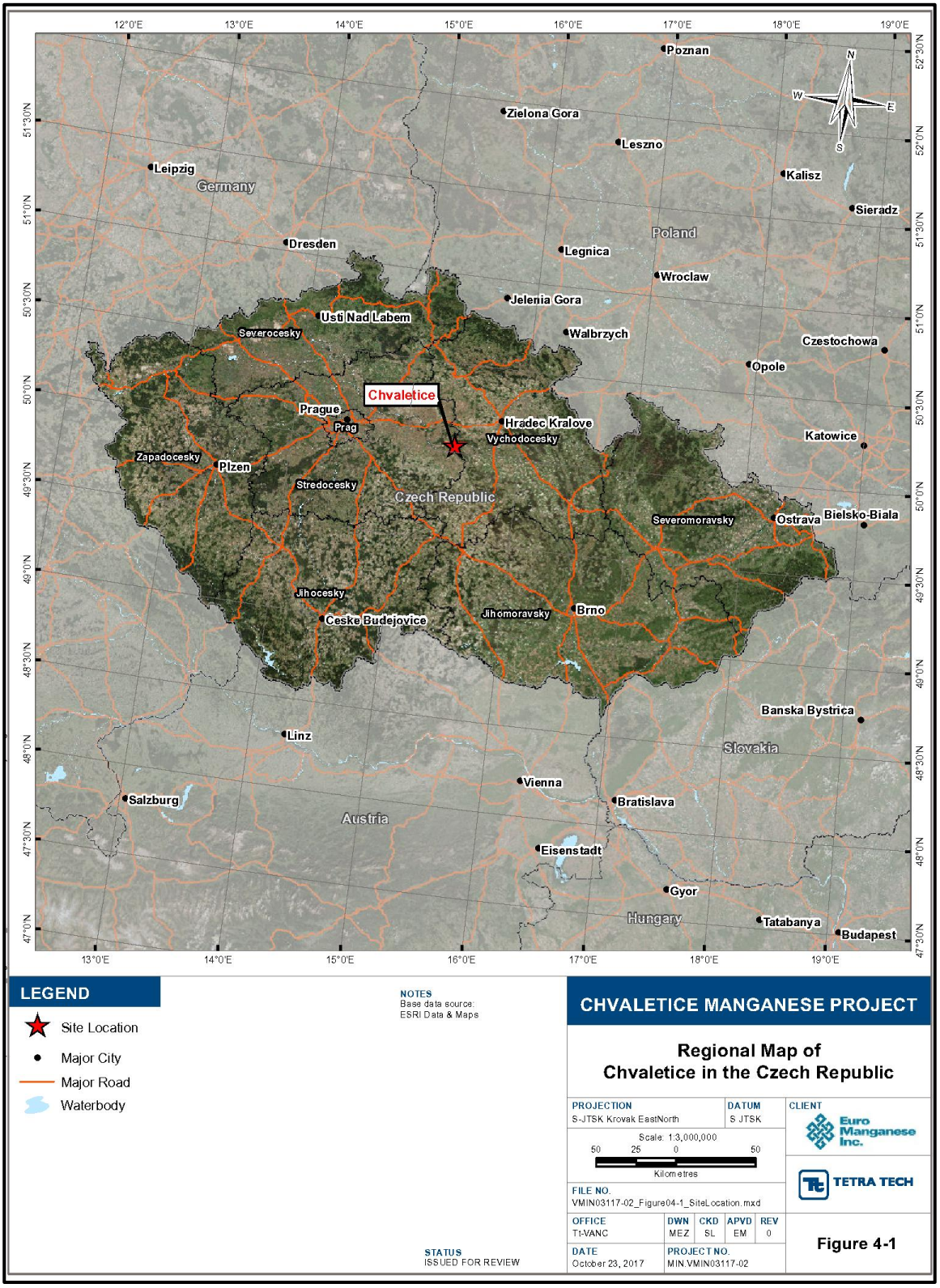

Figure 4-1: Chvaletice Manganese Project Location

Source: Tetra Tech (2022)

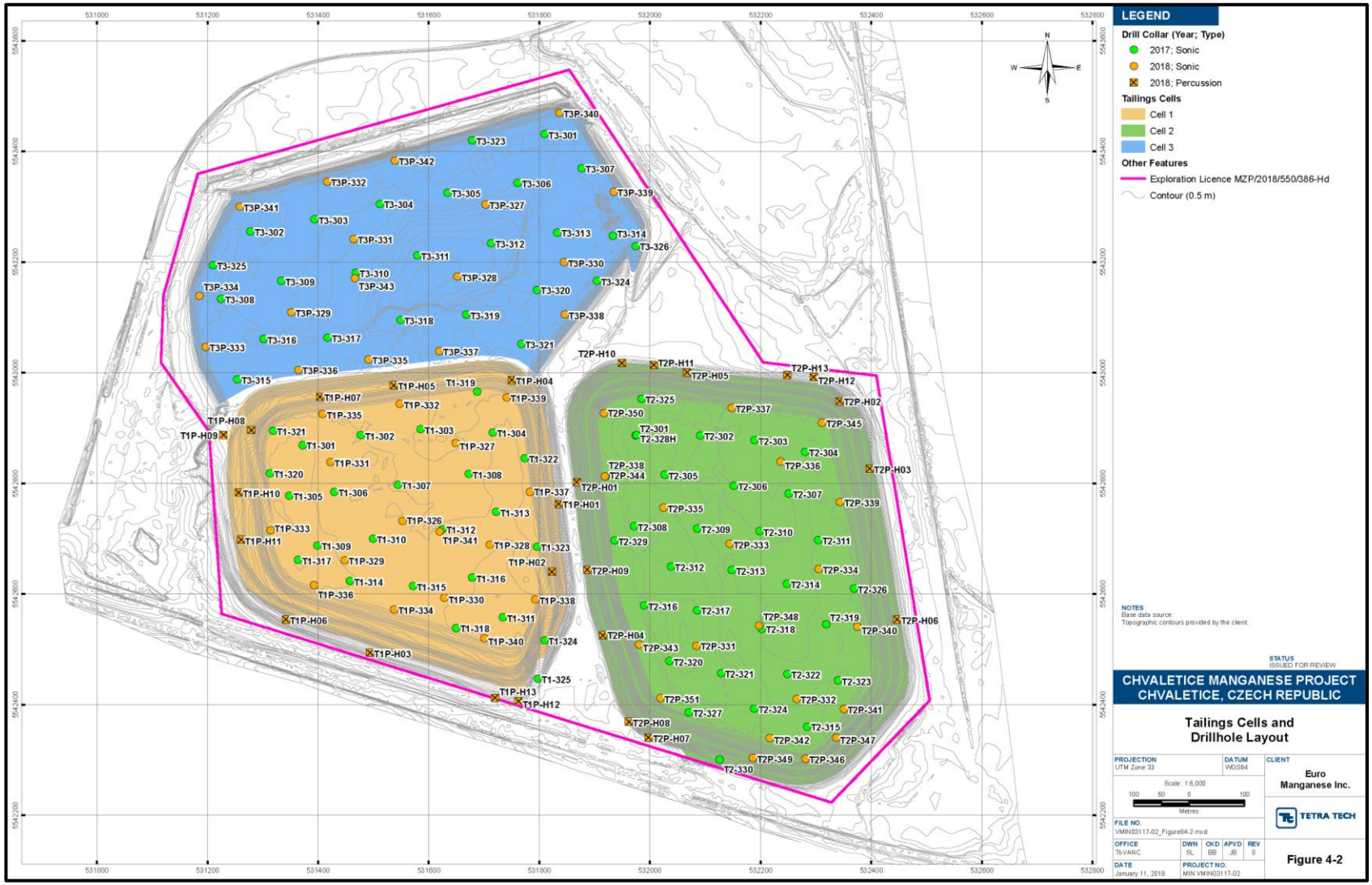

Figure 4-2: Plan Layout of the Project Tailings Deposits, Cells #1, #2, and #3

Source: Tetra Tech (2022)

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4.2 Surface Ownership and Land Access Agreements

4.2.1 Surface Ownership Overview

Surface Rights are required for the construction and operation of the CMP. Land relevant to the project falls in one of two general areas, identified as the Tailings Area, and the Plant Area. These areas are further subdivided into the municipalities of Chvaletice and Trnávka, and furthermore into industrial, municipal, and privately owned land across 194 individual parcels (84 in Tailings Area, and 110 in Plant Area). Negotiation of agreements to lease or purchase land has been conducted by Mangan for the duration of the project. All parcels required for the mining and storage of tailings and processing infrastructure having been acquired or have negotiations for land access agreements in place. The formal rezoning of 100% of the land underlying the tailings deposit area and commercial plant site is now complete, following approvals by both the Village of Trnávka and the Municipality of Chvaletice.

4.2.2 Tailings Area

At present, Mangan holds surface rights to the Tailings Area, which are considered to be those lands of original ground elevation surrounding and immediately underlying the protected area that contains tailings Cells #1, #2, and #3. The area of interest for the CMP overlies and adjoins 18 privately owned land parcels with surface rights described as (Petru 2015) (Figure 4-3).

- The principal plots of land parcels 1170/1, 1170/4, 1170/7, 1217/1, and 1490/2 in the cadastral area of Chvaletice.
- The principal plots of land parcels 349/2, 481/1, 613/1, 661/2, 662/1, 666/4, 1050, 1017 /1, 1017/3, 1065, and 1180/30 in the cadastral area of Trnávka.

Land access agreements and permissions were obtained by Mangan from private landowners as well as the Trnávka and Chvaletice Municipalities for sampling, surveys, studies, road-building, and drilling that were conducted in 2016, 2017, and 2018.

On June 7, 2022, Mangan signed a purchase agreement with company Helot, spol. S.r.o. (owned by Vanek farmer family for a total area of 7.2 ha, which is located on the northern portion of the Chvaletice Manganese Project tailings. The acquisition was completed in 2024.

On May 11, 2019, Mangan signed a purchase contract with the Municipality of Trnavka for a 2.96 ha parcel of land adjacent to the Chvaletice Manganese Project tailings, on which the Company plans to construct a visual and acoustic barrier between Trnávka and the Chvaletice Manganese Project tailings and a utility corridor. The acquisition will be completed by the end of 2026 upon payment of the final installment.

On June 6, 2022, Mangan signed a long-term lease agreement with the Municipality of Chvaletice for a total area of 26.6 ha (266,417 m²), which represents approximately 19% of the total land area required for the Project and approximately 15% of the total tailings area. In addition, Mangan holds an active land lease agreement with ČEZ, a.s. (signed October 30, 2023) covering 56.6 ha of land in the Trnávka area under a royalty-based model.

4.2.3 Plant and Infrastructure Areas

An aggregated parcel of land located immediately to the south and across the highway from the tailings deposit comprising a total 27.19 ha is proposed for development and construction of a high-purity manganese processing facility and related infrastructure. These land purchases and agreements include 19.94 ha of industrial-zoned land fully acquired through the purchase of EP Chvaletice s.r.o. (completed in December 2023), a 1.7 ha parcel of land purchased by EMN's Czech subsidiary (dated November 2017), a pending acquisition of a 5.0 ha parcel of land including a rail spur extension with MABA Prefa spol. s r.o. (successor to Správa nemovitostí Kirchdorfer CZ s.r.o.), a 0.2 ha section

of land encompassing Rail Spur No. 1 purchased from Sev.en EC, a.s. (the owner of the Chvaletice power plant), and an active 30-year lease agreement for a 0.35 ha conveyor route option with KP Chvaletice s.r.o. (successor to Galmet Trade, spol. s r.o.). Mangan is also in negotiations with Elektrárna Chvaletice a.s. for the access rights to approximately 34.8 ha of land inside the deposit area, and approximately 50.9 ha of adjacent land and conveyor routes, and associated easements.

4.3 Royalties and Liens

Three NSR agreements with an aggregate NSR amount of 1.2%, which were held by the original shareholders of Mangan, and were granted as part of the purchase transaction by EMN for 100% ownership of Mangan, were terminated on May 31, 2021. EMN fully settled the agreed consideration on January 31, 2022. As of the date of the PEA, Mangan and EMN as guarantor are party to (i) a convertible loan facility with OMRF (BK) LLC (“Orion”) dated November 28, 2023, as amended, that allows Orion to convert its loan plus accrued interest into a royalty of 1.29% - 1.65% on Project revenues upon conditions being met; and (ii) a second royalty on revenues of 1.93% - 2.47% after FID, subject to conditions being met.

Income taxes and fees imposed by the Government of Czech Republic on mineral resource projects are clearly defined in statutes. Corporate income tax of 21% has been applied in the financial modelling assumptions. The royalty to the Czech government per tonne manganese produced is CZK2,308.

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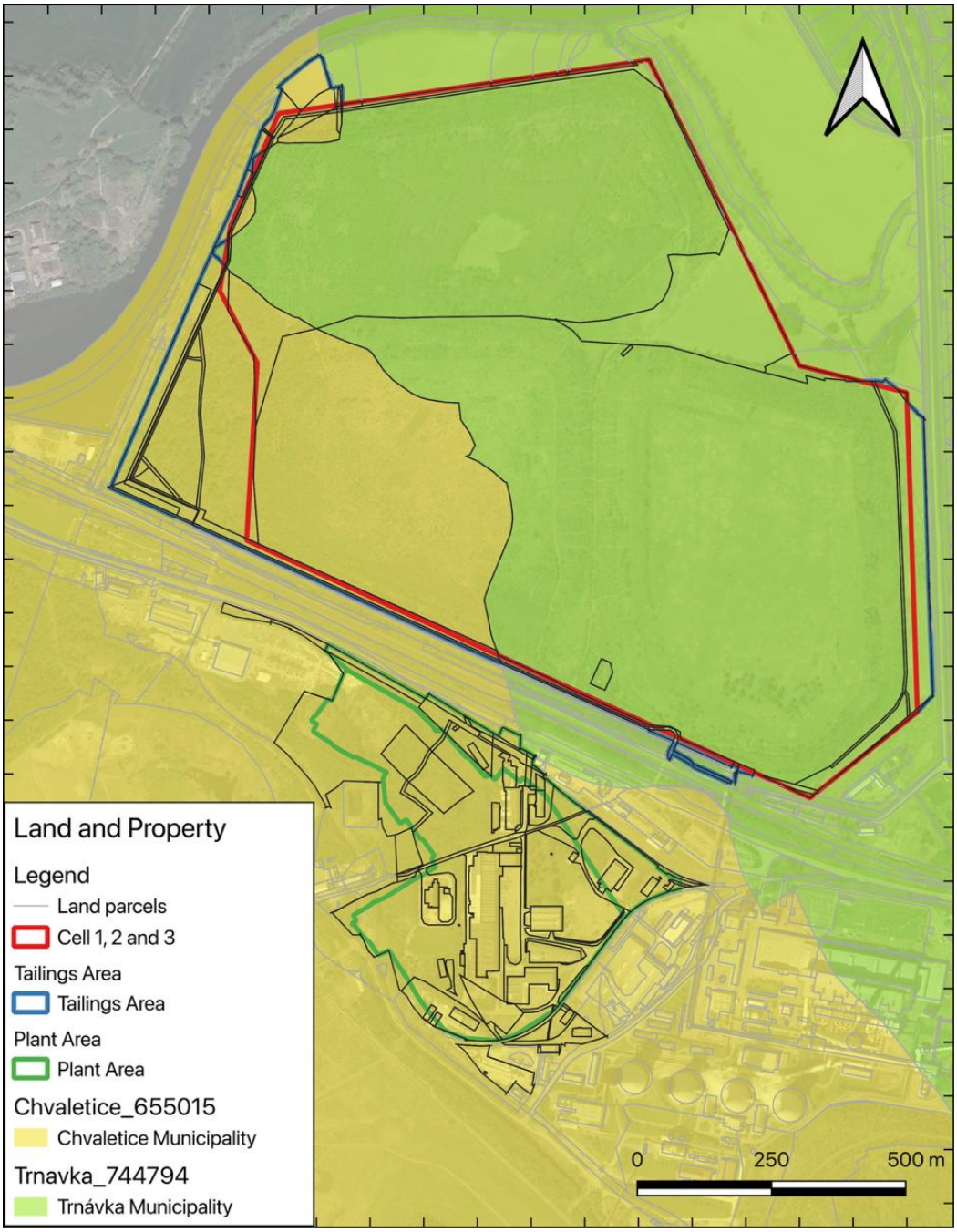

Figure 4-3: Plan Map with Surface Ownership and Preliminary Mining Permit Boundaries

Source: Tetra Tech (2022)

5.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE, AND PHYSIOGRAPHY

5.1 Climate

The climate in the western part of Pardubice region of central Czech Republic is seasonally variable and typical of European continental conditions with warm dry summers and cold winters. It is one of the driest and warmest regions in the Czech Republic. Annual average temperatures are around 8°C, and total annual precipitation is between 700 to 800 mm (Czech Hydrometeorological Institute). The area experiences a net negative precipitation after factoring in evaporation. Monthly average temperatures vary from -3.1°C in January to 16.6°C in July.

5.2 Physiography

The physiography of the Chvaletice region is described as flat lying with some rolling hills. The Property lies immediately south of the Labe River (German: Elbe) which is a regional hydrographic drainage merging with the Vltava River north of Prague. The property is within the Upper and Middle Elbe river basin which is administered by the Elbe River Board under the Ministry of Agriculture.

Forests in the region are classified as boreal. Well-established vegetation on the tailings cells comprises grasses and small shrubs on the upper plateau, and juvenile to semi-mature birch trees along the side slopes.

The gentle landscape and moderate climate promotes a healthy agricultural industry in the region, with arable lands that produce corn, barley, sugar beet, canola, and other crops, which occupy the majority of the rural landscape.

5.3 Local Resources

The Chvaletice deposit is located immediately adjacent to both an 820 MW lignite coal-fired power station operated by Severní Energetická a.s. (Sev.en), and a pre-cast concrete plant operated by Tiba Chvaletice s.r.o.

A rail line is located immediately to the south of the Property, which acts as the main transportation line from Prague to communities of Eastern Czech Republic. Spur lines are used to transport and unload coal to the power station, and to service an adjacent industrial park, which is the site of the former processing facilities that produced the tailings deposits.

5.3.1 Water

Groundwater supplies the agriculture, urban, and industrial water requirements in the region. The Labe River follows the northern and western boundary of the project.

Water resources in the Czech Republic are jointly managed at the national level by the Ministry of Agriculture (policies and regulates services), the Ministry of Environment (regulates wastewater discharge), National Institute of Public Health (controls drinking water quality), and the Ministry of Finance (regulates tariffs), all in conjunction with local municipalities.

Currently, activities being undertaken on the Property have minimal to no water demand. Hydrogeological, groundwater quality, and environmental studies have been completed to support the ESIA, permitting activities, and assessment of local water quality and baseline conditions. These studies are described in Section 20.7. A site Water Management Plan, which will be used to support water use permit applications, is described in Section 18.5.

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5.3.2 Power

The Czech electrical grid will supply electrical power supply for the CMP. The electrical power supply for the facility will be supplied at 400 kV from the existing 400 kV substation at the Elektrarna Chvaletice power plant owned by Sev.en. The power station is a key node in the Czech electrical grid. A description of the project requirements for Power Supply and Distribution is described in Section 18.4.

5.3.3 Infrastructure

No infrastructure exists on the three historical tailings pile area. The infrastructure required for the proposed commercial operation has not yet been constructed.

5.3.4 Community Services

A significant labour workforce is accessible in the nearby communities, including the villages of Chvaletice (population 3,200) and Trnávka (250), as well as the towns and cities of Kutna Hora (21,000), Kolin (31,000), Pardubice (89,000), Hradec Kralove (93,000), and Prague (1,200,000).

Mining supplies, services, and technical expertise can be found mainly in Prague and Pardubice.

5.3.5 Property Access

The Property is located along paved Highway #322, which connects to Prague, approximately 89 km by road, via Kolin and Highway #12. The Property is accessed by a short gravel road and locked gate, which is maintained by Sev.en.

5.4 Topographic Reference

Spatial survey in Czech Republic is conducted using the S-JTSK (Krovak East North) coordinate system and the Bpv, a system designed for the Czech Republic. Czech transformation key has an average positional error of 0.2 m and height error 0.3 m. The CMP is located with midpoint at approximately -670,860 E, -1,057,920 N, and 206 masl (S-JTSK), which would have a Universal Transverse Mercator (UTM) (World Geodetic System [WGS]84) equivalent coordinate of approximately 531,840 E, 5543000 N, and 250 masl. The S-JTSK (Bpv) system is used as the base coordinate system and datum for the CMP.

Topography for the CMP was provided by GET using the 5G DEM developed by the Land Survey Office in Prague. A map was provided by GET in MicroStation software format (.dgn file type) using the S-JTSK Bpv coordinate system, which included topographic contours extracted from the 5G DEM to represent the site. After adjustment, the surface generated from the survey has total standard error of 0.18 m of height in the bare terrain and 0.3 m in forested terrain.

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6.0 HISTORY

Historically, from 1915 to 1945, several small underground mining operations near Chvaletice produced manganese raw ore and concentrates that were principally shipped to German steel mills. Thereafter, from 1951 to 1975, open pit mining and milling operations occurred for the recovery of pyrite to produce sulphuric acid for the chemical plants in nearby Pardubice, which produced the three adjacent tailings deposits.

The following recount was extracted from the Bateria Slany report compiled for the Property in 1989. References to Mineral Resources, Reserves, or “ore” in this section are historical, have not been directly verified by the CP and cannot be relied upon.

6.1 Mining of Iron Ores

The first mention of iron mining at Chvaletice dates to the year 677. The medieval production of iron in the surrounding area can be linked to the origin of the name of Železné hory (Iron Mountains), whose northwestern tip includes the Chvaletice mining district. Mining took place intermittently until the early 17th century. Mining ceased after the Thirty Years' War (1618 to 1648) and resumed at the end of the 18th century.

In the mid-19th century the Česká Montážní Společnost (Böhmische Montangesellschaft) came into the region and was the leading manufacturer of pig iron, the owner of a foundry and rolling mill and the iron mines in the Czech Lands. Zones of iron and manganese deposits at Chvaletice were found to extend over a length of about 12 km and were relatively well explored. In 1885, mining produced about 400 t of iron oxide from iron cap containing 20% each of iron and manganese.

6.2 Mining of Manganese Mineralization

Mining was managed by the Pražská železářská společnost (Prager Eisenindustrie-Gesellschaft), which took over the mines in 1909. Systematic extraction of metal at Chvaletice began in 1915. After mining out the minor gossan occurrences, mining focused on the west side of Chvaletice, where the No. IX underground mine was built. The annual production of manganese ranged between 10,000 and 50,000 t. After World War II, the Pražská železářská společnost was nationalized, and on January 1, 1946, was incorporated into the state enterprise Středočeské uhelné a železnorudné doly (Central Bohemian Coal and Iron Ore Mines). Small-scale, intermittent surface mining of manganese mineralization continued in Chvaletice until 1952.

6.3 Mining of Pyrite 1951-1975

From 1951 onwards, pyrite mined by open pit methods at Chvaletice became the basic raw material for the production of sulphuric acid. Pyrite in Czechoslovakia had been imported mainly from Rio Tinto in Spain and Boliden in Sweden, and from Yugoslavia after the war. After the Communist putsch in February 1948, the shipments of pyrite iron raw material from Western European countries stopped. Since heavy chemical industry and other downstream industries would be jeopardized, alternative sources were then obtained from pyrite shales from the Chvaletice deposit. In 1949, the No. IX mine was re-organized into a separate national enterprise called Manganorudné a Kyzové Závody Chvaletice (Manganese and Pyrite Enterprise [MKZ]). In the following year, a new processing plant and housing for employees was built. Its operation was officially launched on the occasion of the anniversary of the so-called Victorious February on February 25, 1951. Exploration work showed that the processing plant was inappropriately located and obstructed the mining of part of the deposit. The concept of underground mining was abandoned, and the mining method changed to open pit mining.

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In the years 1958 to 1960 the Czechoslovak chemical industry began to phase-out Chvaletice pyrite for the production of sulphuric acid, preferring imported sulphur from Poland. The economic production of manganese ore could never be achieved, given the low grade of the open pit ore and the metallurgical challenges of producing a concentrate.

In 1975, the production of pyrite concentrate was terminated. The MKZ changed its name to Energostroj and started manufacturing machinery and equipment for the power industry.

During the entire period from 1951 to 1975, the open pit reached 2 km long, 700 m wide, and 150 m deep. Over 32 Mt of pyrite was mined and produced 7,467,000 t of concentrate containing 38.3% of sulphur.

The mining lease for Chvaletice was cancelled in 1981. The primary deposit is still recorded as having 108,805 kt of potentially economic “Reserves” (according to the current Czech classification) containing 12.86% of total manganese. The residual “Mineral Resource” of pyrite, estimated to be 39,573 kt, with an average of 12.99% sulphur, is not kept in the State's balance sheet.

Figure 6-1: Photo of Original Chvaletice Iron and Manganese Mine, circa 1978

Source: Tetra Tech (2022)

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Figure 6-2: Photo of Original Chvaletice Iron and Manganese Mine, circa 1974

Source: Tetra Tech (2022)

6.4 Elektrárna Chvaletice (Power Station)

After the closure of the mine, the plant site was used for the construction of a power plant. The site was chosen to minimize disturbance of agricultural land and to permit storage of fly ash in the mined-out pit area. The construction of the power plant was carried out in the years 1973 to 1979. The power plant provided employment opportunities not only for the former employees of the MKZ, but also expanded the population and 172 housing units were built. The waste heat from the power plant continues to be supplied as steam to Chvaletice, Trnávka, and the adjacent industrial areas.

To supply the power plant with thermal coal, the river Labe from Mělník was made navigable and the Chvaletice port was built. Regular shipping of approximately 3.5 Mt of coal from mines in northern Czech Republic took place from 1977 until 1996, when it was completely transferred to rail.

Chvaletice power station has four generating units with a total installed capacity of 820 MW. The power station stack reaches a height of 303 m, and its cooling towers are approximately 120 m high.

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Figure 6-3: Current Power Plant

Note: The CMP tailings are to the left in the photo and the historical open pit mine is behind the plant (looking southeast), taken in 2018.

6.5 Use of Tailings Ponds as a Source of Manganese

The flotation waste was deposited into Cell #1 until 1961, then between 1962 and 1970 into Cell #2, and from 1971 until 1975 into Cell #3. The cessation of the production of pyrite concentrate occurred in 1975.

The waste tailings slurry suspension was placed into the ponds so that the coarser tailings accumulated on the edge, the fine sludge accumulated in the central part of the pond, and water was pumped back into the process plant via a decantation system. The tailings deposit has a volume of over 16 Mm^3 registered with the State as potentially economic "Reserves" "Chvaletice – tailing ponds No. 1, 2" and "Řečany – tailing pond No. 3" with estimated Mineral Resources of 29,996 kt (note: Tetra Tech's current estimates, as documented in Section 14.0, indicate the volume of tailings exceeds 17 Mm^3).

A geological evaluation and technological investigation of the three tailings ponds took place in the years 1985 to 1989 to confirm that the raw materials were available for the manufacture of EMD. The client was the former state-owned manufacturer of batteries, Bateria Slany. An extensive evaluation of the tailings material conducted between April 1986 and July 1988 resulted from their investigation including a "reserve calculation". Raw data has not been sourced by EMN; however, reporting has been recovered and translated into English for reference. The work was stopped due to the collapse of the communist regime in 1989.

In September 2014, the Ministry of the Environment issued an exploration license over the area, following a public tender, which entitles the holder to carry out further exploration and to possess the mineral rights. The rights to the territory called Trnávka was obtained by GET who then transferred the rights to Mangan in 2015. This transaction is described in Section 4.0.

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6.6 Construction of Tailings Facility

Construction of the tailings facilities is believed to have commenced in 1950. Cell #1 was the first facility to have been constructed. Historical documentation has indicated that the cell's foundation is built from local native soils, which were also excavated and compacted to form the original perimeter starter dam. The dimensions of the starter dam are reported to have a trapezoidal cross-section being approximately 20 m wide at the base, 5 m wide at the top surface, and with overall height of approximately 3 m. This approach is assumed to be the same for construction of Cells #2 and #3. It is also assumed that the dam raises were constructed in an upstream direction using dried and compacted tailings material. Four sonic drill holes were completed by EMN in the summer of 2017 and 26 mobile percussion holes were completed in the summer of 2018 to test for these historical structures but were not successful in intersecting them.

Perforated decantation towers (approximately 30 m high) (Figure 6-4) were constructed to channel water into a pit at the tailing pond's edge following the sedimentation of the tailings. The tailings were put in place hydraulically. Pipes or gutters transported tailings along the tailing pond perimeter to fill one-half of the pond while the other half dried. Dam lifts were built by bulldozers that scraped dewatered material away from the center of the tailing cells to the edge, after a pond was filled to the brim with tailings.

Figure 6-4: Historical Decantation Tower Located on Cell #3, Near Drill Holes T3-310, 311, and-318

Source: Tetra Tech (2022)

The elevation of the Labe River and the base of the tailing ponds are similar, around 202 masl (Bpv datum). The perimeter of Cell #1 (26.6 m depth by 500 m by 500 m) and Cell #2 (28.7 m depth by 700 m by 550 m) are irregularly shaped polygons and measurements are approximate. Waste crusher fines from a granite aggregate quarry located

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near Chvaletice were used to cap, stabilize, and reclaim the surfaces of Cell #1 (averaging 1.32 m depth with topsoil) and Cell #2 (averaging 1.23 m depth with topsoil). Cells 1# and #2 are mostly vegetated with grasses, and their embankments were planted with trees and grasses.

Construction of Cell #3 did not reach full capacity and reclamation was not fully completed; however, stands of young birch and aspen trees are most prevalent on Cell #3. This cell abuts the northern toe of Cell #1 and is covered with approximately 0.2 m of overburden material. An exception is in the southern area of Cell #3 where there is some old municipal waste and partial backfills of tailings from iron and manganese mineral extraction in Chvaletice.

6.7 History in Dates

Table 6-1 sets a chronological order of events related to mineral resource extraction near the Chvaletice region.

Table 6-1: Chronology of Mineral Resource Extraction in the Chvaletice Region

Year	Activity
est. 677	▪ According to the legend in the Hájek Chronicle dated 1541, iron was discovered at Chvaletice in 677.
1143	▪ The founding of the Sedlec Monastery, which includes the village of Telčice (a part of today's Chvaletice) in addition to other possessions.
1393	▪ The first written mention of the fortress Chvaletice.
1845	▪ Start of the railway Prague-Pardubice.
1858	▪ The Mining Court in Kutná Hora vested to Count Kinsky a mine area at Chvaletice consisting of four mineral claims.
1886	▪ Česká montánní společnost (Böhmische Montangesellschaft = Bohemian Mining Company) asks for the conferring of the mining areas Karel (Charles) and Nadeje (Hope).
1909	▪ Pražská železářská společnost (Prager Eisenindustrie-Gesellschaft = Prague Iron Company) takes over the mines in Chvaletice mining district.
1915	▪ Ferro manganese mining by Pražská železářská společnost until 1945.
1946	▪ Pražská železářská společnost was nationalized and incorporated into n. p. Středočeské uhelné a železnorudné doly (Central Bohemian Coal and Iron Ore Mines).
1949	▪ Founded n. p. MKZ.
1951	▪ The ceremonial opening of the secondary mining school – because underground mining actually never started, the school never served its purpose, and today is a secondary school of agriculture. ▪ The new MKZ pyrite mining and processing plant started.
1952	▪ Manganese mining was discontinued.
1973	▪ The new Chvaletice power plant construction began.
1975	▪ Pyrite mining ended and the reorganization of the MKZ to Energostroj Chvaletice.
1977	▪ Start of transport of thermal coal on the Elbe water way. ▪ Start of trial operations at Chvaletice power plant.
1979	▪ Full operations at Chvaletice power plant.
1981	▪ Chvaletice obtained Town status. ▪ Chvaletice mining lease expired.
1989	▪ The end of three years of studies by Bateria Slany.
1996	▪ All transport of coal to the power plant was switched to rail.

table continues…

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Year	Activity
2013	▪ The state-controlled power company České Energetické Závody (CEZ) sells Chvaletice power plant to Severní Energetická Společnost for 4.12 billion crowns.
2014	▪ GET granted the exploration license Trnávka for the exploration survey of manganese deposit in the tailing ponds Nos. 1 to 3.
2015	▪ License transferred to Mangan. ▪ EMN initiates preliminary studies of the CMP, whose goal is to recycle the Chvaletice tailings to produce EMM.
2016	▪ EMN acquires Mangan.
2018	▪ EMN lists on TSXV and ASE. ▪ Preliminary MRE is published. ▪ EMN is issued a Preliminary Mining Permit.
2019	▪ Preliminary Economic Assessment (PEA) completed and published for the Chvaletice Manganese Project.
2020	▪ Environmental Impact Assessment (EIA) notification submitted and environmental permitting activities advanced. ▪ Czech authorities issued a Natura 2000 determination concluding that the Project was not expected to adversely affect protected habitats and species.
2021	▪ Exploration licenses and the Preliminary Mining Permit were extended to 2026 by the Czech Ministry of the Environment. ▪ EIT InnoEnergy agreed to support project financing and strategic development of the Chvaletice Manganese Project.
2022	▪ Technical Report and Feasibility Study for the Chvaletice Manganese Project completed and published. Effective dates were July 1, 2022, for Mineral Resources, July 14, 2022, for Mineral Reserves and July 27, 2022, for the Feasibility Study. ▪ Demonstration Plant installed and commissioned to support product qualification, process verification and customer sample production.
2023	▪ Demonstration Plant operations commenced, and production of high-purity manganese qualification samples continued.
2024	▪ The Czech Ministry of Environment issued a favourable EIA Statement for the Chvaletice Manganese Project.
2025	▪ The Determination of the Mining Lease Permit was granted to Mangan Chvaletice s.r.o. on January 23, 2025, authorizing future mining activities within the approved mining lease area. ▪ The Chvaletice Manganese Deposit was designated a Strategic Deposit by the Government of the Czech Republic. ▪ The Chvaletice Manganese Project was designated as a Strategic Project under the European Union Critical Raw Materials Act (CRMA).

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7.0 GEOLOGICAL SETTING AND MINERALIZATION

The following discussion is included to provide context of the geological setting of the original bedrock material that was mined and processed to form the tailings material that is the subject of this report. Due to grinding and flotation processes, none of the original textures that would have characterized the in situ rocks will have been preserved in the tailings material.

Mineralogy, specific to the tailings material, is discussed in Section 7.2.

7.1 Regional Geology

The original Chvaletice bedrock deposit is situated to the south of the CMP by approximately 1 km. Fly ash and other waste products have been used to backfill the original open pit which obscures the majority of exposed bedrock. Here, the bedrock is Proterozoic in age and is comprised of deformed granitic crystalline and overlain meta-sedimentary rocks of the Bohemian Massif, in the marginal area of the Central Bohemian Region.

In the Proterozoic, basement rocks were overlain by the seafloor turbidite sequence off from the continent of Gondwana. Here, the thick layers of fine sediments were deposited in deeper areas of the sea, periodically redeposited by huge subaquatic slumps. At the same time, subaquatic volcanic activity was taking place, associated with extrusions of lavas and assent of hot geothermal fluids. These fluids enriched the host rocks with sulphur, iron, and manganese.

At the end of the Proterozoic, rearrangement of lithospheric plates resulted from the Cadomian Orogeny, with related deformation and development of deep tectonic fracture zones. Magma and hydrothermal fluid ascent through fractures thermally affected the ambient rock domains forming weak to moderately metamorphosed phyllitic shales and greywackes. Intense folding and faulting of the sediments was developed during the orogeny as shown in the historical cross section schematic in Figure 7-1. The meta-sedimentary rocks were cut by dykes and sills which are preserved along the northeastern slopes of Zelezne Hory (Iron Mountains) between Týnec nad Labem, Chvaletice, and Zdechovice. Locally, a lens-shaped body locally called the Chvaletice Massif is composed of this Proterozoic granite and underlies the area south of Chvaletice and Zdechovice. The granite contains brittle deformation zones, altered to a variable degree. The rock is extracted in two quarries and is used as aggregate.

Other pyritic and manganiferous mineralized bodies are aligned along a trend that extends from the western edge of the municipality of Chvaletice to the nearby village of Sovolusky forming a 12 km long belt. In the western part, it creates a synclinorium, while towards the east it has developed into irregular zones that are intruded with porphyries. The maximum thickness of the pyritic schist in the western part is about 90 m, while the minimum is approximately 30 m, thereby with an overall average of thickness of some 60 m.

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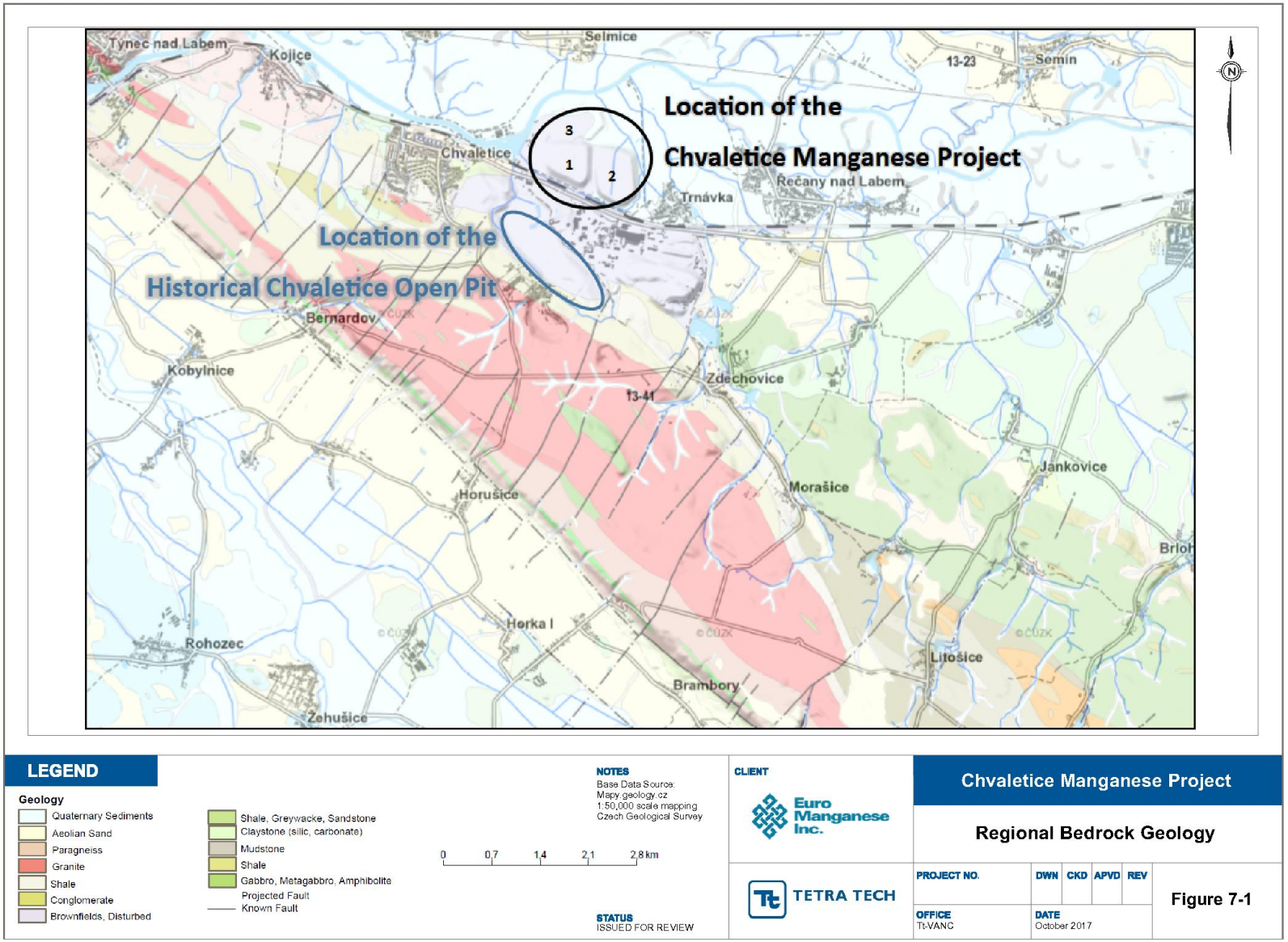

Figure 7-1: Regional Bedrock Geology

Source: Tetra Tech (2022)

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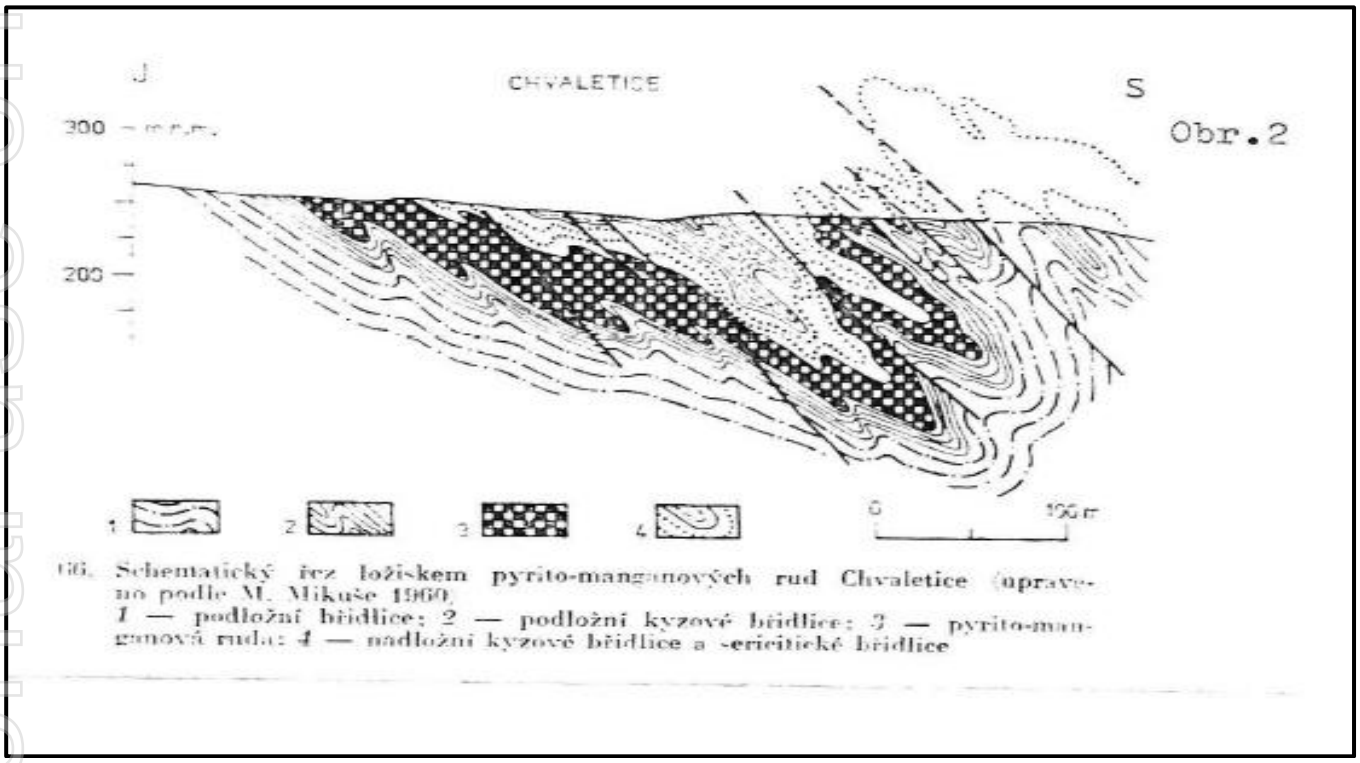
The syngenetic Chvaletice deposit of pyrite-manganese mineralization is hosted by the intensely southwesterly directed folded and moderately metamorphosed Neoproterozoic sediments located to the north of the southeasterly trending contact with granite. To the northeast, the sediments are overlain by younger Palaeozoic and Cretaceous strata.

Terrestrial fresh-water to marine claystones, siltstones, sandstones, and conglomerates of the Upper Cretaceous immediately underlie the CMP tailings deposits.



66. Schematický řez ložiskem pyrito-manganových rud Chvaletice (upraveno podle M. Mikuše 1960).
1 — podložní břidlice; 2 — podložní kyzové břidlice; 3 — pyrito-manganová ruda; 4 — nadložní kyzové břidlice a sericitické břidlice

Figure 7-2: A Simplified Schematic of the Geological Section of Pyrite-Manganese Ores in Chvaletice

Notes: The 1) underlying schist; 2) underlying pyrite schist; 3) pyrite-manganese “ore” (black hatch pattern); and 4) overlying pyrite schist and sericite schist.

Source: Mikuš (1960)

7.2 Local Geology

The Chvaletice bedrock deposits of iron and manganese mineralization constitutes one horizon in the meta-sedimentary stratigraphy with variable proportions of carbonate and silicate minerals occurring laterally from west to east. Through mineral processing during historical mining operations, these minerals have been reduced in size and partially blended by grinding and flotation processes.

Through depositionary processes, these mineral particles were distributed throughout the tailings facilities by sedimentation from suspension in a tailings slurry. Thin beds of sediment will have been deposited laterally with a gradation from coarse to fine particles away from the point of deposition. It is then interpreted that grain size and moisture content may have more similarity with materials in a vertical sense and have more variability in a lateral sense. Whereas mineral and grade distribution, being related more to the process rather than deposition, is interpreted to have more similarity with materials in a lateral sense and less direct similarity with materials in a vertical sense. However, as discussed in Section 13.0, a relationship exists between elevated manganese grade with coarser particle size.

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Met-Solve completed XRD and SEM-energy dispersive x-ray spectroscopy (EDS) analyses on behalf of EMN in 2015 using the samples collected from test pits in 2015. The analysis identified the main manganese bearing minerals were rhodochrosite ($MnCO_3$) and kutnohorite ($Ca(Mn^{2+}, Mg, Fe^{2+})(CO_3)_2$), which forms a series with dolomite and ankerite. These were classified as the principal manganese (Mn)-carbonate minerals. Additionally, the presence of trace quantities of manganese-silicates such as sursassite (a manganese bearing sorosilicate), and oxides such as pyrolusite (a manganese dioxide (MnO_2) and kurchatovite (calcium-magnesium-manganese-iron borate ($Ca(Mg, Mn, Fe^{2+})B_2O_5$) were identified. Pyrite was noted to be the primary form of sulphide mineral, with concentrations in the samples between 5 to 9%. Gangue mineralogy consists of primarily quartz with moderate amounts of plagioclase, feldspars, micas, and apatite. Low concentrations (less than 5%) of kaolinite clay mineral was identified

Further mineralogy work conducted on a bulk sample by CRIMM on behalf of EMN in 2017, concluded that manganese occurs with variable proportions of iron, calcium, and magnesium with carbonate to form a wide variety of manganese bearing carbonates from the rhodochrosite-siderite-dolomite-calcite spectrum. The work concluded that 80% of the manganese occurred as carbonate and 19% of the manganese occurred as silicate. High concentrations of iron and phosphorus were identified in the gangue minerals which were contained predominantly in pyrite and apatite, respectively.

Whole rock lithogeochemical analysis conducted on sonic drill samples collected during the 2017 program measured total sulphur concentration in the tailings with an average of approximately 3.1% which is sourced form sulphide, sulphate, and organic origin. Total carbon concentrations averages approximately 3.4%, which includes contributions from graphite, organic, and carbonate origin.

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8.0 DEPOSIT TYPES

On the world scale, the most important manganese minerals are oxides, including pyrolusite, a manganese (IV) oxide. Other economically important manganese ores usually show a close relationship to the iron ores. Land-based resources are large but irregularly distributed. About 80% of the known world manganese resources are in South Africa, with other important manganese deposits found in Ukraine, Australia, India, China, Gabon, and Brazil. Deposits in China are known to be numerous, with low manganese content, but generally are relatively small.

On a purely descriptive basis, manganese ores can be classed as sediment-hosted, volcanic-hosted, or karst-hosted. Chemical distinctions among these types include:

- Much higher silicon dioxide (SiO_2) in volcanic rock-hosted deposits, which likely reflects a more oceanic setting with important contributions from pelagic radiolaria and diatoms
- Higher phosphorus pentoxide (P_2O_5) in sediment-hosted deposits, which may be related to upwelling
- Strong enrichment of barium (Ba) and lead (Pb) in karstic deposits, enabled by the open tunnels in the structure of cryptomelane-group minerals.

The mineralization found in tailings at the CMP has been deposited by manmade processes following grinding and flotation processes of black pyritic shale and is therefore not characteristic of a traditional manganese deposits. The material can be physically characterized as a compacted soil, with varying degrees of particle sizes from clay to coarse sand.

There is sorting of the flotation waste by grain size and weight, resulting from the sedimentation from the edge to the center of the tailings deposit (based on other tailing pond borehole sludge studies (Novotny et al. 1972). Subsequently, three zones of grain sizes in the tailing pond can result with:

- An outer zone of fine-grained sand and silty sand
- A central zone of alternating sandy laminae with the outer and inner zone types
- An inner zone comprised of silt to slightly clayey silt (finest material of all zones)

This zoning is typical for slurry tailings and results from sedimentation of deposited slurries from fluctuation of water levels during decantation operations (removal of water) within the central zone and a gentle slope (1.5%), leaving little to no water in the outer zone (Bateria Slany, Chapter 2, 1989).

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9.0 EXPLORATION

EMN has been conducting exploration and investigation on the Property since 2014, during which time multiple investigations have been conducted to sample and characterize the chemical and physical subsurface conditions of the tailings materials and surrounding ground. A summary of exploration work by year is included in the following subsections, and as shown in Figure 13-1.

9.1 Hand Auger Sampling, 2014

Four shallow (2.0 to 2.5 m) hand auger drillings were collected for assay and grain size testwork from the periphery of the tailings deposits on November 7, 2014. Samples were collected from each auger hole and were identified as T1 to T4.

Results of the program indicated that total and soluble manganese assay results were comparable to those results reported historically by Bateria Slany (1989), but the sampling was considered to be indicative and not representative of the entire deposit with respect to grade and particle size distribution (AMEC 2016) due to the shallow auger holes testing only near surface material.

9.2 Test Pit Sampling, 2015

In 2015, two test pitting programs were conducted using an excavator to collect samples at greater depth, and with more volume than the previous hand auger program. Four pits, identified as T5 to T8, were dug down between 1.8 and 3.1 m deep at the periphery of the cells on November 11, 2015, and three additional pits, identified as T9 to T11, were dug to between 2.5 and 3.8 m deep at the center of each of the cells on December 14, 2015.

Again, results of the program indicated that total and soluble manganese assay results were comparable to those results reported historically by Bateria Slany (1989). With deeper sampling, the small particle size of the tailings in the center of the tailings was identified to be a potential issue for dewatering and further work was recommended (AMEC 2016).

9.3 AMEC Foster Wheeler Scoping Study, 2016

With results from the 2014 and 2015 sampling programs, a process evaluation report was completed by AMEC in September 2016, which considered a potential flowsheet for processing of the tailings with production of high purity, selenium-free EMM. The results of the study were positive and were used to develop a strength-weakness-opportunities-threats (SWOT) analysis. A list of detailed recommendations was presented for further material characterization and metallurgical testwork to de-risk and refine the processing flowsheet.

9.4 Seismic and Resistivity Geophysical Survey, 2017

In July of 2017, EMN commissioned a geophysical survey over the tailings. A total of 6.6 km lines of high-resolution electric resistivity tomography (ERT) and seismic refraction was conducted by GImpuls Praha spol. s.r.o.

The purpose of the survey was to enhance the geological knowledge of the area with response from sub-horizontal geological components underlying the surface and to evaluate structures down to a maximum depth of the first tens of metres.

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Initial results from ERT measurements show mostly very low resistivity with a maximum of 10 Ωm. According to typical geological ERT results, this may indicate the presence of electrically conductive clay in the rocks (in this case, sandstones with conductive glauconite).

Alternatively, or additionally, the lower measured resistivity values can be attributed to a massive presence of groundwater in the rocks, which, combined with the presence of the chemical infusions from the tailings, could cause low resistivity values. This theory is supported by the results of the seismic refraction that detected bedrock at depths of roughly 5 to 10 m with velocities of approximately 2,000 to 3,000 m/s.

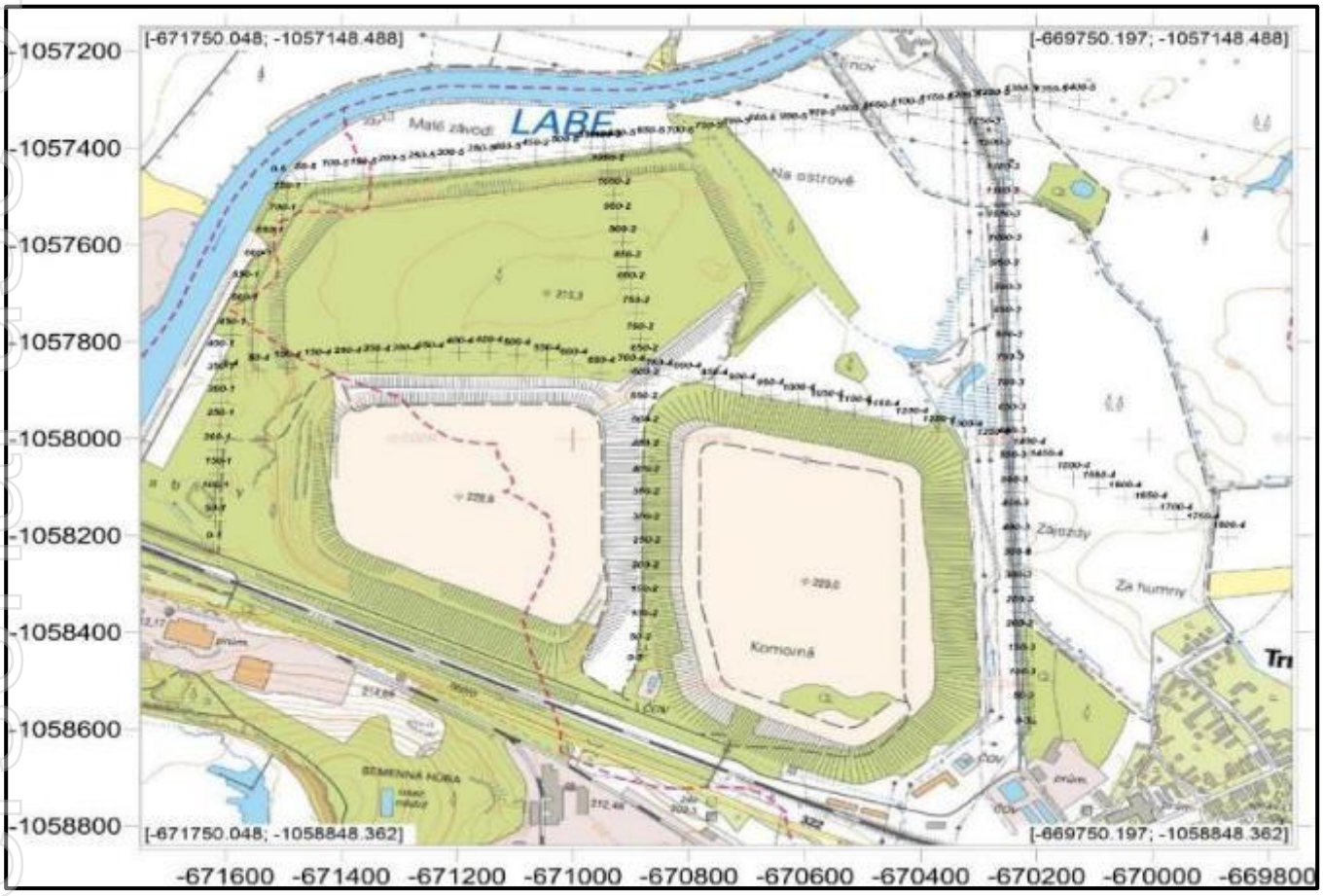

Figure 9-1: Plan Map of Geophysical Survey Lines and Measurement Stations

Source: Tetra Tech (2022)

9.5 Bulk Sample, 2017

A highly-representative bulk sample weighing approximately fifteen tonnes was collected using a Sonic drill rig from tailings materials during the 2017 drilling investigation. The material was the 75% split of the core samples collected, as discussed in Section 11. The samples were packed individually in plastic sample bags and steel barrels and shipped via rail to the CRIMM laboratory in China. Further description of the bulk sample analyses is discussed in Section 13.0.

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9.6 Bulk Sample, 2018

A second bulk sample was collected from half core splits of the Sonic drilling program. The samples were clearly labelled and are currently securely stored in vacuum packed and sealed plastic bags to preserve original moisture content and prevent sample deterioration. The sample bags have been placed into storage in 55 gal sealed steel drums for future testwork.

9.7 Seismic and Downhole Geophysical Survey, 2018

As part of a preliminary geotechnical investigation (cone penetration testing (CPT) investigation described in Section 10.0), shallow refraction seismic (SRS) and vertical seismic profiling (VSP) was conducted on July 13, 2018, on behalf of Mangan by SIHAYA, spol. s.r.o., a geophysical company based in Brno, Czech Republic, specializing in engineering geology and hydrogeology. The survey was conducted from an array of geophones to determine homogeneity and relative density (compactness) and dampness of soils, and the depth and condition of the first 10 m of original soils and bedrock subbase underlying the tailings (SRS survey), and from within three boreholes drilled within the tailings (G 3-7 in Cell #3, GB 1-5 in Cell #1, and GB 2-6 in Cell #2) to determine the to determine S-wave and P-wave velocities of the various soil types within the tailings (VSP survey). The survey resulted in generation of interpreted geology-geophysical section profiles and tabulated measurements and confirmed the presence of native soils comprised of fluvial sands which underlie the tailings deposit.

9.8 Demonstration Plant Bulk Excavation

Following completion of the Feasibility Study in 2022, bulk excavation campaigns were completed within Cell 3 to provide feed material for the Chvaletice Demonstration Plant. The excavation activities generated additional operational and sampling data that were used to assess the performance of the Mineral Resource model. Details of the excavation program, model reconciliation, and associated Mineral Resource implications are presented in Chapter 14, Mineral Resource Estimates.

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10.0 DRILLING

Table 10-1 lists the drilling completed to date by EMN on the CMP by year, cell, and drilling method. A description of the 2017 and 2018 drilling programs follows in Sections 10.1 and 10.2, respectively. Figure 10-1 shows a plan view of the drill collars.

Table 10-1: CMP Resource Drilling Completed by EMN, Listed by Cell, Year, and Type

Cell and Year	Drill Type	Number of Holes	Total Metres	Number of Samples
Cell #1				
2017	Eijkelkamp SonicSampDrill CRS-V	25	629	291
2018	Makita HM1317C Mobile Percussion	13	589	285
	Eijkelkamp SonicSampDrill SRS	16		
Total		**54**	**1,218**	**576**
Cell #2				
2017	Eijkelkamp SonicSampDrill CRS-V	30	755.3	346
2018	Makita HM1317C Mobile Percussion	13	728	344
	Eijkelkamp SonicSampDrill SRS	21		
Total		**64**	**1,483.3**	**690**
Cell #3				
2017	Eijkelkamp SonicSampDrill CRS-V	25	295	119
2018	Eijkelkamp SonicSampDrill SRS	17	192.5	101
Total		**42**	**487.5**	**220**
Grand Total		**160**	**3,188.8**	**1,486**

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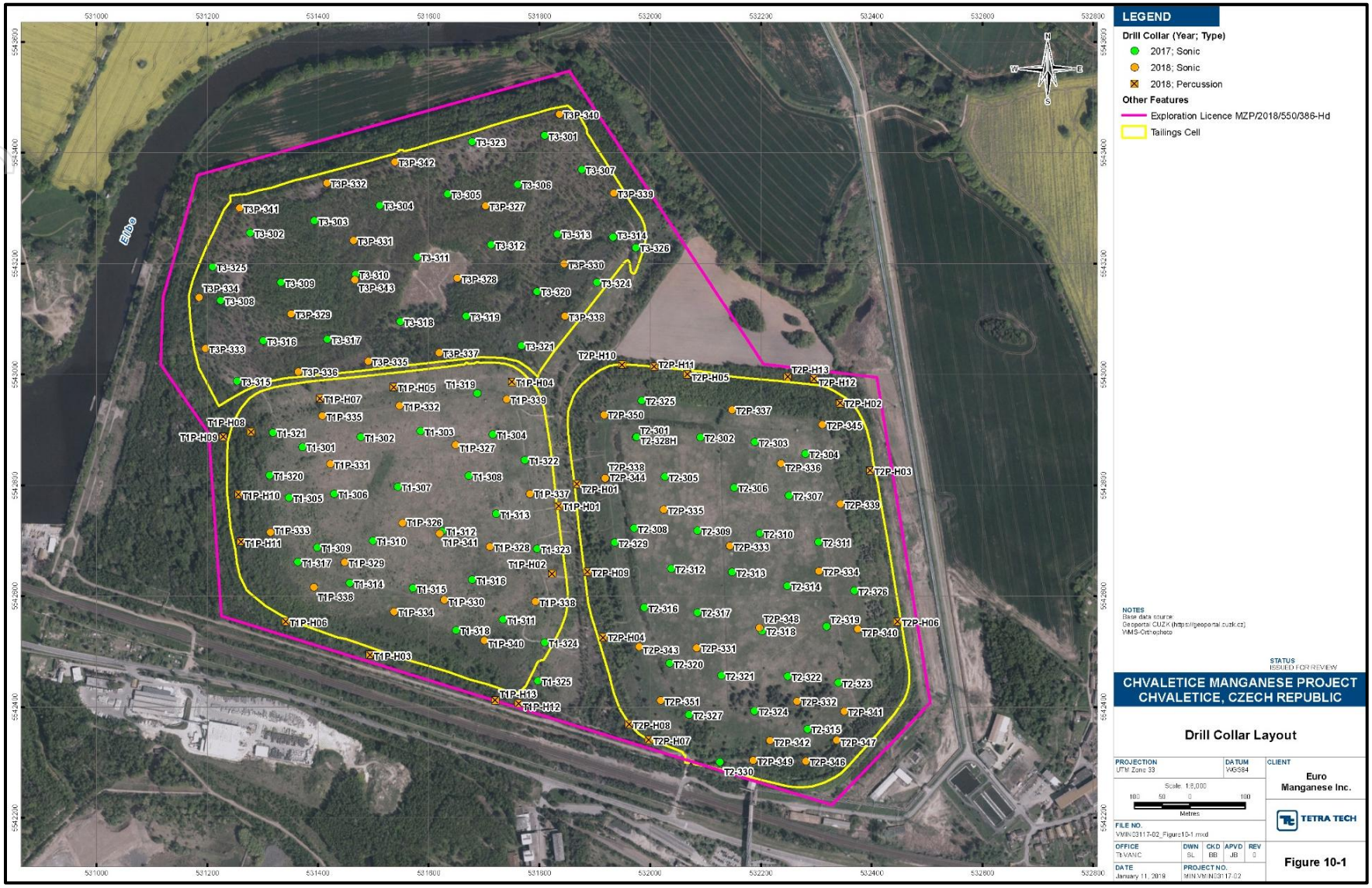

Figure 10-1: Plan View of Drill Collar Layout, 160 Holes Totaling 3,188.8 m at Chvaletice Manganese Project

Source: Tetra Tech (2022)

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10.1 2017 Drilling

The 2017 drilling and sampling program was carried out between June 12, 2017, and July 19, 2017, utilizing advanced sonic rig technology provided by Eijkelkamp SonicSampDrill B.V. and crews from Giesbeek, the Netherlands (Figure 10-2). The program was supervised in the field by Chris Baldys, P.Geo. (BC), a non-independent CP at the time of the investigation.

A total of 1,679.3 m was drilled in 80 holes, using 100 mm diameter size rods and sonic core barrel advance (Figure 10-1). Twenty-five holes totaling 629 m were completed on Cell #1, 30 holes totaling 755.3 m were completed on Cell #2, and 25 holes totaling 295 m were completed on Cell #3. All holes were drilled vertically; no downhole surveying was completed. Figure 10-1shows the drill hole layout. Drill holes were spaced evenly at approximately 100 m centres throughout the upper bench of each cell, encompassing a combined area of 1.2 km by 1.2 km (Figure 10-1).

Coring progressed using 2 m core runs. No casing was installed, and drill rods were pulled for each core run. Minor caving and pooling of water is assumed to have occurred on re-entry; however, this material accumulated in the hollow core rods above the core barrel and is believed to have had minimal effect on the integrity of the recovered sample. This material was dumped on surface adjacent the borehole and has been collected by Mangan for future evaluation if required.

Access to the embankment slopes around the perimeter of the tailings was limited due to safety and not included in this investigation. To verify the composition of the embankments, four additional drill holes (Drill holesT1-324, T1-325, T2-330, and T3-326) were collared on access ramps. Each hole intersected a layer of topsoil with average thickness of approximately 1 m, manganese bearing tailings material, and terminated in native basal soils at an elevation consistent with surrounding drill holes. Based on these drill results, the presence of manganiferous tailings material was confirmed within the perimeter embankment and based on the elevation of the basal soil contact, the historical starter dyke was not identified at these locations.

10.2 2018 Drilling

A total of 80 holes were drilled in 2018, totalling 1,509.5 m. The 2018 program included completion of 54 sonic holes, totalling 1,409.5 m from the top of each cell, and an additional 26 mobile percussion drill holes, totalling 100 m from the perimeter embankments of each cell in areas which were not previously accessed for sampling. The 2018 drilling and sampling program was carried out between July 10 to August 29, 2018. The program was supervised in the field by Tomas Pechar Jr., Ph.D. (Mining), Project Implementation Manager for Mangan.

10.2.1 Sonic Drilling

Sonic boring used advanced sonic rig technology provided by Eijkelkamp SonicSampDrill B.V. and crews from Giesbeek, the Netherlands (Figure 10-2). The purpose of the program was to increase the confidence in the distribution and concentrations of tailings geochemistry and physical properties for the purposes of Mineral Resource estimation and ultimately mine planning. This was achieved by conducting infill drilling between holes completed in 2017, and by completion of several holes within the perimeter embankments in areas not sampled during the 2017 program.

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Figure 10-2: Showing Eiikelamp SonicSampDrill B.V. and Drill Crew

Source: Tetra Tech (2022)

The Sonic program was divided as 35 vertical (660.5 m) and 19 inclined (749 m) holes using 100 mm diameter size rods and sonic core barrel advance (Figure 10-3) with the remote operated Eijkelkamp SonicSampDrill SRS. Twenty-nine holes totaling 589 m were completed on Cell #1, 34 holes totaling 728 m were completed on Cell #2, and 17 holes totaling 192.5 m were completed on Cell #3. Vertical infill holes were placed at mid-points between three existing holes, resulting in new short-range sample spacing of between 50 and 75 m. The inclined holes were drilled at 45° into the outer perimeter of Cells #1 and #2 to collect samples from the benched perimeter embankment. No downhole surveying was completed for the 2018 program; all holes were assumed to be straight given their short length.

Coring progressed using 2 m core runs. No casing was installed, and drill rods were pulled for each core run. Minor caving and pooling of water is assumed to have occurred on re-entry; however, this material accumulated in the hollow core rods above the core barrel and is believed to have had minimal effect on the integrity of the recovered sample. This material was dumped on surface adjacent the borehole and has been collected by Mangan for future evaluation if required. Any lost core was recorded in the field logs with recovery of zero percent; a total of 6.5 m was logged in 2018 as lost core.

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Figure 10-3: Eijkelkamp SonicSampDrill SRS Used for 2018 Sonic Drilling Investigation

Source: Tetra Tech (2022)

10.2.2 Hand Portable Percussion Drilling

A hand portable percussion drill was used to collect samples within the lower benched portions of the perimeter embankment, where mature tree and vegetation growth prevented access by the Sonic rig. The drill rotor was powered by a generator powered Makita HM1317C drill which used a 3-inch hollow core tube configuration for core recovery (Figure 10-4 and Figure 10-5). The drill barrel was manually advanced and recovered by two operators employed by Mangan.

The percussion drilling program included 26 vertical holes, totalling 100 m, spaced at approximately 2 to 3 holes per side of Cells #1 and #2. The program was developed for sampling of the outer perimeter of the embankment in areas not accessed by drilling during the 2017 program to confirm the presence of manganiferous tailings and provide control on the elevation of the original ground elevation. The percussion holes ranged in depth from 1 m to 6 m.

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Figure 10-4: Drilling of Perimeter Embankment Hole using Hand Portage Percussion Drill

Source: Tetra Tech (2022)

Figure 10-5: Oxidized Tailings Recovered by Percussion Drill on North Perimeter Embankment Cell #2

Source: Tetra Tech (2022)

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10.2.3 Cone Penetration Testing Geotechnical Drilling

Geotechnical investigations using CPT and downhole seismic geophysical testing (geophysics described in Section 9.0) were undertaken in 2018 to characterize existing geotechnical conditions and provide information in support of PEA-level mine planning and conceptual design for the CMP. CPT holes were targeted across all three cells to assess the expected variation in material properties from the perimeter (coarser-grained tailings) to the interior (finer-grained tailings, likely softer/wetter layers) of the cells. The program was conducted between December 4, 2017, and January 15, 2018, using a Geoterend Gouda Truck Mounted Geotechnical rig (on Liaz truck) with 200 kN pushing capacity. The program employed continuous CPT drilling in 24 holes, totaling 554 m, and collected measurements for tip resistance, sleeve friction, pore water pressure, soil density (by gamma-gamma log), natural radiation (gamma), hydrogen index and soil humidity (neutron log), electric conductivity (dielectric log) to evaluate soil type and physical compaction characteristics. Table 10-2 summarizes the CPT drilling program.

Table 10-2: Summary of 2018 Geotechnical CPT Boreholes

Cell	Number of CPT Holes	Total CPT Length Drilled (m)
#1	8	224.3
#2	6	162.9
#3	10	126.8
Original Soils*	4	35.5
Total	**28**	**549.5**

Note: *Testing in original soils was conducted using a Begeman's type mechanical cone.

10.2.4 Hydrogeological Drilling

A hydrogeological investigation was conducted at the CMP between December 5 and 13, 2018. Drilling was completed by Intermarket Company using a SOILMEC 65 piloting rig. Eight new hydrogeological boreholes were drilled. Drilled material was logged by the geologist present on site during drilling and samples were collected into plastic buckets after every 3 m for chemical analyzes. A total of 47 samples were collected. In addition, 10 samples were collected for the Institute of Geological Sciences of Masaryk University in Brno for the purpose of specimen processing for models of water element spreading. Table 10-3 summarizes the hydrogeological drilling.

The hydrogeological study of the tailings piles was undertaken to contribute to the monitoring of changes in flow and chemistry of tailing's water over time, the determination of sorption of tailing's material and quaternary collectors, the determination of hydraulic characteristics (storativity, transmissivity, filtration coefficient) in the body of the tailings piles and of the surrounding area, assessment of the infiltration effect of the water from tailings piles to the surrounding quaternary collector, and for assessment of the dynamics and chemical changes of the groundwater water coming in and out of the bodies of tailings piles. The resulting data will be used to create a complex transport and geochemical model using the Modflow mathematical modeling code (GMS software). The collected data were used to support hydrogeological characterization, groundwater flow and geochemical modelling, the ESIA process, risk assessment, and project permitting activities.

Water testing is being performed on boreholes CHV1, CHV9, CHV10, and CHV13. Hydrodynamic tests and sampling of groundwater from new boreholes will follow in the near future.

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Table 10-3: Summary of 2018 Hydrogeological Boreholes and Groundwater Depth

Borehole	Cell	Ø Borehole (mm)	Ø Borehole Equipment (mm)	Depth from Ground (m)	Depth from Top of Casing (m)	Casing Stick-up (m)	Groundwater Depth from Top of Casing (m)
CHV6	II	600	110	26.7	27.72	±1.00	27.23
CHV7	II	600	110	26.7	27.83	±1.00	--
CHV8	II	600	110	21.9	22.60	±0.70	12.83
CHV9	I	600	110	25.8	26.95	±0.95	21.56
CHV10	I	600	110	26.5	27.34	±0.95	21.55
CHV11	III	600	110	11.5	12.72	±1.00	--
CHV12	III	600	110	11.5	12.62	±0.86	--
CHV13	III	600	110	11.5	12.28	±0.85	12.20

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11.0 SAMPLE PREPARATION, ANALYSES, AND SECURITY

The sample preparation and analysis program described in this section was developed by EMN for the 2017 drilling campaign, with input from Tetra Tech, and implemented in the field by technical personnel employed by EMN. The program was designed to evaluate chemical and physical characteristics of the tailings material for the purposes of mineralogy; Mineral Resource estimation; and hydrogeological, geotechnical, metallurgical, and process engineering. The protocols established in 2017 were also used during the 2018 campaign for consistency.

Samples were analyzed and tested for manganese and elemental assay, lithogeochemistry, particle size distribution, mass, moisture content, paste pH, and electrical conductivity (EC) and specific gravity. Wet and dry in situ bulk density was calculated based on core recovery measured in the field, along with the sample mass and moisture data measured at the lab.

The program is summarized in the following bullet points and details of the analysis are included in the subsequent sections.

- Seven hundred and fifty-five (755) core samples were recovered in 2017, and 730 in 2018, totaling 1,484 samples which were recorded for analyses and material characterization (these exclude field duplicates and other QA/QC samples).
- One hundred and eight (108) control samples were generated in 2017 and 101 in 2018 by EMN to monitor commercial lab performances.
- Seventy-nine (79) laboratory duplicates (21 in 2017 and 58 in 2018) were generated by the primary lab (SGS) for review and analysis.
- Wet sample mass, recovery, and geological data were logged at the drill sites by a qualified team of geologists. Moisture percentage and magnetic susceptibility were measured in 2017.
- Photographs of each core sample were taken for additional reference.
- Shipment of samples to analytical labs was done in accordance with chain of custody.
- Analysis for multi-element assay with aqua regia and 4-acid digestion (inductively coupled plasma [ICP] and AAS) and fusion-XRF.
- Particle size distribution testwork with laser diffraction and sieve/hydrometer.
- Wet and dry mass, and moisture measurements were collected in field and lab (used for bulk density calculation).
- Specific gravity by pycnometer measured in the laboratory.

The primary lab selected for sample analysis was SGS with facilities in Lakefield, Canada, and Bor, Serbia. The lab, formerly Société Générale de Surveillance, is a multinational company headquartered in Geneva, Switzerland, which provides inspection, verification, testing, and certification services.

Comparative particle size analysis by sieve and hydrometer methods was completed (only for 2017 investigation) at GEOtest, a.s. (GEOtest) located in Brno, Czech Republic.

The 2018 drilling programs are summarized in Figure 11-1 and Figure 11-2, which show the field and laboratory sampling and analysis flowsheet. Figure 11-3 and Figure 11-4 show core recovered from holes T1-318 and T-312 representing unsaturated materials near the edge of the deposits and saturated materials near the core of the tailings deposits, respectively.

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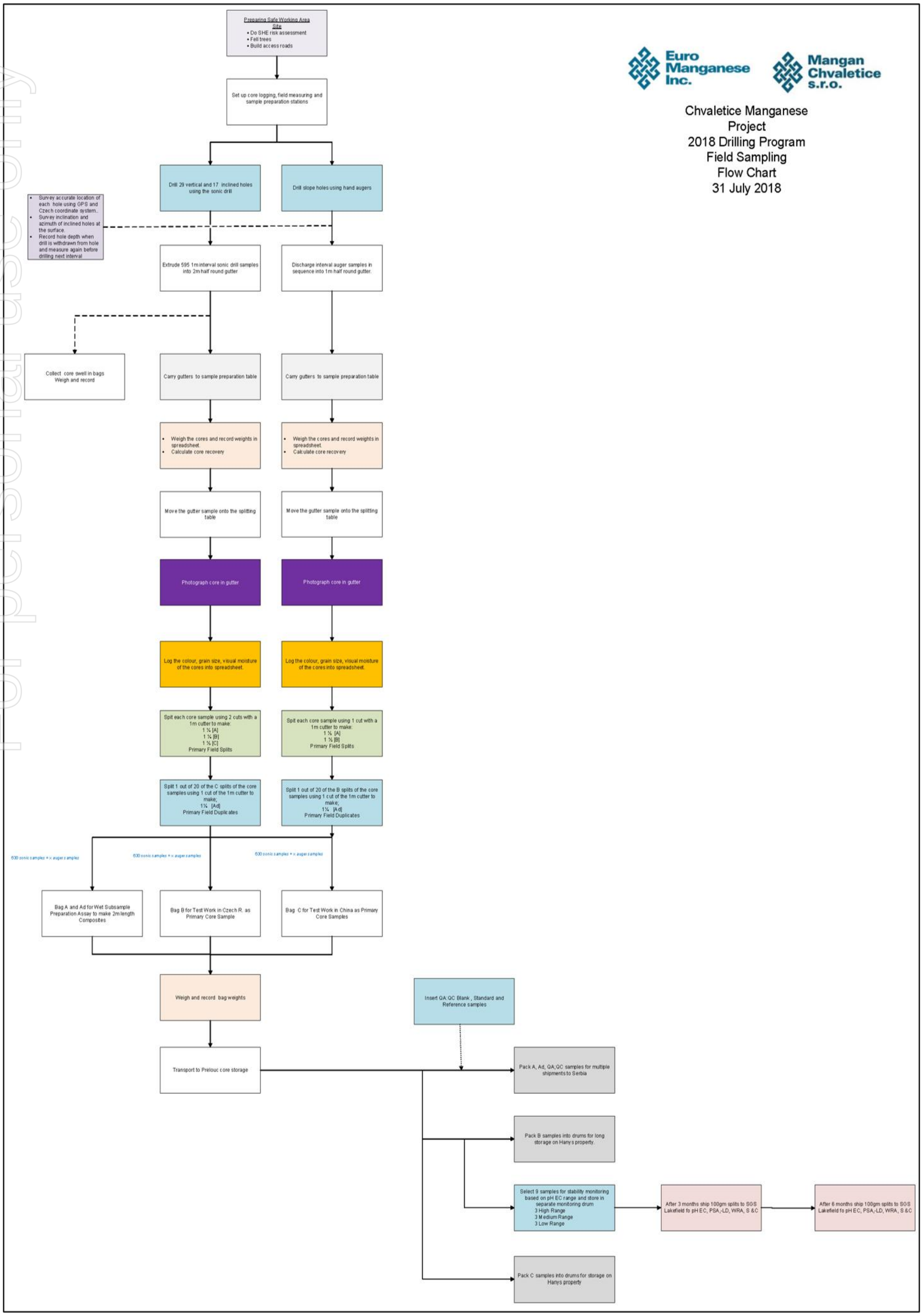

Figure 11-1: Sample Collection and Subsampling Flowsheet Developed by EMN for 2018 Drill Investigation

Source: Tetra Tech (2022)

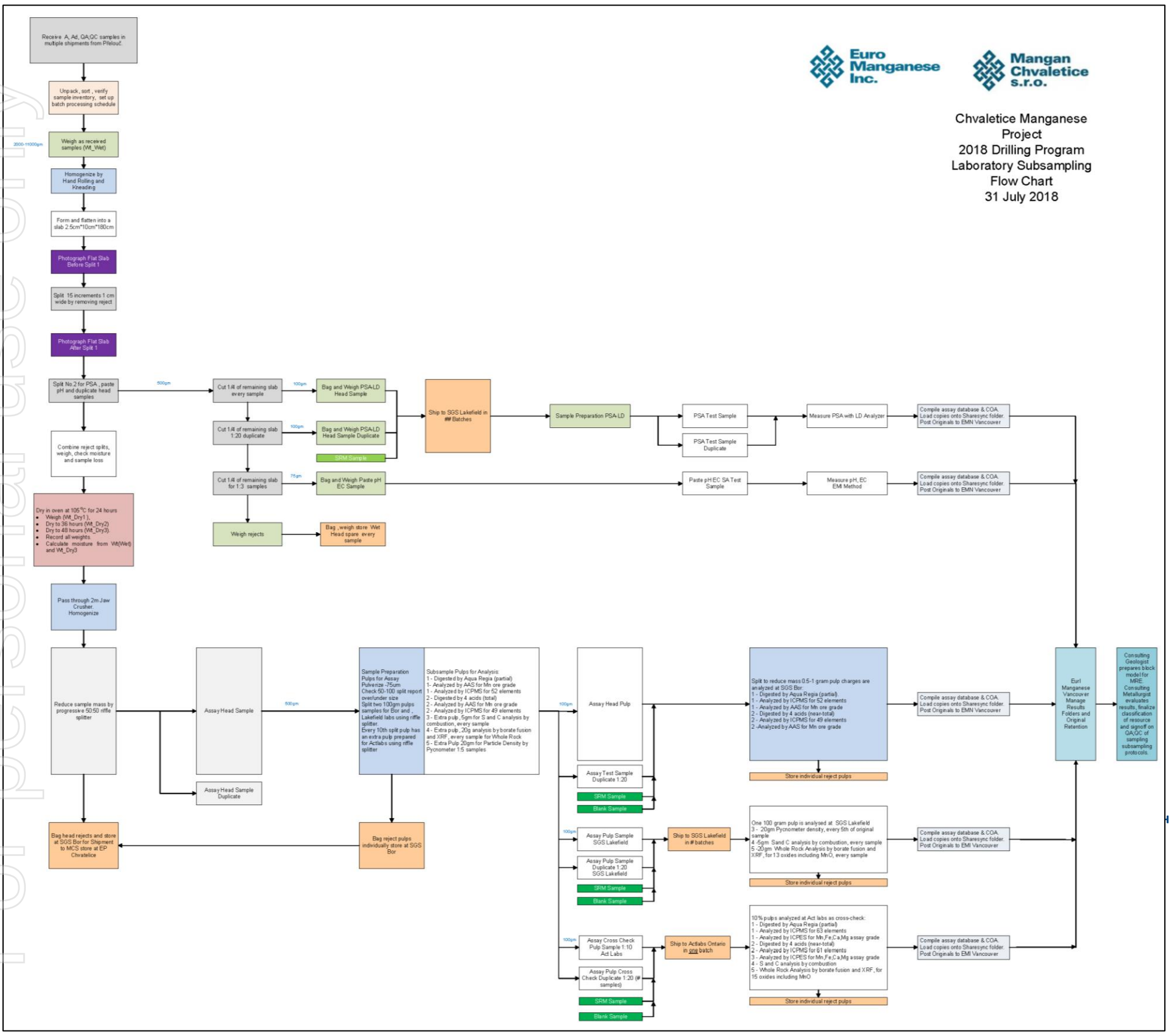

Figure 11-2: Subsample A Handling and Analysis Flowsheet Developed by EMN for 2018 Drill Investigation

Source: Tetra Tech (2022)

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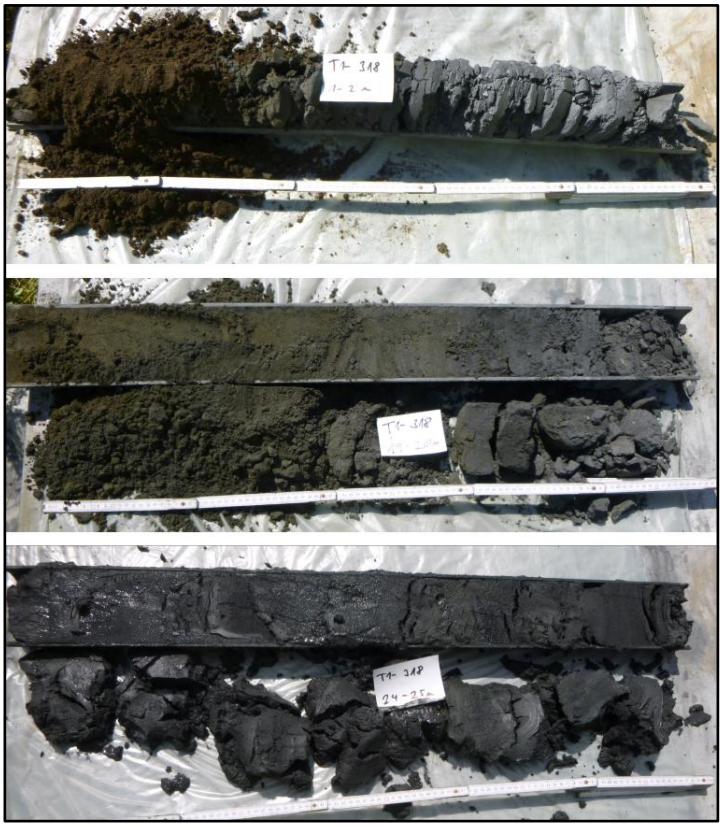

Figure 11-3: Core Photos from Drill Hole T1-318, from Depths 1-2 m, 19-20 m, and 24-25 m

Source: Tetra Tech (2022)

Figure 11-4: Core Photos from Drill Hole T1-312, from Depths 3-4 m, 9-10 m, and 23-25 m

Source: Tetra Tech (2022)

11.1 Sample Collection

Core samples were collected continuously from the lower topsoil contact to the base of the tailings material at the subsoil contact. Sampling included only tailings material and excluded the upper topsoil and lower subsoil materials. A total of 755 samples with a combined wet weight of 23,521 kg were collected, representing 1,497.8 m in 2017, and a total of 730 samples with a combined total weight of 13,373 kg representing 1,398.7 m of cross stratigraphy tailings material.

The drilling was advanced on 2 m core runs. The core was extracted from the core tube in 1 m intervals into half cylinder core trays. These sub-samples were logged geologically, and field measurements were collected. Field measurements included sample wet mass, recovery, moisture, and magnetic susceptibility. Core logs and field measurements were recorded on site and later merged into a digital database.

Core recovery was measured on 1 m sub-samples and ranged from 45% to 110%. Some loss of material was encountered during flushing of drill pipes and likewise some elongation of core resulted due to plasticity if the material at certain locations in the deposit.

Each 1 m sub-sample was then quarter split (25:75) using a cutter along the length of the core axis (Figure 11-5) to preserve the in situ material distribution; the samples were not homogenized in the field. The 25% split was bagged and recombined with the corresponding quarter split from the other remaining one metre core run sub-sample. The 75% split was also bagged and recombined with the corresponding 75% core run sub-sample. Identification tags were included with each sample before the bags were sealed.

Figure 11-5: Sample Collection

Notes: A) 1 m core run sub-sample
B) and C) half and quarter splitting or core in field
D) sealed sample bags (bulk samples)

Source: Tetra Tech (2022)

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The 25% split samples were assembled for assay and particle size analysis (“assay samples”). The samples were delivered to SGS located in Bor, Serbia, in two shipments, then divided into 19 analytical batches at the lab (7 and 12 batches per shipment, respectively). The samples remained in custody of EMN personnel until being delivered by a commercial logistic company to SGS.

In 2017, the remaining 75% sub-sample was shipped to CRIMM in China, for bulk sample metallurgical and processing testwork, respectively. In 2018, the remaining sample was split again with a 25% subsample collected for testwork in Czech Republic, and the remaining half core collected for metallurgical testwork in China. These samples were collected at a field warehouse which is managed by Geomin in Jihlava, inventoried, and placed into sealed steel drums strapped to pallets which loaded into a 40 ft. shipping container.

11.2 Laboratory Preparation and Sample Splitting

Assay samples received at SGS Bor were weighed (wet) and homogenized by hand using the “Japanese slab cake method” of kneading and rolling the sample. The homogenized sample was rolled out into a slab approximately 10 cm by 180 cm and 2.5 cm thick, as shown in Figure 11-6.

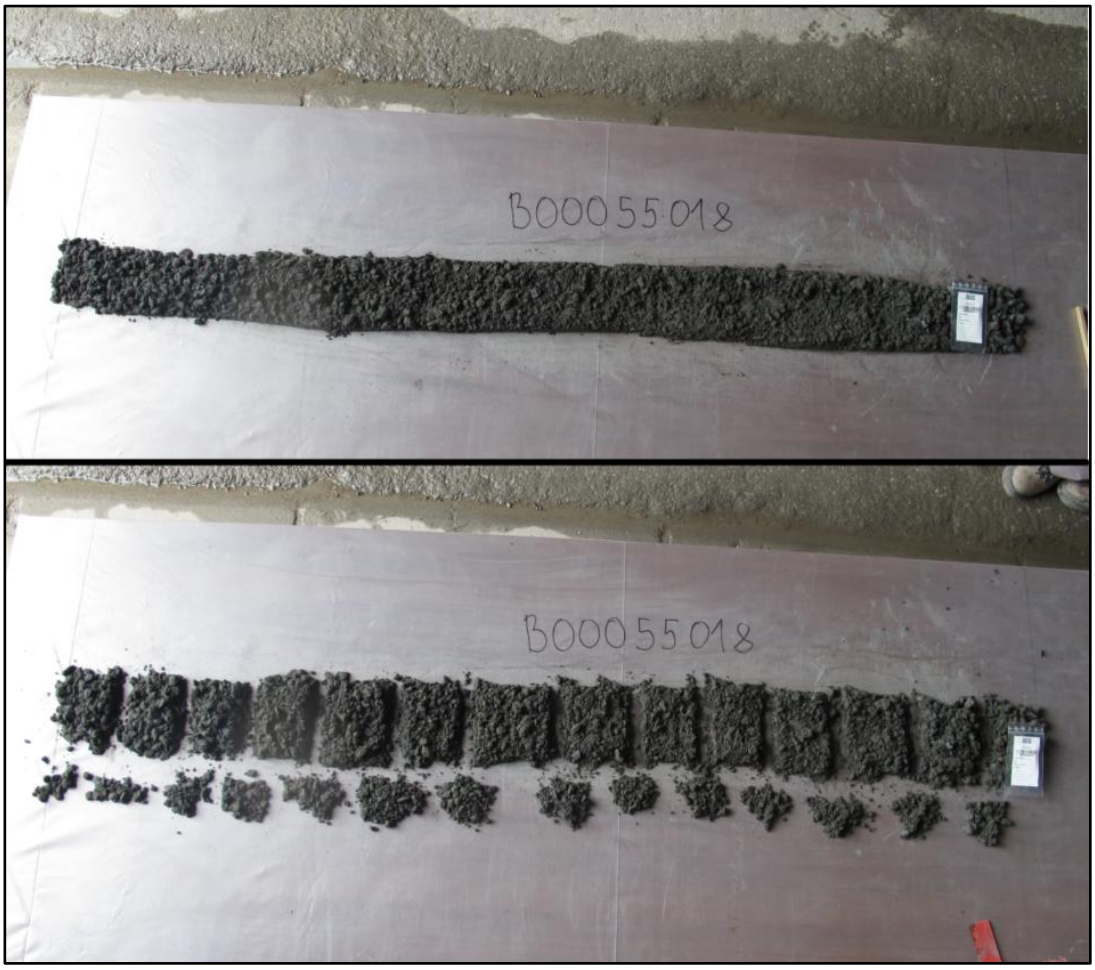

Figure 11-6: Example of Sample Splitting by the Wet Japanese Slab Cake Homogenization Method

Source: Tetra Tech (2022)

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A first split was achieved by forming fifteen smaller slabs from the original sample volume by cutting and removing the reject from around the perimeter of the slabs.

A quarter of each of the small slabs was cut from one to make about 100 g of head sample. This split was not dried and was sent for laser diffraction particle size analysis (PSA-LD) at SGS in Lakefield, Canada. In 2017, one out of twenty (1:20) samples were sent as duplicates to GEOtest (Brno, Czech Republic) for comparative hydrometer particle size analysis (PSA-H); hydrometer tests were not completed as part of the 2018 test program. Approximately 75 g of materials as extracted for pH and EC measurement using a paste pH method.

The remaining slab material was dried at 105°C and homogenized using standard lab methods.

The wet cut method was selected to preserve the in situ state of the particles for PSA-LD. The total mass of material extracted from the PSA-LD, PSA-H, paste pH, and EC splits was approximately 500 g.

Duplicate splits which are master head assay duplicates were again taken 1:20 for heterogeneity/sampling error monitoring. These are identified as “lab duplicates” in the QA/QC assessment in Section 11.9.3.

All reject materials from the PSA splits were recombined, weighed, and dried. Moisture content of the sample was determined from the moisture loss measured at this stage of preparation. The sample was again homogenized and approximately 1 kg of material was extracted for assaying. These samples were pulverized to -75 µm.

The remaining head rejects were bagged, inventoried, and shipped for storage at the Geomin field warehouse in Jihlava.

11.3 Trace Element Assay

A total of 1,694 (863 in 2017 and 831 in 2018, including QA/QC samples) assay samples, averaging approximately 4.5 kg each (except for 50 g certified reference standards), were delivered to SGS in Bor, Serbia, for assay. The samples were submitted for the analyses listed in Table 11-1. The assay methods were selected to measure total elemental concentration in addition to measuring partial digestion concentrations of manganese as a proxy for “soluble manganese”. In 2017, total manganese was initially inferred from the results of the 4-acid digestion methods, however, this practice was revised in 2018 when total manganese was measured from total digestion methods with XRF detection. Soluble manganese refers to the results of the aqua regia digestion.

A sample assay exceeding 10,000 ppm manganese, which is the upper detection limit of the ICP-MS equipment was submitted for ore grade analysis using AAS. A sample split was digested in four acids (hydrochloric acid, nitric acid, hydrofluoric acid, and perchloric acid) for a near total digestion of the sample and a second split was digested in a weaker aqua regia solvent for partial digestion and as proxy for the “soluble manganese” mineral phases contained in the sample.

Table 11-1: Tabulated Description of Analytical Methods used for Assay of Tailings Sample

Digestion	Finish	SGS Method	Description
Aqua Regia	ICP-MS or AAS	IMS14B, AAS15Q	52 trace elements, includes analysis for “soluble” manganese
4-acid	ICP-MS or AAS	IMS40B, AAS42S	49 trace elements
Borate Fusion	XRF	GO_XRF76V	Total digestion lithogeochemistry; major cation oxides, includes analysis for “total” manganese
Combustion	LECO or SC632	GE_CSA06V	Inorganic carbon and sulphur assay

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11.4 Particle Size Analysis

Particle size distribution throughout the deposit varies significantly due to the processed nature of tailings slurry material and the dynamics during deposition and particle settlement. Grain size may influence the manganese recovery process that is developed for the CMP. As regrinding of the tailings was not envisaged, understanding of particle size distribution was considered a critical variable for the deposit.

The primary method for particle size distribution analysis was by laser diffraction technology (PSA-LD) in a Malvern Mastersizer located at SGS in Lakefield, Canada (SGS method ME-LR-MIN-MET-SC-A03) using wet material. This equipment is able to analyze particle sizes from 0.02 to 2,000 µm, which is ideal for very fine materials such as silt and clays. A total of 830 PSA-LD results were received, which included 720 primary tailings samples. An additional 76 sample duplicates were submitted by EMN, 5 sample duplicates prepared internally by SGS, and 31 internal QC standards.

Particle size distribution analysis was also conducted through sieve and hydrometer methods using the European standard International Organization for Standardization (ISO) TS 17892-4, at GEOtest located in Brno, Czech Republic. The method includes passing dried material through standard screens, with the smallest screen size at 0.063 mm. Fractions passing this screen are classified as silt and clay and subjected to hydrometer testing. A total of 93 samples were submitted for hydrometer tests.

Grain sizing used for the CMP incorporates both North American standard ASTM International (ASTM) D-422 and the European standard ISO14688-1/-2.

11.5 Lithogeochemistry

Lithogeochemistry was conducted at SGS in Lakefield using lithium borate fusion with XRF detection of 12 major oxides including manganese (II) oxide. A total of 1,448 (714 in 2017 and 734 in 2018, excluding QA/QC samples) samples were submitted for analysis.

Total inorganic carbon and inorganic sulphur were analyzed at SGS Lakefield using LECO furnace (combustion and infrared detection).

11.6 Moisture and Mass

Mass was measured in the field as wet mass on 1 m core run sub-samples, and also as wet and dry mass at the SGS laboratory in Bor in Serbia on the 25% split samples which represented the full 2 m core run sample size. Figure 11-7 depicts the relationship between wet and dry mass measured at SGS in Bor with the total represented sample interval length.

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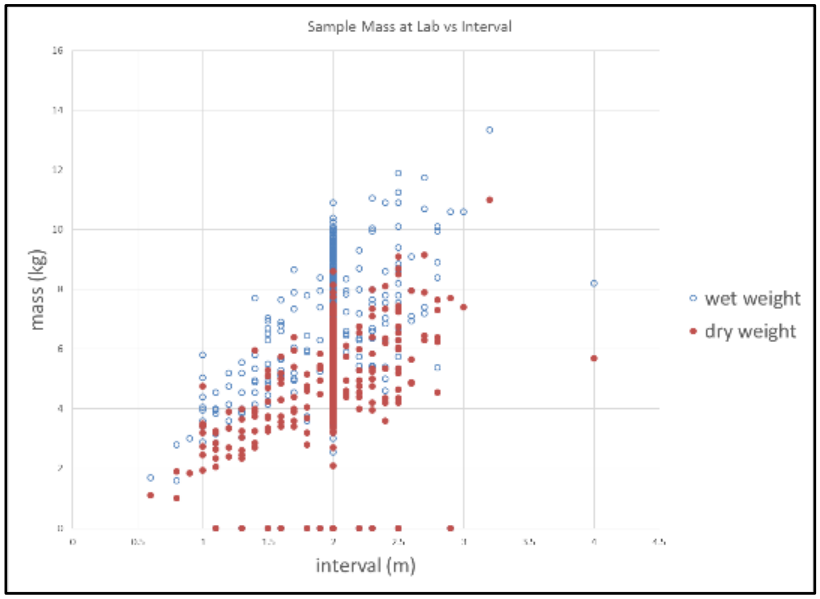

Figure 11-7: Wet and Dry Mass Measured at SGS Bor vs. Sample Interval

Source: Tetra Tech (2022)

Approximate moisture content was measured in the field during the 2017 drilling program using a Delta-T MT3 soil moisture sensor (Figure 11-8) and at SGS in Bor from the assay samples that were received. The field moisture measurement approximated values ranged from 4% to 33%, with average value of 17.9%. Comparatively, laboratory moisture was calculated from the mass lost after wet samples were dried with values ranging from 5.6% to 27.4%, with average value of 17.4%. This procedure was not implemented during the 2018 field program.

Figure 11-8: Collection of Moisture and Magnetic Susceptibility Data in the Field

Source: Tetra Tech (2022)

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11.7 Specific Gravity

Specific gravity analysis was conducted at SGS Bor on splits from the assay sample using method ME-LR-MIN-MET-DS-A01. The pycnometer tests results are directly proportional to the individual densities of the mineral grains in the sample and can be used in estimating the in situ porosity of the tailings materials. The pycnometer specific gravity results ranged from 2.90 to 3.28 with average value of 3.05.

11.8 Bulk Density

Calculation of in situ dry bulk density was based on core recovery estimated in the field and the dry mass weights measured at SGS Bor. Further description of in situ bulk density calculation is included in Section 14.5.6.

11.9 2017 Sampling and Laboratory Analysis QA/QC Program

A systematic QA/QC program was designed in connection with the 2017 drill-sampling and analytical work. The program consisted of the following:

- Insertion of control samples (CRMs, duplicates, and blanks) into the analytical sample stream to monitor the performance of the labs, representing 15.7% of overall analytical results
- Review of internal QC data generated by the labs
- Re-analysis or repeat of the testwork on batches and samples that fail the QC criteria
- Independent QA assessment completed by Tetra Tech.

A total of 755 samples were shipped to SGS for elemental analysis. This included 695 assays, 3 CRMs (33 analyses), 35 blanks, and 41 field duplicates. The laboratory included 21 additional lab duplicates. This resulted in a total of 884 assay results reported to EMN.

11.9.1 Certified Reference Materials

Three CRMs were inserted in sequence with the samples that were shipped to SGS in Bor. The name of the samples was recorded on the sample tag and was delivered to the lab as a blind sample with composition unknown to the lab. CRM insertions assess the accuracy of the analysis being performed and are intended to be present at a rate of at least one CRM per sample batch. Batch sizes at SGS included approximately 45 samples per batch, including field and laboratory QC sample insertions.

Three reference materials were selected by EMN at the onset of the program to be used as standards: as described in the following sub-sections.

11.9.1.1 Certified Reference Material – NRC-SCH-1

The NRC-SCH-1 reference was supplied by the National Research Council of Canada CANMET and was prepared from iron ore as hematite with various hydrous oxides of iron from the Schefferville Mine in Quebec, Canada. The expected mean manganese grade is 0.777% with 95% confidence interval of 0.008% manganese.

This sample accounted for thirteen analyses. Figure 11-9 shows the performance of the standard, where total manganese grade falls within the confidence interval of ±2 standard deviations. Soluble manganese values fall below the confidence interval, as expected, with somewhat variable correlation to the total manganese values.

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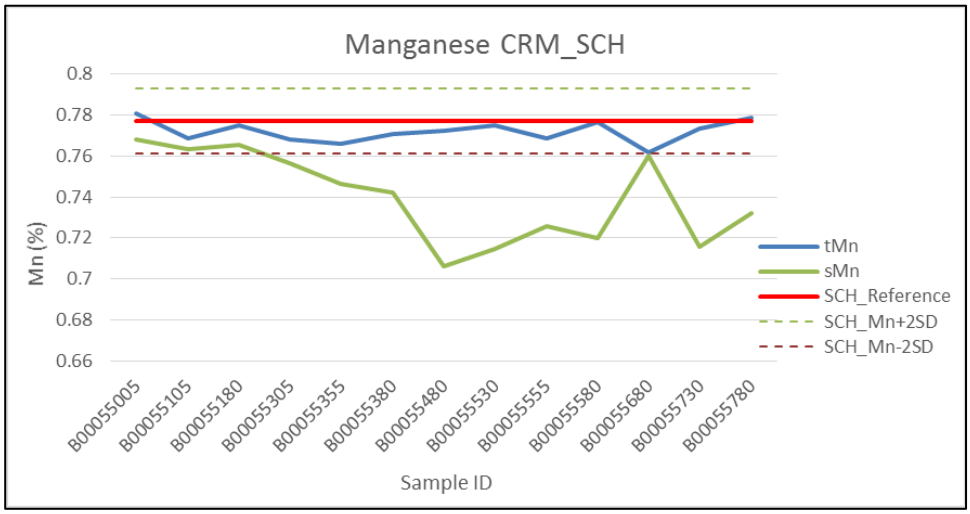

Figure 11-9: CRM_SCH-1 Performance Plot for Total and Soluble Manganese

Source: Tetra Tech (2022)

11.9.1.2 Certified Reference Material – NCS-DC-70007

The NCS-DC-70007 reference was supplied by China National Analysis Center for Iron and Steel. The source material is not disclosed in the material datasheet. The expected mean manganese (II) oxide grade of 1.49% (1.154% manganese) and standard deviation of 0.08% manganese (II) oxide (0.062% manganese).

This sample accounted for seven analyses. Figure 11-10 shows the performance of the standard, where total manganese grade falls within the confidence interval of ±2 standard deviations. Soluble manganese values fall below the confidence interval, as expected, with good correlation to the total manganese values.

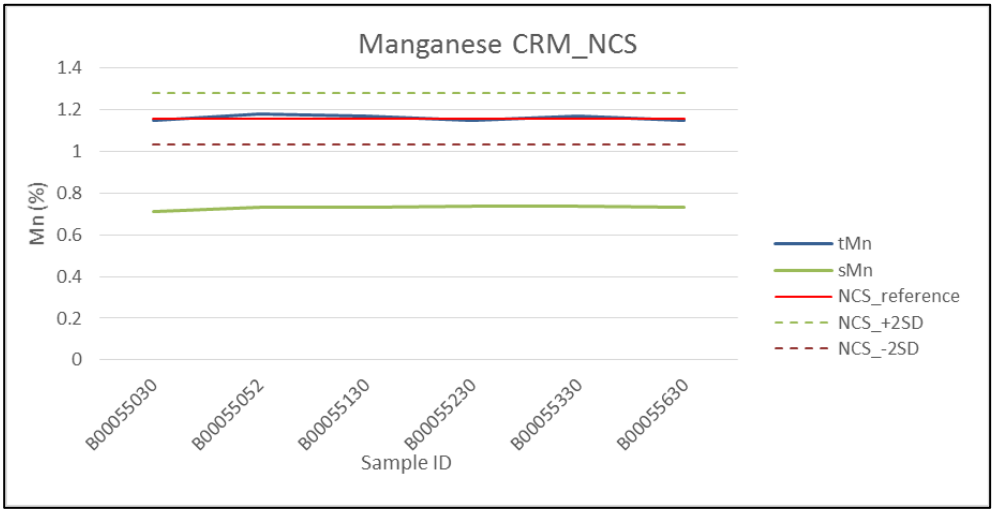

Figure 11-10: CRM_NCS Performance Plot for Total and Soluble Manganese

Source: Tetra Tech (2022)

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11.9.1.3 Certified Reference Material – NOD-A1

The NOD-A1 reference was supplied by the United States Geological Survey and was prepared from Atlantic Ocean seamount manganiferous nodules from the Blake Plateau. The expected mean manganese (II) oxide grade is 23.9% (18.51% manganese) with standard deviation of 0.065%.

This sample accounted for eleven analyses. Figure 11-11 shows the performance of the standard, where total manganese grade falls below the confidence interval of standard deviations and soluble manganese values falls further below with good correlation to the total values. This performance failure has been identified by others (Cullen et al. 2013) whereby it was concluded that "the primary meta-borate fusion and ME-ICP06 analytical package did not provide sufficient extraction of manganese and iron to match reference material results that were based on XRF analysis". This CRM is not believed to be a suitable reference standard for control of exploration data as the results of this control measure are considered highly susceptible to analytical method. The materials do not assess, with validity, the digestion and equipment calibration used in this program's analysis.

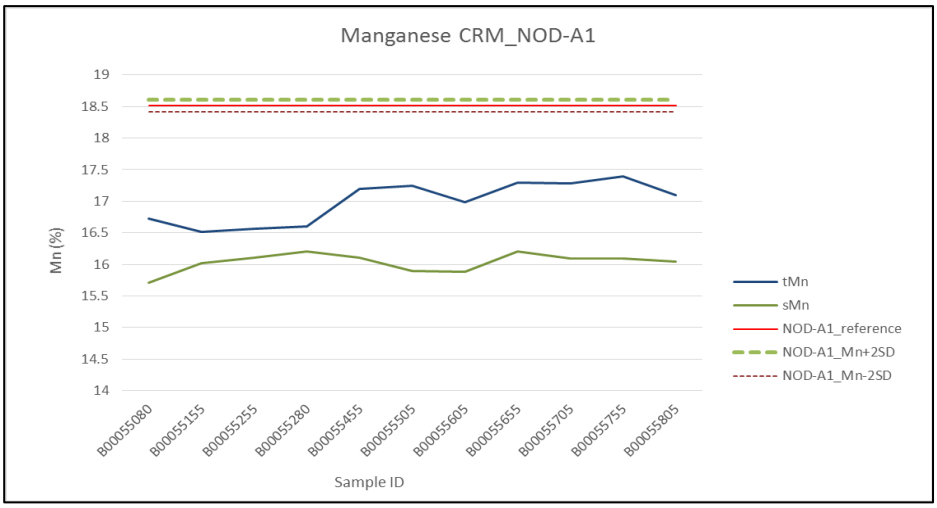

Figure 11-11: CRM_NOD-A1 Performance Plot for Total and Soluble Manganese

Source: Tetra Tech (2022)

11.9.2 Blank Analyses

11.9.2.1 Certified Blank – ST08

The ST-08 Certified Blank was supplied by Sklopísek Strelec, Czech Republic, as a high purity silica sand with low impurity concentration. The standard was manufactured for grain size distribution analysis and reports an expected manganese concentration; however, this is expected to be negligible.

This sample accounted for twenty-three analyses. Figure 11-12 and Figure 11-13 show the performance of the blank for iron and manganese concentrations. One sample failure (B00055034) was observed for manganese with a concentration of 0.77%. The remaining concentrations were below 150 ppm. This ambient concentration may be due to residual manganese within the grinding equipment, but it was determined to be insignificant. Overall sample failure is less than 5%, which is interpreted by the CP as acceptable.

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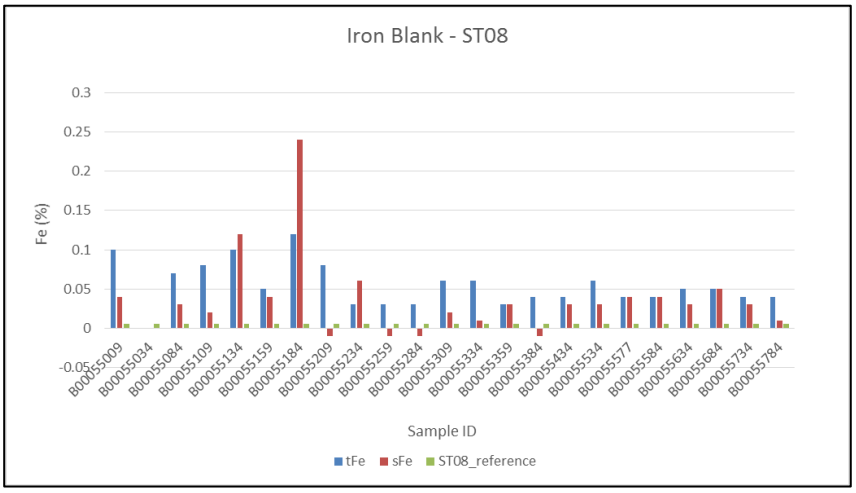

Figure 11-12: Certified Blank – ST08 – Iron

Source: Tetra Tech (2022)

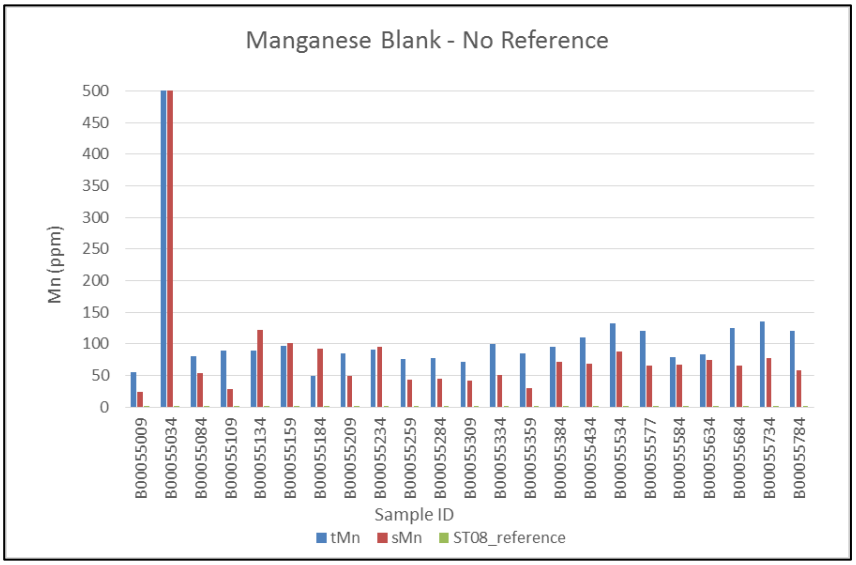

Figure 11-13: Certified Blank – ST08 – Manganese

Source: Tetra Tech (2022)

11.9.2.2 Certified Blank – BCS

The BCS certified blank was supplied by Bureau of Analysed Samples Ltd, based in England, prepared as low iron sand that passes a nominal 250 µm aperture. The standard has a “certified value” of 0.00014% manganese (II) oxide with 95% confidence interval of 0.0003%.

This sample accounted for eleven analyses. Figure 11-14 and Figure 11-15 show the performance of the blank for manganese and iron concentrations. The manganese concentrations were below 150 ppm. This ambient concentration may be due to residual manganese within the grinding equipment, but it was determined to be insignificant.

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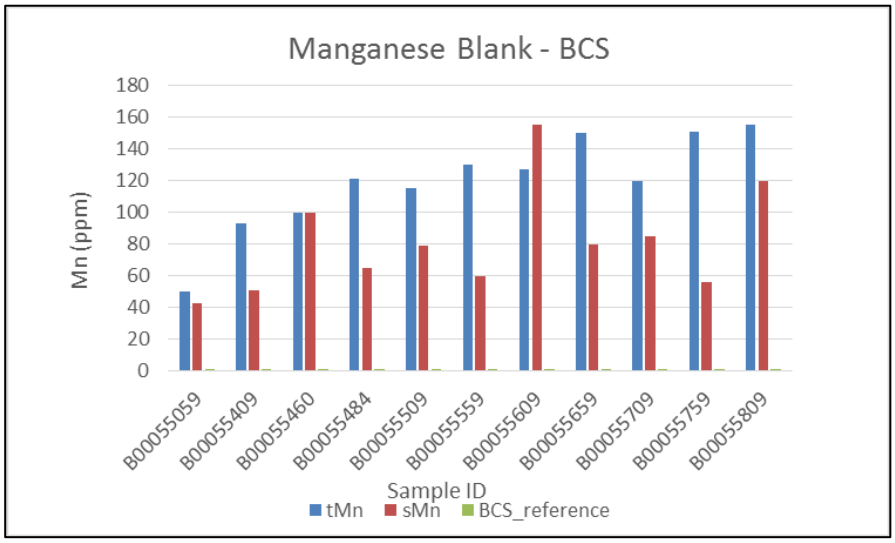

Figure 11-14: Certified Blank – BCS – Manganese

Source: Tetra Tech (2022)

The certified blank, BCS, (green) is consistently shown as having less manganese percentage than the total manganese, 4-acid AAS, (blue) or soluble manganese, aqua regia AAS, (red).

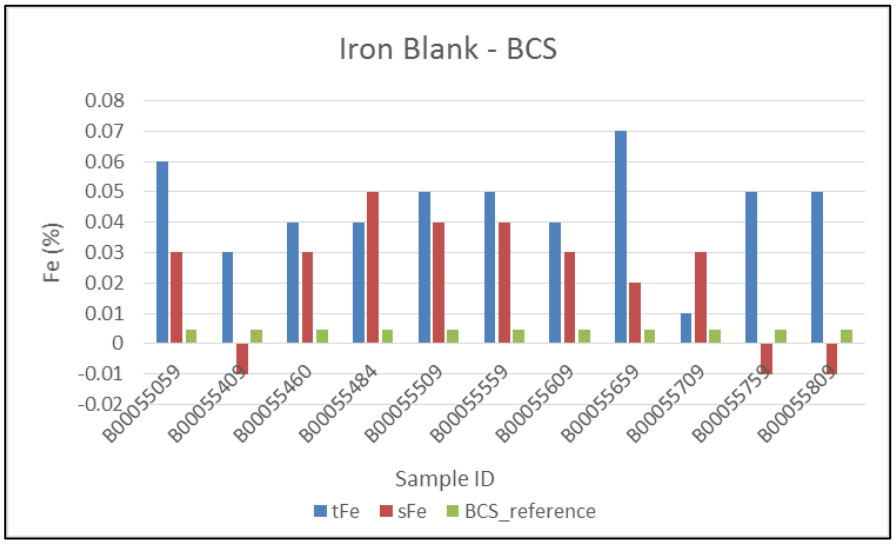

Figure 11-15: Certified Blank – BCS – Iron

Source: Tetra Tech (2022)

11.9.3 Lab Duplicates

Lab duplicates represent those samples which were homogenized and split from the coarse material into to replicate sub-samples internally by the lab, on request of EMN, prior to being pulverized and analyzed. The results of the lab duplicate assays allow for pairwise assessment of the laboratory's sample preparation, homogenization and splitting procedures prior to pulverization and digestion for analyte.

A total of 20 pairs of lab duplicates were collected, with 16 result pairs for soluble manganese and 18 result pairs for total manganese. In the assay database, each pair was identified with the same sample number with one labelled with DUP as suffix and the second with no suffix. The duplicate sets were evaluated using simple linear regression and the

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Pearson's coefficient, and also for relative percent difference (RPD) as a measure of precision. An RPD of less than 10% within 90% confidence interval is considered to be a reasonable variation for evaluation of the quality of the data.

Figure 11-16 shows the duplicate regression for soluble manganese (aqua regia AAS) and Figure 11-17 shows the regression for total manganese (4-acid AAS) against a 1:1 unity line in red. The soluble manganese regression indicated a slope of 1.0049 with Pearson's coefficient of 0.83, mainly due to one outlier. Total manganese indicated a slope of 0.9423 with Pearson's coefficient of 0.97.

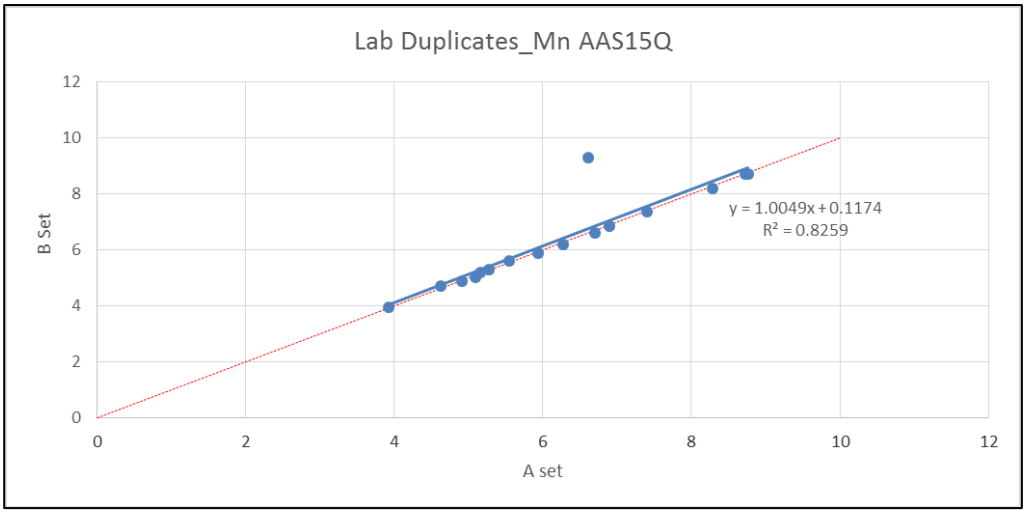

Figure 11-16: Linear Regression of Soluble Manganese Assay Lab Duplicate Results

Source: Tetra Tech (2022)

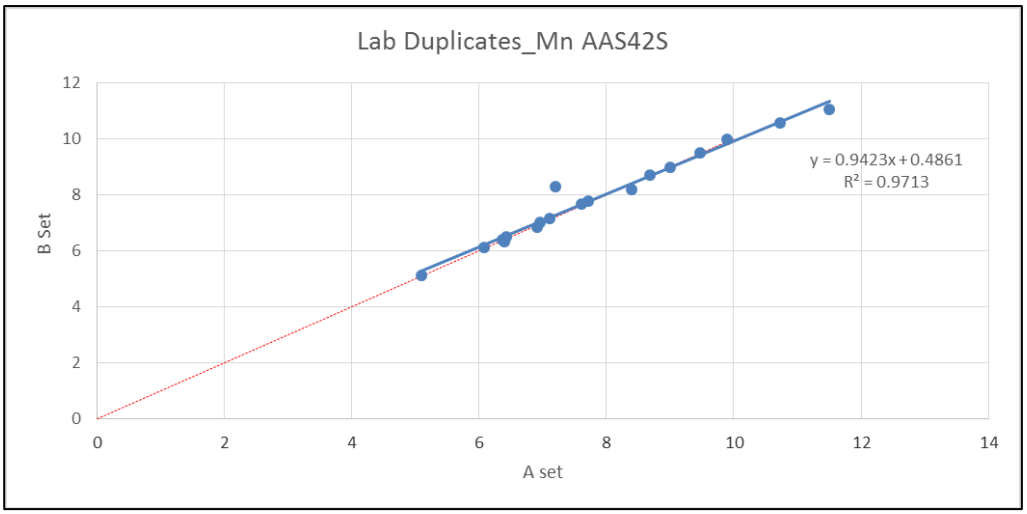

Figure 11-17: Linear Regression of Total Manganese Assay Lab Duplicate Results

Source: Tetra Tech (2022)

RPD analysis of the field duplicates results for soluble manganese shows 15 of 16 pairs with a value of less than 1.72% and one sample pair with value of 33.82%. RPD analysis of the lab duplicates results for total manganese show 17 of 18 pairs with a value of less than 3.99% and one sample pair with value of 14.19%. A greater precision was observed for the total manganese assays.

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11.9.4 Field Duplicates

Field duplicates represent those samples split and collected by EMN field staff at the drill and delivered to the lab as a blind duplicate. The results of the field duplicate assays allow for pairwise assessment of the procedures used in the field to split and collect samples prior to being delivered to the lab for analysis.

A total of 41 pairs of field duplicates were collected with reportable results. In the assay database, each pair was identified with the same sample number with one labelled with A as suffix and the second with B as the suffix. The A and B sets were evaluated using simple linear regression and the Pearson's coefficient, and also for RPD as a measure of precision. An RPD of less than 10% within 90% confidence interval is considered to be a reasonable variation for evaluation of the quality of the data.

Figure 11-18 shows the duplicate regression for soluble manganese (aqua regia AAS) and Figure 11-19 shows the regression for total manganese (4-acid AAS) against a 1:1 unity line in red. The soluble manganese regression indicated a slope of 0.9174 with Pearson's coefficient of 0.94, and total manganese indicated a slope of 0.9977 with slope of 0.98.

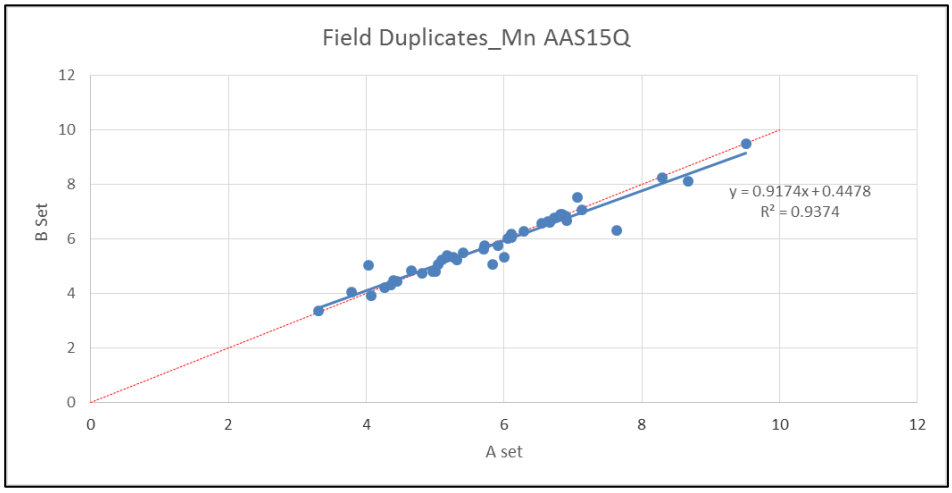

Figure 11-18: Linear Regression of Soluble Manganese Assay Duplicate Results

Source: Tetra Tech (2022)

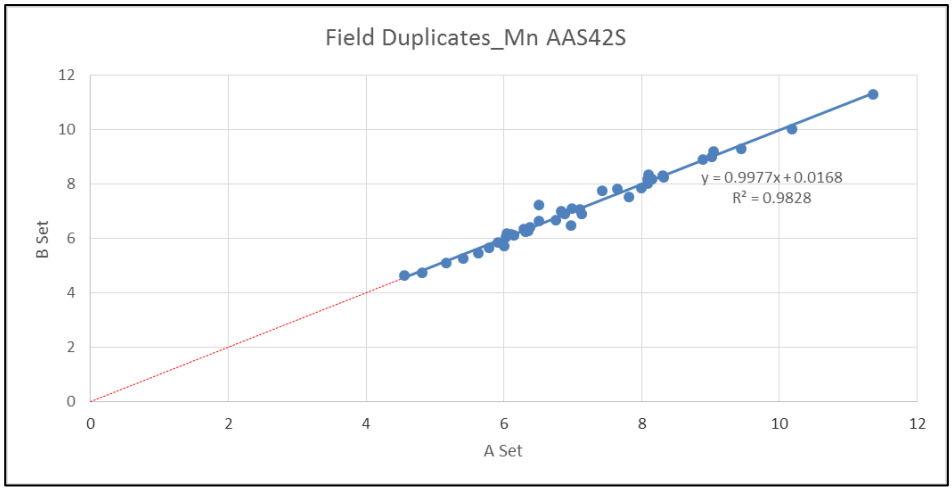

Figure 11-19: Linear Regression of Total Manganese Assay Duplicate Results

Source: Tetra Tech (2022)

RPD analysis of the lab duplicates results for soluble manganese show 37 of 41 pairs with a value of less than 6.90% and four samples pair with values between 11.64% and 22.47%. RPD analysis of the lab duplicates results for total manganese show 40 of 41 pairs with a value of less than 7.43% and one sample pair with value of 10.48%. A greater precision was observed for the total manganese assays.

11.9.5 SGS Re-Analysis

Upon initial receipt of the laboratory data, instances were observed by EMN whereby concentrations of soluble manganese exceeded the reported concentrations of total manganese. As this is technically not possible, re-analysis of three batches was requested by EMN and completed by SGS. The re-runs were comprised of a split of the pulverized and homogenized sample.

Results of the re-analysis reduced the occurrence of soluble manganese exceeding total manganese to two samples, both of which were blank control samples at or below the detection limit.

11.9.6 External Laboratory Assay Verification

An external laboratory was selected by EMN to replicate the assay procedure for verification of assay splits that were prepared at SGS following initial receipt, drying, weighing and pulverizing of the sample. A total of 89 samples were shipped to Activation Laboratories Ltd. (Actlabs), located in Ancaster, Ontario, Canada. Comparison of total manganese grades from Actlabs with the SGS results are shown in Figure 11-20, and comparison of the soluble manganese grades are shown in Figure 11-21.

The results of the external laboratory verification indicate a reasonable comparison for both the total (4-acid) manganese and soluble (aqua regia) manganese data. Total manganese values show a slight scatter around a linear regression with Pearson's coefficient of 0.95, and slight bias to the Actlabs data with and slope of 0.98. A total of 14 total manganese grades, representing 16% of the data, showed RPD values of greater than 10%. Soluble manganese values show a slight scatter around a linear regression with Pearson's coefficient of 0.95, and slight bias to the Actlabs data with and slope of 0.96. A total of 46 soluble manganese grades, representing 51% of the data, showed RPD values of greater than 10%.

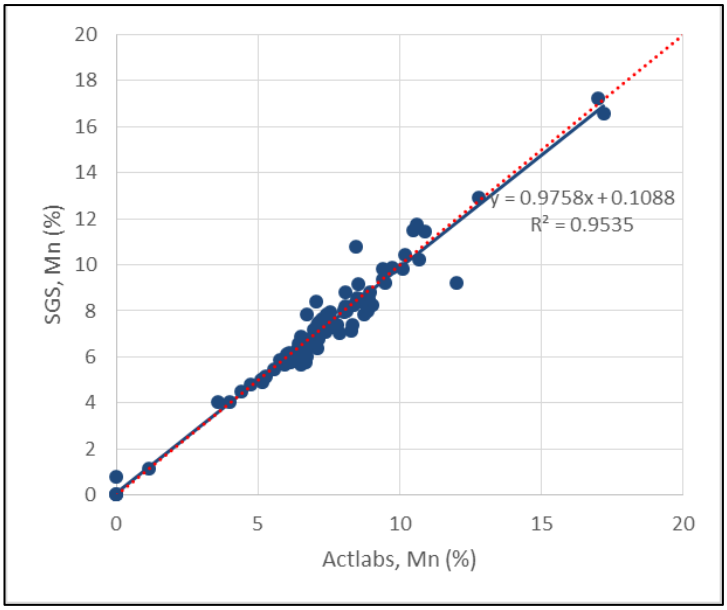

Figure 11-20: Linear Regression of Total Manganese Assay from Umpire Lab

Source: Tetra Tech (2022)

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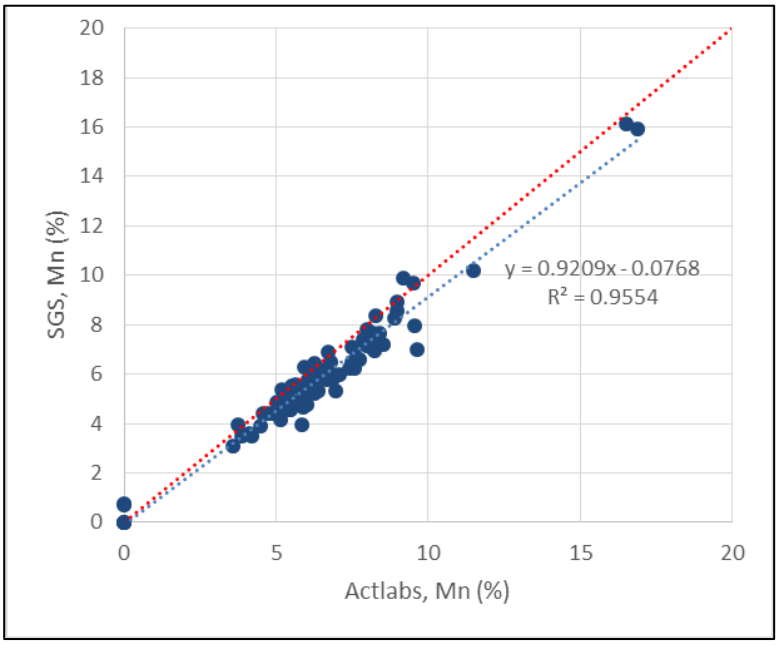

Figure 11-21: Linear Regression of Soluble Manganese Assay from Umpire Lab

Source: Tetra Tech (2022)

Linear regression of the external laboratory assay verification supports the manganese grades reported from SGS analysis, however, RPD analysis suggests some variability exists between the laboratory analyses. This may be caused by heterogeneity in sampling in the field.

11.10 2018 Sampling and Laboratory Analysis QAQC Program

A systematic QA/QC program was designed in connection with the 2018 drill-sampling and analytical work. The program consisted of the following:

- Insertion of control samples (CRMs, duplicates, and blanks) into the analytical sample stream to monitor the performance of the labs, representing 17.8% of overall analytical results
- Review of internal QC data generated by the labs
- Re-analysis or repeat of the testwork on batches and samples that fail the QC criteria
- Independent QA assessment completed by Tetra Tech.

A total of 830 samples were shipped to SGS laboratories located in Bor, Serbia, for elemental analysis. This included 730 assays, 33 CRMs (3 materials), 30 blanks (2 materials) and 37 field duplicates. The laboratory included 48 additional lab duplicates from preparation and analytical stages. This resulted in a total of 888 assay results reported to EMN.

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All analytical certificates were delivered directed to both EMN and to Tetra Tech allowing QA assessments to be conducted by Tetra Tech. A database was compiled, and various checks and measures were performed by Tetra Tech. Tetra Tech did not identify any significant QA concerns; however, high variability was identified in manganese concentrations reported from the partial and near-total digestion methods. Due to this, it was decided that manganese reported by lithium borate fusion and XRF was more reliable and was selected as the basis for total manganese grades for development of the MRE. The compiled database was validated for use in mineral resource estimation.

11.10.1 Certified Reference Materials

Three CRMs were inserted in sequence with the samples that were shipped to SGS in Bor. The name of the samples was recorded on the sample tag retained by EMN; the samples were delivered to the lab as a blind control samples with unknown composition. CRM insertions assess the accuracy of the sample solution preparation and accuracy of the analytical equipment being used. CRMs are intended to be present at a rate of at least one CRM per sample batch. Batch sizes at SGS included approximately 45 samples, including field and laboratory QC sample insertions.

Three reference materials were selected by EMN at the onset of the program to be used as standards as described in the following sub-sections.

11.10.1.1 Certified Reference Material – NRC-SCH-1

The NRC-SCH-1 reference was supplied by the National Research Council of Canada CANMET and was prepared from iron ore as hematite with various hydrous oxides of iron from the Schefferville Mine in Quebec, Canada. The expected mean manganese grade is 0.777% with 95% confidence interval of 0.008% manganese. This CRM was selected to evaluate samples with manganese concentration less than 1%, which were analyzed using ICP-MS and by XRF.

This sample accounted for eleven analyses. The manganese assays from XRF analysis (Mn_XRF), and both digestions with the ICP methods (4-acid digestion: Mn_4A, and aqua regia digestion: Mn_AR) were transformed to Z-score values and plotted against the expected mean and confidence interval to assess the performance of the CRM. The CRM performance chart and analytical drift chart are shown in Figure 11-22. Sample B00094854 (certificate AV011733) was mislabeled at SGS in Lakefield, Ontario for XRF analysis and has not been shown in Figure 11-22 for CRM performance.

The results show good performance for the XRF analysis where 73% of samples were measured within range, and the 4-acid ICP-MS methods where 82% of samples were measured within range. The aqua regia ICP-MS methods measured 27% of samples within range, which is an expected performance as only a portion of the sample is digested. The aqua regia digestion does have variable performance in relation to the 4-acid digestion suggesting the digestion method has strong influence on measured manganese concentration for this CRM. Overall, elevated variability is observed for manganese concentrations in this “low grade” range.

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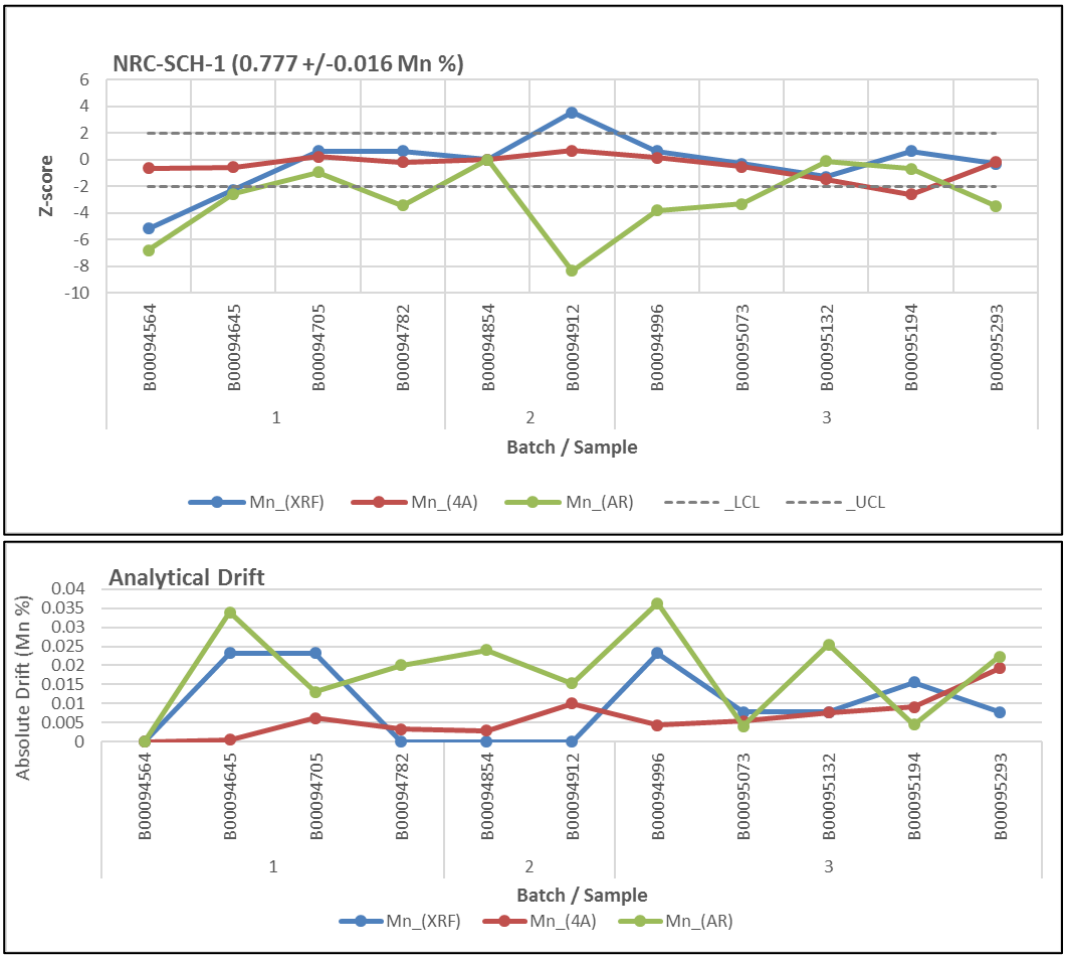

Figure 11-22: CRM Performance and Analytical Drift Charts for NRC-SCH-1

Source: Tetra Tech (2022)

11.10.1.2 Certified Reference Material – NCS-DC-70007

The NCS-DC-70007 reference was supplied by China National Analysis Center for Iron and Steel. The source material is not disclosed in the material datasheet. The expected mean manganese (II) oxide concentration is 1.49% (1.154% manganese) with a standard deviation of 0.08% manganese (II) oxide (0.062% manganese). This CRM was selected to evaluate samples with manganese concentration in low range greater than 1%, which were analyzed with “ore grade” methods using AAS and by XRF.

This sample accounted for eight analyses. The manganese assays from XRF analysis (Mn_XRF), and both digestions with the AAS methods (4-acid digestion: Mn_4A, and aqua regia digestion: Mn_AR) were transformed to Z-score values and plotted against the expected mean and confidence interval to assess the performance of the CRM. The CRM performance chart and analytical drift chart are shown in Figure 11-23.

The results show excellent performance for the XRF analysis where 100% of samples were measured within range, and the 4-acid ICP-MS methods where 100% of samples were measured within range. Th aqua regia ICP-MS methods measured 25% of samples within range, which is an expected performance as only a portion of the sample is digested. The aqua regia digestion does have variable performance in relation to the 4-acid digestion suggesting the digestion method has strong influence on measured manganese concentration for this CRM. The measurements by the XRF method were the most accurate.

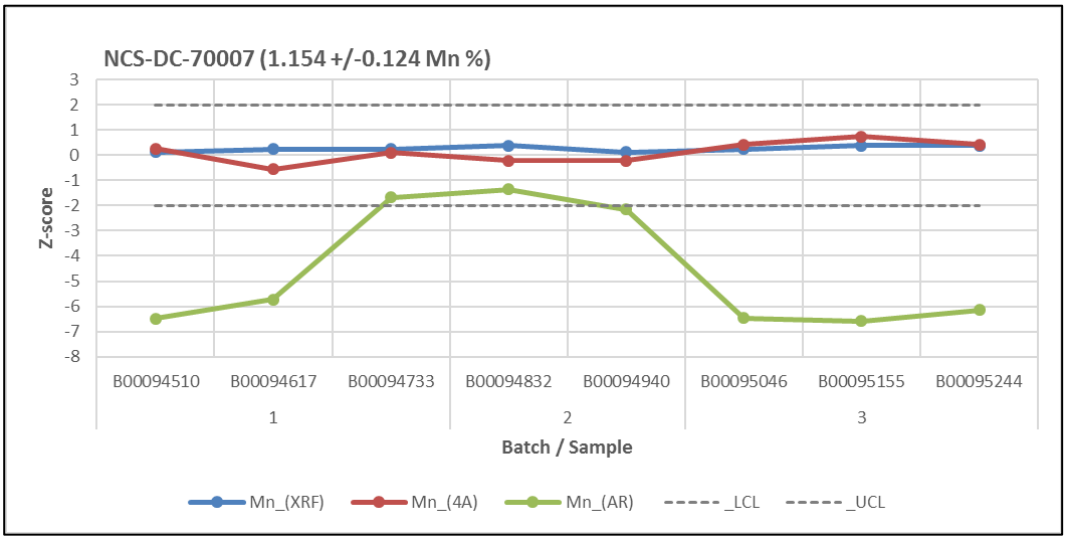

Figure 11-23: CRM Performance and Analytical Drift Charts for NCS-DC-70007

Source: Tetra Tech (2022)

11.10.1.3 Certified Reference Material – SX74-03

The SX74-03 reference was supplied by Dillinger Hütte Laboratories, Germany, manufacturers of steel products. The material source is a silicomangenese slag product with expected mean manganese concentration of 4.93% with a reported 95% confidence interval of 0.01%. This CRM was selected to evaluate samples with manganese concentration in mid-range greater than 1%, which were analyzed with “ore grade” methods using AAS and by XRF.

This sample accounted for thirteen analyses. The manganese assays from XRF analysis (Mn_XRF), and only the results of the 4-acid digestion with the AAS analysis (Mn_4A) were transformed to Z-score values and plotted against the expected mean and confidence interval to assess the performance of the CRM. The CRM performance chart and analytical drift chart are shown in Figure 11-24. Twice the original confidence interval of 0.01% is shown in Figure 11-24. The aqua regia digestion with AAS analysis results were not plotted.

The reported confidence interval for the SX74-03 reference is very narrow. The results show good performance for the XRF analysis where 92% of samples were measured within ±2.5% of the expected value, however, only 23% within twice the original confidence interval. The 4-acid AAS methods measure 62% of samples within ±2.5% of the expected value, however, report a higher variability and 30% within twice the original confidence interval. The aqua regia ICP-MS methods did not measure any samples to be within ±2.5% of the expected value and were not plotted. It was observed that the measurements from 4-acid AAS methods had a positive drift over time from below to above the threshold value.

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The measurements by the XRF method showed least variability and consistently low accuracy, compared to higher variability results of the 4-acid AAS analysis for this CRM.

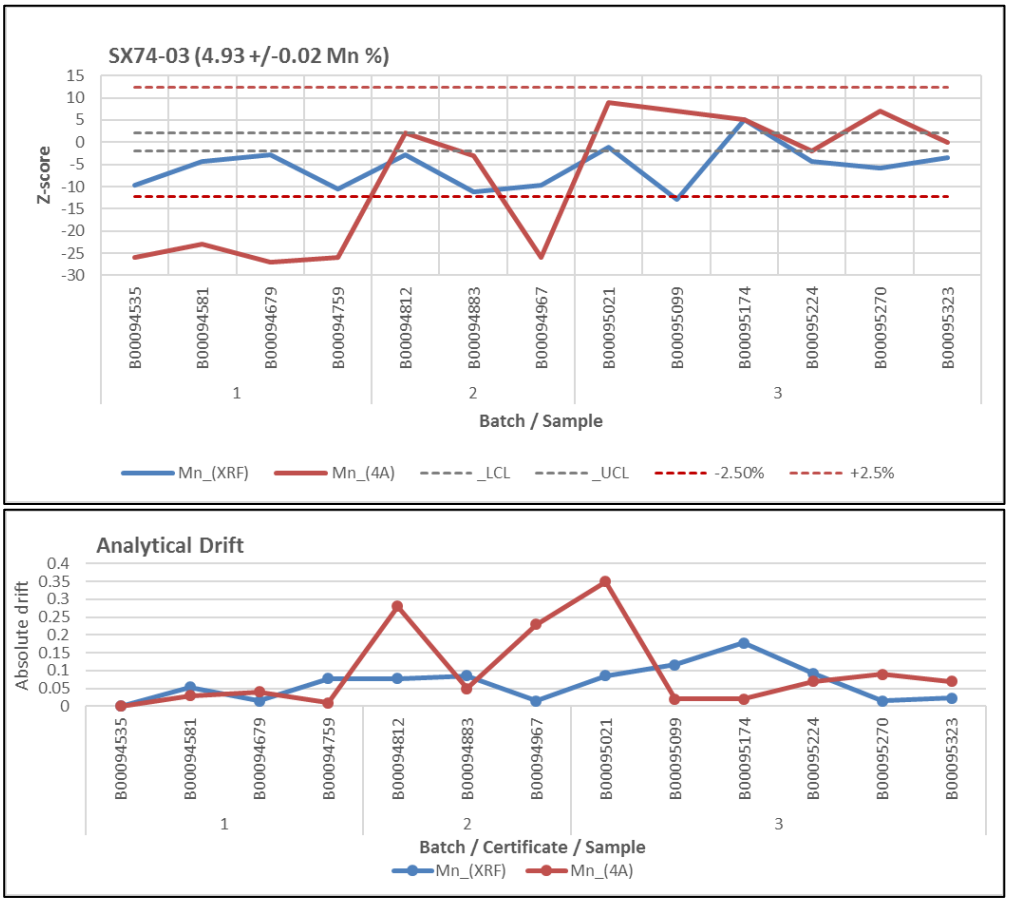

Figure 11-24: CRM Performance and Analytical Drift Charts for SX74-03

Source: Tetra Tech (2022)

11.10.2 Certified Blank Materials

11.10.2.1 BCS-CRM-531 Blank

The BCS-CRM-531 certified blank was supplied by Bureau of Analysed Samples Ltd, based in England, prepared as low iron sand that passes a nominal 250 µm aperture. The standard has a “certified value” of 0.00014% manganese (II) oxide within 95% confidence interval of 0.0003%.

Fifteen BCS-CRM-531 blanks were submitted for analysis to SGS. The assays from both 4-acid and aqua regia digestion with AAS analysis of these 15 samples are plotted in Figure 11-25 through Figure 11-27 for manganese, calcium, and iron concentrations, respectively. Three of the 4-acid AAS manganese results were measured above 150 ppm including one with concentration of 217 ppm (B00095250). This ambient concentration may be due to residual manganese within the grinding equipment, but it was determined to be insignificant. The results from the aqua regia AAS preparation appear to have lower overall manganese concentrations; all measured below 150 ppm. Although no specific failure threshold has been applied, the CP interprets that the sample contamination has not been introduced through sample handling and preparation in the lab.

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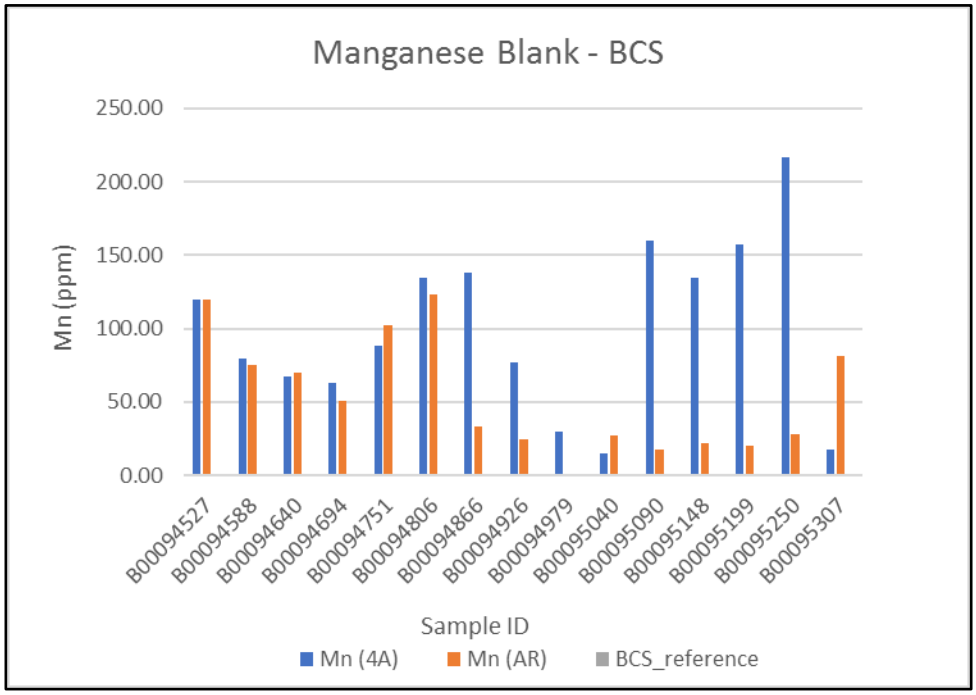

Figure 11-25: Certified Blank – BCS-CRM-531 – Manganese

Source: Tetra Tech (2022)

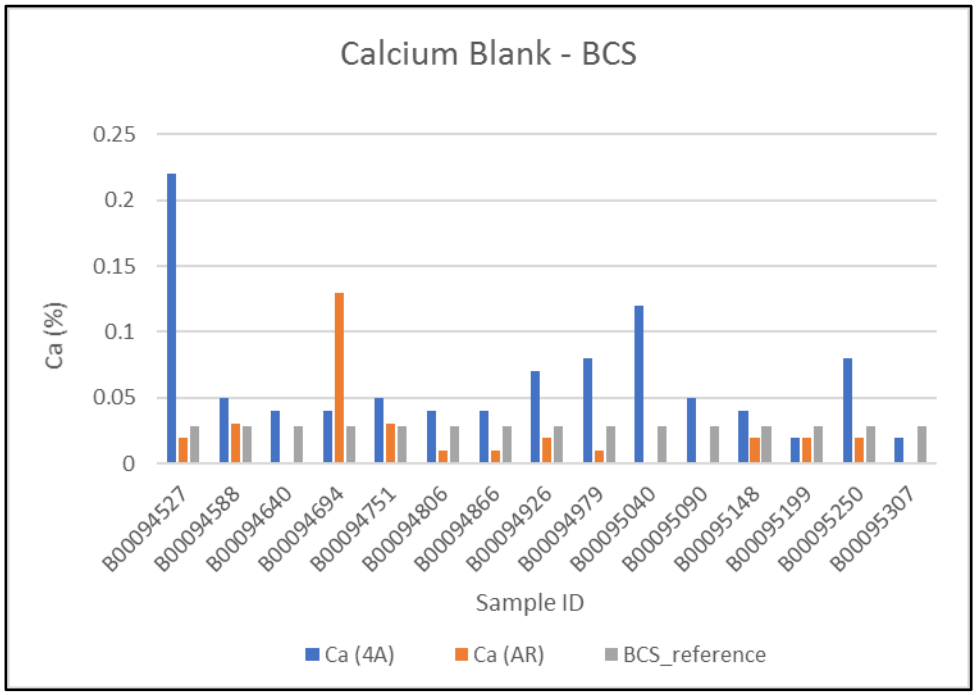

Figure 11-26: Certified Blank – BCS-ST-531 – Calcium

Source: Tetra Tech (2022)

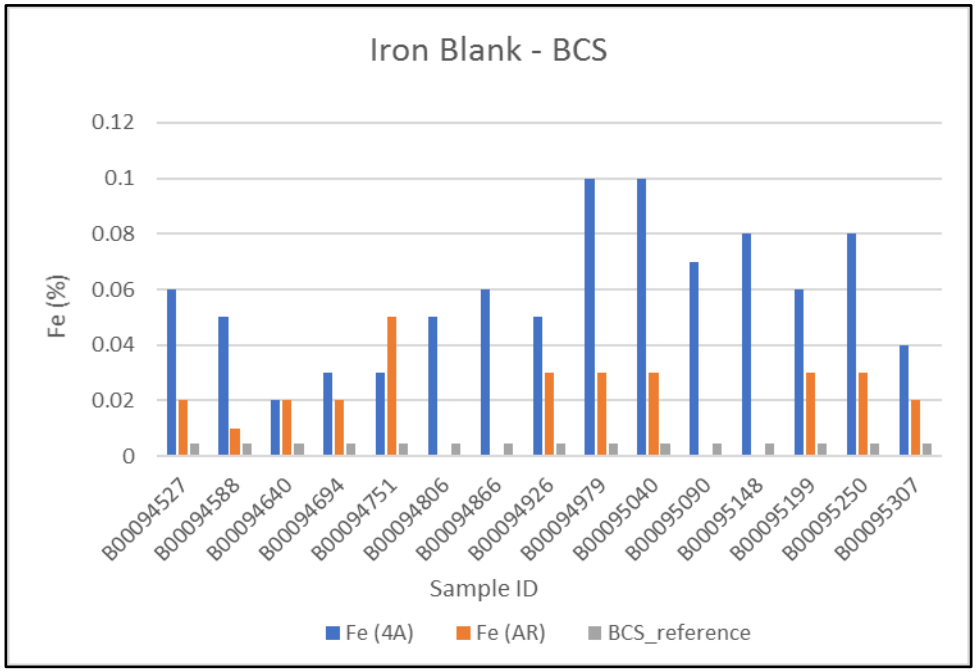

Figure 11-27: Certified Blank – BCS-ST-531 – Iron

Source: Tetra Tech (2022)

11.10.2.2 ST-08 Blank

The ST-08 certified blank was supplied by Sklopísek Strelec, Czech Republic, as a high purity silica sand with low impurity concentration. The standard was manufactured for grain size distribution analysis and reports an expected manganese concentration; however, this is expected to be negligible.

Fifteen ST-08 blanks were submitted for analysis to SGS. The assays from both 4-acid and aqua regia digestion with AAS analysis of these fifteen samples are plotted in Figure 11-28 through Figure 11-30 for manganese, iron, and calcium concentrations, respectively. Four of the 4-acid AAS manganese results were measured above 150 ppm and less than 200 ppm, and one aqua regia AAS sample was measured at 150 ppm. This ambient concentration may be due to residual manganese within the grinding equipment, but it was determined to be insignificant. Although no specific failure threshold was applied, the CP interprets that the sample contamination has not been introduced through sample handling and preparation in the lab.

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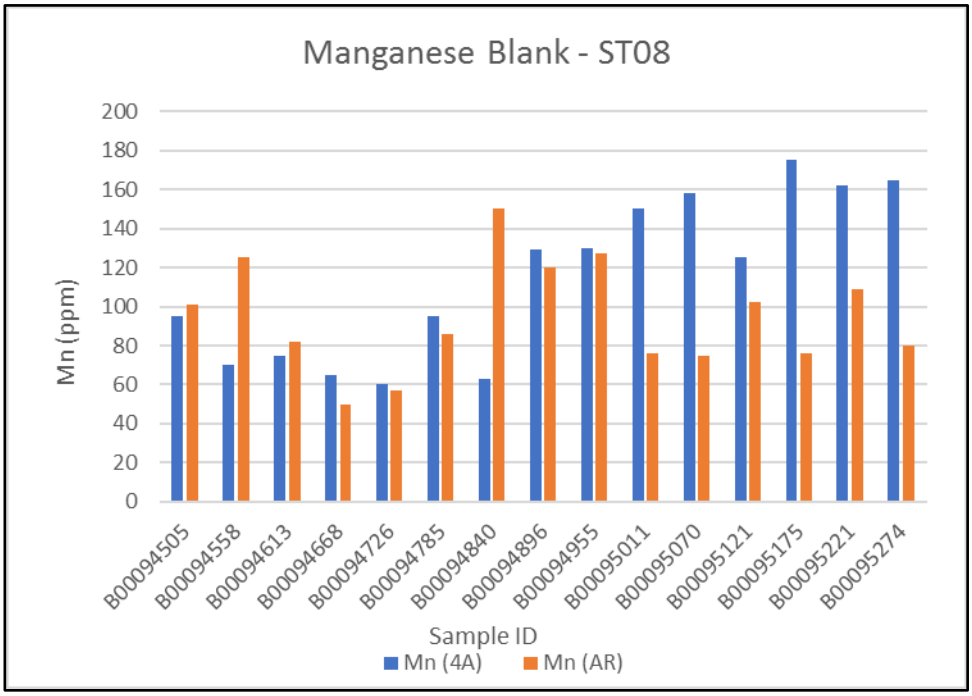

Figure 11-28: Certified Blank – ST-08 – Manganese

Source: Tetra Tech (2022)

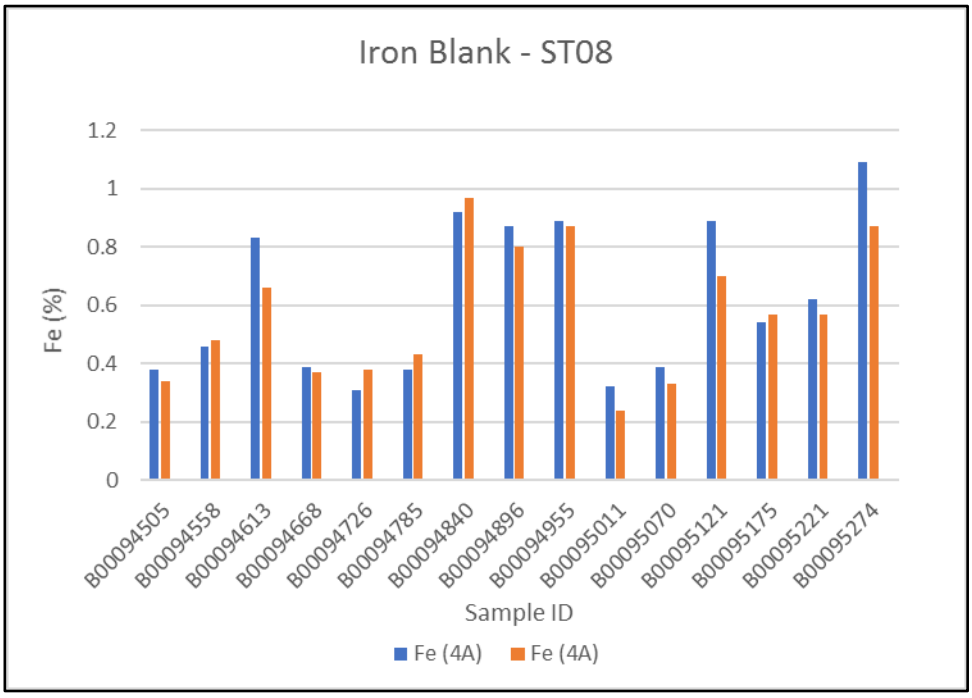

Figure 11-29: Certified Blank – ST-08 – Iron

Source: Tetra Tech (2022)

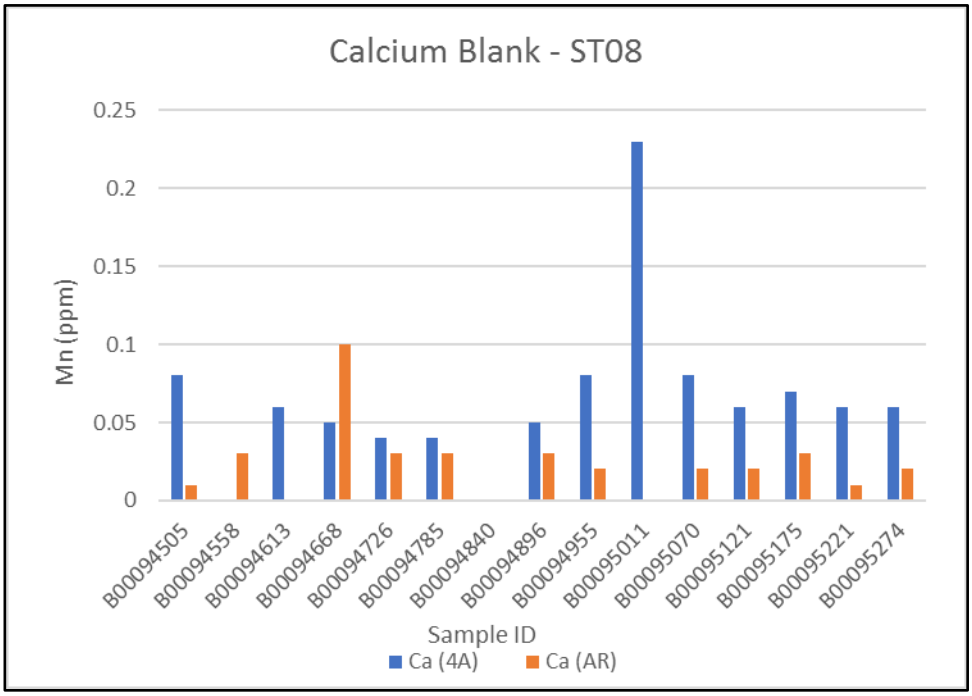

Figure 11-30: Certified Blank – ST-08 – Calcium

Source: Tetra Tech (2022)

11.10.3 Field Duplicates

Field duplicates represent those samples collected by EMN field staff at the drill and delivered to the lab as a blind duplicate. The results of the field duplicate assays allow for pairwise assessment of analytical reproducibility, or precision.

A total of 37 field duplicate pairs were collected with reportable results. In the assay database, each pair was identified with the same sample number with one labelled with A as suffix and the second with B as the suffix. The A and B sets were evaluated using simple linear regression and the Pearson's coefficient, and also for RPD as a measure of precision. An RPD of less than 30% within 90% of samples is considered to be an acceptable threshold of variation for field duplicates.

Figure 11-31 shows the duplicate regression for manganese measured by 4-acid digestion with AAS and Figure 11-32 shows the regression for manganese measured by aqua regia with AAS against a 1:1 unity line in red. The 4-acid manganese regression indicated a slope of 0.9237 with Pearson's coefficient of 0.7851, and with 97% of samples having RPD less than 30%. The aqua regia manganese indicated a slope of 0.8972 with Pearson's coefficient of 0.7285, and with 95% of the samples having RPD less than 30%.

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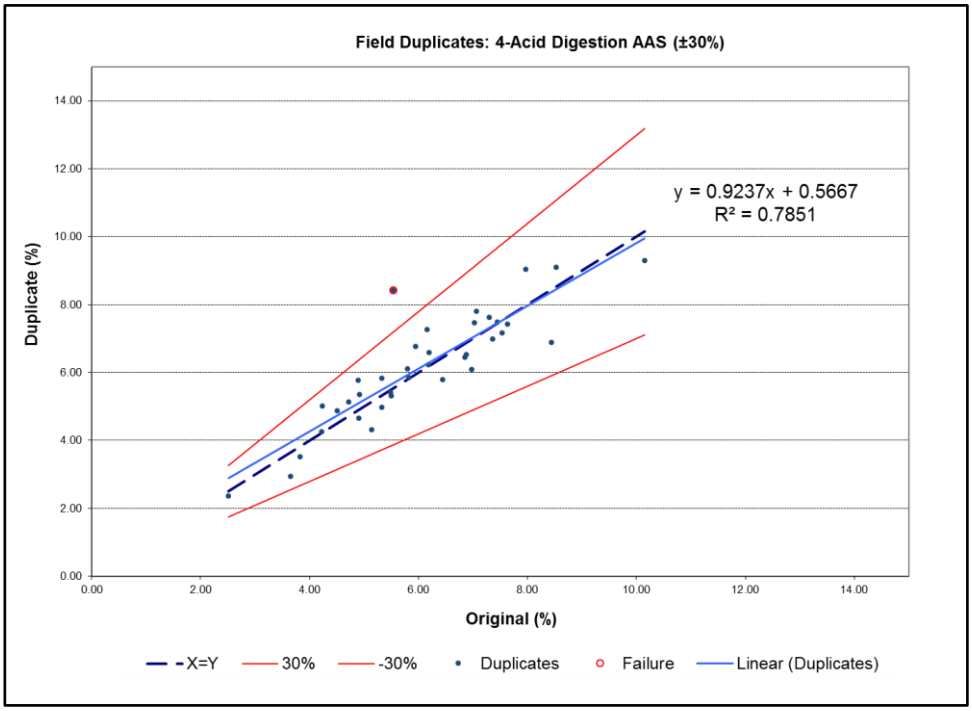

Figure 11-31: Linear Regression of 4-Acid AAS Manganese Field Duplicates

Source: Tetra Tech (2022)

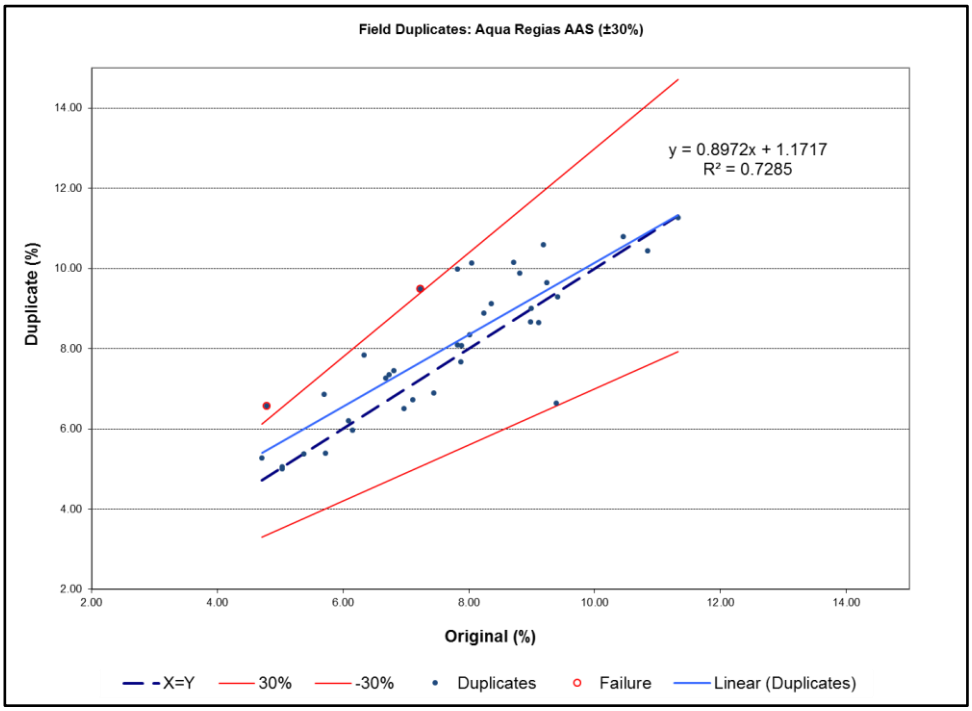

Figure 11-32: Linear Regression of Aqua Regia AAS Manganese Field Duplicates

Source: Tetra Tech (2022)

11.10.4 Lab Duplicates

Lab duplicates represent those samples analyzed in duplicate internally by the lab, by request of EMN, to assess the precision and quality of the homogenization, sample splitting and preparation methods. EMN directed SGS to collect preparation duplicates (i.e., before pulverizing) and analytical duplicates (i.e., following pulverization) at a frequency of 1:20 samples.

11.10.4.1 Preparation Duplicates

A total of 40 preparation duplicate pairs were collected with reportable results. In the assay database, each pair was evaluated using simple linear regression and the Pearson's coefficient and also for RPD as a measure of precision. An RPD of less than 20% within 90% of samples is considered considered to be an acceptable threshold of variation for preparation duplicates.

Figure 11-33 shows the duplicate regression for manganese measured by 4-acid digestion with AAS and Figure 11-34 shows the regression for manganese measured by aqua regia with AAS against a 1:1 unity line in red. The 4-acid manganese regression has a slope of 0.9647 with Pearson's coefficient of 0.9614, and with 95% of samples having RPD less than 20%. The aqua regia manganese has with a slope of 0.984 with Pearson's coefficient of 0.9762, and with 98% of the samples having RPD less than 20%.

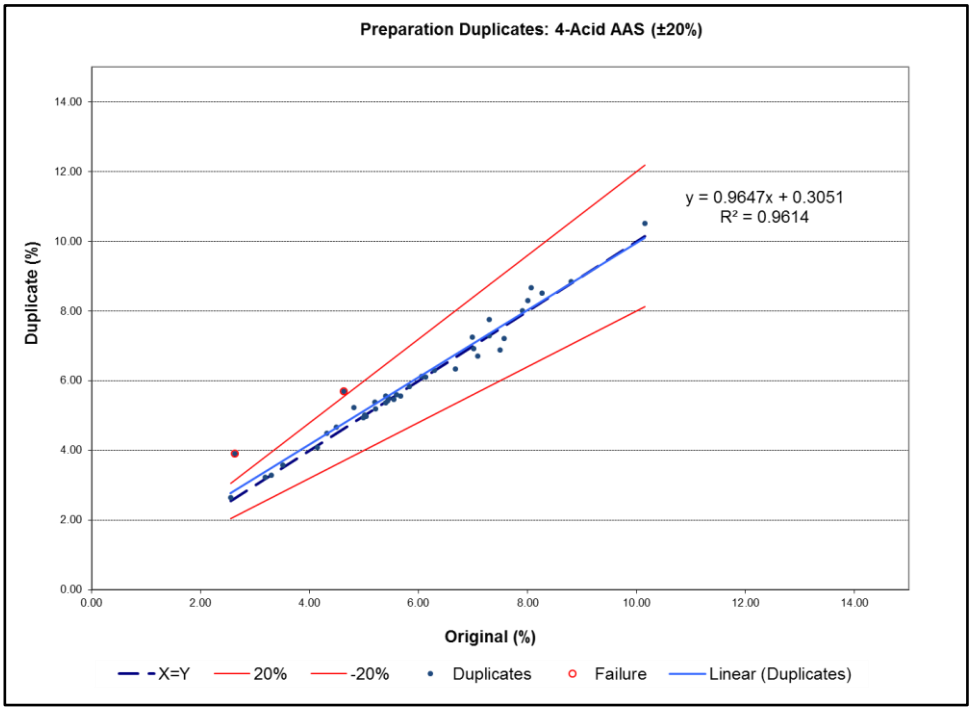

Figure 11-33: Linear Regression of 4-Acid AAS Manganese Preparation Duplicates

Source: Tetra Tech (2022)

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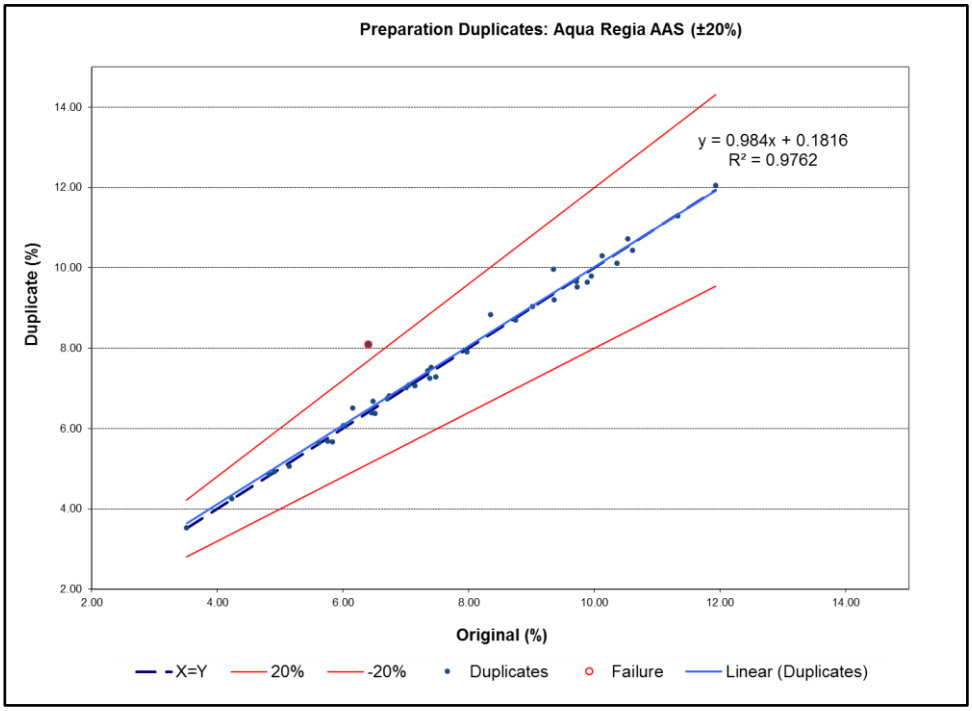

Figure 11-34: Linear Regression of Aqua Regia AAS Manganese Preparation Duplicates

Source: Tetra Tech (2022)

11.10.4.2 Analytical Duplicates

A total of 18 analytical duplicate pairs were collected with reportable results. In the assay database, each pair was evaluated using simple linear regression and the Pearson's coefficient, and also for RPD as a measure of precision. An RPD of less than 10% within 90% of samples is considered considered to be an acceptable threshold of variation for analytical duplicates.

Figure 11-35 shows the duplicate regression for manganese measured by 4-acid digestion with AAS and Figure 11-36 shows the regression for manganese measured by aqua regia with AAS against a 1:1 unity line in red. The 4-acid manganese regression has a slope of 0.9965 with Pearson's coefficient of 0.9989, and with 100% of samples having RPD less than 10%. The aqua regia manganese has with a slope of 0.9936 with Pearson's coefficient of 0.9849, and with 94% of the samples having RPD less than 10%.

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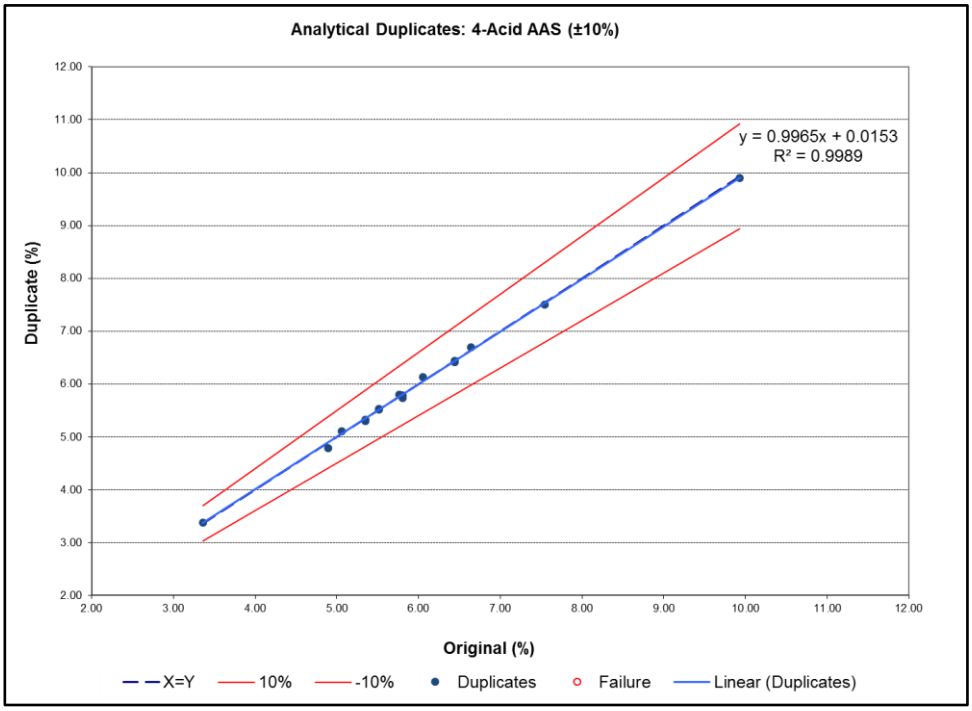

Figure 11-35: Linear Regression of 4-Acid AAS Manganese Analytical Duplicates

Source: Tetra Tech (2022)

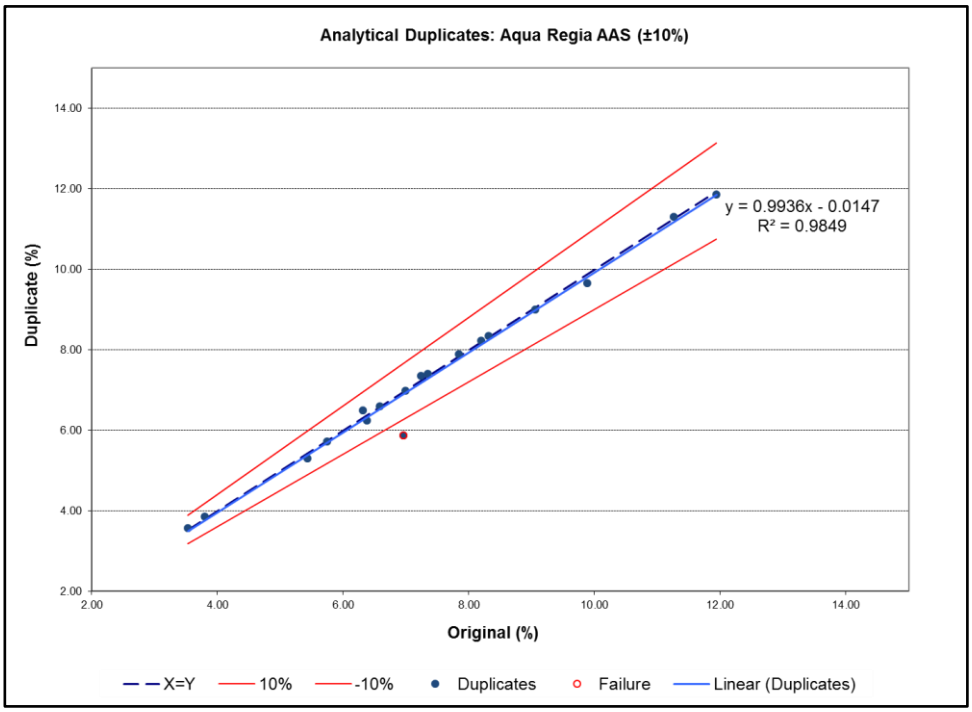

Figure 11-36: Linear Regression of Aqua Regia AAS Manganese Analytical Duplicates

Source: Tetra Tech (2022)

11.10.5 External Laboratory Assay Verification

External laboratory verification analysis was conducted again in 2018 using Actlabs based in Ancaster, Ontario, Canada. EMN selected Actlabs to replicate the assay procedures for verification of reported SGS analysis results following initial receipt, drying, weighing, and pulverizing of the sample. A total of 96 samples were shipped to Actlabs, including QA/QC samples. The suite of analyses included aqua regia and 4-acid digestion using ICP-MS and AAS analysis for trace elements, and XRF for major cations.

Comparison of manganese grades from Actlabs with the SGS results are shown in Figure 11-37 through Figure 11-39 by sample batch, as delivered to the lab.

Manganese assays from XRF analysis show low scatter with Pearson's coefficient ranging from 0.954 to 9987 and RPD ranging between -2.12% to -1.60%, compared to coefficients of 0.8986 to 0.9675 and RPD ranging between -3.99% to 5.57% for 4-acid AAS results, and coefficients of 0.67 to 0.9713 with RPD ranging between -26.54 to -8.52 for the aqua regia AAS results.

The results of the external laboratory verification indicate an excellent correlation from XRF assays, and moderate correlation from both the 4-acid and aqua regia AAS assays. In particular, the 4-acid AAS results reported from Batch 3 revealed possible positive bias in high grade ranges towards the SGS results. The results were assessed, and a selective batch of samples were requested for re-assay at SGS (results discussed in Section 11.10.6).

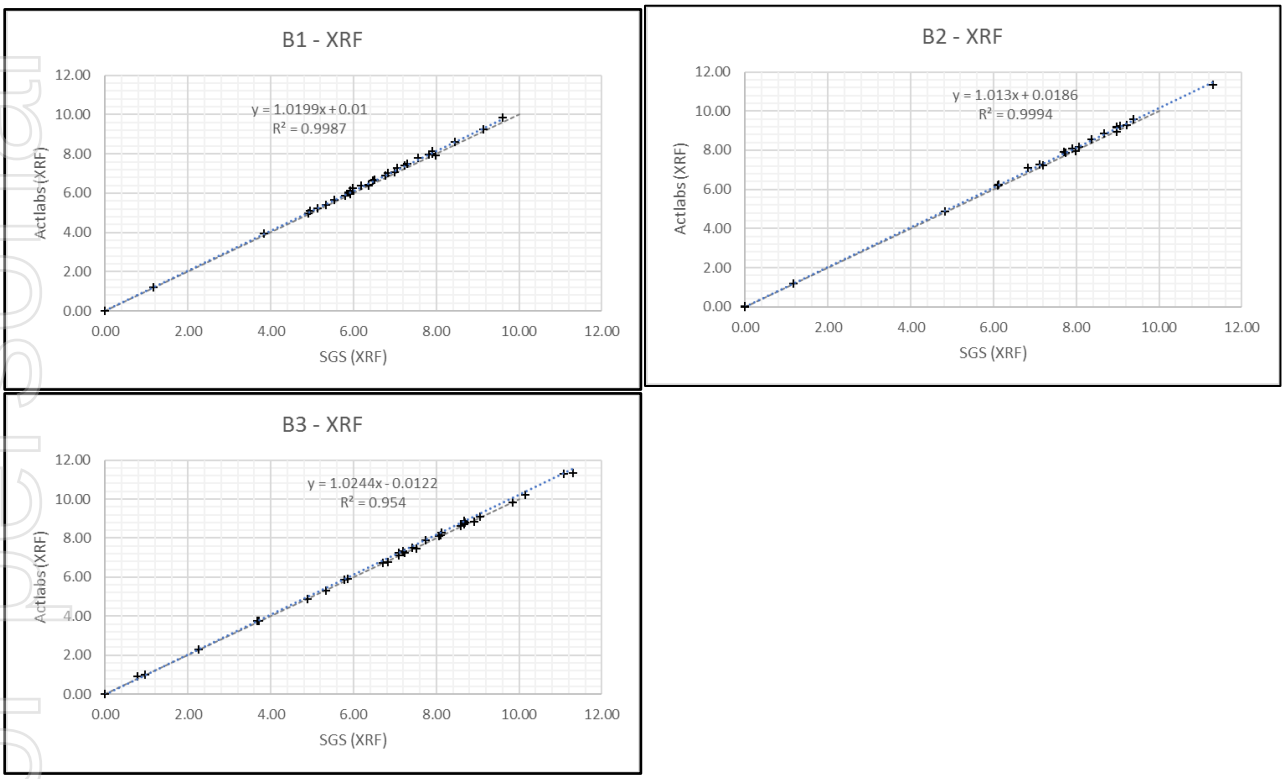

Figure 11-37: Linear Regression of Manganese by XRF Assay from Umpire Lab

Source: Tetra Tech (2022)

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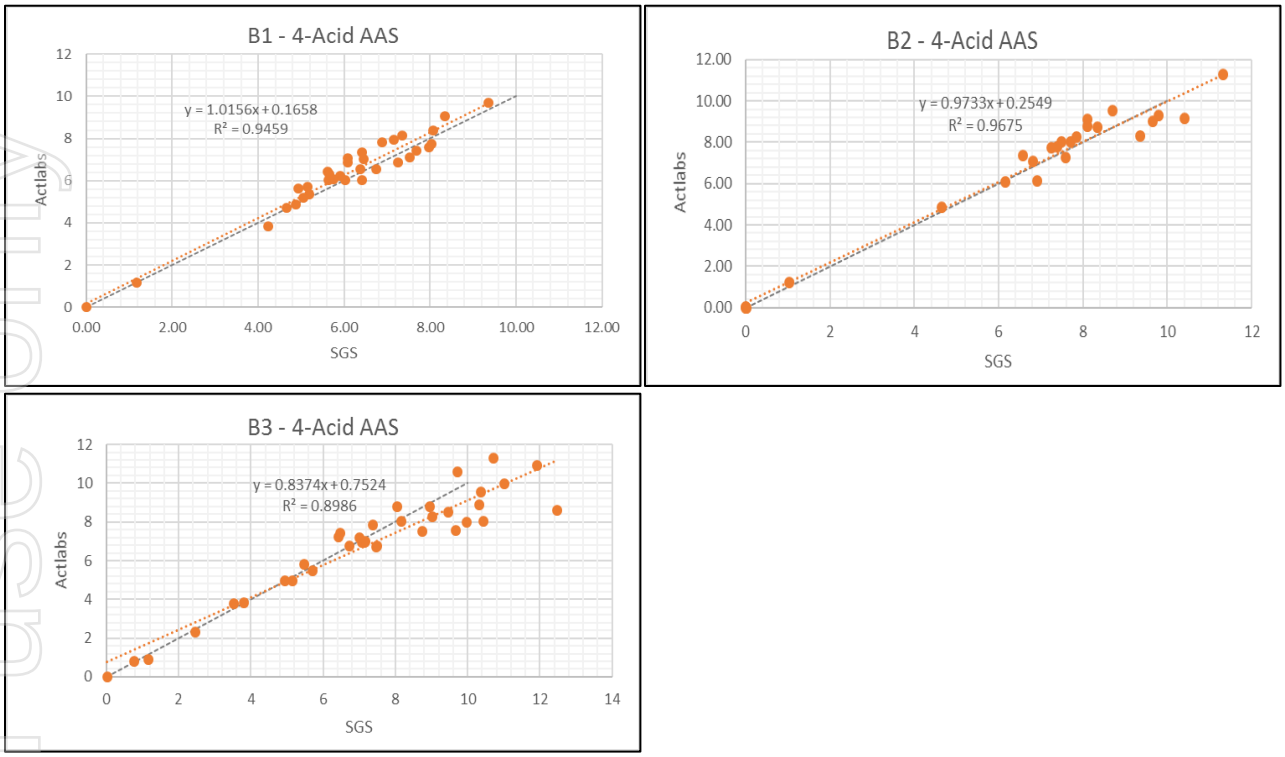

Figure 11-38: Linear Regression of Manganese by 4-Acid AAS Assay from Umpire Lab

Source: Tetra Tech (2022)

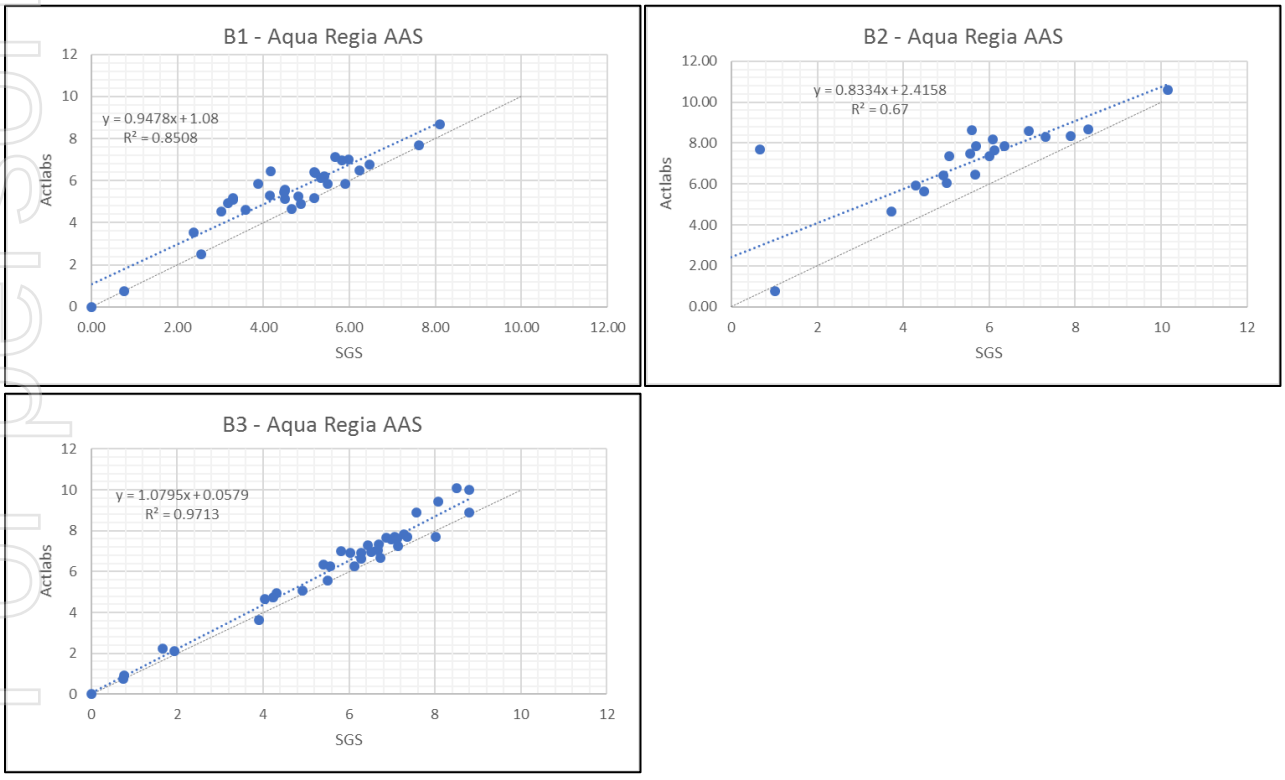

Figure 11-39: Linear Regression of Manganese by Aqua Regia AAS Assay from Umpire Lab

Source: Tetra Tech (2022)

11.10.6 SGS Re-analyses

A possible assay bias was identified by external laboratory verification analysis for the reported 4-acid AAS analysis results. A selection of 35 samples from six separate analytical certificates were sent for re-analysis. The results were assessed using RPD and are plotted in Figure 11-40. The RPD results were evaluated to meet analytical duplicate threshold of at least 90% samples having less than 10% RPD. The 4-acid AAS re-assays met the threshold having 94% of samples with less than 10% RPD. The aqua regia re-assays did not meet the threshold having only 80% of samples with less than 10% RPD, with the majority of re-assays having lower assays than the original values.

The re-analysis supported the consistency in assay procedures used by SGS for the 4-acid AAS analysis but did not explain the potential bias identified by external laboratory verification. Examination of internal CRMs used by the laboratories for calibration of equipment for manganese grades above 7% revealed usage of the NOD-A1 produced by United States Geological Survey and the GMN-04 produced by Geostats PTY Ltd. Conclusions from previous QA/QC on the CMP in 2017 concluded that the NOD-A1 CRM is not suitable for wet-digestion analytical procedures such as the 4-acid and aqua regia methods applied to this program.

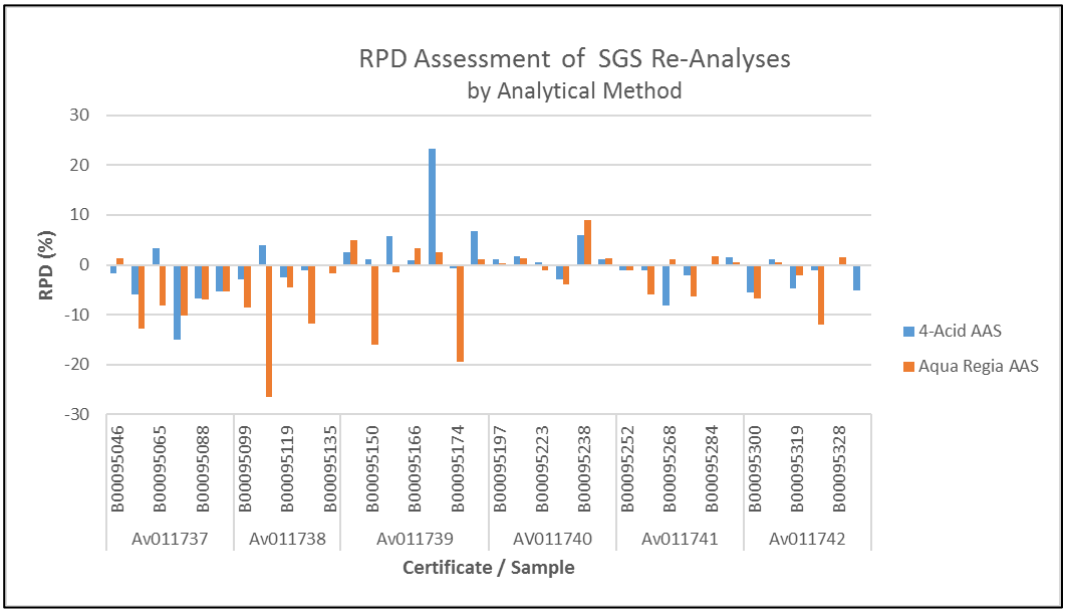

Figure 11-40: RPD Assessment of SGS Sample Re-Analysis

Source: Tetra Tech (2022)

11.11 CP Opinion on Sample Collection, Preparation, and Analyses

The methods implemented by EMN for sample collection, preparation and analysis were developed with great detail and with reference to applicable ISO and/or ASTM standards in advance of the drilling investigation. The procedures maximize use of sample volumes to measure physical and chemical parameters relevant to current and future project studies. The labs selected by EMN are recognized accredited laboratories which adhere to recognized ISO, ASTM or internally reproducible standards. The CP feels the collection, analysis and security is reliable and adequate.

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Comparison of the various analytical methods for manganese has determined that the results of the XRF analysis provide a more consistent and accurate result compared to the 4-acid AAS methods. An unresolved discrepancy exists with a potential bias between 4-acid AAS results reported for manganese by SGS and Actlabs. The CP concludes that the manganese grades measured by XRF are more reliable measurements as total manganese concentration compared to the measurements from the 4-acid AAS analyses and are thus used as the basis for mineral resource estimation.

More work should be undertaken to establish a suitable and reliable assay method for wet-digestion analytical procedures should EMN choose to use these in the future. In particular, evaluation of equipment calibration at manganese grade above 7% and use of suitable CRMs should be considered. It is recommended that EMN incorporate use of CRM GMN-04 produced by Geostats PTY Ltd, Western Australia, with expected manganese (II) oxide concentration of 17.33%, standard deviation of 0.16 at a 95% confidence interval of ±0.06 (reported by XRF analysis) for calibration of high-grade manganese analyses.

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12.0 DATA VERIFICATION

12.1 Audit of the Drill Hole Database

12.1.1 Collar Survey and Topography

The Property topography was provided by GET as a MicroStation software format, dgn file, based on LiDAR imagery. The contours were extracted from these files and converted to a common .dxf file format. The original data was provided in Czech projection S-JTSK using the Bpv datum.

GET completed drill hole collar surveying on-site using a Trimble model R4 GNSS GPS receiver equipment. The survey was reported in S-JTSK (Bpv), UTM (WGS84), and Lat-Lon (WGS84). It was observed that the average elevation difference between the Bpv and WGS84 datum equaled approximately 44.25 m. The elevation difference for drill hole T3-319 initially was reported as 46.36 m; however, this was later corrected to accurate Bpv equivalent elevation. The CMP references the S-JTSK (Bpv) coordinate system.

A comparison between the corrected collar elevation surveys with the local topographic DEM was undertaken. Of the 160 drill holes completed on the Property, a mean deviation in elevation of 0.049 m was calculated between the collars and the DEM, with values ranging from -0.348 to +0.580 m. The site survey correlates well with the drill collar survey and is considered of high quality for spatial modelling.

12.1.2 Downhole Logs and Measurements

GET compiled a drill hole database using the field logs and measurements collected on-site. This database was inspected using digital validation tools within Leapfrog® Geo modelling software. The validation tools assess the data for common errors such as overlapping intervals, major data gaps, drill hole depths versus sample depths, etc. These errors must be corrected prior to modelling to ensure the data is accurately represented.

Errors that were initially identified in the database were mainly due to the consolidated structure of the database that listed data measurements related to intervals for samples (2 m), core runs (1 m), and lithological intervals (variable lengths) on a single master spreadsheet. For modelling purposes, these various interval classes were parsed into three separate data sheets to represent data on 2 m sample intervals, 1 m field measurements, and the logged lithology sub-intervals.

These three subsets were again inspected in Leapfrog® Geo for common errors. This resulted in fewer errors which were corrected in the final database.

12.1.3 Geological Database Compilation

Tetra Tech received the raw data from laboratory test work and analysis. The data was verified for completeness and was then compiled, processed, and assessed for use in mineral resource estimation. The analytical data is saved in digital format as a geological database.

12.1.4 Cross Verification of Certificate of Analysis and Digital Data

Tetra Tech undertook verification of the data transfer and compilation process at SGS through visual comparison of the issued certificates of analysis with the digital assay records. This assessment was approached by first comparing the upper 25th percentile of assays reported for total manganese (n = 175), followed by a random spot check of an additional 10% of the remaining data (n = 55). No significant reporting errors were identified.

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12.1.5 Independent CP Site Visits

Two site visits have been completed by the Geology CP, the first between the dates July 1 to 3, 2017, and again between July 30 and 31, 2018. Both visits were coincident with the summer drilling investigations during which time he observed drilling, sample collection and preparation, sample logging, and sample storage facilities. An overview of the GPS tracks and sample collection locations are seen in Figure 12-1; this does not include GPS tracking of off-site facilities and locations.

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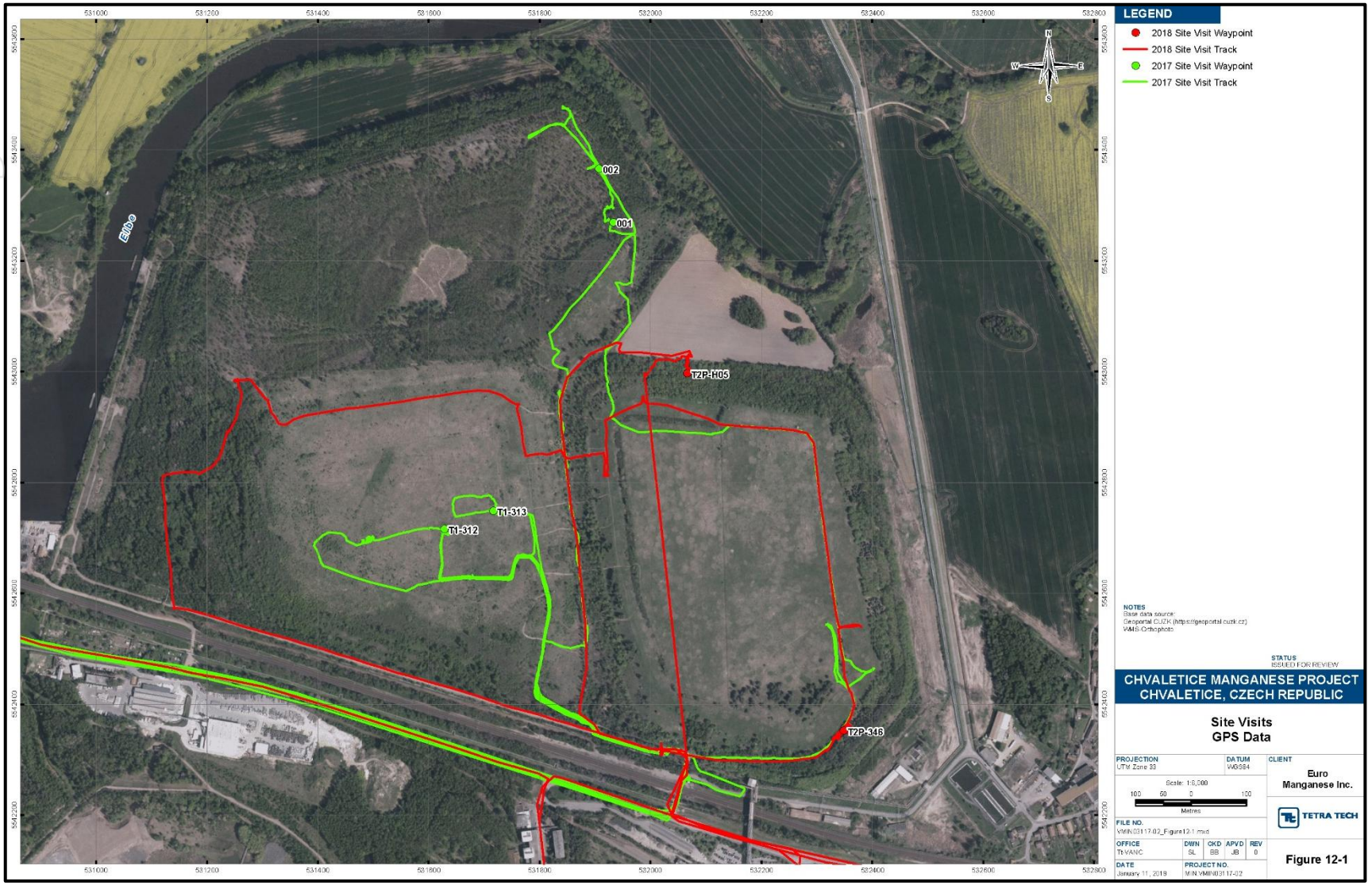

Figure 12-1: Overview Map of GPS Track and Waypoints from 2017 and 2018 CP Site Visit

Source: Tetra Tech (2022)

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12.1.5.1 Independent Check Assay, 2017 Site Visit

Two samples were collected by the Tetra Tech CP geologist during the site visit. The samples were extracted as splits from recovered drill core weighing approximately 3 kg, placed in separate plastic bags, labelled with a generic sample identification, and zip tied. One sample was extracted from hole T1-312 between depths of 22 and 23 m (EMN sample B00055404), and the second sample was extracted from hole T1-313 between depths of 22 and 23 m (EMN sample B00055416). Each sample weighed approximately 2 kg.

The samples were then transported by the CP to Prague and delivered to the GET office where shipping via DHL was arranged. Upon receipt of the samples in Canada, the packaging, polyethylene bags, zip ties, and labelling was inspected. Evidence of tampering was not observed.

The samples were submitted to ALS Laboratories (ALS) in North Vancouver, Canada, for a selective leach check analysis. The selective leach analysis progressively dissolved the sample in stages using stronger solvents for digestion. Table 12-1 lists the digestion solvent in successive order. Table 12-2 shows the cumulative percent of the manganese that is dissolved at each stage along with the total manganese grade for the sample. The samples reported 80% and 74% leaching of the total manganese in the first three stages of the selective leach, with the majority of this being dissolved at the aqua regia digestion stage.

Table 12-3 compares the total and soluble manganese concentrations between the Tetra Tech sampling and the EMN reported results. RPD analysis shows some variability in the assay comparisons with values of between 3% and 16% for soluble, and 1 to 13% for total. The check assay does repeat the general magnitude of the manganese assay value within the SGS results.

Table 12-1: Tabulated Description of Selective Leach Analytical Methods used for Independent Check Assay

Digestion	Finish	SGS Method	Mn Detection Limits (ppm)
Aluminum Acetate	ICP-MS	ME-MS04	0.05-5,000
Cold Hydroxylamine-Hydrochloride	ICP-MS	MS05	0.05-5,000
Aqua Regia	ICP-MS, ICP-AES	MS42	5-50,000
4-acid	ICP-MS, ICP-AES	MS62	5-50,000

Table 12-2: Cumulative Leaching Results from Selective Leach Analysis

Sample ID	ME-MS04 (cum_Mn%) (%)	ME-MS05 (cum_Mn%) (%)	MS42 (cum_Mn%) (%)	MS62 (cum_Mn%) (%)	Total Mn% (%)
CT1312 (T1-312, 22-23)	6	9	80	100	10.35
CT1313 (T1-313, 18-19m)	7	11	74	100	6.44

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Table 12-3: Independent Check Assay Comparison with EMN Results

	CT1312 (B00055404)	CT1313 (B00055416)
Tetra Tech tMn (%)	10.35	6.44
EMN tMn (%)	10.42	7.36
RPD (%)	**1**	**13**
Tetra Tech sMn (%)	9.54	5.16
EMN sMn (%)	8.14	5.30
RPD (%)	**16**	**3**

Acid-base Accounting

Acid-base accounting (ABA) tests were also performed to measure total sulphide sulphur concentration using LECO furnace and net neutralization potential ratios of the sample. Total sulphide sulphur values for samples CT1312 and CT1313 were measured at 2.48% and 2.45%, respectively, and neutralization potential ratio (NPR) values were reported as 3.11 and 1.94 (using Sobek method). In accordance with standard methodologies and as per guidelines set forth in MEND 1.20.1, Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (Price 2009), NPR values greater than 2 indicate the material is not potentially acid generating, materials with NPR between 1 and 2 have uncertain potential for net acid generation and materials with NPR less than 1 indicate they have potential for net acid generation. Based on these results, sample CT1312 does not have potential for acid generation, and sample CT1312 has uncertain potential for acid generation.

Summary of previous acid rock drainage (ARD)-metal leaching (ML) testwork is discussed in Section 13.7. The results of the analysis of two samples identified NPR of 0.94 and 0.4 indicating that the material has potential for acid generation.

The tailings materials, and their processed by-product, should be fully characterized for acid generating potential.

12.1.5.2 Independent Check Assay, 2018 Site Visit

One sample was collected by the Geology CP during the site visit in July 2018. The CP observed drilling advance and recovery of the sample from the core tube, sample logging procedures, and sample splitting procedures. The sample was extracted as a quarter split from 1 m of recovered drill core and weighed approximately 1.90 kg. The sample was placed directly in a clear plastic bags, labelled with a generic sample identification, zip tied, and kept in possession of the CP.

The sample was collected from hole T2P-346 between depths of 6 and 7 m and was located approximately midway up the southeastern access ramp on the outer perimeter of Cell #2. The material was dark grey to black (when wet) and was comprised of fine- to medium-grained sand, with trace visible amounts of pyrite. The material was considerably drier than those samples observed from the center of Cell #1 during the 2017 CP site visit. Table 12-4 lists the sample and manganese concentrations, which correspond well with the concentrations reported for the sample submitted by EMN. The “soluble” portion of the sample collected by Tetra Tech accounts for 74% of the overall sample, which is slightly lower but generally consistent with the assay results collected by EMN. Trace element concentrations (not shown) are also generally consistent with average values of assay results collected by EMN. Figure 12-2 shows the sample being quarter split and Figure 12-3 shows a close-up of the material.

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Table 12-4: Identification and Mn Concentration of Tetra Tech Check Sample

Hole	From (m)	To (m)	Sample Number	Mass (kg)	Mn (Aqua Regia ICP-MS)	Mn (4-acid ICP-MS)
T2P-346	6	7	TT18-001 (Tetra Tech)	1.90	4.95	6.73
	6	8	B00094802 (EMN)	1.99	5.18	7.46

Note: Tetra Tech sample was only 1 m of the overall 2 m interval collected by EMN and sent to SGS for analysis; absolute manganese concentrations may vary due to mineralogical composition of the full 2 m sample.

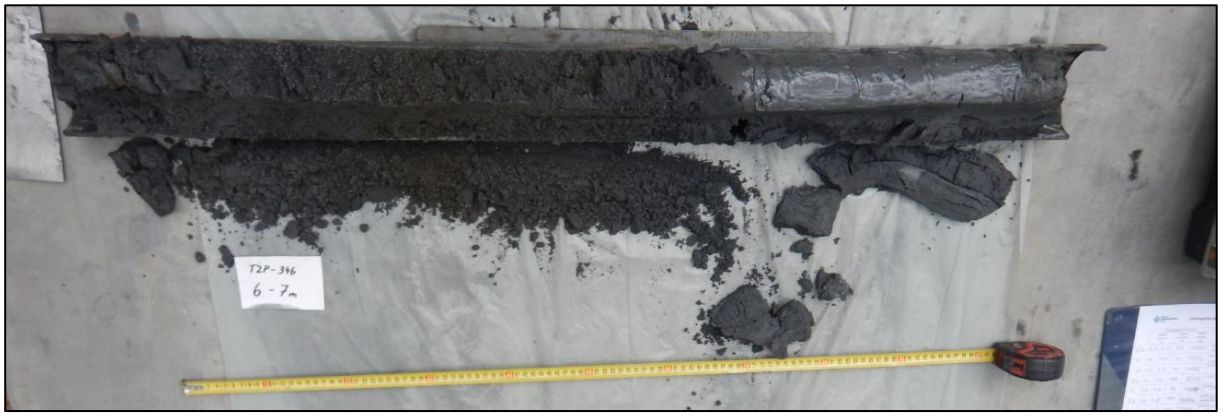

Figure 12-2: View of 1 m Tailings Core Being Quarter Split (uphole direction is to right), T2P-346, 6-7m

Source: Tetra Tech (2022)

Figure 12-3: Close-up of Tailings Material, T2P-346, Sample TT18-001

Source: Tetra Tech (2022)

The sample was submitted by ALS for XRD and Rietveld quantitative analysis at AuTec Innovative Solutions located in Vancouver, Canada, by request of the CP.

The sample was ground for approximately five minutes in a McCrone Micronizing Mill using reagent alcohol. Grinding in the Micronizing Mill reduces particles to between 5 and 10 µm in size without distorting the crystal lattices which are critical for diffraction of X-rays.

Diffraction data was collected over the range of 5-75º2θ with CoKα radiation using a Bruker D8 Focus Bragg- Brentano diffractometer. The diffractometer uses a 0.6 mm divergence slit and incident and diffracted-beam Soller slits. The system is equipped with a LYNXEYE-Super Speed Detector.

Diffraction data produced is analyzed and peaks are identified using HighScore Plus software by Panalytical using the Crystallography Open Database. Refinement of diffraction data is done using Topas 5.0 by Bruker AXS.

Detection limits for XRD depend on multiple factors, but as a general rule, if the peak to background ratio is low, the detection limit is approximately 2.0 wt%. For samples in which the peak to background ratio is high and there is good crystallinity, the detection limit can be less than 0.5 wt%. If a phase is present at less than 0.5 wt%, it could still be identified, but confidence decreases. Table 12-5 lists the model abundance derived from the Rietveld Quantitative Analysis. The main manganese bearing mineral was listed as spessartine, with major gangue minerals being quartz, albiten, and kaolinite. Dolomite was the only carbonate mineral listed which may include minor amounts on manganese carbonate not recognized by the XRD.

Table 12-5: Mineralogy Results of Rietveld Quantitative Analysis

Mineral	Ideal Chemical Formula	Modal Abundance (wt%, normalized)
Quartz	SiO_2	36.5
Albite	$NaAlSi_3O_8$	11.7
Kaolinite	$Al_2Si_2O_5(OH)_4$	0.3
Muscovite	$KAl_2(AlSi_3O_{10})(OH)_2$	12.4
Dolomite	$CaMg(CO_3)_2$	10.8
Pyrite	FeS_2	5.4
Fluroapatite	$Ca_5(PO_4)_3F$	2.4
Spessartine	$Mn_3Al_2Si_3O_{12}$	5.6
Amorphous	--	14.9
Total		**100.0**

12.1.6 Drill Twinning Program, 2018

A twin drilling program was executed during the 2018 investigation. Two twin pairs were established in the center of Cell #1 and #2, and a third pair near the northwestern extent of Cell #2. The third pair, however, was comprised on an inclined hole and a vertical hole which resulted in a total 30.23 m of horizontal difference at the base of the holes. Table 12-6 lists the holes and Figure 12-4 shows a visual strip log.

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Table 12-6: List of Twin Holes Drilled in 2018

Cell	2017 Original Hole	2018 Twin Hole	Comments
1	T1-312	T1P-341	Twin holes located in center of Cell #1
2	T2-318	T2P-348	Twin holes located in center of Cell #2
2	N/A	T2P-344 (inclined) T2P-338 (vertical)	Sonic holes drilled from same collar location at northwest perimeter of Cell #2; results differ due to inclined and vertical orientations

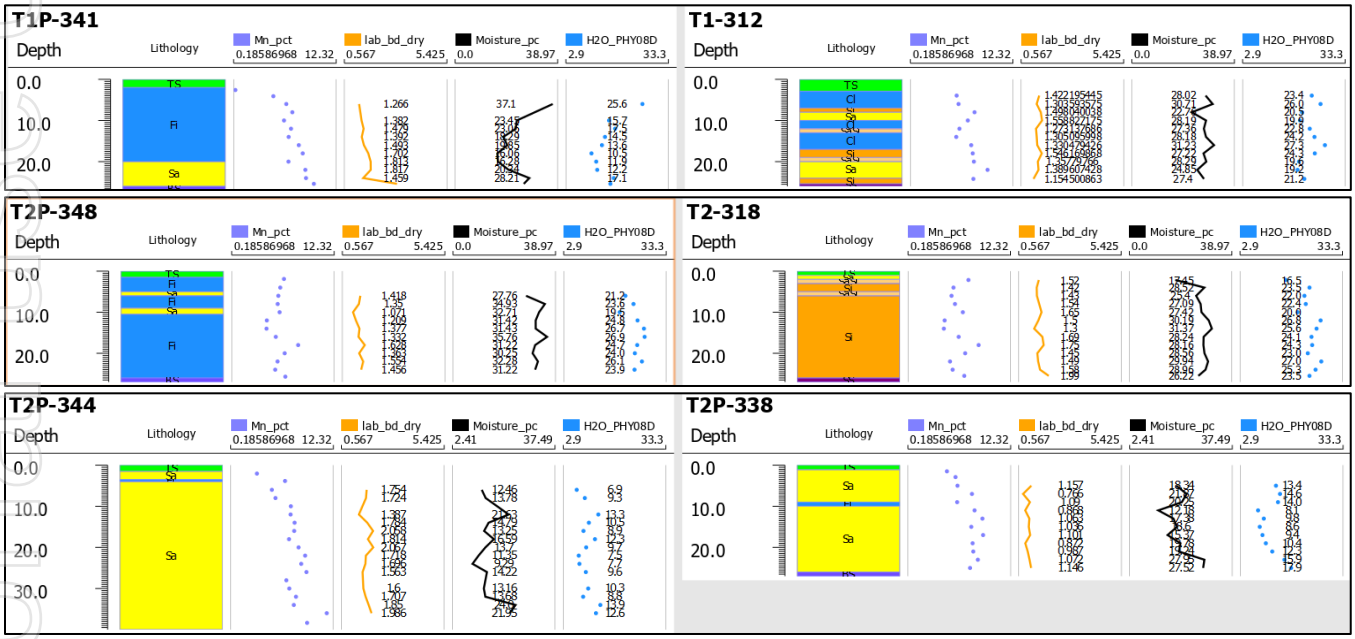

Figure 12-4: Strip Logs for Twin Hole Pairs

Source: Tetra Tech (2022)

An RPD comparison was conducted to assess the reproducibility of manganese concentrations, the calculated in situ dry bulk density value (BD) and total moisture content (H_2O). The threshold applied to the RPD assessment was 30% as the accepted variability for field replicate samples. The assessment concluded that the manganese concentrations measured by 4A AAS and AR AAS have high variability compared to the results of the XRF analysis. The calculated values for in situ dry bulk density had moderate variability, and the total moisture has the most variability. In situ moisture has seasonal variability and is expected to be different between years; these results were observed from shallow and deep samples. Table 12-7 shows the results of the RPD assessment, where cells highlighted in red have an RPD of greater than 30% and those cells highlighted in green have an RPD of less than -30%.

Table 12-7: RPD Comparison of Twin Drill Holes

2018 Twin Hole			Relative Percent Difference (2017:2018)					2017 Original Hole		
Hole ID	From	To	Mn (4A AAS)	Mn (AR AAS)	Mn (XRF)	BD (t/m^3)	H_2O (%)	Hole ID	From	To
T1P-341	2	3.2	--	--	--	--	--	--	--	--
T1P-341	3.2	5	48.2	44.5	14.7	30.9	-30.8	T1-312	2.9	5
T1P-341	5	7	8.0	12.5	-8.7	3.0	-18.9	T1-312	5	7
T1P-341	7	9	16.1	24.5	8.6	71.0	-30.1	T1-312	7	9
T1P-341	9	11	20.7	0.2	12.7	12.1	18.4	T1-312	9	11
T1P-341	11	13	-11.5	-20.1	-15.2	-15.0	17.1	T1-312	11	13
T1P-341	13	15	2.2	-6.8	-17.6	-6.5	42.6	T1-312	13	15
T1P-341	15	17	-6.1	-17.2	-6.7	-11.5	44.6	T1-312	15	17
T1P-341	17	19	-2.5	-16.6	-10.1	-9.6	51.6	T1-312	17	19
T1P-341	19	21	46.6	42.0	14.2	-28.7	53.9	T1-312	19	21
T1P-341	21	23	8.5	7.5	7.1	-26.6	20.0	T1-312	21	23
T1P-341	23	25	-12.1	-15.0	-13.6	-23.3	-2.9	T1-312	23	25.4
T2P-348	0.8	3	32.9	36.5	14.1	128.5	-83.3	T2-318	1.2	3
T2P-348	3	5	47.6	48.6	-6.4	17.7	-84.7	T2-318	3	5
T2P-348	5	7	21.3	-1.8	-6.7	4.6	-46.4	T2-318	5	7.3
T2P-348	7	9	43.6	24.1	2.0	-1.6	-97.1	T2-318	7.3	8.5
T2P-348	9	11	8.7	2.0	13.1	48.8	-95.1	T2-318	8.5	11
T2P-348	11	13	81.2	75.9	4.0	23.0	-98.1	T2-318	11	13
T2P-348	13	15	74.7	63.1	2.8	44.4	-89.1	T2-318	13	15
T2P-348	15	17	52.4	35.4	13.4	6.9	-102.5	T2-318	15	17
T2P-348	17	19	5.7	-3.5	5.9	34.8	-77.8	T2-318	17	18.5
T2P-348	19	21	55.7	45.4	7.4	24.7	-99.9	T2-318	18.5	19.6
T2P-348	21	23	41.0	43.1	-8.5	12.5	-89.8	T2-318	19.6	22
T2P-348	23	25	46.1	36.7	2.4	35.7	-49.9	T2-318	22	24
T2P-348	25	26.4	6.2	-13.8	4.6	-14.7	-36.8	T2-318	24	25.1

12.2 CP Opinion on Data Verification

The CP has audited the field data and drilling logs, compared digital analytical data to laboratory certificates, compiled the geological database, observed field sample collection and splitting methods, conducted independent sample verification following two site visits, and reviewed the results of a twin drill hole program. The CP is satisfied that the samples have been properly collected, the geological database accurately reflects field observations and laboratory analysis, and that the data is suitable to support mineral resource estimation.

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13.0 MINERAL PROCESSING AND METALLURGICAL TESTING

EMN plans to recover manganese by reprocessing the CMP tailings from three adjacent tailings dumps that originated from pyrite mining conducted from 1951 to 1975. The potential recovery processing includes:

- Pre-concentration of manganese minerals using high-intensive magnetic separation
- Sulphuric acid dissolution of magnetic concentrate
- Iron and phosphorus removal and related solid-liquid separation
- Pregnant solution purification
- Selenium-free electrowinning to produce HPEMM
- Production of HPMSM from HPEMM

13.1 Metallurgical Test Programs

Several metallurgical test programs have been carried out to assess the metallurgical responses of the tailings material. From 1986 to 1989, Bateria Slany, a Czechoslovak-state battery producer, undertook extensive metallurgical studies and process design work focused on the production of EMD. EMN undertook the latest test programs from 2015 through 2021 and included semi-continuous pilot plant testing, including two major test programs conducted by CRIMM and BGRIMM. Table 13-1 lists the recent metallurgical testing programs.

Table 13-1: Metallurgical Testwork Programs

Year	Program ID	Laboratory	Mineralogy	Pre-concentration	Leaching/EW	Others
2015	-	UBC	√	-	-	-
2016	100301	Kemetco	-	-	√	-
2016	Eu Mn J0201	Kemetco	-	-	-	√
2016	-	Kemetco	-	√	-	-
2016	1656	Met-Solve	√	√	-	√
2017	-	CRIMM	-	√	√	-
2017	16204-001	SGS	√	-	√	-
2017-2018	-	CRIMM	√	√	√	√
2018	-	Slon	-	√	-	-
2018	-	NHD	-	-	-	√
2018	-	Jingjin	-	-	-	√
2018	-	Longi	-	√	-	-
2021	-	Jenike	-	-	-	√
2021	-	ALS	√	-	-	-
2019-2021	-	BGRIMM	√	√	√	√
2026		Mangan*		√	√	

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Year	Program ID	Laboratory	Mineralogy	Pre-concentration	Leaching/EW	Others
2026		BGRIMM			√	

Notes: Global ARD – Global ARD Testing Services Inc.; Kemetco – Kemetco Research Inc.; Met-Solve – Met-Solve Laboratories Inc.; PMC – Process Mineralogical Consulting Ltd.; UBC – University of British Columbia; CRIMM – Changsha Research Institute of Mining and Metallurgy Co.; SLon – SLon Magnetic Separator Ltd.; Longi – Longi Magnet Co., Ltd.; NHD – Jiangsu New HongDa Group; BGRIMM – BGRIMM General Research Institute for Mining and Metallurgy; Jenike – Jenike & Johanson; ALS – ALS Metallurgy
*Summary datasheet for magnetic separation and leaching Demonstration Plant test results, completed in 2024.

Early testwork, including the testwork completed by UBC, Kemtco, Met-Solve, CRIMM, and SGS since 2015, was conducted on randomly collected samples. Early testwork included the following:

- Preliminary mineralogical studies indicate that manganese is mainly present as rhodocrosite and as kutnohorite, with lesser amounts as sursassite, pyrolusite, and kurchatovite (grouped as manganese-silicate minerals). The grain size of manganese-carbonates varies significantly with significant amounts occurring as liberated and middling grains. Lesser amounts are present as sub-middling and locked grains. The manganese-carbonates are mainly in complex associations with other carbonates, quartz, and feldspars, or manganese-silicate minerals. The main gangue mineral is quartz. Pyrite is the dominant sulphide mineral. On average, approximately 80 to 85% of the manganese is present as acid-soluble manganese. Residual pyrite is also identified by the preliminary mineralogical studies. A significant amount of the manganese carbonate minerals occurs as a liberated form. The particle sizes of theses samples vary significantly from sample to sample.

- Pre-concentration of the tailings samples used flotation, gravity concentration, and magnetic separation in an effort to upgrade the manganese content from the tailings samples without a significant loss of the manganese. The test results show that magnetic separation with a strong background magnetic intensity can recover the manganese minerals into a concentrate of approximately 15% tMn at a recovery of approximately 85%, depending on the magnetic intensity applied and the sample tested.

- Early test results show that the ratio of acid soluble manganese to total manganese for the samples collected during 2015 and 2017 ranges from 66 to 91%, averaging 81%. As reported by AMEC Foster Wheeler (2016), the Bateria Slany (1989) report indicated that the average sulphuric acid soluble manganese content of 968 samples was 70% of the total manganese content with only a minor difference in leachable fraction between the three tailings cells.

- The tests conducted by Kemetco show that approximately 74% of the total manganese was extracted, at a pH of 1.5 and in 24 hours. It is likely that the manganese extraction may be improved by finding optimum leaching conditions using a different leaching testwork procedure.

- The preliminary test results by CRIMM show that the manganese extractions were 49% for the head sample and 57% for the concentrate at the leaching temperature of 60°C. The extraction improved to 52% and 64%, respectively, when the leaching temperature was increased to 90°C.

SGS conducted sulphuric acid leach tests on a head sample, a magnetic concentrate sample, and a magnetic tailings sample produced by CRIMM. The tests were conducted at an initial pulp solid density of 27% w/w at a temperature of 50°C for eight hours. The results indicate that manganese leach extraction improved with an increase in initial sulphuric acid dosage. The head sample and the magnetic concentrate sample produced similar manganese extraction rates: 78.6% for the head sample with adding 300 kg/t of sulphuric acid and 76.7% for the concentrate sample with adding 500 kg/t of sulphuric acid. The non-magnetic tailings showed a much better metallurgical response. Approximately 87.8% of the manganese was extracted from the low-grade sample at an acid dosage of 200 kg/t. The early testwork has been summarized in *Public Report on Mineral Resource Estimation for the Chvaletice Manganese Project, Chvaletice, Czech Republic*, released on June 21, 2018 (Tetra Tech 2018).

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Two comprehensive test programs conducted by CRIMM and BGRIMM on various drill core interval samples generated during the 2017 drilling program. The testwork completed by BGRIMM during 2019 to 2021 mainly focused on verifying the previous test results generated from 2017-2018 test program by CRIMM.

The historical results, including test sample collection and preparation, comprehensive test results from CRIMM and BGRIMM, and test results for material handling, high purity product chemical and physical property analysis, and various ancillary tests, were detailed in the 2022 technical report (Tetra Tech, 2022).

Following completion of the Feasibility Study in 2022, bulk tailings material was excavated from Cell 3 and transported to the Chvaletice Demonstration Plant for processing and operational testing. The excavation campaigns provided feed material for demonstration-scale verification of the proposed process flowsheet and generated additional information on material characteristics, handling, and metallurgical performance. Details of the excavation program and associated resource model reconciliation are provided in Section 14.

Mangan declared that the on-site Demonstration Plant successfully completed a 5-day continuous operation program for the production of high-purity electrolytic manganese metal in the Czech Republic (EMN 2024). The Demonstration Plant achieved key technical targets. Mangan provided part of the test results, including acid leaching and leach solution purification, obtained during the Demonstration Plant testing. The tests were able to achieve the targeted manganese extraction, although there are some variations in acid leaching performances. The solutions produced from the leaching tests can be purified to meet the qualified solution requirements for the downstream electrowinning.

In 2026, BGRIMM conducted additional tests to assess the leachability of two residue samples generated during the Demonstration Plant electrowinning tests to recover the manganese. The materials tested were the material collected from the electrowinning anodes and the sludge collected from the bottom of the electrowinning cell. Both the samples were treated using sulphur dioxide (SO_2) reduction leaching to evaluate manganese recoverability. The test results indicate that both the materials respond well to the reduction leaching. More than 98% of manganese in the residual materials from the Demonstration Plant can be leached by using sulphur dioxide reduction treatment.

13.2 CP's Opinion on Metallurgical Tests

In the opinion of Dr. Huang, the metallurgical data is adequate for the purposes used in this report. Several comprehensive metallurgical test programs have been completed, including three semi-continuous pilot plant runs and large-scale batch testing based on preliminary optimized process/test conditions. Dr. Huang witnessed the metallurgical test programs conducted at CRIMM, BGRIMM and SGS. Also, Dr. Huang oversaw the additional testwork conducted in 2026 for recovering manganese from the anode sludges produced from the demonstration plant campaign.

13.3 Metallurgical Performance Projection

According to the historical and recent testwork results, manganese metallurgical performance for the CMP is projected and shown in Table 13-2.

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Table 13-2: Metallurgical Recovery Projection – Manganese

Area	Projection
Magnetic Separation	= 30.301 x Ln(Head Grade, % tMn) + 25.641
Leach Extraction	= 75.0
Purification and Refinery	= 94.6
Total Manganese to HPEMM	= (30.301 x Ln(Head Grade, % tMn) + 25.641) x 75% x 94.6%
HPEMM to HPMSM	= 98.4

This study also recovers the magnesium as magnesium carbonate ($MgCO_3$) from the process. The magnesium recovery estimate is based on the METSIM™ simulation and BGRIMM's estimates, which were based on the metallurgical test results. The magnesium recovery used for this PEA is 46%.

13.4 Testwork Recommendations

EMN has constructed a demonstration plant to further verify the proposed process and produce HPEMM and HPMSM samples for potential suppliers. The demonstration plant runs can further verify product quality, metallurgical performances, optimize processing conditions, and verify process design related data. The recommended testwork is detailed in Section 26.0.

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14.0 MINERAL RESOURCE ESTIMATES

14.1 Basis of Current Mineral Resource Estimate

The current MRE was based on 1,485 samples taken from a total of 160 drill holes collected by EMN in the summer of 2017 and 2018. Samples were collected from three tailings cells within an above ground tailings facility. Tailings were generated from historical mining operations.

Data was analyzed in Phinar X10-Geo v.1.4.15.8, Snowden Supervisor v8.9.0.2 and Leapfrog® Geo and EDGE v.4.4.2, and models were developed using Seequent Leapfrog® Geo v.4.4.2.

A MRE was developed for total and soluble manganese concentrations as primary production, and for total magnesium as a by-product. All technical and scientific data that is relevant to the MRE and made available to the CP up to an including the effective date of April 27, 2026, has been incorporated into this report. Several geochemical and physical parameters have been included in the modelling process to help characterize and inform interpretation of the tailings material; these variables include 18 trace and major elements, in situ dry bulk density, total moisture, and various grain size indicators. The majority of these additional parameters are not reported as part of the MRE and are supplementary in the block model.

14.2 Historical Mineral Resource Estimates

Two historical MREs reported by Bateria Slany are described in this section as they are considered relevant to the Mineral Resource presented herein. The key assumptions, parameters, and methods used to prepare the estimates is unknown and the results cannot be relied upon. Neither Tetra Tech nor EMN accepts these historical estimates as a current Mineral Resource or Mineral Reserves estimate.

Upon transfer of the Chvaletice mine from the federal government to the Chvaletice Energy Company in 1978, an estimation of “reserves” within the tailings facility, identified as “flotation sludge”, totalled 26,600,000 t at a grade of 7.09% Mn (tMn). The “reserve” was considered uneconomic; however, research into possible processing technologies was initiated.

From 1985 to 1989, Bateria Slany completed 956.3 m of drilling to characterize the physical and chemical properties of the tailings sludge, in addition to over 200 m^3 of trenching. Extensive testing and analysis of the samples was undertaken by Bateria Slany, who in 1989, evaluated that the tailings deposits comprised 27,557,441 t of “reserves”, containing 25,496,299 t at a grade of 5.15% leachable manganese (7.06% tMn) at a C2 category, and 2,061,143 tonnes of material at an average grade of 4.97% of leachable manganese (7.39% total Mn) at a C1 category. The definition of C2 and C1 categories references a system developed in the Czech Republic for classification of mineral “resources” and “reserves”, where resources classified as C1 are supported in greater detail than those classified as C2. The Czech system differs significantly from classification defined under the CIM Terms and Definitions as referenced by NI 43-101 and cannot be misconstrued to imply a similar level of confidence.

14.3 Previous NI 43-101 Mineral Resource Estimate

An initial MRE with an effective date of April 27, 2018, (the “2017 MRE”) was developed by EMN for the CMP using data from samples collected by EMN during the summer of 2017. The 2017 MRE was based on 755 samples from 80 vertical Sonic drill holes completed within the three tailings cells.

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The block model was classified with Indicated and Inferred Resources in accordance with CIM Definitions Standards (2014). Inferred blocks were those located around the perimeter embankments of the tailings deposits which were untested and unable to be verified as being comprised of manganiferous material. Indicated blocks were those that were able to be tested by drilling from the upper bench, with average spacing of approximately 100 m. Total manganese estimates were based on the 4-acid digestion and ICP-MS and/or AAS detection

The model was revised in 2018 (with effective date of December 8, 2018, the "2018 MRE") with the addition of 80 sonic holes to increase estimation confidence, and method changes incorporated total manganese estimates based on fusion XRF analyses. The 2018 MRE was restated with updated break-even input data, with effective date of July 1, 2022 (the "2022 MRE"). Table 14-1 shows the 2022 MRE, which is superseded by the current MRE stated in Section 14.8 and should no longer be relied upon as being accurate.

Table 14-1: Previous Mineral Resource Estimate for the Chvaletice Manganese Project, Effective July 01, 2022

Cell	Class	Volume ('000 m^3)	Tonnes (kt)	Bulk DP (t/m^3)	Total Mn (%)	Soluble Mn (%)
#1	Measured	6,577	10,029	1.52	7.95	6.49
	Indicated	160	236	1.47	8.35	6.67
#2	Measured	7,990	12,201	1.53	6.79	5.42
	Indicated	123	189	1.55	7.22	5.30
#3	Measured	2,942	4,265	1.45	7.35	5.63
	Indicated	27	39	1.45	7.90	5.89
Total	**Measured**	**17,509**	**26,496**	**1.51**	**7.32**	**5.86**
	Indicated	**309**	**464**	**1.50**	**7.85**	**6.05**
Combined	**M&I**	**17,818**	**26,960**	**1.51**	**7.33**	**5.86**

Notes:

- Estimated in accordance with the CIM Definition Standards on Mineral Resources and Mineral Reserves adopted by CIM council, as amended, which are materially identical to the JORC Code.
- The Chvaletice Mineral Resource has a reasonable prospect for eventual economic extraction. Mineral Resources do not have demonstrated economic viability.
- Indicated Resources have lower confidence that Measured Resources.
- A breakeven grade of 2.18% tMn has been estimated for the Chvaletice deposit based on preliminary pre-concentration operating costs of USD$6.47/t feed, leaching and refining operating cost estimates of USD$188.00/t feed, total recovery to HPEMM and HPMSM of approximately 60.5% and 58.9%, respectively, and a combined price derived using metal prices of 9.60 kg/t for HPEMM and 3.72 kg/t for HPMSM (CPM Group Report, June 2022).. The actual commodity price for these products may vary
- A cut-off grade has not been applied to the block model. The estimated breakeven cut-off grade falls below the grade of most of the blocks (excluding 5,000 t which have grades less than 2.18% tMn). It is assumed that material segregation will not be possible during mining due to inherent difficulty of grade control and selective mining for this deposit type.
- Grade capping has not been applied.
- Numbers may not add exactly due to rounding.

14.3.1 Comparison to Previous Resource Estimate

Overall, the 2022 model shows a good reconciliation with the previous model. Differences between the models are largely the result of additional drilling information and modelling approaches. The most significant changes are observed in blocks located in the perimeter slopes where sampling was not conducted in 2017. The data acquired in 2018 from additional Sonic and hand-portable percussion drilling conducted within the perimeter slopes reduced the spacing of samples and increased confidence of interpolated grades in the perimeter slope.

Table 14-2 lists the percentage change observed in the 2018 block model compared to the 2017 block model. It was observed that the slight changes in modelled volume and interpolated bulk density together have influenced the reported tonnages.

Table 14-2: Percentage Change in 2018 Block Model Compared with 2017 Block Model

Cell	Volume (%)	Tonnage (%)	Insitu Dry Bulk Density (t/m³)	tMn (%)	sMn (%)
#1	101	99	99	98	100
#2	104	101	97	97	98
#3	98	99	101	100	97
Total	**102**	**100**	**98**	**98**	**98**

Figure 14-1 shows a histogram distribution, by cell, of the changes in total manganese block grades. Figure 14-2 depicts the location of all blocks where a decrease of more than 1% total manganese (left, red) and an increase of more than 1% total manganese (right, green) are observed.

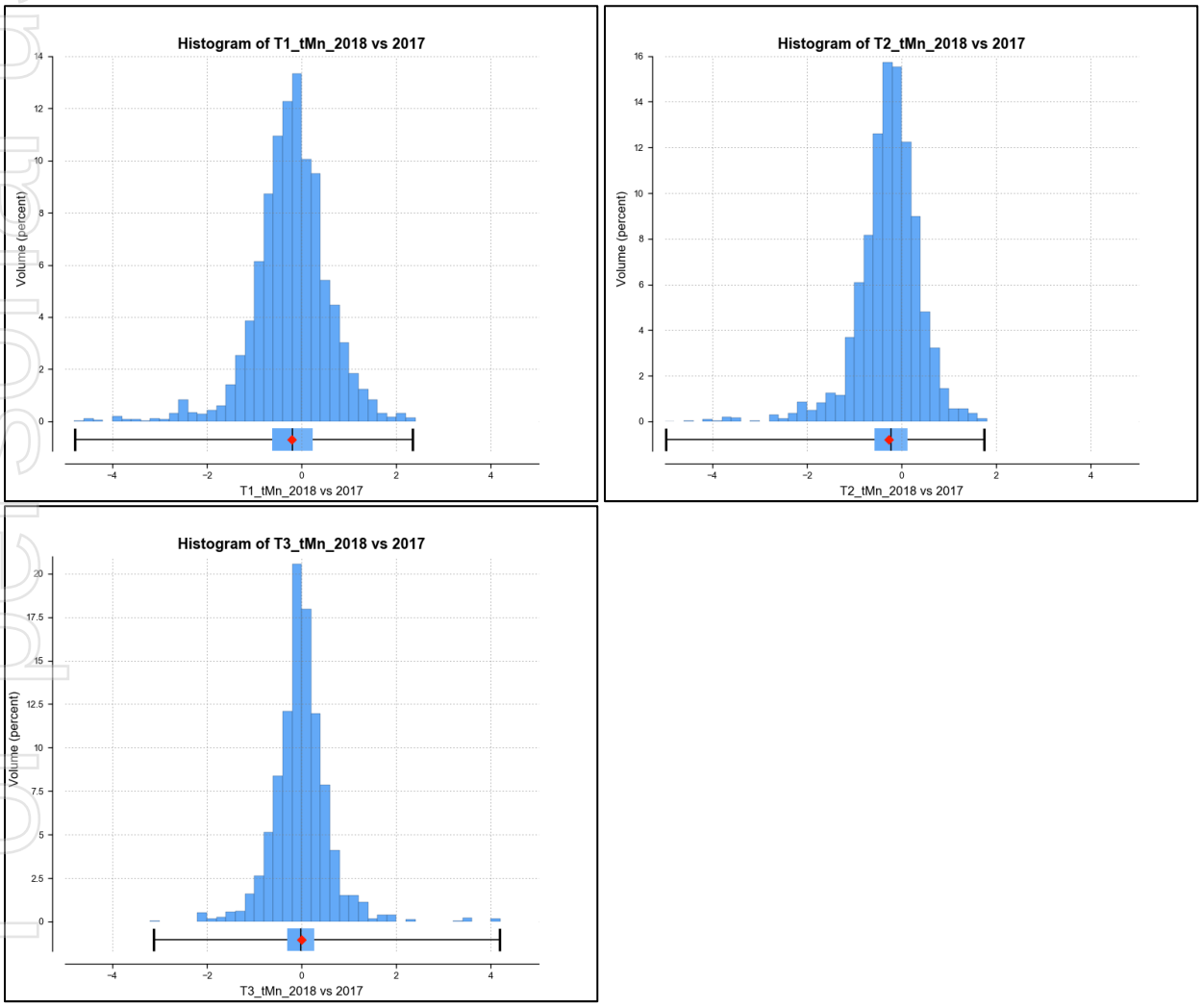

Figure 14-1: Frequency Distributions for Change in Total Manganese Block Grades

Source: Tetra Tech (2022)

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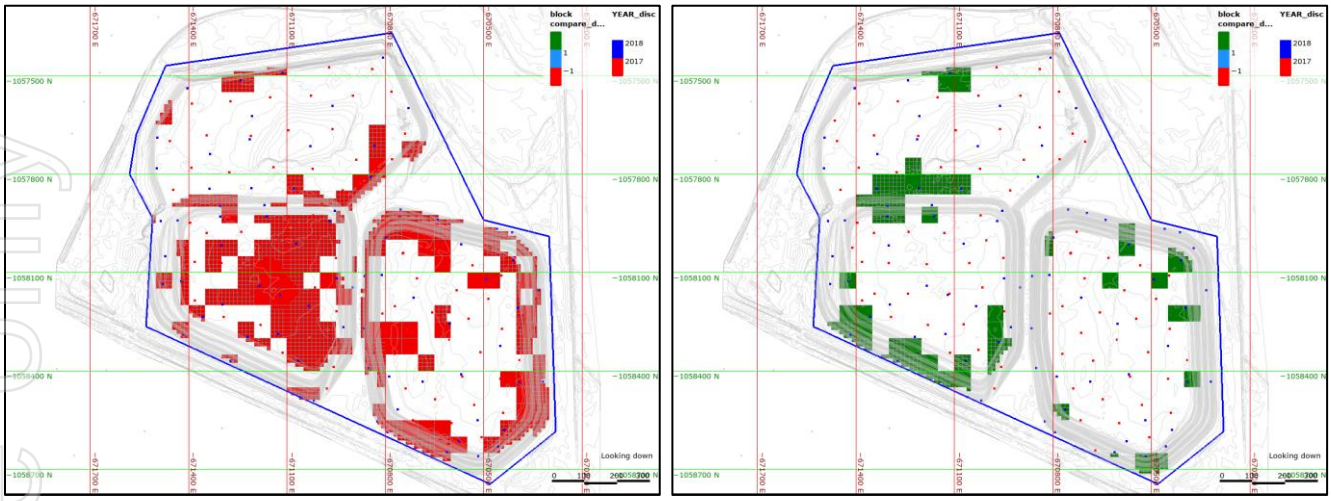

Figure 14-2: Plan View Showing Changes in 2018 Total Manganese Block Model Grades

Notes:

- Left image: blocks with decrease greater than 1% manganese
- Right image: blocks with increase greater than 1% manganese

Source: Tetra Tech (2022)

14.4 Input Data and Analysis

14.4.1 Compositing

Samples were collected from drill core at an average of 2 m interval lengths equal to each drill run, or the proportion of each drill run at the top and bottom of each hole which was comprised of tailings material. The raw assay data was then composited to 2 m sample lengths. This resulted in a decrease from 1,485 raw samples to 1,456 composite samples (Table 14-3). A total of 183 composite sample lengths (12.5%) were less than 2 m, ranging from 0.3 to 1.99 m. The mean manganese values and overall sample distribution was not significantly impacted by the compositing process.

Table 14-3: Descriptive Statistical Comparison of Raw Data and 2 m Composite Data for Total Manganese

Dataset	Count	Mean	Geometric Mean	Standard Deviation	Coefficient of Variation	Minimum	Maximum
Raw Data	1,484	7.261	6.982	1.722	0.24	0.186	12.32
2 m Composites	1,455	7.328	7.160	1.519	0.21	1.371	11.69

In Figure 14-3, the predominant sample length is 2 m, with range from 0.6 to 4.0 m with standard deviation of ±0.3 m.

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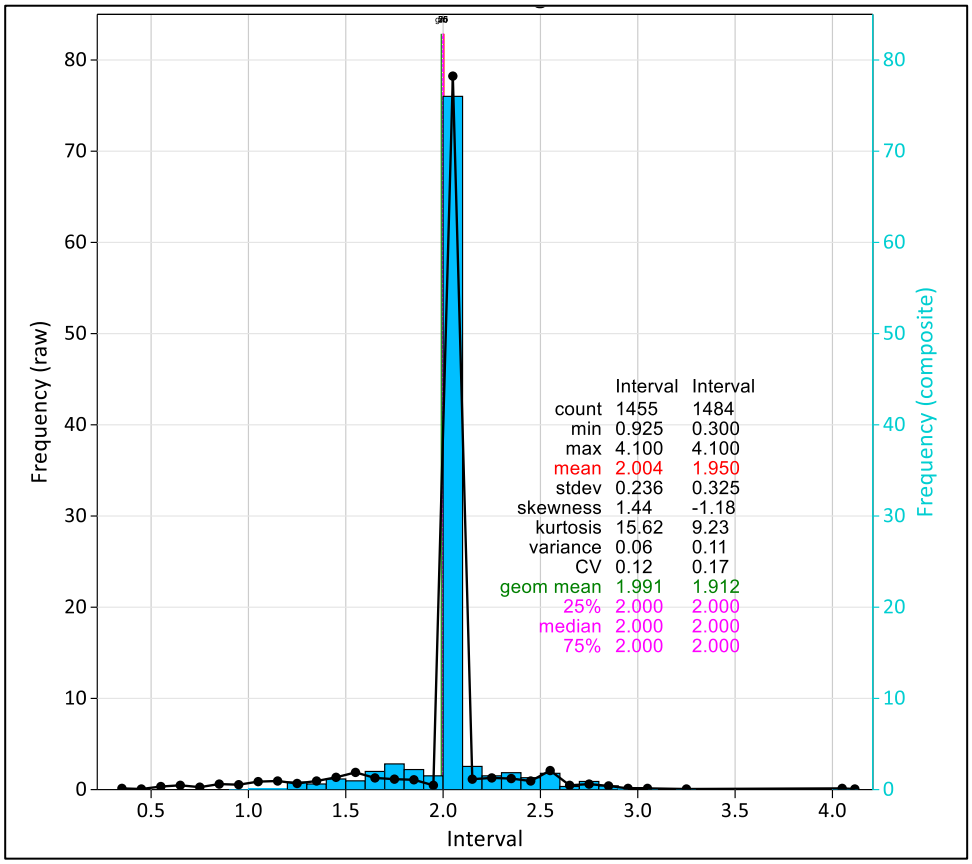

Figure 14-3: Frequency Distribution Comparing Raw and Composite Sample Lengths

Source: Tetra Tech (2022)

Histogram comparison of the raw assay values versus the composited assay values show excellent reproduction and confirm that no bias has been introduced in the compositing procedure (Figure 14-4).

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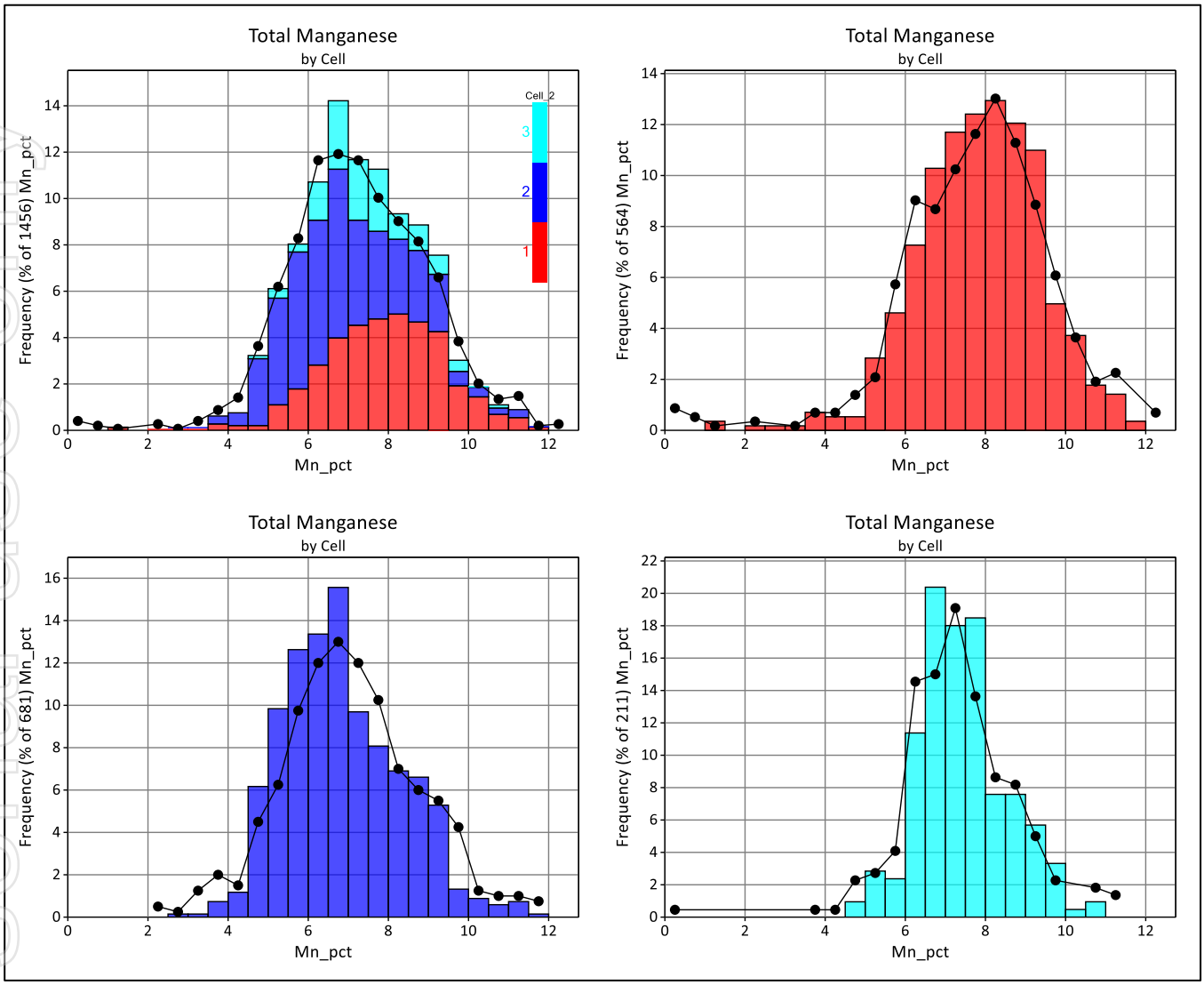

Figure 14-4: Frequency Distribtution Comparison Between Raw Assay (Black Line) and 2 m Composites (Coloured Bars) for Total Manganese Concentrations by Cell

Source: Tetra Tech (2022)

14.4.2 Capping Analysis

Manganese grades are normally distributed with low to negligible positive skew. It was observed that values occurring on the high and low ends of the grade distribution tails were located within zones of similar grade trends. It was interpreted that these grades are representative of the natural variance within the deposit and that grade capping was not required.

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14.4.3 Variogram Assessment

Variogram analysis was undertaken for each cell using the 2 m composite drill hole sample data using Snowden Supervisor v.8.9.0.2. Downhole variograms used a lag of 2 m to determine if a nugget (C_0) exists for total and soluble manganese, and horizontal variograms used a lag of 40 m to assess reasonable search radius parameters. These parameters were used only as a guide since kriging was not selected as the interpolation method for the MRE. The modelled nugget values were identified ranging from 0.05 to 0.38 for total manganese and from 0.05 to 0.40 for soluble manganese. Horizontal major and semi-major axis ranges were defined using spherical models with two internal structures. The first spherical structure of the major axis had ranges between 137 to 188 m and the second structure from 166 to 298 m for total manganese. Soluble manganese ranged between 73 and 135 m for the first structure and between 276 and 549 m for the second structure. Minor axis ranges were between 7 and 17 m. (Table 14-4).

Table 14-4: Summary of Major and Minor Axis Variogram Parameters

	Nugget	Major Structure 1	Major Structure 2	Minor Structure
Cell #1				
Total Mn	0.20	137	249	17
Soluble Mn	0.05	73	276	7
Cell #2				
Total Mn	0.38	188	298	9
Soluble Mn	0.40	135	549	17
Cell #3				
Total Mn	0.05	165	166	6
Soluble Mn	0.23	112	331	7
Model	n/a	150	n/a	8

Drill hole and corresponding assay data within the model is spaced at approximately 75 m on the horizontal plane. Experimental variogram analysis had moderate to good fit for spherical models, with the 2018 drilling allowing for greater short-range variability analysis than the 2017 dataset alone. It was concluded from the variogram analysis that some nugget exists related to the manmade nature of the tailings deposits. A range of 150 m for the major and semi-major axes, and 8 m for the minor axis was selected as an overall range for all cells within which spatial continuity exists for the total and soluble manganese grades.

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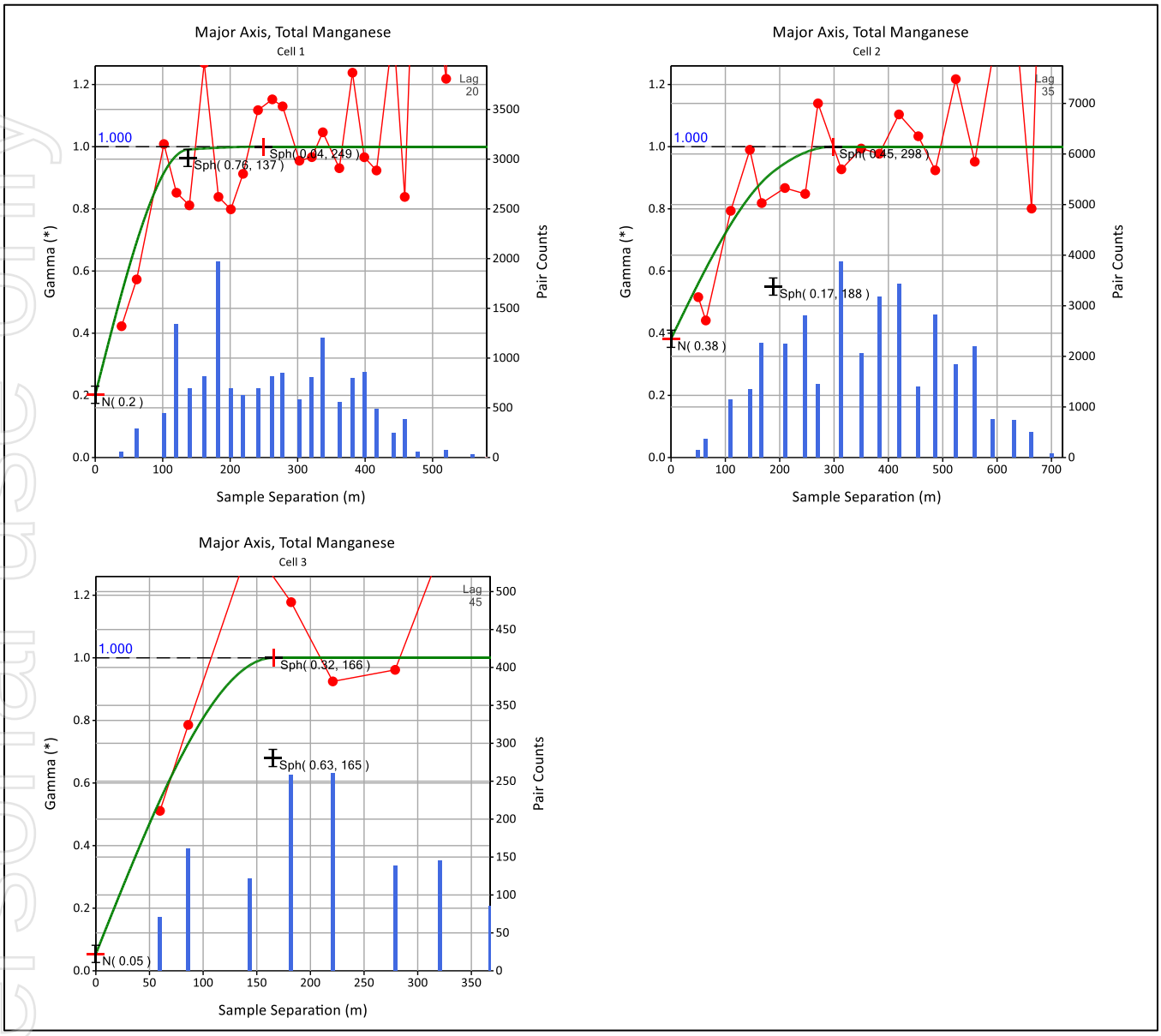

Figure 14-5: Major Axis Variograms for Total Manganese, Normal Scores, by Cell

Source: Tetra Tech (2022)

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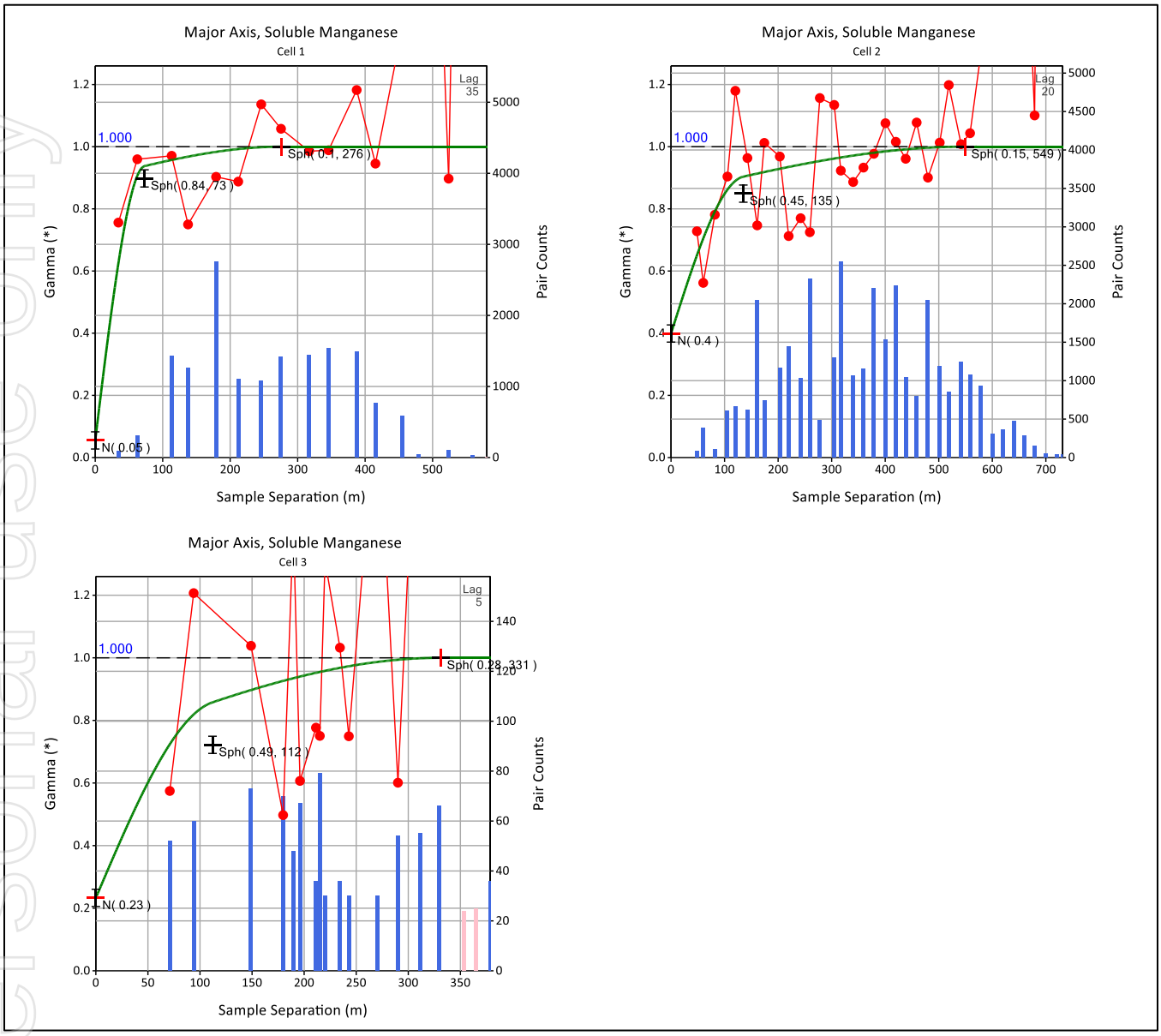

Figure 14-6: Major Axis Variograms for Soluble Manganese, Normal Scores, by Cell

Source: Tetra Tech (2022)

14.4.4 Search Parameters

Interpolation searches were performed using inverse distance squared (to third exponent) for manganese grades, nearest neighbour for particle size indicators, and the spheroid model in Leapfrog® for supporting geochemical values. These methods were selected to minimize bias within the local search neighbourhood. All searches were performed with major and semi-major axes orientation on the horizontal plane, and the minor axis in the vertical.

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14.4.5 Block Size Determination

A sub-block model was used to determine volumes of the Chvaletice tailings deposits, allowing for higher resolution with smaller block sizes around the perimeter slopes of the model. Parent block size for the model was determined based on drill hole spacing and de-clustered mean analysis. Using the de-clustering cell size optimization utility in GEOVIA GEMS™, it was determined that a 50 m cell size was the optimal size (Figure 14-7). The model was established using a parent cell size of 50 m by 50 m by 4 m, and minimum sub-cell size of 12.5 m by 12.5 m by 4 m.

Table 14-5 lists the de-clustered mean values for total and soluble manganese concentrations. The sub-block model was established with overall model dimension as listed in Table 14-6.

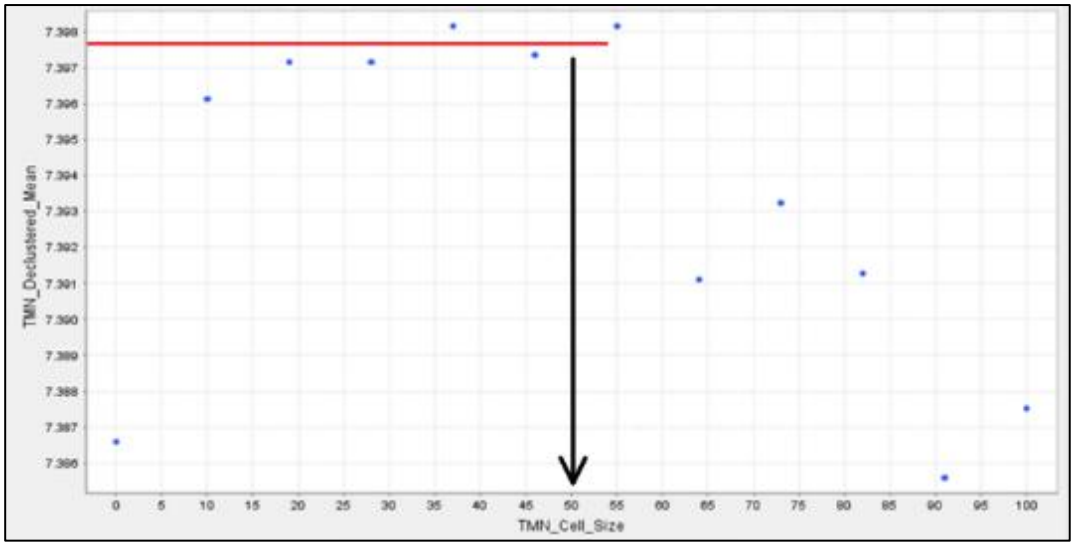

Figure 14-7: De-clustered Mean Versus Cell Size

Source: Tetra Tech (2022)

Table 14-5: Block Size Determination De-clustered Manganese Concentrations

Dataset	Value	Count	Mean	De-clustered Mean
T1	tMn	564	7.86	8.01
	sMn	-	6.40	6.40
T2	tMn	681	6.85	6.62
	sMn	-	5.44	5.19
T3	tMn	211	7.43	7.42
	sMn	-	5.65	5.63

Table 14-6: Block Model Dimensions (S-JTSK Coordinate System)

Model	Origin_X	Origin_Y	Origin_Z	Size_X	Size_Y	Size_Z	Blocks_X	Blocks_Y	Blocks_Z
Parent	-671,600	-1,058,750	240	50	50	4	27	28	23
Sub-block	-	-	-	12.5	12.5	4	-	-	-

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14.4.6 Bulk Density Estimation

Mineralogy, grain size, and the method used for deposition of historically processed material as a slurry into the tailings deposits has a significant influence on the final in situ dry bulk density of the tailings material. Water content, particle size gradations, mineral density composition, and degree of compaction from overlying material all contribute to grain settlement and packing. Recovery of the tailings material from the Sonic drill core tube was conducted using methods to minimize the disturbance of in situ material conditions. In practice, controlled core recovery is nearly impossible for saturated tailings and very challenging in under saturated material. Slumping and plasticity of the material caused some variability in the estimated core recoveries.

Core recovery values collected during field logging along with the moisture and mass measurements collected from laboratory sample processing were used as the basis for calculating in situ bulk density for the tailings material.

Idealized core volumes for the 1 m sub-samples were factored for core volume recovery and then back calculated to the full 2 m core run volume before being factored again by 0.25 to represent the volumes of 25% split assay samples that were sent to SGS.

All samples were weighed as wet samples on receipt at the lab, then again following split extraction for the PSA-LD samples. They were then dried at 105°C until no additional moisture loss was measured. In situ dry bulk density was calculated based on the wet mass of the assay sample received at SGS prior to extraction of the PSA-LD sample split, and then was factored to account for moisture loss during the PSA-LD sample preparation and from drying the final sample to estimate the dry mass of the assay sample as received. This dry mass was then factored over the sample volume estimated to have been received at the lab, using the following formula:

$$Insitu\ Dry\ bulk\ density = \frac{(Wet\ mass\ of\ sample\ as\ received) - (Mass\ of\ Total\ Moisture\ Content)}{Assay\ sample\ volume, measured\ in\ field}$$

In situ dry bulk density values for individual samples, as calculated from field and laboratory data, range between 0.35 and 3.154 t/m^3, with 95% probability interval of 0.87 to 2.01 t/m^3, and average of 1.49 t/m^3 ±0.017 t/m^3 (95% chlorine) as depicted in the frequency distribution shown in Figure 14-8. Immeasurable moisture loss in the field and visual estimation of core recovery, in addition to mineralogy and grainsize, influences the wide range of in situ dry bulk density. The in situ dry bulk density values were composited to 2 m and included as variables in the final model interpolation. This result in spatially unique values applied to the block model.

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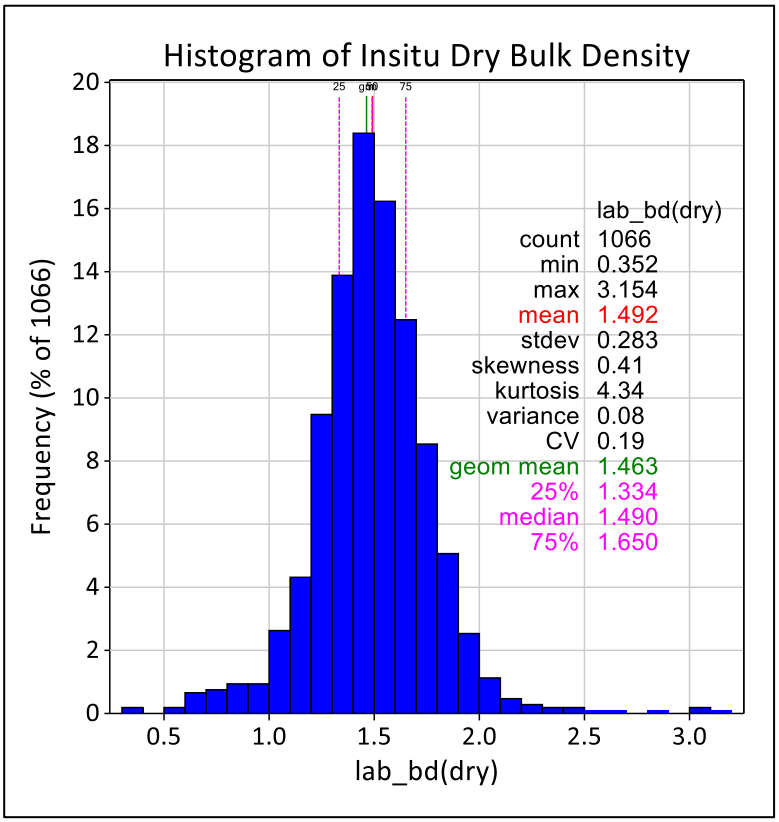

Figure 14-8: Frequency Distribution of Calculated In Situ Dry Bulk Density, Represented On Raw Sample Intervals

Source: Tetra Tech (2022)

14.5 Volume Estimations

Volume estimates for the cells were developed using the topographic DEM to constrain upper surfaces and deposit perimeters, and logged drill hole data were used to constrain the lower boundary of tailings with original ground soils. A simplified lithological model was developed for each cell to identify topsoil, tailings, and subsoil. The volume of material defined as tailings was then used to confine all numerical models and estimates reported for each cell under the MREs. Table 14-7 lists the volume estimates for tailings material contained in each cell and Figure 14-9 shows a typical section through Cells #1 and #2 with the three simplified lithologies identified.

Table 14-7: List of Estimated Volume of Tailings within Each Cell, Constrained by Topography

Cell	Surface Area	Topsoil Volume (m^3)	Tails Volume (m^3)
#1	326,400	284,870	6,720,300
#2	393,200	365,820	8,035,200
#3	313,200	167,030	3,035,900
Total	**1,032,800**	**817,720**	**17,791,400**

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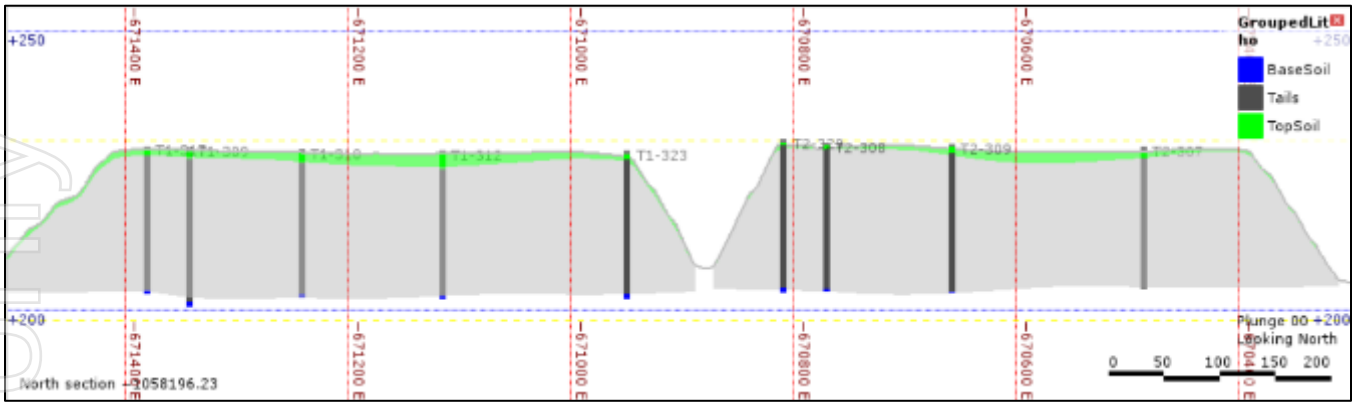

Figure 14-9: Typical Section Looking North Through Cells #1 and #2 Showing the Simplified Lithology and Tailings Volume Used for Deposit Modelling (5x Vertical Exaggeration)

Source: Tetra Tech (2022)

14.6 Geological Interpretation for Model

The mineralization found in tailings at the CMP was deposited by manmade processes following grinding and flotation processes of black pyritic shale and is therefore not characteristic of a traditional bedrock hosted manganese deposit. The material can be physically characterized as a compacted soil, with varying degrees of particle sizes from clay to coarse sand. Mineralogy has been quantified by limited XRD analyses, with resulting manganese bearing mineral phases identified as rhodochrosite (and other manganese-bearing carbonates), spessartine (and other manganese-silicates); quartz was the main gangue mineral, and pyrite was the main sulphide mineral.

Deposition of tailings materials was episodic over the life of the historical mining operations. The material was deposited from processed materials with mixed particle sizes suspended in slurry. The deposits are characterized by the broad lateral (i.e., horizontal to sub-horizontal) extent of particle segregation as the slurry flooded the tailings facility. Thin beds of sediment would have been deposited and flowed laterally outwards with a particle gradation from coarse to fine away from the point of discharge. It is interpreted that grain size and moisture content may have more similarity with materials in a vertical sense and have more variability in a horizontal sense. It has been demonstrated by metallurgical testwork that a weak relationship exists with increasing manganese grade and with increasing particle size. However, variogram assessment has indicated that the best spatial continuity, in a statistical sense, occurs laterally within the horizontal plane. All searches for block model interpolation were undertaken relative the horizontal plane using a relatively flat elliptical search.

Local beds, or lenses, of oxidized tailings material were observed in core logging to exist along the upper, or outermost surfaces including perimeter slopes, and infrequently at depth within the deposit with thicknesses typically less than 0.5 m. These zones are due to oxidized pyrite and other sulphide minerals contained in under saturated tailings that were exposed to air for long durations, representing periods of hiatus or where local beaching occurred within the tailings at a distance to the point of deposition. These zones have not been modelled in detail and are considered to be insignificant in the broader sense of the deposit. For the purpose of the MRE, all tailings materials are considered to be primary, or unoxidized, materials.

A deposit model was developed using Seequent Leapfrog® Geo v.4.4.2 to represent the volume of tailings within each facility, and to further subdivide the tailings into domains representing ranges in elemental concentration, particle size, and in situ dry bulk density.

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Each cell was first segmented into lithology volumes for topsoil, tailings, and subsoil based on descriptions in the field logs. The tailings unit for each cell was applied as an external shell to constrain the grade, particle size, moisture, and bulk density models.

The particle size model was based on data from the laser diffraction particle size analysis. The grain size distribution was simplified to percentages of clay, silt, sand, and gravel using both European and North American soil classification standards. Additionally, the data was simplified to single value indices to characterize the distribution. Particle diameters measured for each decile of the distribution characterizes how the particles are statistically distributed throughout the deposit, where D50 represents the particle size of the 50th percentile (or median value), and D80 represents the particle diameter at the 80th percentile. Alternatively, the distribution was also characterized by the percent of the sample which passes a defined screen mesh, such as P75 which describes the percentage of the sample which passes nominal screen size of 75 µm (i.e., 200 mesh). Table 14-8 lists the average value for these indices as modelled, by cell.

The moisture model was based on moisture data measured by SGS labs from mass measurements on receipt of the sample and after drying, after applying a correction for mass loss from the PSA-LD sample split.

Table 14-8: List of Average Values for Modelled Variables Compared, Listed by Cell

Cell	Particle Size				Moisture (%)
	D50 (µm)	D80 (µm)	D90 (µm)	P75 (%)	
T1	64.14	152.90	219.01	66.48	21.20
T2	49.46	125.38	185.02	71.29	21.46
T3	66.96	157.08	230.42	67.48	20.68

An additional 18 elemental concentrations were interpolated into the block model to help inform metallurgical studies and mine planning exercise (Table 14-9). These elements are not included as part of the Mineral Resource statement.

Table 14-9: Additional Elements Interpolated into Block Model

Element	Method
As	4-Acid AAS
Ca	4-Acid AAS
Cd	4-Acid AAS
Co	4-Acid AAS
Cu	4-Acid AAS
Fe	4-Acid AAS
Hg	4-Acid AAS
K	4-Acid AAS
Mg	4-Acid AAS
Na	4-Acid AAS
Ni	4-Acid AAS
P	4-Acid AAS

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Element	Method
Pb	4-Acid AAS
Se	4-Acid AAS
Zn	4-Acid AAS
P	XRF
C	LECO
S	LECO

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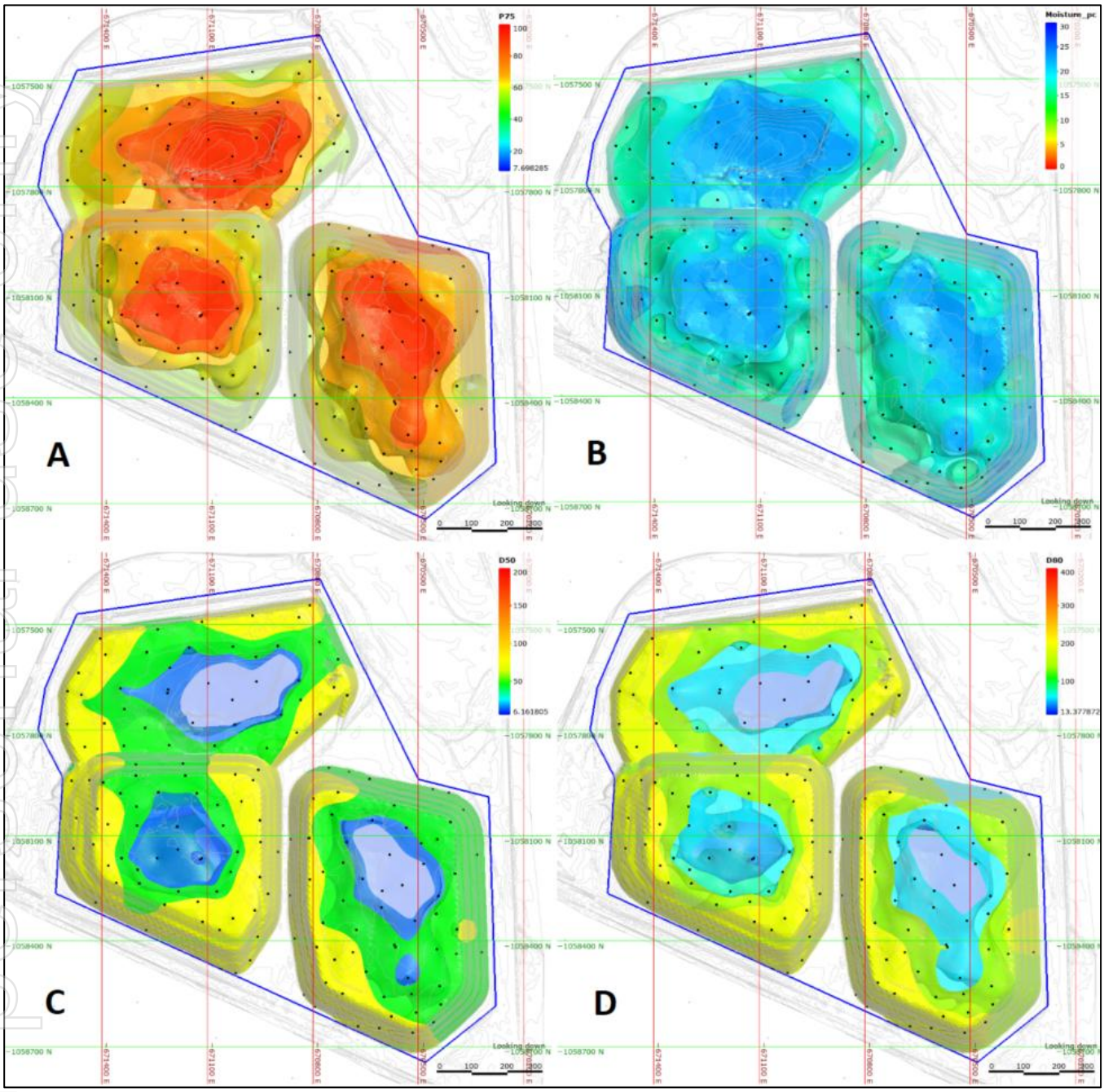

Figure 14-10: Plan Views of Geological Model Volumes

Notes:

- A – P75 grain size indices
- B – moisture
- C – D80 grain size indices
- D – D50 grain size indices

Source: Tetra Tech (2022)

14.7 Manganese Break-Even Grade

The CP considers the deposit to be a reasonable prospect for eventual economic extraction, as defined in NI 43-101, using the following assessment.

Based on preliminary on-site and off-site operating cost estimates and metal recovery estimates, the breakeven grade is estimated to be 3.78% tMn. All the costs and recoveries are based on preliminary estimates and may not be representative of the actual project costs and parameters. Assumptions for this grade calculation include:

- A product price is based on USD $2.75/kg for HPMSM (Mangan, 2026))
- A pre-concentration operating cost of USD$6.51/t feed
- A leaching and refining operating cost estimate of USD$118.42/t feed
- Total recovery to HPEMM and HPMSM is approximately 46.3% and 44.9%, respectively
- It is assumed that mining selectivity will not be applied due to inherent difficulty of grade control and selective mining for this deposit type.

The deposit is being considered as a bulk tonnage operation and it is assumed that selective mining will not be applied. All tailings material will be sent to the process plant on a diluted basis as a re-pulped slurry, and no cut-off grade can reasonably be applied to the deposit (i.e., no mining waste will be generated). The case for economic extraction relies on the net value of resources being sent to the plant to be positive; the average feed grades must be greater than the breakeven grade (cost equivalent) of 3.78% tMn. Most of the blocks contain Mn grades above the break-even grade except 36,329 t in Cell 1 and 7,284 t in Cell 2, totalling 46,613 t, representing 0.16% of the total estimated tonnage. These blocks are located in proximity to the modelled upper topsoil and lower subsoil contacts, and the lower grades may be due to dilution with non-tailings material. These blocks have not been discounted from the model.

Figure 14-11: Histogram of the block model manganese grade (tMn) distribution, and portion below break-even grade (shown in grey)

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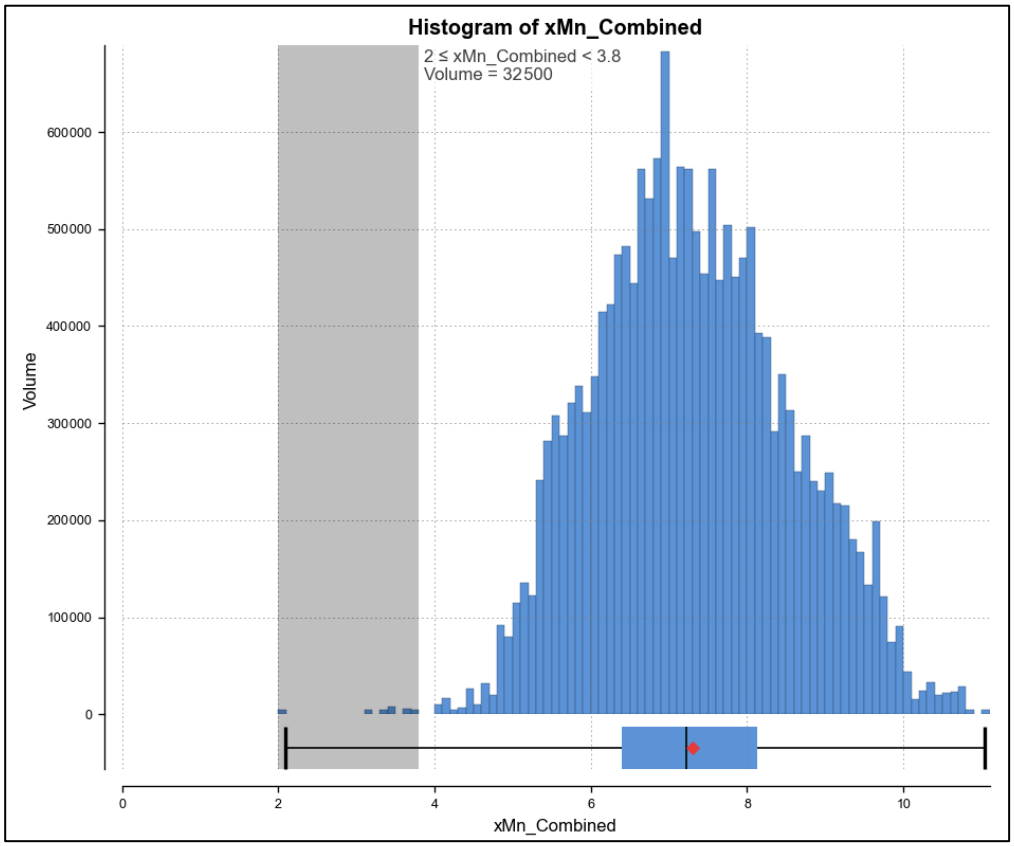

Figure 14-11: Histogram of the block model manganese grade (tMn) distribution, and portion below break-even grade (shown in grey)

Source: Tetra Tech (2022)

14.8 Mineral Resource Estimate

The MRE was calculated using Seequent Leapfrog® Geo Edge v4.4.2 using Phase 1 and Phase 2 drilling results for the total and soluble manganese grades and bulk density values. The 2 m composited data were interpolated into a sub-block model and reported on a block tonnage weighted basis.

Table 14-10 lists the MRE for in situ tailings material at the CMP. This estimate is effective as of April 27 2026. This estimate adheres to guidelines set forth by NI 43-101 and the CIM Best Practices.

Table 14-10: Mineral Resource Estimate for the Chvaletice Manganese Project, Effective April 27, 2026

Cell	Class	Volume ('000 m^3)	Tonnage (kt)	In Situ Dry Bulk Density (t/m^3)	tMn (%)	sMn (%)	Mg (%)
#1	Measured	6,577	10,029	1.52	7.95	6.49	0.95
	Indicated	160	236	1.47	8.35	6.67	1.09
#2	Measured	7,990	12,201	1.53	6.79	5.42	1.11
	Indicated	123	189	1.55	7.22	5.30	1.27

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Cell	Class	Volume ('000 m^3)	Tonnage (kt)	In Situ Dry Bulk Density (t/m^3)	tMn (%)	sMn (%)	Mg (%)
#3	Measured	2,942	4,265	1.45	7.35	5.63	0.96
	Indicated	27	39	1.45	7.90	5.89	0.95
Total	**Measured**	**17,509**	**26,496**	**1.51**	**7.32**	**5.86**	**1.02**
	Indicated	**309**	**464**	**1.50**	**7.85**	**6.05**	**1.15**
Combined	**M&I**	**17,818**	**26,960**	**1.51**	**7.33**	**5.86**	**1.15**

Notes:

- Estimated in accordance with the CIM Definition Standards on Mineral Resources and Mineral Reserves adopted by CIM council, as amended, which are materially identical to the JORC Code.
- The Mineral Resource has been classified as Indicated and Measured Resources based on the level of confidence in the deposit and estimation. Indicated Resources have lower confidence than Measured Resources. Mineral Resources that are not Mineral Reserves do not by definition have demonstrated economic viability. No Mineral Reserves have been defined for the CMP.
- The Chvaletice Mineral Resource is a reasonable prospect for eventual economic extraction. The Mineral Resource has been estimated with Mn as the primary commodity and Mg as a by-product. A break-even grade of 3.78% total Mn has been estimated for the Chvaletice deposit based on preliminary pre-concentration, leaching and refining operating cost estimates of US$124.93/t feed, total recovery to HPEMM and HPMSM of approximately 46.3% and 44.9%, respectively, and a combined price derived using commodity prices of USD $9.60/kg for HPEMM and USD $2.75/kg for HPMSM (Mangan 2026). $MgCO_3$ is produced as a raw product in the processing of HPMSM and would otherwise be discarded. This by-product is presented as total insitu concentration, and has been assessed as being a reasonable prospect for eventual economic extraction based on preliminary and approximate estimated market value for $MgCO_3$ of USD $800/t, process recovery of 45%, and an additional treatment cost of USD $1.00/t feed. The actual commodity price and recovery for these products may vary.
- A cut-off grade has not been applied to the block model and entire volume of the tailings is reported in the Mineral Resource statement. The estimated break-even cut-off grade falls below the grade of most of the blocks (excluding 46,613 tonnes which have grades less than 3.78% total Mn). It is assumed that material segregation will not be possible during extraction due to inherent difficulty of grade control and selective mining for this deposit type.
- Grade capping has not been applied.
- Numbers may not add exactly due to rounding.
- While the CP is not aware of issues related to environmental, permitting, legal, title, taxation, sociopolitical, marketing, or other relevant issues that may materially affect the estimation of Mineral Resources.

Figure 14-12 shows a plan view of the block model for Cells #1, #2, and #3 and definition of sections A-A' and B-B'. Figure 14-13 shows vertical cross sections along these lines for soluble manganese block values and for P75 block values.

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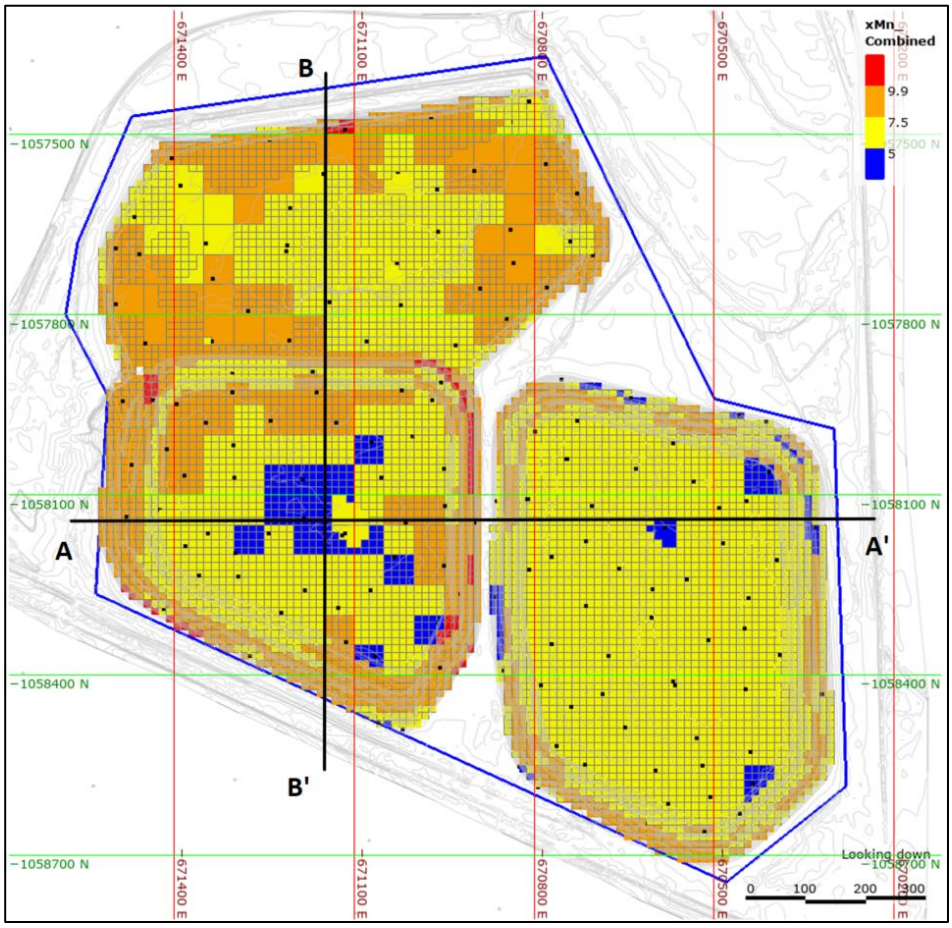

Figure 14-12: Plan View of Block Model Showing Section Lines and Soluble Manganese Grade Distribution at Surface

Source: Tetra Tech (2022)

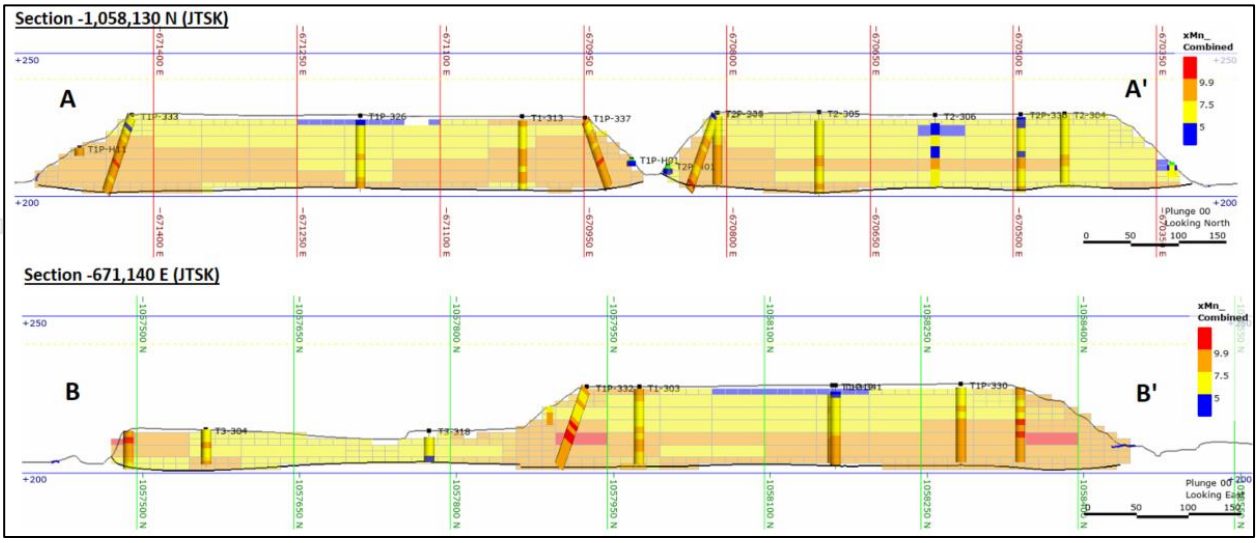

Figure 14-13: Vertical Cross-Section View Showing Total Mn Block Values Along Lines A-A' and B-B' (3x vertical exaggeration)

Source: Tetra Tech (2022)

14.9 Classification

Mineral Resource classification was performed in reference to CIM Best Practices. No set standard exists for classification of resources for tailings deposits.

In accordance with CIM Definitions Standards (2014), the CP is of the opinion that the CMP is a reasonable prospect for eventual economic extraction on the basis of:

- Extensive drill investigation and geochemical assaying of representative samples collected from the Chvaletice tailings storage facility has confirmed the material has continuous and anomalous concentration of manganese throughout the tailings material contained above the original ground surface and below a topsoil reclamation cap.
- The net average Measured (7.32%) and Indicated (7.85%) total manganese grades reported for the MRE are greater than the breakeven grade of 3.78% manganese, and only 46,613 tonnes of tailings material (0.16% of total) have grade less than the breakeven grade of 3.78% manganese (Section 14.6).
- The tailings deposits are located above ground surface, with immediately accessible transportation infrastructure and are located in proximity to industrially zoned land that is suitable for process plant development.
- Further engineering and financial assessments will be conducted to validate the economic viability of the CMP.

Measured Mineral Resources are those materials with evidence derived from detailed and reliable exploration, sampling, and testing, which is sufficient to confirm geological and grade or quality continuity between points of observation. The materials comprising Measured Mineral Resources have quantity, grade or quality, densities, shape, and physical characteristics that are estimated with confidence sufficient to allow the application of modifying factors to support detailed mine planning and final evaluation of the economic viability of the deposit. Confidence ranges for Measured Resources were evaluated using the total manganese variograms and by variance sensitivities of the closest sample and average distance of samples for each cell within the block model. Blocks have been classified as Measured where total manganese grades have been based on a minimum of five samples within a maximum average distance of 100 m and with closest sample within a maximum of 75 m. The majority of the model blocks have been classified as Measured.

Indicated Mineral Resources are those materials where evidence is derived from adequately detailed and reliable exploration, sampling, and testing and is sufficient to assume geological and grade or quality continuity between points of observation. Distribution and concentration of manganese concentrations have been reasonably defined for the majority of the deposits by drilling spaced at approximately 100 m spacing confirming trends with three dimensional continuity and allowing for modelling of grade distribution in conjunction with numerous other chemical and physical parameters. Indicated Resources have a lower confidence than Measured Resources. Those blocks within the established bounds of the tailings deposits that did not meet the criteria established for Measured Mineral Resources have been classified as Indicated. Presence of tailings material in these locations is very probable; however, given the distances to supporting samples, the grade has been estimated with lower confidence than Measured Resources. Figure 14-14 depicts the model blocks that have been classified as Indicated Mineral Resources, representing approximately 2% of the overall resource tonnage.

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Figure 14-14: Plan View Showing Extent of Indicated Resource Blocks (Red); Measured Blocks are not Shown (All Remaining Blocks)

Source: Tetra Tech (2022)

14.10 Grade Tonnage Curves

As means of a reference to tonnage sensitivity and distribution of manganese grade, Figure 14-15 shows the grade-tonnage curve. The grade-tonnage tabulation includes all blocks contained within the model and have not been segmented based on Mineral Resource classification.

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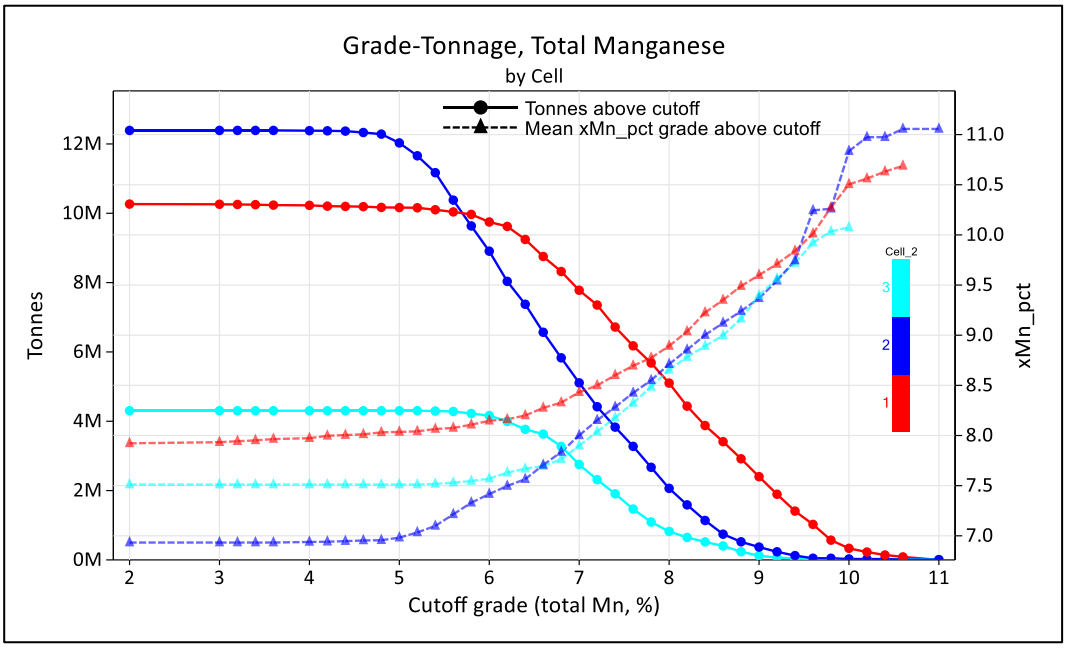

Figure 14-15: Grade-tonnage Curve for the Chvaletice Manganese Project, Total Manganese

Source: Tetra Tech (2022)

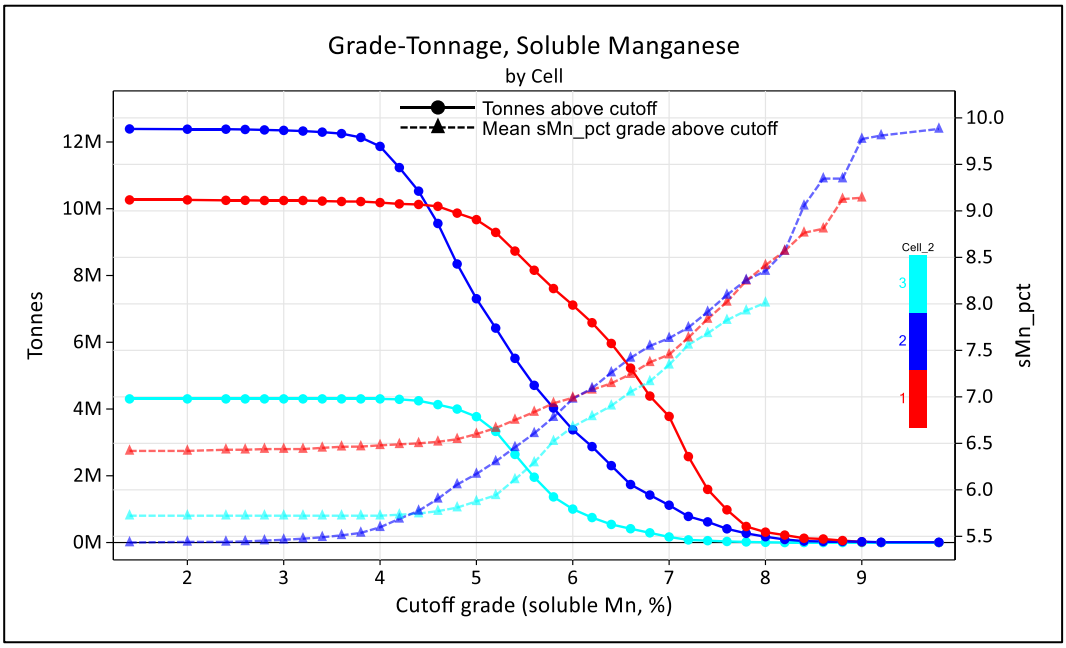

Figure 14-16: Grade-tonnage Curve for the Chvaletice Manganese Project, Soluble Manganese

Source: Tetra Tech (2022)

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14.11 Model Validation

Model validation was conducted by visual inspection, and various geostatistical comparisons.

A visual inspection of the modelled variables along vertical cross sections comparing raw values, composite values, and block values was conducted. No visual concerns were observed, and the interpolated models fit the drill hole sample data well.

A quantile-quantile (QQ) assessment is used as a visual check to compare the shape of two dataset distributions. Figure 14-17 shows a QQ plot by cell where quantiles of the composite total manganese values are compared with the block total manganese values. It is observed that excellent correlation exists for data in the middle two quantiles, with slight deviation in the higher and lower grade ranges due to minor smoothing of data in the block model.

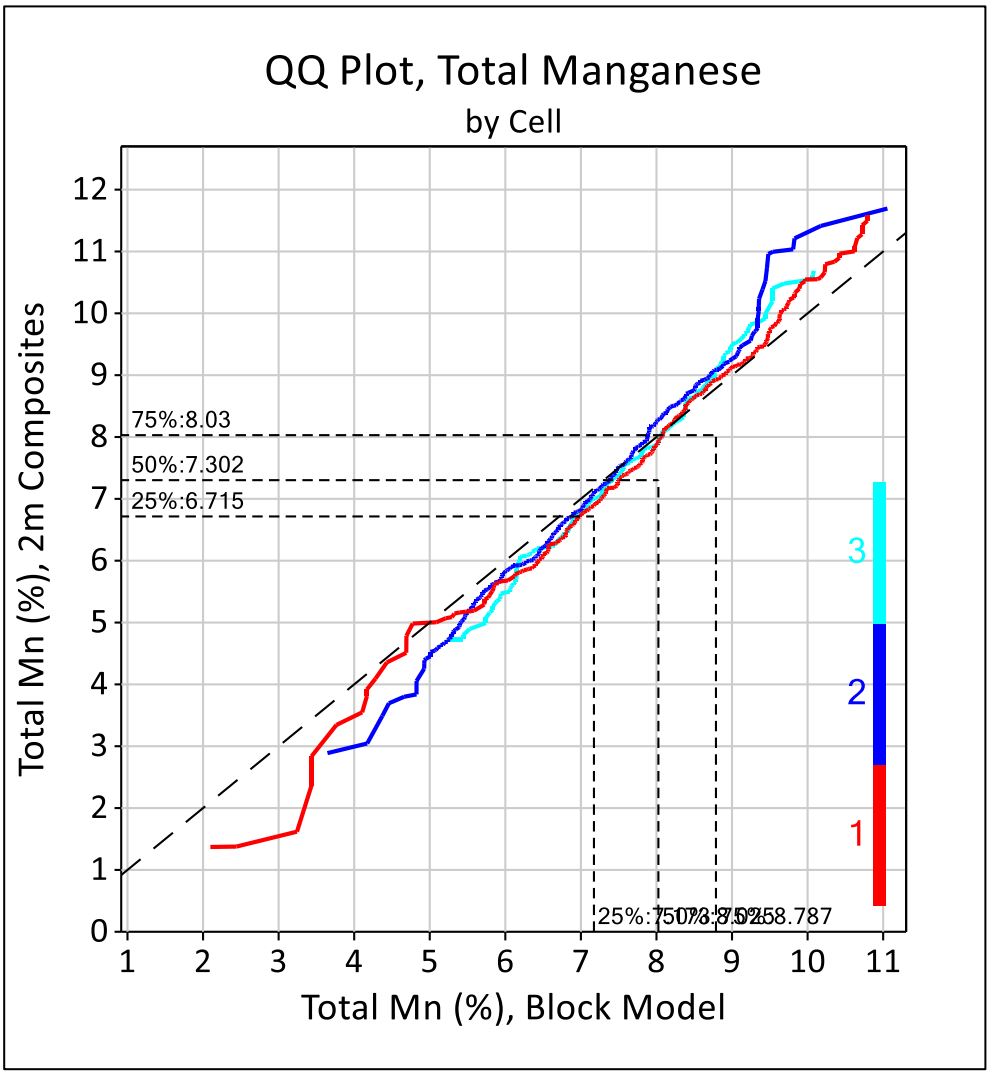

Figure 14-17: Quantile-Quantile Plot for 2 m Composites and Block Model Values of Total Manganese

Source: Tetra Tech (2022)

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Comparison of histogram distribution between the input 2 m composite data and the block model output is also used as a visual check to compare the data distributions, to verify that a bias has not been introduced during the interpolation procedure. Figure 14-18 shows excellent correlation exists between the datasets, where overall shape and tails have been preserved.

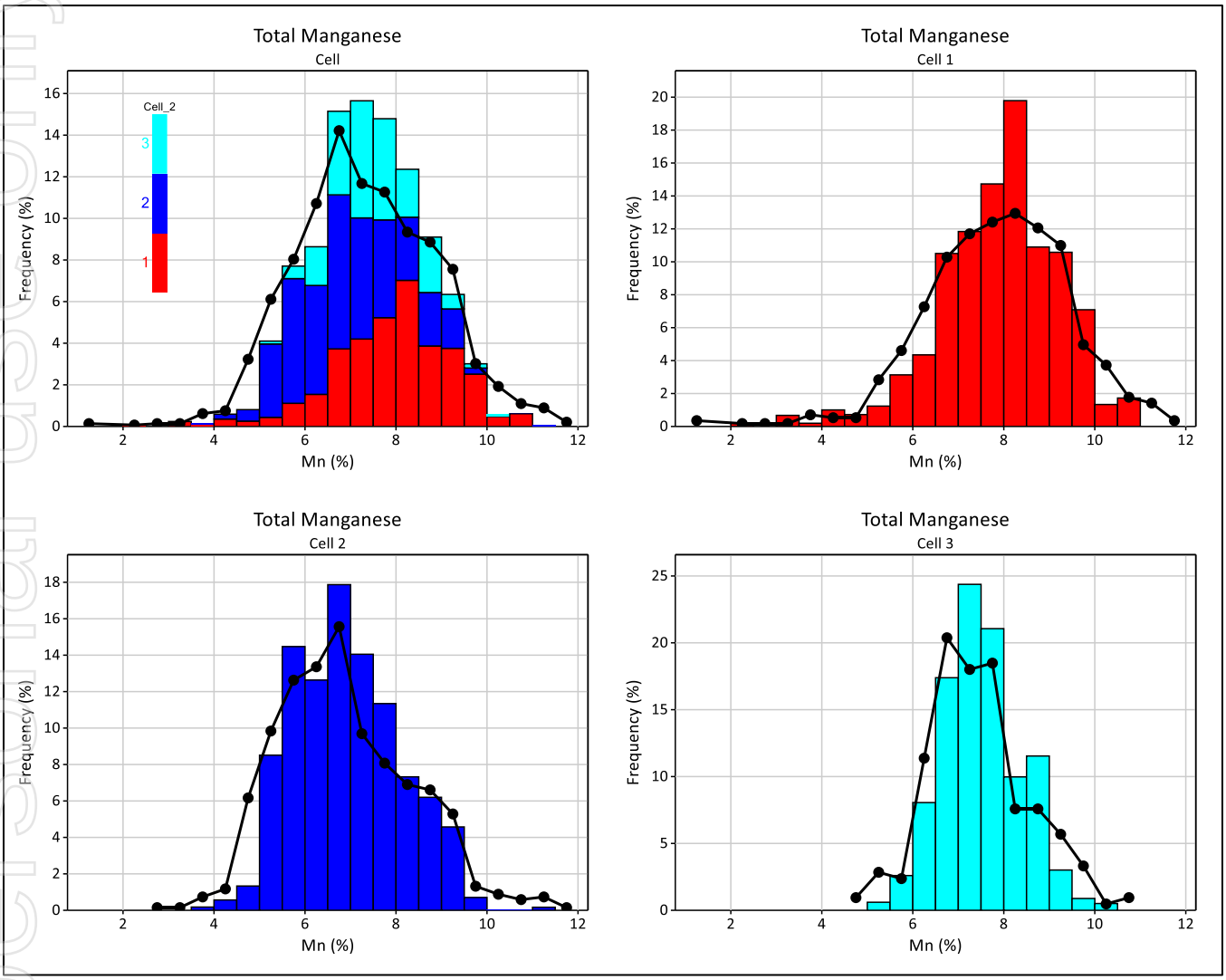

Figure 14-18: Histogram Comparison for 2 m Composites and Block Model Values of Total Manganese

Source: Tetra Tech (2022)

A swath plot analysis was completed on both the entire dataset and individual cell datasets. The analysis enables spatial verification for reasonable congruence of original assay data to the interpolated values along the three principal axes of the model.

Figure 14-19 shows swath plots along the X-axis,

Figure 14-20 along the Y-axis, and Figure 14-21 along the Z-axis. The analysis results indicate good correlation of the modelled blocks and no major bias has been introduced to the model during the interpolation process.

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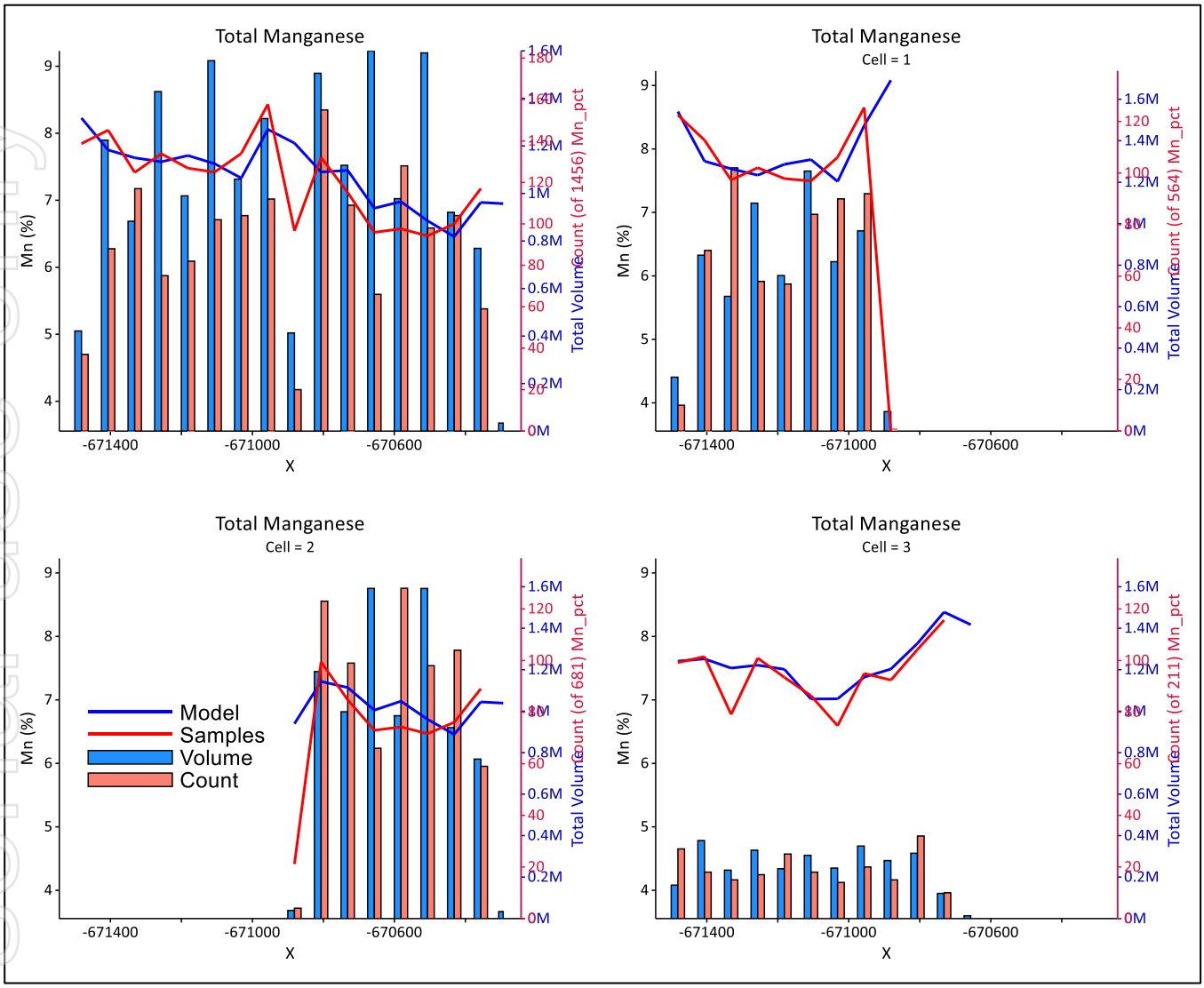

Figure 14-19: Swath Plots Along X-Axis, Total Manganese Values Shown

Source: Tetra Tech (2022)

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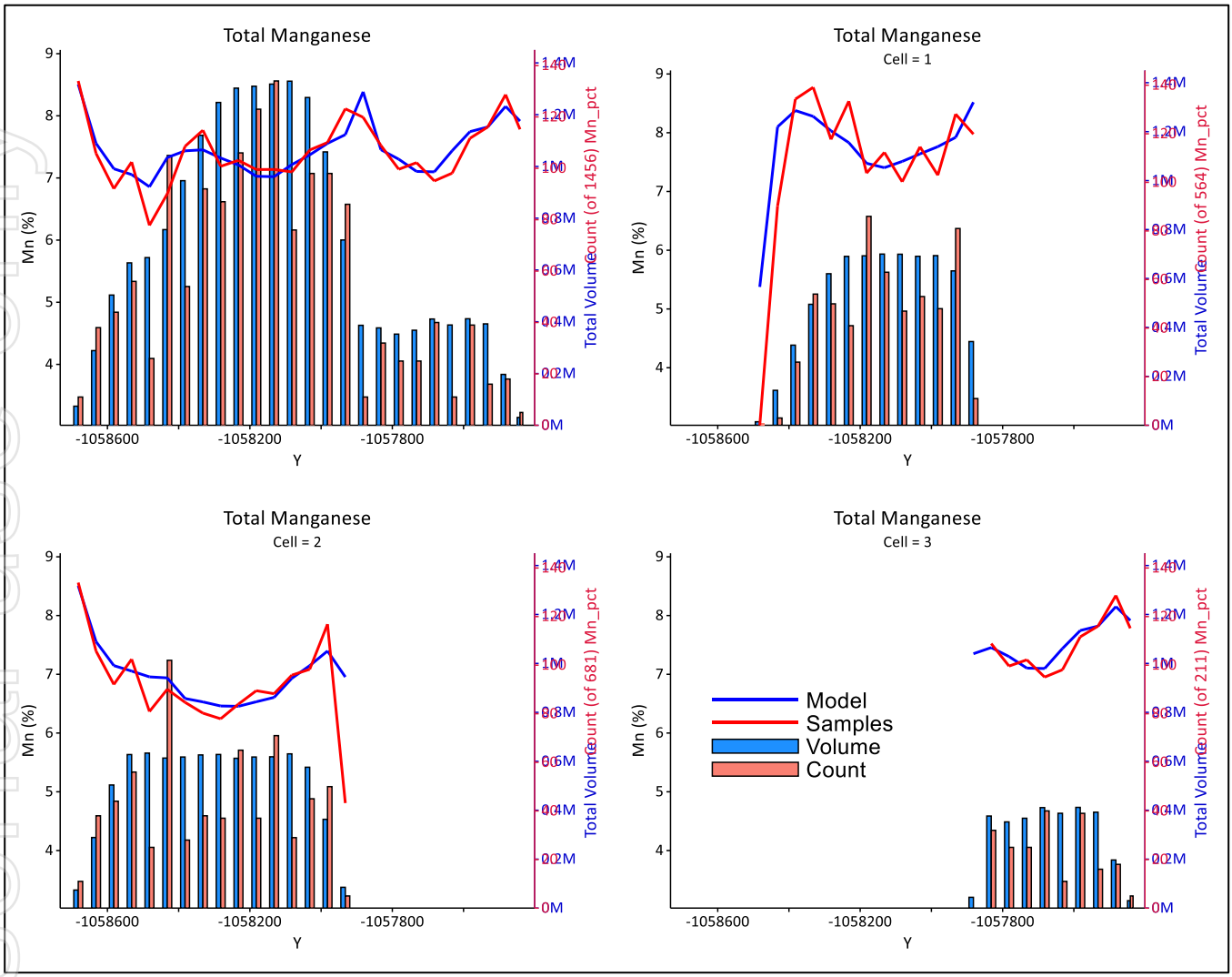

Figure 14-20: Swath Plots Along Y-Axis, Total Manganese Values Shown

Source: Tetra Tech (2022)

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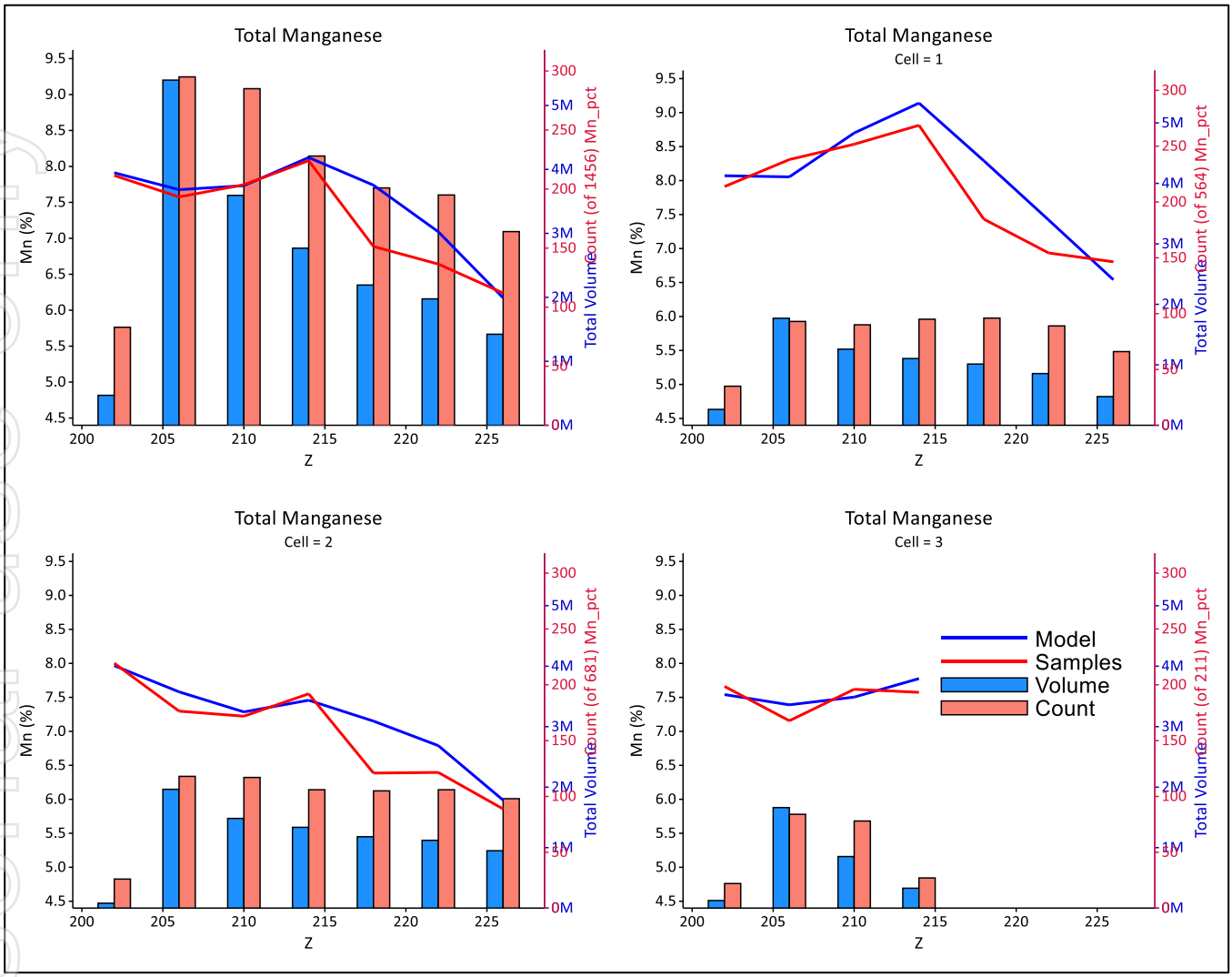

Figure 14-21: Swath Plots Along Z-Axis, Total Manganese Values Shown

Source: Tetra Tech (2022)

The CP has conducted various forms of model validation and believes the model is a fair and reasonable representation of the sampling data collected from on-site investigations completed to date.

14.12 Model Reconciliation

While full scale mining and production has not yet been undertaken on the project, model reconciliation is not able to be completed.

Extraction of a small bulk sample was conducted across several campaigns from the same location in Cell 3 to provide feed material for the Pilot Demonstration Plant (DP). The excavation totalled approximately 413 m^3 of which 163.2 m^3 was transported and stockpiled at the DP, after loss from oversize screening and discard of organics. A total of 57 m^3 of the stockpile was processed. The bulk sample represents only a fraction of the 10,000 m^3 volume of the discrete block volume; the excavated volume was not deducted from the stated mineral resource estimate.

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Sampling of the DP feed material returned a manganese grade of 5.35%, based on partial Aqua Regia digestion which comparable to the sMn values reported in the block model, and a magnesium grade of 0.94% which is comparable to 0.82% reported in the block model. A comparison between this localized bulk sample material with the resource model is summarized showing good correlation in Table 14-11 below.

Table 14-11: Comparison of Manganese and Selected Element Contents between Block Model and Processed Bulk Sample

Value	Block Model	Processed Bulk Sample	% Difference
Volume m^3	n/a	57	
Mn % (sMn)	6.29	5.35	-18%
As ppm	54.00	53.25	1%
Ca %	3.50	3.91	-12%
Cd ppm	0.52	0.27	49%
Co ppm	28.80	24.92	13%
Cu ppm	39.97	41.02	-3%
Fe %	5.55	6.07	-9%
K %	0.67	0.77	-14%
Mg %	0.82	0.94	-16%
Na %	0.69	0.64	7%
Ni ppm	46.03	44.81	3%
P %	0.67	0.91	-36%
Pb ppm	28.83	22.89	21%
Se ppm	1.90	0.87	54%
Zn ppm	79.27	75.74	4%

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15.0 MINERAL RESERVE ESTIMATE

No mineral reserves were estimated for the Project.

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16.0 MINING METHODS

16.1 Introduction

The CMP Mineral Resources, as described in Section 14.0, consist of three tailings cells located near the town of Chvaletice, roughly 89 km by road east of Prague, Czech Republic. The tailings cells will be mined by conventional open pit mining methods that will have minimal disturbance to the project site's surroundings, promoting both a safe and environmentally favorable project. Tetra Tech has designed a mining operation to produce 3,000 t/day of tailings feed from the Chvaletice deposit over a mine life of 26 years. Tailings will be extracted by truck and shovel equipment from the three cells using benches in parallel mining cuts. The layout of both the site and tailings cells allow for a mining operation that is flexible in terms of ramp placement on the cells throughout for the life of mine.

Figure 16-1 below illustrates the location and layout of the three tailings cells at the CMP that will be mined.

Figure 16-1: Plan View of the Three Tailings Cells at the CMP
Source: Google Map (2022)

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16.2 Proposed Tailings Extraction Methods

16.2.1 Mine Design Criteria

Mining the tailings cells of the CMP will be completed during two 8-hour shifts weekdays in daylight hours to minimize community disturbance. Mining operations will be done 250 days a year, 5 days a week, excluding holidays. Mined tailings will be hauled to the plant feed storage and pulping area that will also be used as a temporary stockpile for the tailings and residue. The main mine design criteria were developed based on the project and regulatory requirements and are shown in Table 16-1 below.

Table 16-1: Mine Design Criteria

Parameter	Unit	Value
Operating Days per Year	days	250
Shifts per Day	shifts	2
Hours per Shift	hours	8
Allowable Work Hours	hour range	6 am – 10 pm
Operating Days Per Week	days per week	5 days per week
In-Plant Maximum Storage 5-day Capacity for Raw Tailings	tonnes	18,000
In-Plant Maximum Storage 5-day Capacity for Residue	tonnes	17,000
Plant Throughput Rate	tonnes per year	700,000 – 1,250,000
Maximum Ramp Gradient	%	12
Double Lane Road Width excluding berms	metres	11.4
Single Lane Road Width excluding berms	metres	7.6
Ramp Berm Height (Articulated Trucks)	metres	1
Mining Bench Height (Single Bench)	metres	3
Overall Slope Angle	degrees	13° - 15°
Bench Face Angle	degrees	45°
Minimum setback distance from tailings cell crest for residue placement	metres	12
Ore Bulk Density (dry)	tonne/m^3	1.51
Overburden Density (dry)	tonne/m^3	2
Average In-situ Moisture Content	%	C1 = 21.2, C2 = 21.5, C3 = 20.7

The 26.9 M tonnes of tailings will be processed at the plant at a variable throughput rate. Mine design criteria are driven by geotechnical analysis of the tailings to meet required factors of safety for design and operation.

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16.2.2 Bench Design

Each of the tailings cells will be mined by excavator loading haul trucks on 3 m high benches with a 12 m bench width and a bench face angle of 45 degrees. A haul ramp to the crest of each cell will be developed for access for the excavator to mine the benches from the top to the bottom. The bench height of 3 m was chosen as a conservative bench height that could be achieved in all areas of the cells with depressurization of the tailings. The 12 m bench width with the 45-degree face angle will allow slumping of the saturated tailings on the working face without causing a multi-bench failure.

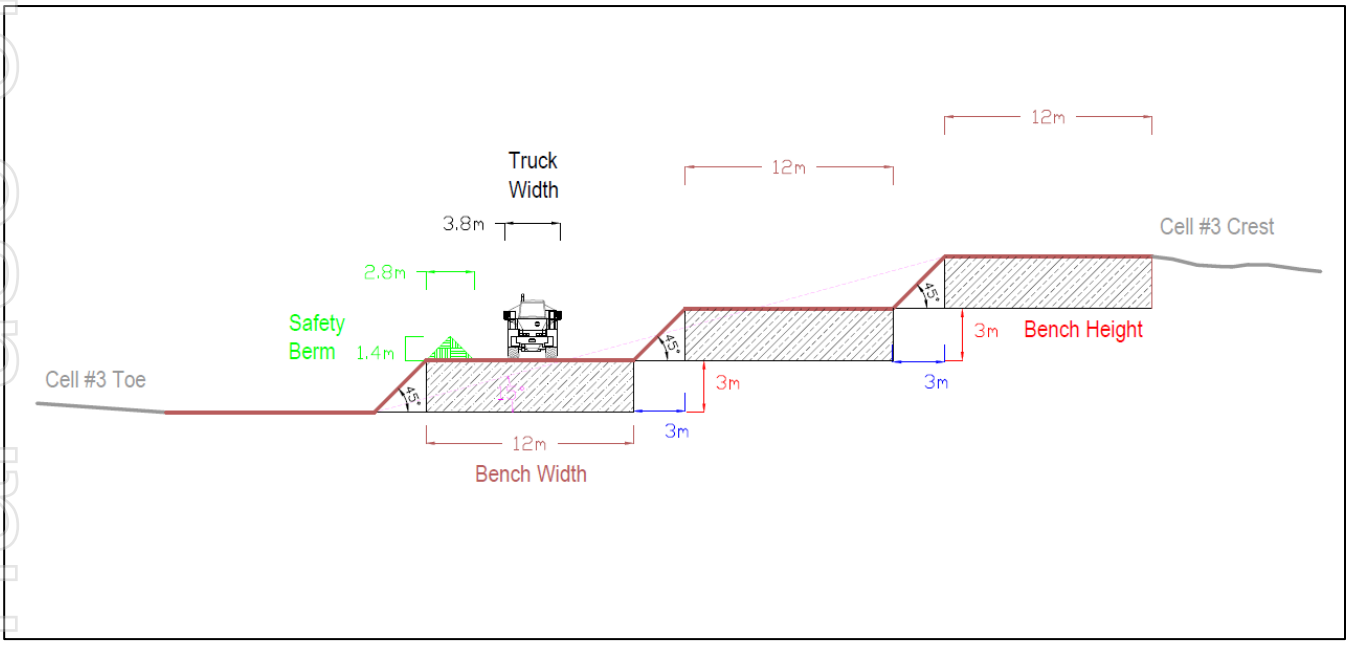

Figure 16-2: CMP Bench Design for Cell 3

Source: Tetra Tech (2022)

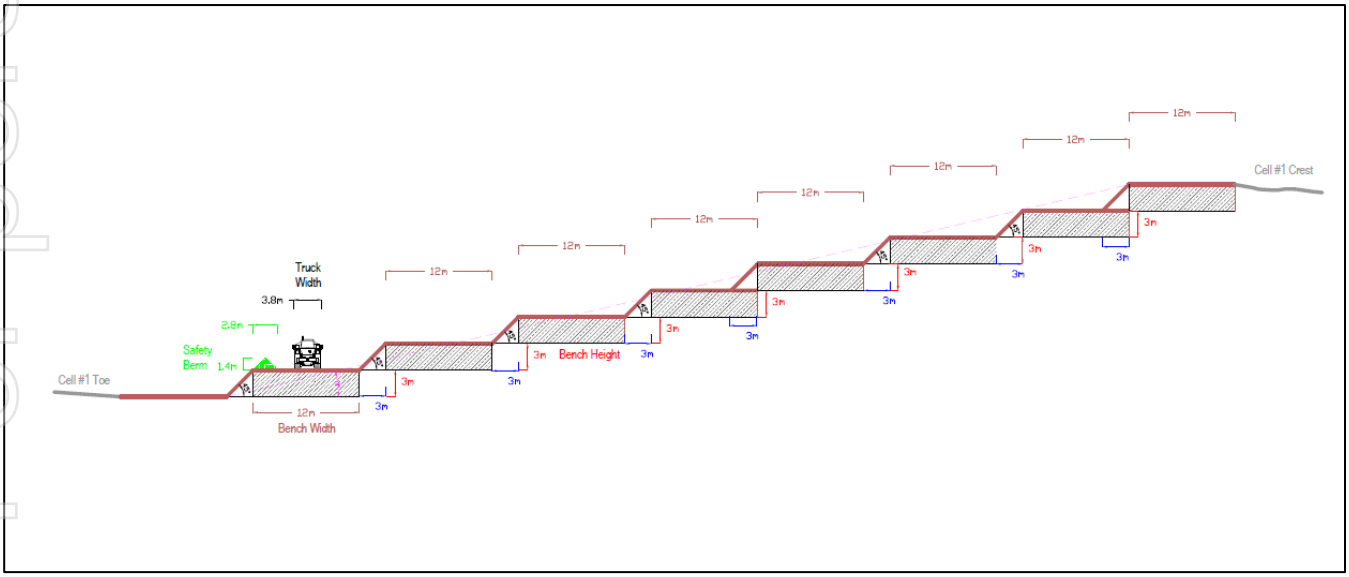

Figure 16-3: CMP Bench Design for Cell 1 & 2

Source: Tetra Tech (2022)

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16.2.3 Haul Road and Ramp Design Parameters

The primary haul road for the CMP will run from the plant feed storage area between Cells 1 and 2 to allow access to all three tailings cells as shown in Figure 16-4. The primary haul road will be extended between Cells 1 and 3 after Cell 3 is mined. Roads will be constructed using all-fill techniques, using gravel and overburden that will be removed from the plant site, to achieve design alignment and grade. The roads will be graded as required and dust control will be done using water trucks. All roads on site are considered private roads and access will be controlled by operations.

The main haul road is designed to be double lane with an overall road allowance of 18 m in width including berms and ditching. The main haul road ditch will have gradient to allow for gravity flow of the contact water to the collection sump. Haul ramps will be designed single lane with an overall road allowance of 14.2 m in width. Ramps are designed with a maximum grade of 12% and a ditch to contain contact water. Figure 16-4 highlights the location of the main haul road. A sump pump at the end of the main haul road will be used to pump the contact water through a 4” pipe to another sump located between Cells 1 and 2. Gravity flow will be used to transport the collected water to the collection point at the stockpile.

The selected road allowance for double lane is accommodating three times the width of the largest truck. The selected road allowance for single lane is accommodating two times the width of the largest truck. All roads have additional room for drainage ditches and safety berms as summarized in Table 16-2 below.

Table 16-2: In-Pit Haul Road Design Parameters

Parameter	Unit	Value
Truck (41 t) operating width	m	3.8
Double Lane – 3 x truck width	m	11.4
Single Lane – 2 x truck width	m	7.6
Berm height (¾ tire height)	m	1.4
Berm width	m	2.8
Ditch Width	m	1
Total Allowance Single Lane	m	14.2
Total Allowance Double Lane	m	18

The haul road will be capped with 50 mm minus gravel and 200 mm minus gravel to keep water drained away from the roadway. The haul road profiles are shown in Figures 16-5 and 16-6 below.

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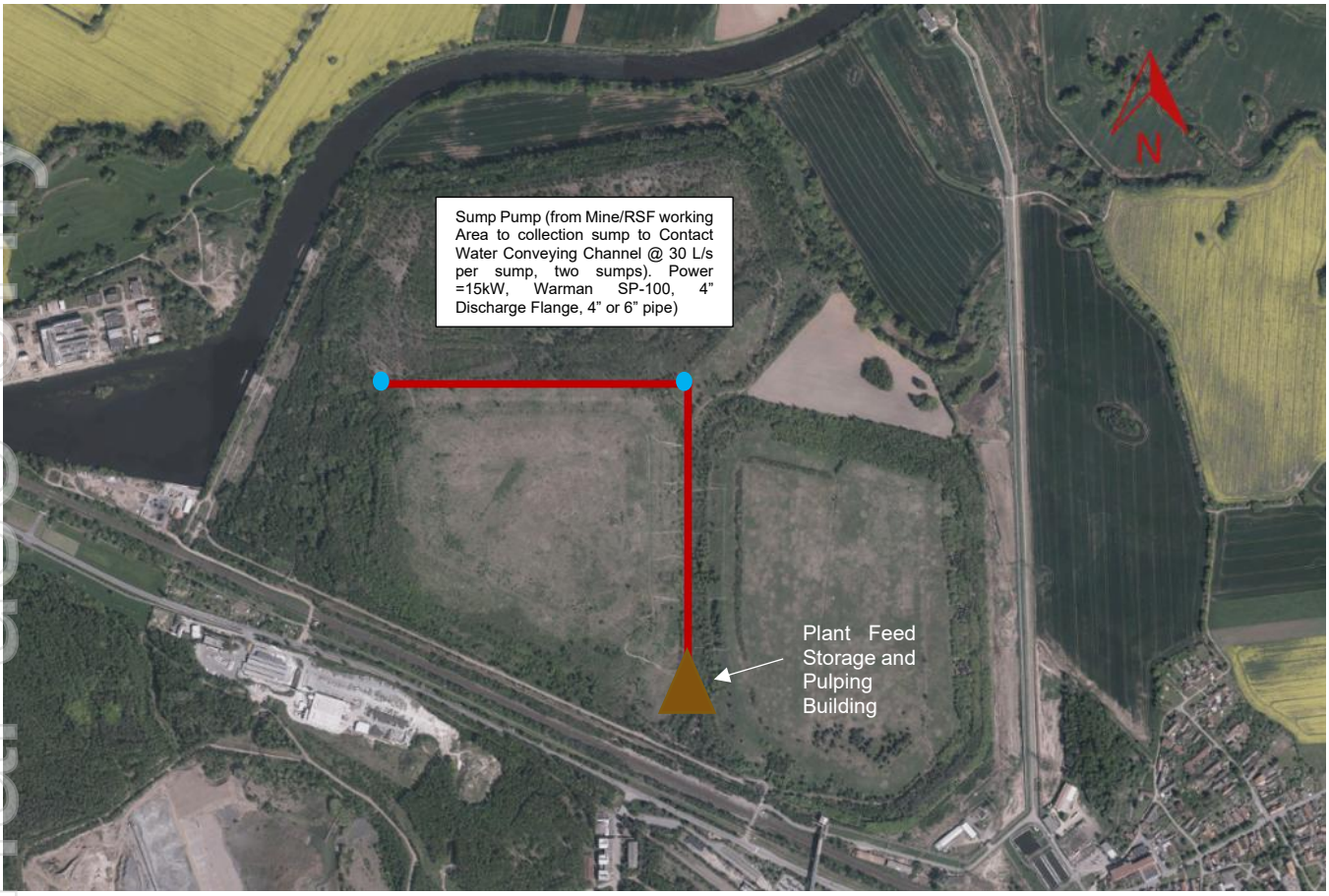

Figure 16-4: Main Haul Road Location
Source: Google Map (2022)

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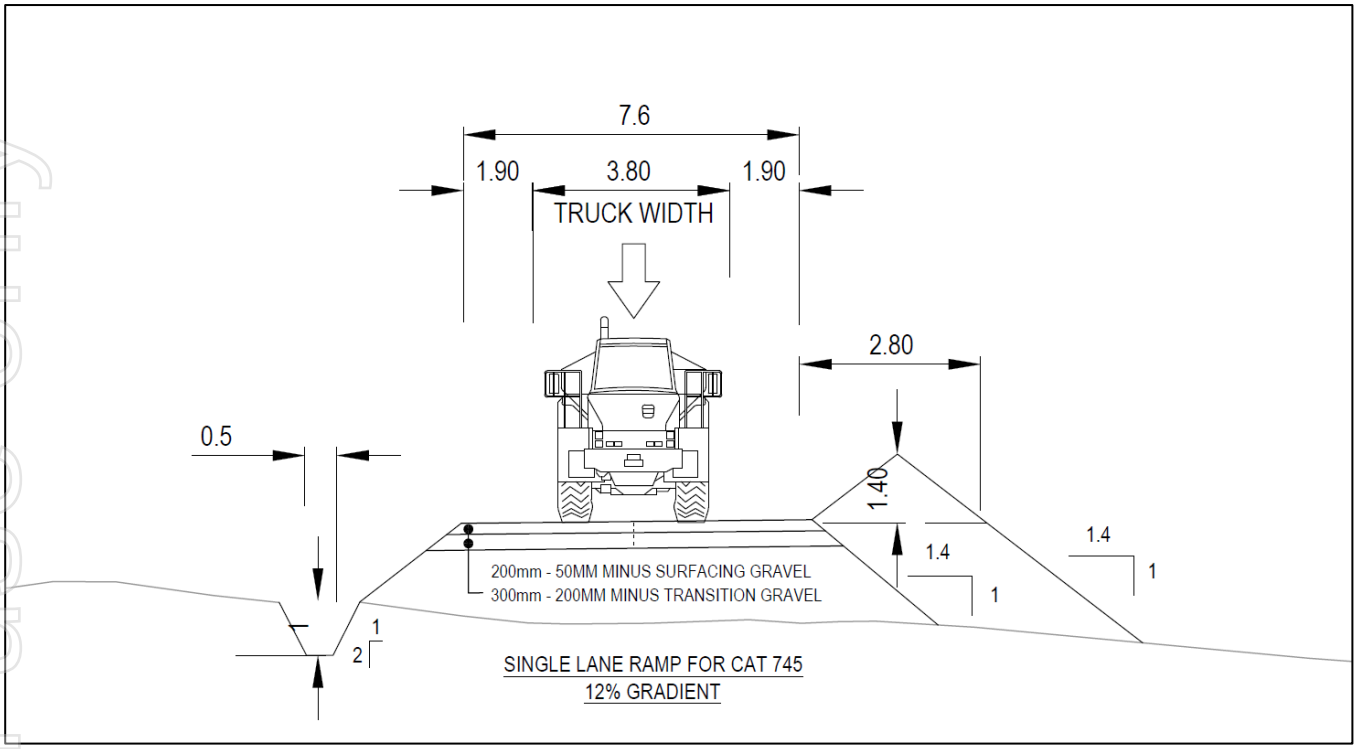

Figure 16-5: Single Lane Ramp Profile

Source: Tetra Tech (2022)

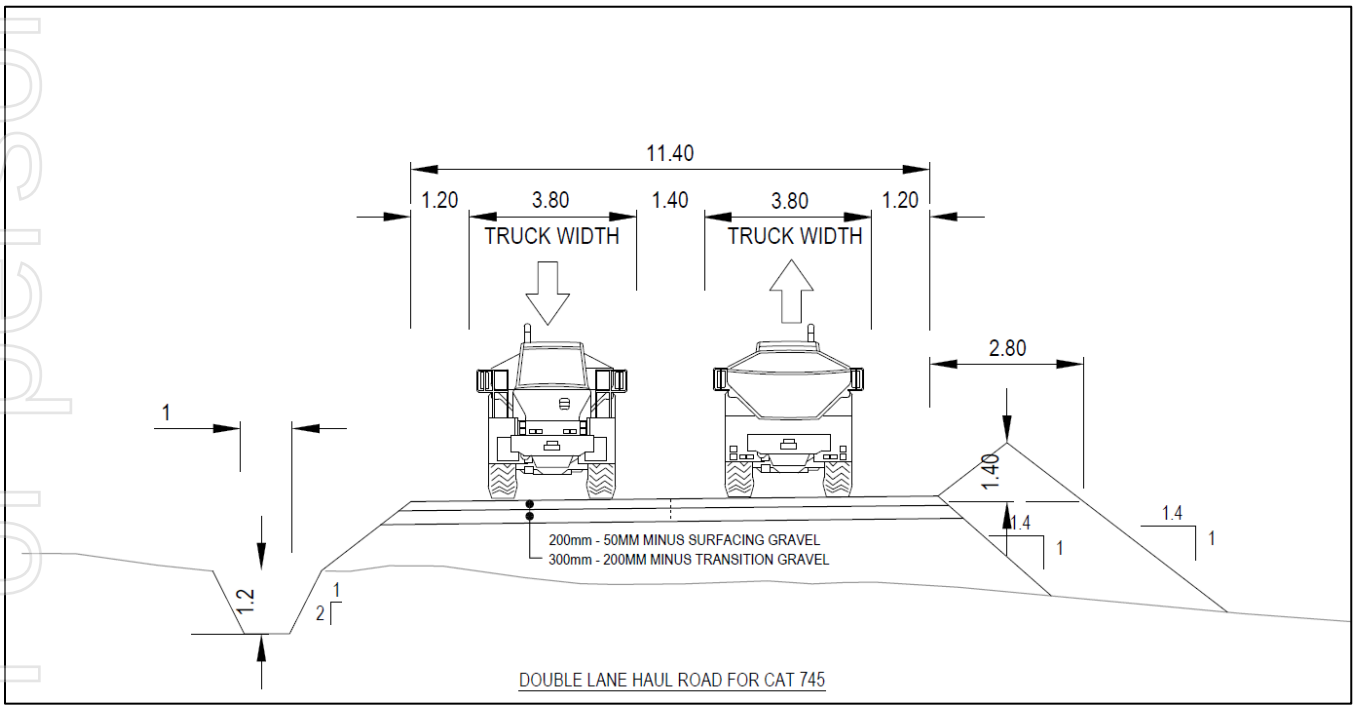

Figure 16-6: Double Lane Haul Road Profile

Source: Tetra Tech (2022)

16.3 Tailings Extraction Sequencing

The primary drivers of the production schedule are mining the tailings to meet the plant production targets and advancement of the toe of the tailings material to allow storage capacity for residue placement. Topsoil growth on the cells will be removed prior to mining the tailings.

16.3.1 Pre-production Plan

Construction of the main haul road from the plant feed storage area to the toe of Cell 3 will be undertaken before mining starts. Overburden from the plant site will be used as the base of the main haul road with a gravel capping. Haul ramp access to the crest of the advancement for year 1 in Cell 3 will be developed, as well as preparation of the starter cell for the residue placement.

16.3.2 Topsoil Removal and Progressive Reclamation

As part of the mine sequence, removal of the topsoil cover on each of the tailings cells will be completed annually. The topsoil volumes for each of the cells are shown in Table 16-3.

Table 16-3: Overburden Thickness and Volume

Cell	Area	Estimated Overburden Thickness	Estimated Overburden
#	m^2	m	m^3
1	334,660	1.5	501,990
2	396,563	1.5	594,845
3	323,824	0.5	148,052

The topsoil cover on each of the cells limits infiltration to the tailings cells so topsoil removal will be limited to only stripping the topsoil from the crest advancement of each year of mining. Each of the tailings cells will be stripped and grubbed by excavators and haul trucks with the topsoil organics being stockpiled for progressive reclamation as the residue placement achieves final crest. Any small trees in the organic removal will be chipped and removed from the topsoil. Figure 16-7 shows the topsoil stockpiles that will be used when mining the cells.

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Figure 16-7: Temporary Overburden Stockpile Locations

Source: Tetra Tech (2022)

16.3.3 Stockpile for Tailings and Residue

The plant feed storage and pulping building will be located to the south of the tailings cells as shown in Figure 16 4. Haul trucks will dump tailings into a hopper at the site for a stockpile feed for the process plant. Filtered residue will also be stockpiled at the building, where wheel loaders will load filtered residue into haul trucks for transport back for residue placement in the mined-out cells.

16.3.4 Tailings Mining Sequence

Figure 16-8 shows the mined-out footprint of the mine sequence. The CMP has a 26-year production schedule to mine and process the 26.9 M tonnes of tailings. The mine sequence for the tailings will begin with Cell 3. Cell 3 has a large ground footprint relative to the amount of time it will take to fully mine Cell 3. Cell 3 is also the shortest of the three cells, which will allow rapid advance. As such, Cell 3 will be mined first in order to increase the available footprint for residue construction. Table 16-4 shows the CMP mining sequence.

Table 16-4: Mining Sequence

Years to Complete Mining	
Cell #	**Years**
3	5.25
1	10
2	10.25

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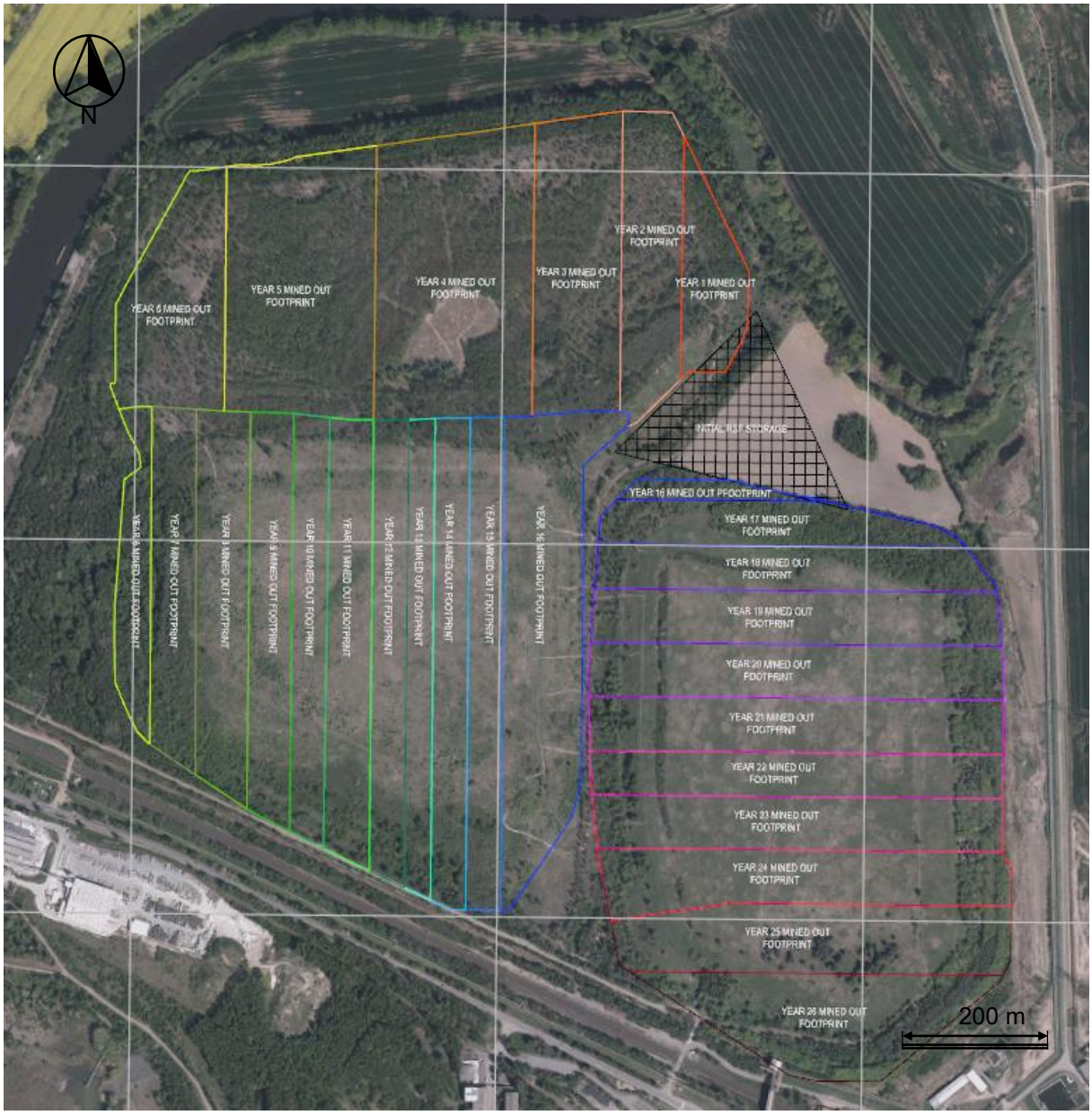

Figure 16-8: Plan View of Annual Mined-Out Footprint

Source: Tetra Tech (2026)

The processing plant's targeted production rate is driven by HPMSM production targets. There is a planned ramp up period in the first four years of production as highlighted in Table 16.5. The grade of the tailings material is relatively consistent, with the total manganese grade ranging from a minimum of 6.44% in year 21 to a maximum of 8.89% in year 15. Cell 3 will be mined from E-W, with Cell 1 being mined from W-E. Cell 2 will be mined from N S with the advancement of the tailings toe the primary focus to provide maximum residue storage capacity. Table 16-5 below shows the tailings processing and residue placement schedule for the CMP.

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Table 16-5: Tailings and Residue Schedule

Schedule Year	Topsoil Volume (m^3)	Dry Tailings to Plant (t)	Residue to RSF (dry tonnes) (t)	Total Manganese (%)	Contained Manganese (t)	Total Magnesium (%)	Contained Magnesium (t)
1	33,248	323,163	336,090	8.13	26,258	0.91	2,929
2	30,032	549,687	571,675	7.54	41,440	0.92	5,034
3	36,414	581,946	605,223	7.22	42,043	0.94	5,467
4	68,252	1,078,988	1,122,148	7.06	76,202	0.97	10,423
5	69,201	1,149,030	1,194,991	7.29	83,791	0.98	11,206
6	142,730	1,014,017	1,054,577	8.03	81,377	1.00	10,139
7	67,578	1,031,019	1,072,260	7.89	81,333	1.10	11,368
8	81,878	1,083,030	1,126,352	7.6	82,344	1.15	12,444
9	75,529	1,103,856	1,148,010	7.5	82,749	1.15	12,717
10	64,921	1,058,221	1,100,550	7.73	81,750	1.13	11,959
11	85,436	1,063,691	1,106,239	7.7	81,944	1.12	11,939
12	51,158	1,055,328	1,097,541	7.76	81,861	1.12	11,784
13	84,138	1,039,428	1,081,005	7.85	81,564	1.08	11,254
14	33,889	971,672	1,010,539	8.25	80,193	1.03	10,034
15	29,227	880,703	915,931	8.89	78,286	0.99	8,734
16	205,939	1,041,796	1,083,468	7.82	81,510	1.01	10,545
17	92,863	1,199,101	1,247,065	7.05	84,565	1.18	14,107
18	75,075	1,234,599	1,283,983	6.9	85,196	1.28	15,768
19	88,939	1,299,705	1,351,693	6.64	86,312	1.34	17,392
20	88,939	1,313,879	1,366,434	6.59	86,612	1.35	17,798
21	71,936	1,326,454	1,379,512	6.44	85,483	1.33	17,661
22	82,399	1,351,554	1,405,616	6.46	87,358	1.28	17,353
23	77,168	1,314,291	1,366,862	6.6	86,718	1.28	16,815
24	64,350	1,263,384	1,313,919	6.79	85,794	1.28	16,171
25	28,774	1,162,796	1,209,307	7.22	83,988	1.23	14,268
26	41,854	468,179	486,906	8.08	37,832	1.19	5,591
Total	**1,871,867**	**26,959,517**	**28,037,896**	**7.32**	**1,974,503**	**1.15**	**310,900**

16.4 Residue Placement and Haul Road Access

Part of the haulage cycle will be transportation of filtered residue from the stockpile located between existing Tailings Cells 1 and 2. The interim stages of tailings extraction, residue development, and haul roads are shown in Figures 16-9 through 16-14 below.

Haul ramps will be cut from the existing tailings by the excavator as the crest advances. A single lane haul ramp will be developed on the south side of Cell 3 for tailings extraction. Haul ramps in Cell 3 will be single lane width with a berm at a 12% gradient for an overall length of 92 m. As mining advances into Year 3, a separate haul ramp will be developed on the north side of Cell 3 to allow the excavator to work either north to south or south to north to permit the saturated material in Cell 3 to depressurize as the mining face advances.

The management of contact water from the tailings excavation area and the RSF will be integrated during mining operations. Ongoing grading of the benches during operation will direct any contact water on the active mining bench to the haul ramp ditches. The contact runoff and seepage from the active mining face and RSF will be collected through collection ditches incorporated into the haul road design.

Sumps will collect contact water at the base of haul ramps, and ditches running along the main haul road will transport contact water to the mine site water collection tank at the stockpile.

Cells 1 and 2 are on average 400 m crest to crest, so single lane haul ramps at a 12% gradient with an overall length of 218 m from toe to crest will be cut into existing tailings. Haul ramps will be developed on both sides of the mining advance to allow the excavator to work from both sides for depressurization of saturated material in the centre of the cells.

16.4.1 Tailings Extraction and Residue Placement Haul Cycles

Empty haul trucks will be filled with residue at the plant feed storage and pulping building and will travel loaded down the double lane haul road. Loaded haul trucks will drive up the single lane haul ramps to dump the residue and then travel empty down the haul ramp and drive to be loaded with tailings on the mining bench. After being loaded with tailings, haul trucks will travel loaded down the single lane haul ramp and then travel back loaded to the plant feed storage building on the double lane haul road. The haul cycle at different stages of the mine life is shown in Figures 16-9 to 16-11 below. Figures 16-12 to 16-14 show cross sections of the mining progression and residue placement at different years in the mine life.

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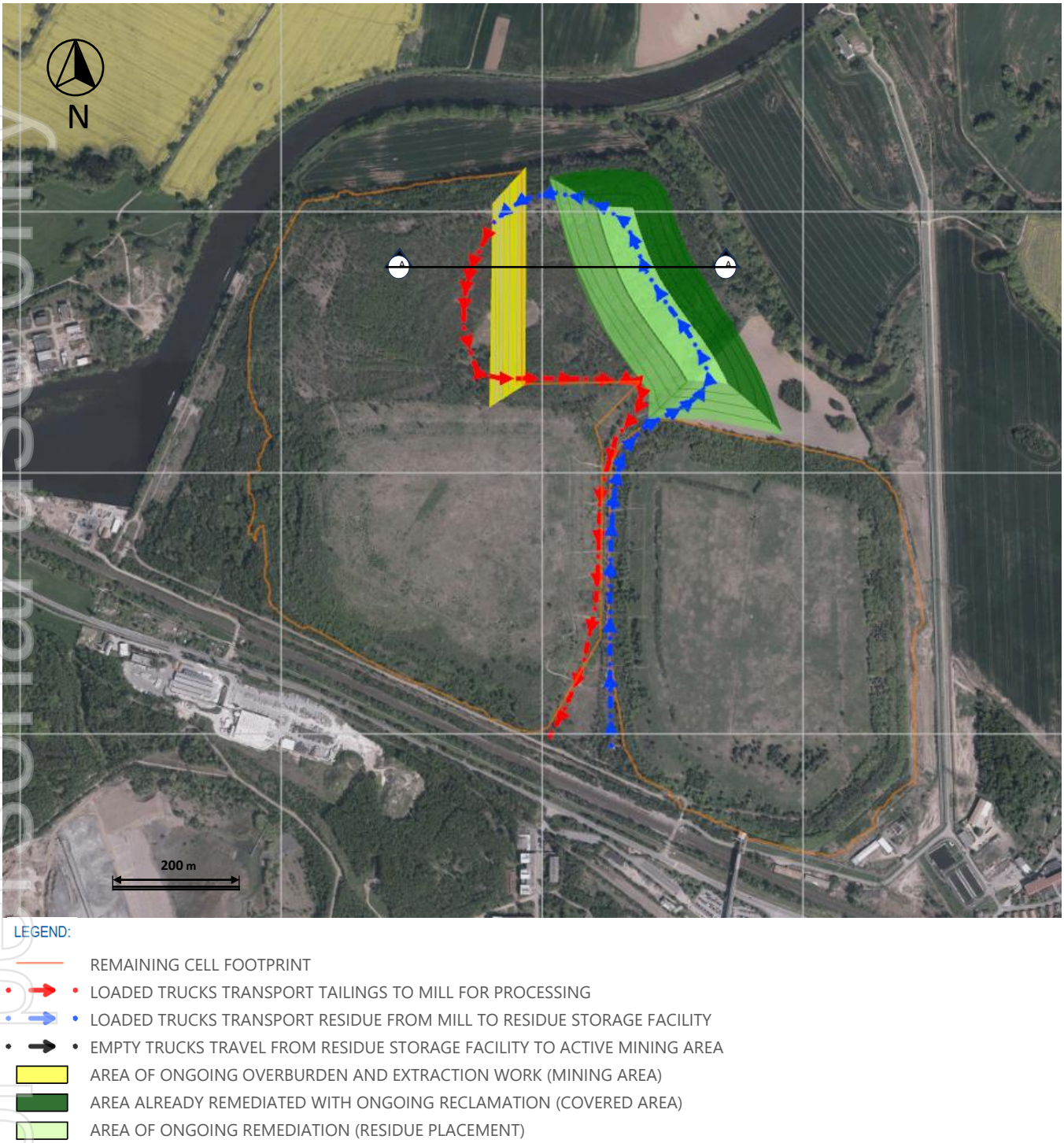

Figure 16-9: Tailings Extraction and Residue Development Year 3

Source: Tetra Tech (2026)

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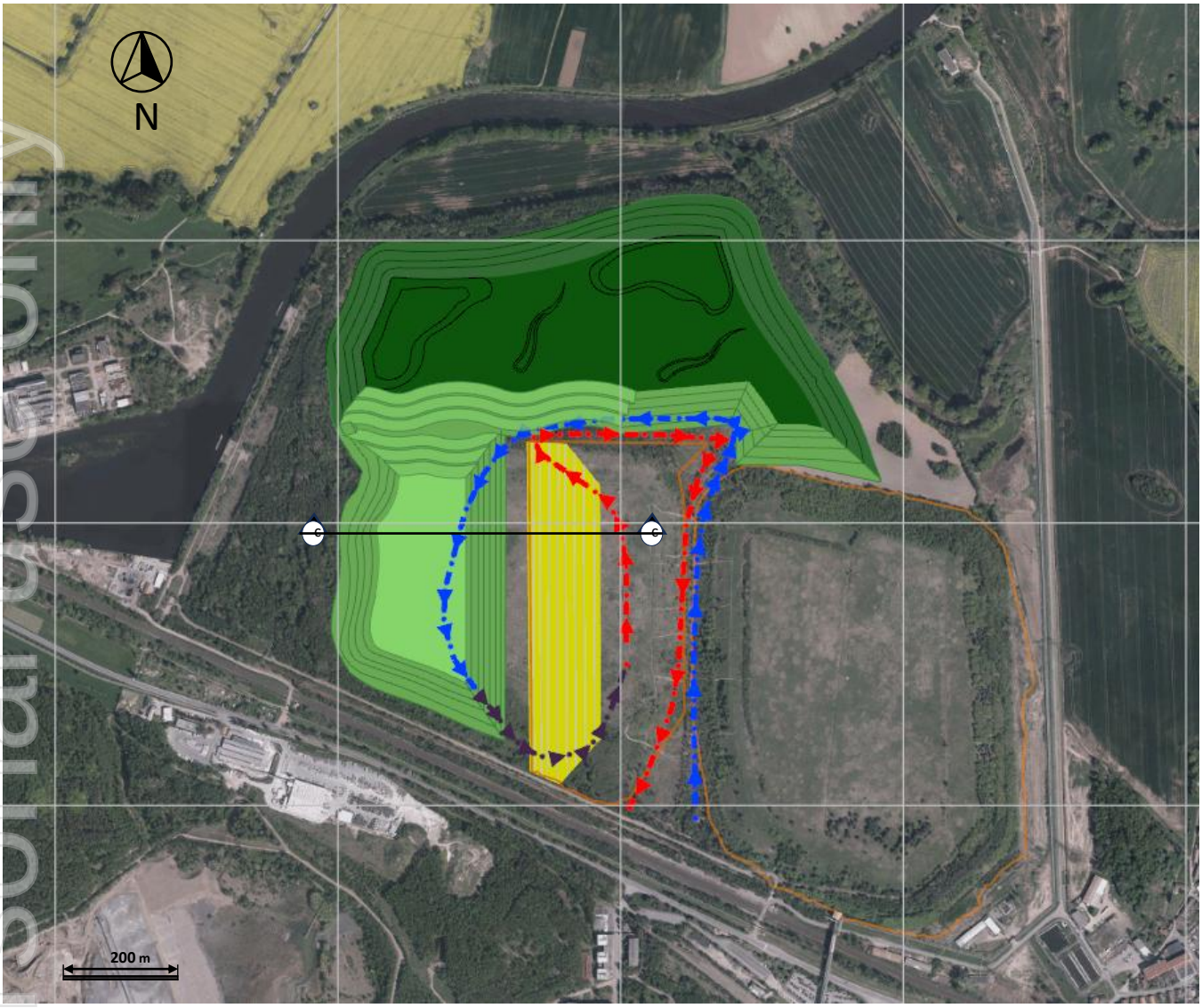

Figure 16-10: Tailings Extraction and Residue Development Year 12

Source: Tetra Tech (2022)

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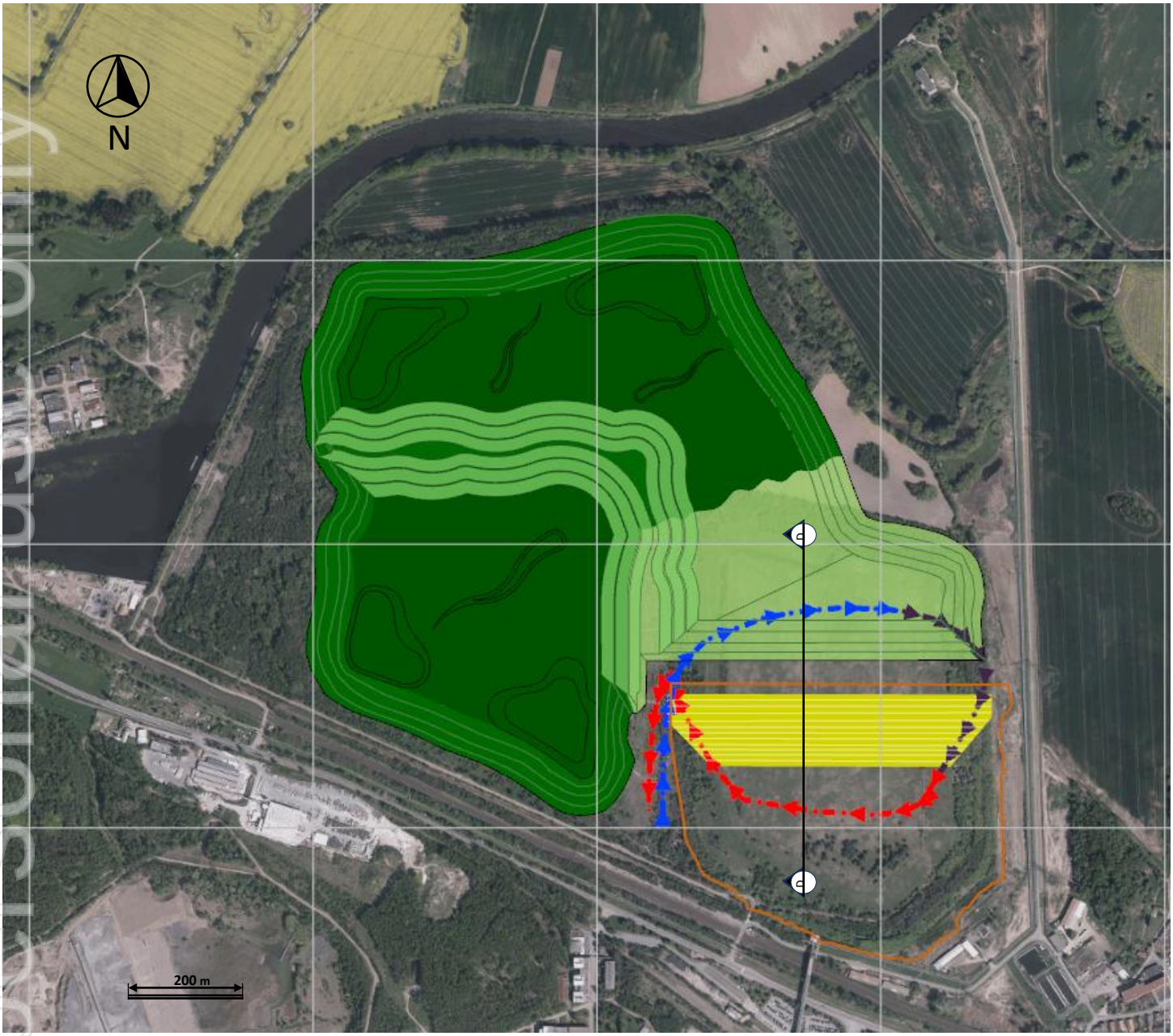

Figure 16-11: Tailings Extraction and Residue Development Year 22

Source: Tetra Tech (2022)

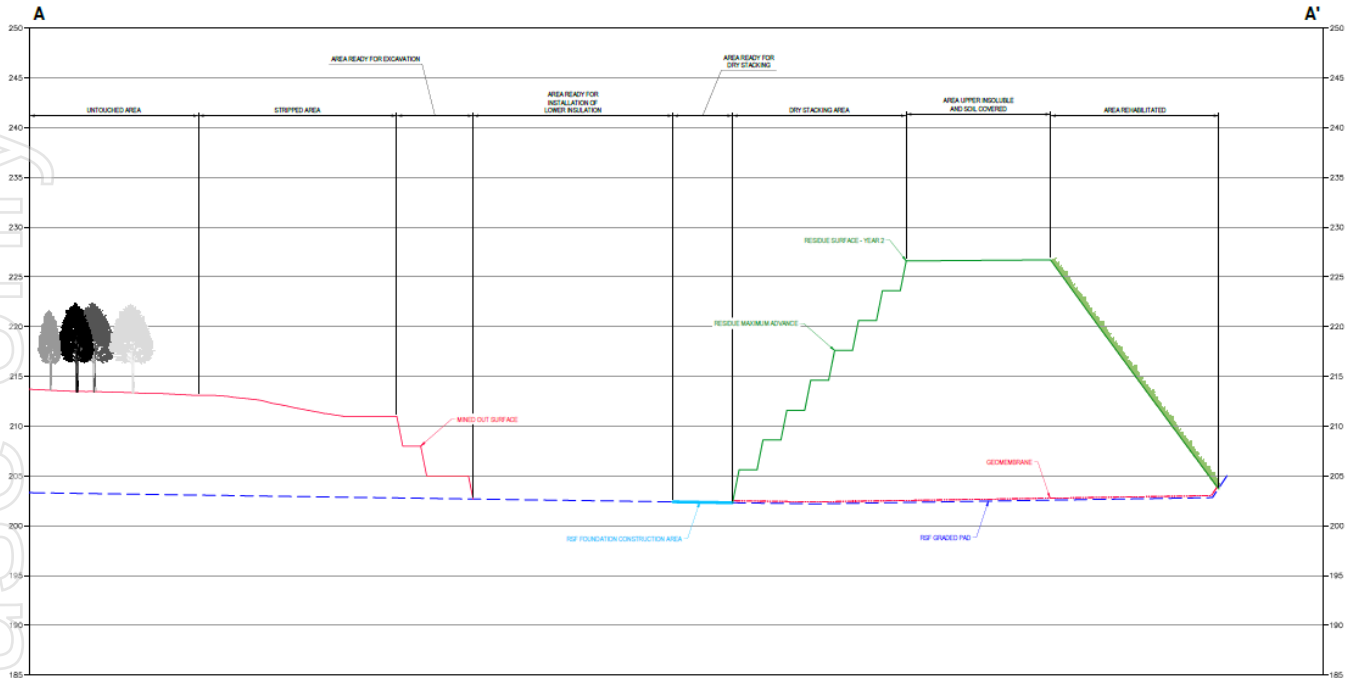

Figure 16-12: Tailings Extraction and Residue Development Section A-A'

Source: Tetra Tech (2022)

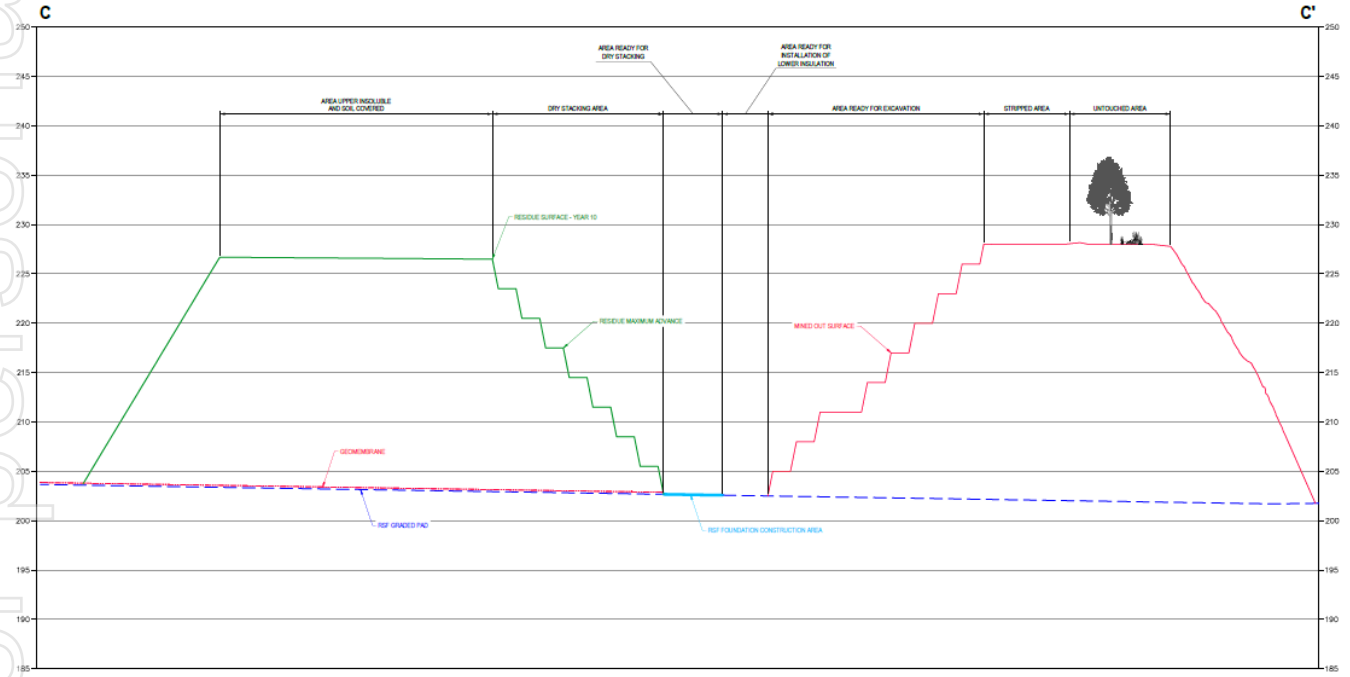

Figure 16-13: Tailings Extraction and Residue Development Section C-C'

Source: Tetra Tech (2022)

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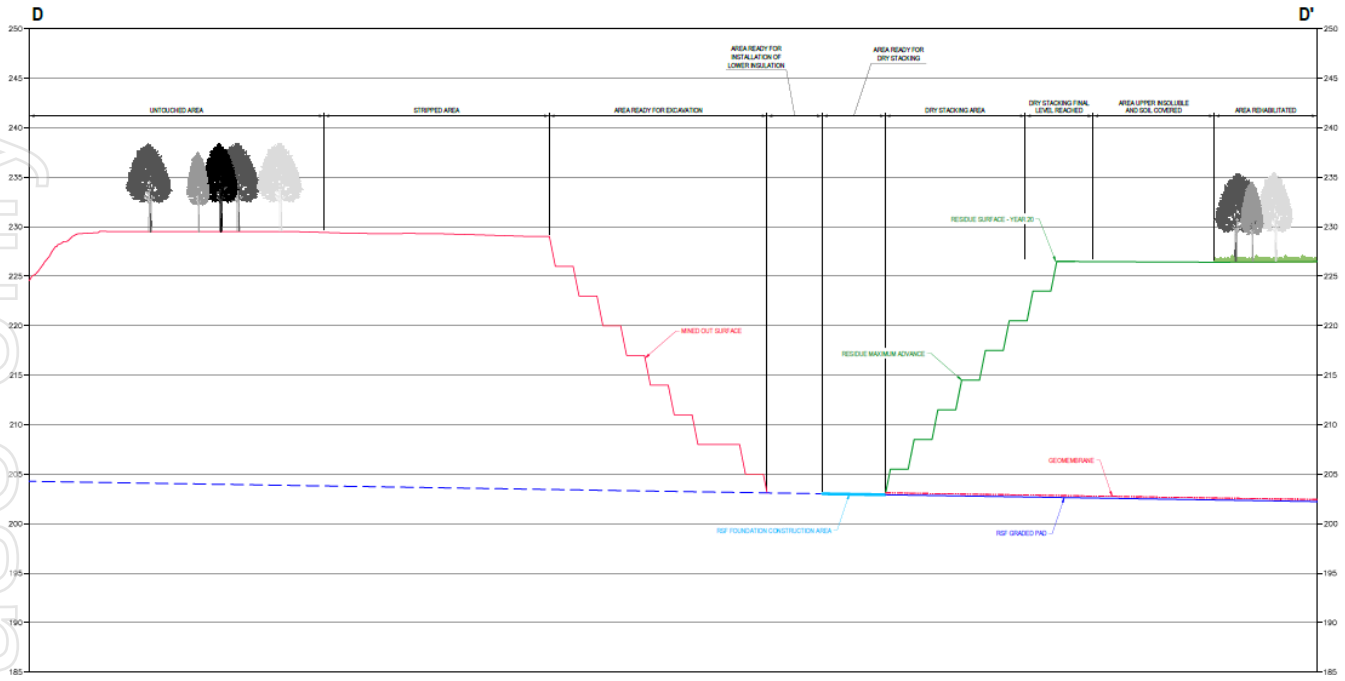

Figure 16-14: Tailings Extraction and Residue Development Section D-D'

Source: Tetra Tech (2022)

16.5 Tailings Extraction Equipment

16.5.1 Equipment Selection

The mining operations of the CMP will be owner operated. The equipment fleet will consist of conventional trucks and excavators. Given the availability and overall scale of the operation and equipment required, a diesel-powered fleet has been selected.

16.5.2 Equipment Requirements

The equipment requirements are based on the design parameters of the tailings cells, schedule requirements of tailings and residue, selective mining capability, and the relative size-classes in order to pair equipment efficiently. Equipment requirements were estimated on a first principles basis, with haul truck requirements based on measured haul profiles and material movement. Equipment availability and usage is based on Tetra Tech's experience, judgement, and vendor recommendations.

For mine equipment size selection, the following items are taken into consideration:

- Minimum working bench width
- Required mining selectivity
- Bench height
- Load bearing capacity of equipment
- Equipment capacity

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- Capital cost

For determination of mine equipment required, the following is considered in addition to the parameters above:

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

The mining equipment described in this section is based on currently available equipment and standard sizes and/or weight classes. Conventional equipment from established suppliers was recommended due to the reliability of proven technology, access to multiple potential vendors and spare components. A summary of the recommended equipment fleet is presented in Table 16-6 below.

Table 16-6: Summary of Mine Equipment

Mine Equipment	Model	Number Required
Hydraulic Excavator	CAT 374F L or Equivalent	2
Wheeled Loader	CAT 972M or Equivalent	2
Articulated Haul Truck	CAT 745 or Equivalent	4
Dozer	CAT D6N or Equivalent	2
Auxiliary and Support	**Model**	**Number Required**
Grader	CAT 160 or Equivalent	2
Vibratory Compactor	CAT CP12 GC or Equivalent	2
Water Truck	-	1
Fuel and Lube Truck	-	1
Maintenance Truck	-	2
Low Bed Truck	-	1
Pickup Trucks	-	5

16.5.3 Equipment Utilization

Several assumptions were incorporated into equipment selection and usage calculations to model the overall equipment efficiency and estimate working hours for each piece of equipment on an annual basis. Assumptions for mechanical availability, operator efficiency and operation efficiency are shown in Table 16-7 below.

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Table 16-7: Equipment Utilization Factors

Equipment Utilization		
Factor	**Unit**	**Value**
Mechanical Availability	%	85
Operator Efficiency	%	90
Operation Efficiency	%	80

To complete the equipment performance calculations, Tetra Tech used loading and hauling equipment specifications to determine cycle times and estimate the maximum material that could be moved within the remaining available time. Annual truck hours were then calculated, and excavator hours were estimated based on bucket capacity as well as individual loading and dumping times. These results were used to derive the required number of equipment units on an annual basis.

16.5.4 Loading Equipment

The loading equipment has been sized to support the tailings mining while meeting the required residue placement. Diesel hydraulic excavators and wheeled loaders were selected as the loading equipment. The selection for loading equipment was based on the bench size, material selection control, material type and ability to effectively load trucks with payloads of 41 t.

The hydraulic excavators with a 4.6 m3 bucket will mine the tailings material. The wheeled loaders with a 4.8 m^3 bucket will load the residue material from the plant feed storage building. The capacity of loading equipment was calculated based on the operational efficiency, equipment productivity and the trucking loading times.

The loading will be performed by CAT 374F L and CAT 972M or equivalent. Both excavator and wheel loader model were chosen due to their high reliability and proven performance in open-pit mines where maneuverability and selectivity are prioritized.

Tables 16-8 and 16-9 below summarizes the loading parameters. In addition, the loading equipment productivities include truck factor, bucket capacity, mechanical availability, operation efficiency, and operator efficiency factors.

Table 16-8: Hydraulic Excavator Parameters

Hydraulic Excavator – CAT 374F L or Equivalent		
Parameter	**Unit**	**Value**
Bucket Size	m^3	4.6
Bucket Fill Factor	%	95
Nominal Bucket Payload	t	6.9
Average Number of Buckets to Load	#	5
Average Bucket Cycle Time	sec	25
Total Time to Load	min	2.7
Theoretical Loads Per Hour	#	27
Ground Bearing Pressure	kPa	78

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Hydraulic Excavator – CAT 374F L or Equivalent		
Parameter	**Unit**	**Value**
Productivity per day	t/d	8,034
Productivity per hour	t/hr	574

Table 16-9: Wheeled Loader Parameters

Wheeled Loader - CAT 972M or Equivalent		
Parameter	**Unit**	**Value**
Bucket Size	m^3	4.8
Bucket Fill Factor	%	95
Nominal Bucket Payload	t	7.2
Average Number of Buckets to Load	#	5
Average Bucket Cycle Time	sec	30
Total Time to Load	min	3.1
Theoretical Loads Per Hour	#	23
Productivity per day	t/d	6,986
Productivity per hour	t/hr	499

The operating hours for the loading equipment were estimated by the amount of material to be moved within a specified period and the associated productivities. Number of equipment required was then calculated using total operating hours for the period and the operating hours per unit within the period. Operating hours and annual requirement of loading equipment are shown in Table 16-11.

16.5.5 Hauling Equipment

The hauling fleet was selected to match the loading capacity and expected volumes from scheduling. A 41-tonne capacity articulated truck was chosen with sloped truck box and HDPE liner to increase the fill factor and reduce the quantity of fine material retained following dumping. Haul trucks will be cleaned by a loader at the start of each shift to further remove any tailings or residue that remains in box. This class of truck was chosen because of the productivity and performance CAT 745 or equivalent trucks provide in operations worldwide. There is the additional benefit of reduced maintenance and operating costs than larger, heavier trucks.

Haulage profiles were developed for the mine plan for each year over the mine life. Requirements for haulage of tailings to the stockpile plant and residue to the residue storage facility were both accounted for. Table 16-10 summarizes the haul cycle parameters used in calculating truck productivities.

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Table 16-10: Haulage Model Parameters

Articulated Haul Truck – CAT 745 or Equivalent		
Item	**Unit**	**Value**
Truck Nominal Payload	t	41
Truck Load Factor	%	90
Actual Truck Payload	t	37
Dump Time at Mill	min/cycle	1.5
Dump Time at RSF	min/cycle	1
Ramp Uphill (Loaded)	km/hr	10
Ramp Downhill (Loaded)	km/hr	12
On Bench	km/hr	15
Main Haul Road	km/hr	35
Ramp Uphill (Unloaded)	km/hr	12
Ramp Downhill (Unloaded)	km/hr	17

Haul cycles were created by using the centroid of each year of advance in tailings and sequence of residue placement. Loading and dumping times at the tailings, RSF, and stockpile were based on equipment manufacturer calculations and material type. The annual requirement of haul trucks is shown in Table 16-12 below.

16.5.6 Mine Equipment Maintenance Waste Estimate

The mine equipment's maintenance waste estimates were based on planned maintenance hours recommended by the vendor and equipment specifications. The planned maintenance includes lube oils, grease, fluids, and filters that are specific to the individual mine equipment. Table 16-15 below summarizes the maintenance waste estimates

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Table 16-11: Loading Equipment Requirements

Production Schedule - Year		Total	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Total Tailings Mined	000 tonnes	**26,960**	323	550	582	1,079	1,149	1,014	1,031	1,083	1,104	1,058	1,064	1,055	1,039	972	881	1,042	1,199	1,235	1,300	1,314	1,326	1,352	1,314	1,263	1,163	468
Topsoil Mined	000 tonnes	**1,872**	33	30	36	68	69	143	68	82	76	65	85	51	84	34	29	206	93	75	89	89	72	82	77	64	29	42
Total Material Moved	000 tonnes	**56,869**	693	1,151	1,224	2,269	2,413	2,211	2,171	2,291	2,327	2,224	2,255	2,204	2,205	2,016	1,826	2,331	2,539	2,594	2,740	2,769	2,778	2,840	2,758	2,642	2,401	997
Total RSF Placed	000 tonnes	**28,038**	336	572	605	1122	1195	1055	1072	1126	1148	1101	1106	1098	1081	1011	916	1083	1247	1284	1352	1366	1380	1406	1367	1314	1209	487
CAT 374																												
Shovel Hours	Hours	**50,243**	621	1,010	1,078	1,999	2,123	2,016	1,914	2,030	2,055	1,957	2,003	1,928	1,958	1,752	1,586	2,174	2,251	2,282	2,420	2,445	2,437	2,499	2,425	2,314	2,076	889
Shovels Required	#	**2**	1	1	1	1	2	1	1	1	2	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	1
CAT 972M																												
Loader Hours	hours	**56,206**	674	1,146	1,213	2,250	2,396	2,114	2,150	2,258	2,301	2,206	2,218	2,200	2,167	2,026	1,836	2,172	2,500	2,574	2,710	2,739	2,765	2,818	2,740	2,634	2,424	976
Loader Required	#	**2**	1	1	1	2	2	2	2	2	2	2	2	2	2	1	1	2	2	2	2	2	2	2	2	2	2	1

Table 16-12: Hauling Equipment Requirements

Production Schedule - Year		Total	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Total Tailings Mined	000 tonnes	**26,960**	323	550	582	1,079	1,149	1,014	1,031	1,083	1,104	1,058	1,064	1,055	1,039	972	881	1,042	1,199	1,235	1,300	1,314	1,326	1,352	1,314	1,263	1,163	468
Topsoil Mined	000 tonnes	**1,872**	33	30	36	68	69	143	68	82	76	65	85	51	84	34	29	206	93	75	89	89	72	82	77	64	29	42
Total Fill Moved	000 tonnes	**910**	1	4	23	145	31	89	44	44	48	41	31	26	32	40	4	12	33	17	6	8	13	23	29	45	105	16
Total RSF Placed	000 tonnes	**28,038**	336	572	605	1,122	1,195	1,055	1,072	1,126	1,148	1,101	1,106	1,098	1,081	1,011	916	1,083	1,247	1,284	1,352	1,366	1,380	1,406	1,367	1,314	1,209	487
Total Material Moved	000 tonnes	**57,779**	694	1,155	1,247	2,414	2,444	2,300	2,215	2,335	2,375	2,265	2,287	2,230	2,237	2,056	1,829	2,343	2,572	2,611	2,746	2,778	2,790	2,863	2,787	2,687	2,506	1,013
CAT 745		**Total**																										
Truck Hours Tailings/Residue	truck hours	195,289	2,178	3,651	3,888	7,467	8,174	7,414	8,016	8,311	8,517	8,062	7,991	7,831	7,608	7,021	6,295	7,367	9,044	9,300	9,952	9,484	9,547	9,693	8,914	8,523	7,882	3,158
Truck Hours Overburden	truck hours	13,063	215	192	234	454	473	1,003	505	604	560	476	617	365	592	235	201	1,400	673	544	655	617	498	568	503	417	188	271
Truck Hours Fill Material	truck hours	6,357	7	25	214	963	213	626	332	322	353	301	226	186	226	275	24	80	237	126	45	59	87	160	186	294	686	104
Total Truck Hours	truck hours	214,709	2,400	3,867	4,336	8,884	8,860	9,043	8,854	9,237	9,431	8,838	8,835	8,382	8,426	7,532	6,520	8,848	9,954	9,970	10,651	10,160	10,132	10,422	9,604	9,235	8,756	3,534
Total Trucks	Trucks	4	1	2	2	4	4	4	4	4	4	4	4	3	3	3	3	4	4	4	4	4	4	4	4	4	4	2

Table 16-13: Annual Average Cycle Time

Annual Average Cycle Time	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Minutes/cycle	14.4	14.2	14.3	14.8	15.2	15.6	16.6	16.4	16.5	16.3	16.0	15.8	15.6	15.4	15.3	15.1	16.1	16.1	16.3	15.4	15.4	15.3	14.5	14.4	14.5	14.4

Table 16-14: Mining Fleet Annual Diesel Fuel Consumption Estimate

Total Fuel Usage	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
000 litres	174	268	292	558	561	552	539	564	574	544	546	525	527	481	424	548	611	616	653	638	639	656	620	597	564	243

Table 16-15: Estimated Maintenance Waste

PM Waste Estimates		Total	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Total Filter	filters	1,576	52	63	64	62	60	61	62	62	60	59	59	57	56	53	61	62	63	64	66	64	64	65	63	61	57	57
Total Waste	L	475,448	14,219	19,556	19,834	19,067	17,916	18,318	18,764	19,021	17,785	17,759	17,438	16,361	15,898	14,888	18,244	18,882	19,421	20,010	20,991	19,876	19,711	20,421	19,191	18,603	16,637	16,637

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16.5.7 Auxiliary and Support Equipment

The auxiliary and support equipment required for operation have been selected considering load and haul activities, pre-mining activities, maintenance of the waste dump, re-handling of the ROM stockpiles at the plant feed storage building, haul road maintenance, RSF activities, refueling and maintenance of the heavy equipment fleet.

Equipment allocated for RSF includes tracked dozers for material placement and vibratory compactors. The dozers will also be used for excavator support and clean-up, stockpile maintenance, road construction, and other activities as needed. Graders and water trucks have been allocated for road construction, road maintenance, and pit floor maintenance.

Mobile equipment maintenance trucks, a fuel and lube truck and low bed are included in the estimate to support heavy equipment during day-to-day operations. Mobile lights will be used for lighting of pits, RSF, and construction areas as needed. A fleet of five light pickup trucks have also been included for staff transport and site activities as well as light maintenance tasks.

16.5.8 Equipment Replacement Criteria

The equipment replacement criteria are based on life of the project and on the average working life of each of the equipment supplied by equipment vendors. Mine equipment component rebuilds will be planned to reduce the number of equipment replacement purchases. The estimated equipment average working life is summarized in Table 16-16 below. Additional maintenance hours have been included for selected equipment expected to reach 50,000 working hours in the 5 years prior to the end of the life of mine, to reduce late capital costs for equipment replacement where possible.

Table 16-16: Estimated Equipment Life

Mine Equipment	Model	Operating Life (hours)
Hydraulic Excavator	CAT 374F L	50,000
Wheeled Loader	CAT 972M	50,000
Articulated Truck	CAT 745	50,000
Dozer	D6N	35,000
Grader	CAT 160	56,000

16.6 Infrastructure

Infrastructure designed to support tailings extraction and residue placement at the CMP is described in detail in Chapter 18 of the study, with mining-specific infrastructure summarized in the following sections. The mine infrastructure area will be located between Cells 1 and 2 at the south edge of the mining area. The mining infrastructure will include truck maintenance workshops, truck washing facility and parking lots, fuel station, warehouse, and administration related facilities. The area also will have raw tailings material and leach residue handling facilities, including raw tailings receiving, storage, repulping, leach residue storage, and loadout. The site plan view is shown in Figure 16-15. Infrastructure has been planned and designed with consideration for both the scale of the operation and available area on site to allow for compact yet efficient operational facilities.

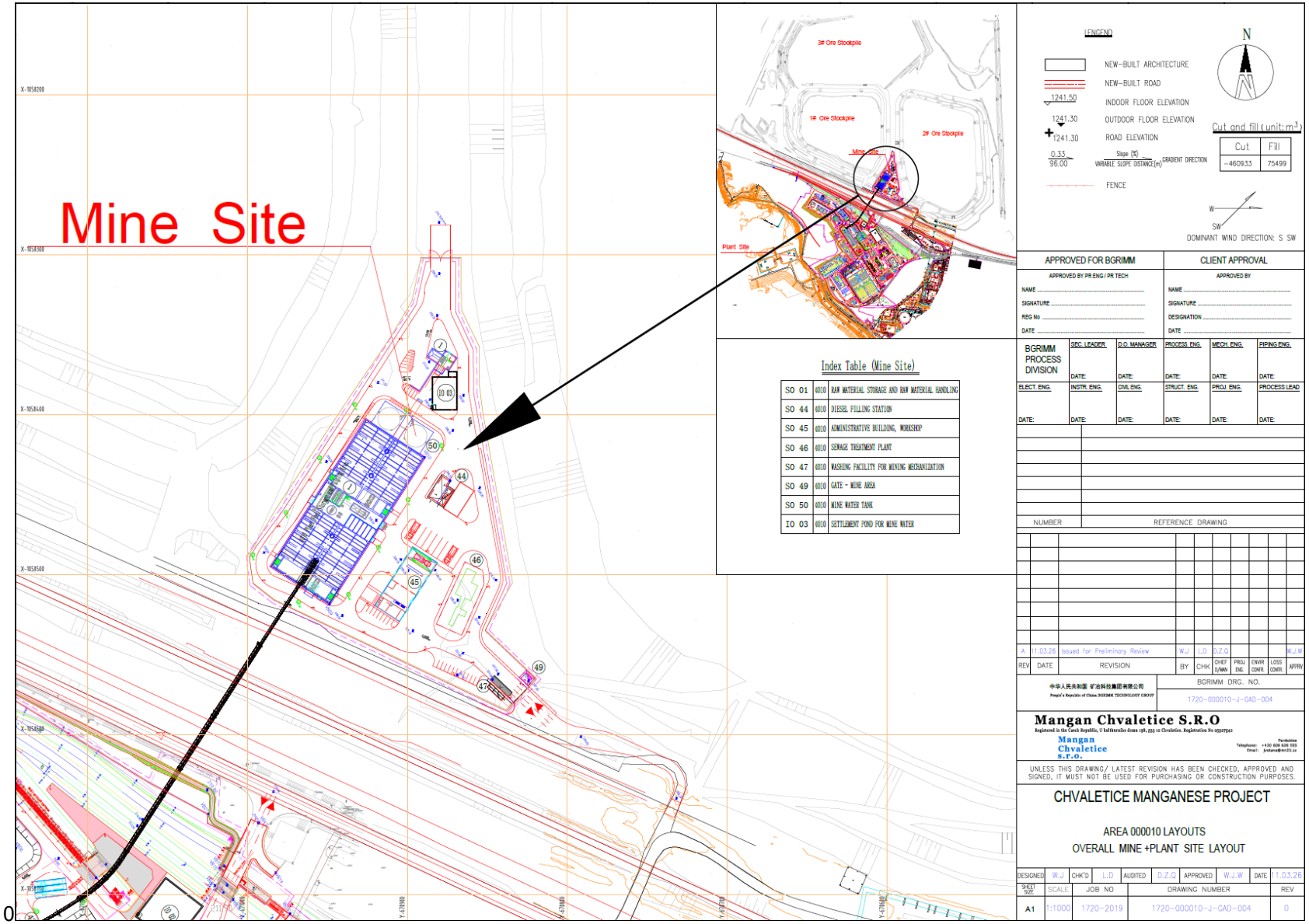

Figure 16-15: Mine Site Infrastructure

Source: Tetra Tech (2022)

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16.6.1 Workshop, Warehouse, and Administration Building

A workshop and warehouse have been included for site and heavy equipment maintenance requirements, with a nominal footprint of 19 m by 42 m. This is designed as a two-story building containing the following:

- Offices and meeting rooms for management and administration staff.
- Kitchen and washroom facilities.
- Mine dry and locker space for operations staff.
- Parking space for light vehicles – capacity of 10 spaces.
- One warehouse bay: 10 m by 18 m by 6 m with one mechanical room.
- One truck wash bay: 7 m by 18 m by 9 m, sized for accommodation of CAT 745 or equivalent truck as largest vehicle planned for use on site.
- Two maintenance bays: 8 m by 18 m by 9 m, one inclusive of a repair pit for vehicle undercarriage access and both with overhead crane.

16.6.2 Fuel and Lubricant Storage Area

The diesel fuel, primarily used for the mine fleet, is stored within a bermed containment area located near the truck shop. The diesel fuel tank will be above ground with capacity of 20,000 L, which will be filled weekly. This size was chosen based on 5-day fuel usage estimate with contingency and consideration for smaller on-site footprint. The lubricants will mostly be stored in the warehouse and in the maintenance bay. The fuel and lube truck will attend mine fleets as needed during operation. The annual diesel fuel consumption estimate of the mining fleet is summarized in Table 16-14 in Section 16.5 above.

16.6.3 Heavy Equipment Laydown

The heavy equipment laydown area is situated to the north of the truck shop. Haul trucks will park here overnight and for maintenance. Excavators, dozers, and compactor equipment will remain situated at the tailings cells or residue piles for refuel by fuel truck.

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17.0 RECOVERY METHODS

BGRIMM, together with EMN and Tetra Tech, designed the process facilities, including ancillary facilities and process flowsheet for HPMSM productions, based on the comprehensive metallurgical test results provided mainly by CRIMM and the verification test work completed by BGRIMM. In 2026, BGRIMM performed further testwork to investigate the recovery of manganese dioxide (MnO_2) from the sludge collected from the electrowinning anodes during the pilot plant trials.

This PEA design work is the same as the previous FS design with various process circuit and process equipment optimization and ancillary service facility design, but incorporates:

1. A manganese dioxide dissolution circuit to recover manganese from the anode sludge from the electrowinning circuit
2. A high temperature crystallization circuit to partially generate HPMSM crystals and recycle the barren solution, which contains elevated sodium, potassium, and other impurity elements, to the leaching circuit
3. A magnesium carbonate filter cake drying and packing system for magnesium carbonate by-product.

Mass, energy, and water balances were based on the previous FS study, including simulations and estimates using a combination of METSIM™ modelling, calculations using results from the metallurgical testwork program, and BGRIMM and Tetra Tech's experience in designing HPEMM and HPMSM process facilities. The design team sized and selected equipment with incorporating inputs from potential Chinese equipment vendors.

The updated CMP process plant has been designed to have a 26-year project life at a nominal production rate of 150,000 t/a of HPMSM by extracting approximately 1.1 Mt/a of the CMP tailings. This PEA study is based on HPMSM as the final product, and the HPMSM production will start at approximately 50% of the nominal rate in the initial years (Year 1 to Year 3). As market requirement, the intermediate product, HPEMM, may be sold as the final product. As the current market study, converting all the HPEMM to HPMSM is expected to best meet the high-purity manganese market demand expected in current and future low-cobalt lithium-ion battery formulations. Because the CMP HPMSM product is converted from the HPEMM flakes, which are produced without the use of selenium and chromium, the final HPMSM product is expected to contain no less than 99.9% MSM, a minimum of 32.34% manganese, and will be sold in powder form, produced without the use of fluorine. Figure 17-1 depicts the proposed process flowsheet.

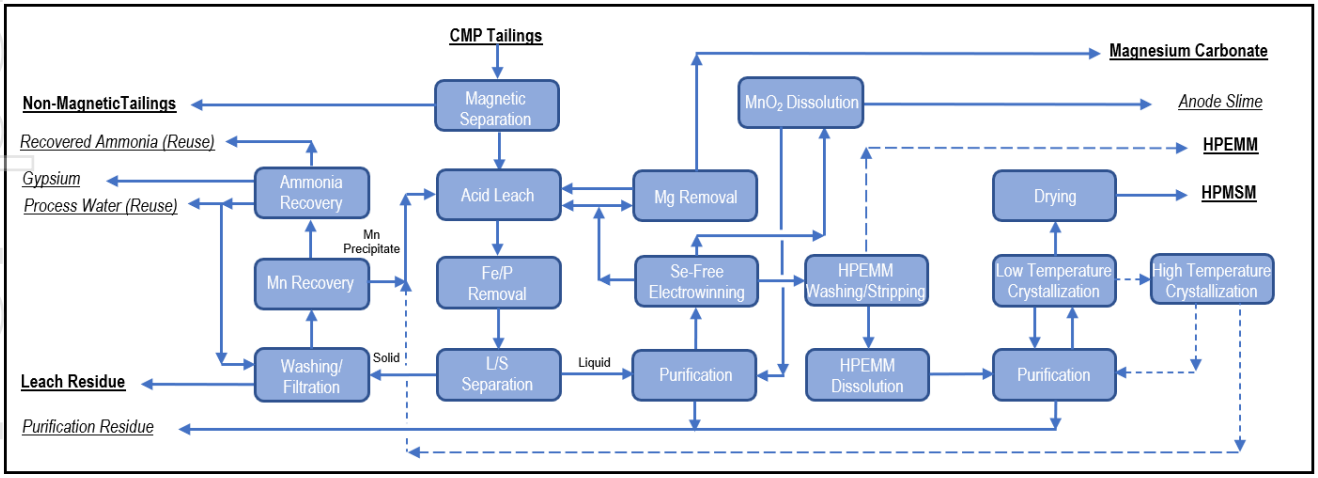

Figure 17-1: Simplified Process Flowsheet

Source: Tetra Tech (2026)

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Excavated tailings will be stored in a mill feed storage area within the tailings pulping facility. The tailings will be reclaimed, pulped, and then pumped to the plant site located south of the CMP tailings cells. The pipeline will be carried by an overhead bridge that would cross a public rail line, Highway #322, and related spurs that adjoin the proposed process plant site.

The tailings slurry will be processed in a wet, on average high-intensity magnetic separation circuit that will upgrade the manganese grade of the leach feed to approximately 15% tMn and reject approximately 57% of the feed to non-magnetic tailings (NMT), with an expected 86% manganese recovery. The magnetic concentrate and NMT produced will be dewatered using thickeners and filters. The concentrate will be fed to the downstream leach process, and the dewatered tailings, together with the washed leach residue (LR), will be dry stacked at the RSF.

The magnetic concentrate cake will be re-pulped using anolyte solution from the electrowinning tank house and leached using sulphuric acid at 90°C for approximately six hours. The barren solution from the high temperature HPMSM crystallization circuit will be sent to the leach circuit. Neutralization of the slurry will be achieved using powdered lime. Air will be sparged into the neutralized slurry to cost-effectively co-precipitate the substantial quantities of impurities that leach with the manganese. The leach pulp will be filtered in automatic pressure filters to separate the pregnant leach solution from the LR.

The LR will be repulped using the washing water from downstream dewatering circuit where the slurry will be dewatered by pressure filtration equipped with on-steam LR washing. After dewatering, the LR cake, together with the NMT, is transported to a lined dry stack tailings storage facility that will be progressively constructed in excavated areas of the CMP tailings cells.

The wash water from the LR washing circuit will be treated for manganese and ammonia recovery in order to minimize manganese and ammonia losses. The wash water recovery system will recover soluble manganese to the leaching circuit in the form of manganese carbonate. The spent wash water solution will be subsequently treated to recover ammonia using a conventional lime boil process and will produce a gypsum by-product, which is planned to be sold or handled offsite. The potential value of the gypsum material is not included in the CMP economics. The recovered ammonia will be re-used in the HPEMM production circuits. The inclusion of the LR washing circuit, with its associated wash water recovery circuit, is expected to be a world-leading industry practice for the hydrometallurgical processing of manganese ores. Returning washed residue to the carefully prepared containment cells in the excavated areas of the CMP tailings progressively remediates the environmental impact risks of legacy mining operations.

The pregnant solution from the leaching circuit will be purified to remove heavy metals and other impurities and stabilized to prevent uncontrolled crystallization of salts to produce a qualified solution for the downstream electrowinning process.

Electrowinning will be conducted in electrowinning cells following the addition of sulphur dioxide to the tank house feed solution. The tank house would have the capacity to produce 50,000 t/a HPEMM using an energy-efficient and selenium-free process. The proposed electrowinning circuit is designed to have a plating cycle of 24 hours at a cell voltage of 4.2 to 4.4 V and an average cathode-current density of 320 to 370 A/m^2. Cathodes will be harvested using automatic harvesting machines, washed, and stripped of electrodeposited manganese metal using industry-standard automatic cathode plate stripping machines. The design of the CMP tank house includes comprehensive mist emission control and mechanical handling systems that eliminate manual handling of cathodes and other processes. Tank house system design features include the recovery of anode sludge to minimize manganese losses, as well as diaphragm cleaning and ongoing cell maintenance operations. The collected anode sludge contain mainly manganese dioxide, which is dissolved by ammonium bisulphite. By the design, the HPEMM flakes produced would then be used as feed for HPMSM production. According to the HPEMM market requirement, the HPEMM flakes can be packed and directly shipped to customers as the metal form.

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A magnesium removal process has been incorporated into the process plant design to ensure efficient electrowinning operations and high-quality product. The magnesium removal process will maintain the magnesium concentration in the electrowinning solutions at a level that prevents uncontrolled precipitation of salts and scaling. The process will use low-cost reagents without incurring significant losses of manganese and reagent units.

This PEA study proposes to dissolve all the HPEMM flakes using high quality sulphuric acid to produce approximately 150,000 t/a of HPMSM powder in a dust-free chemical processing facility. The solution with the dissolved manganese will be further purified to remove trace impurities carried by the HPEMM flakes, sulphuric acid, and other used chemicals. The mother solution from the HPEMM dissolution will be concentrated using an energy-efficient, low-temperature mechanical vapour recompression (MVR) crystallization process to generate a single specification of manganese sulphate monohydrate crystals. The HPMSM crystals will be separated from the saturated MVR crystal slurry using centrifuges. The dewatered crystals will be dried using disc type dryers to produce the final HPMSM powder. Most of the spent mother solution will return to the mother solution purification circuit or to the crystallization circuit for recrystallization while a portion of the spent mother solution is further crystalized by a high-temperature crystallization unit to reject sodium, potassium, and other light metals that accumulate during the heavy metal removal purification and the low temperature evaporation crystallization processes. The spent solution with elevated sodium, potassium, and other impurities from the high temperature crystallization will be recycled back to the magnetic concentrate leaching circuit. The HPMSM crystals from the high temperature crystallization will be recycled back to the HPMSM low temperature crystallization feed solution purification circuit or be dried together with the crystals produced in the low temperature evaporation crystallization circuit.

The dried HPMSM powder product will be packed prior to being shipped in trucks or containers to customers worldwide.

17.1 Plant Design Basis

The process plant for the proposed 26-year-life project is designed to produce approximately 150,000 t/a of HPMSM by extracting approximately 1.1 Mt/a of the CMP tailings, excluding the initial three years (Phase 1) when the HPMSM production rate is approximately 50% of the designed nominal rate. Table 17-1 outlines the major process design criteria.

Table 17-1: Major Process Design Criteria

Criteria	Unit	Value
General Design Criteria		
Operating Days per Year	d	365
Operating Hours	h	24
Plant Overall Availability	%	90.4
Operating Shift per Day	shift/d	3
Head Manganese Grade (Average)	% tMn	7.32
Head Magnesium Grade (Average)	% Mg	1.15
Nominal Process Rate		
Magnetic Separation	t/h	139
Leaching/Dewatering	t/h	60
Purification/Electrowinning	t/a HPEMM	50,000
HPMSM Production	t/a HPMSM	150,000

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Criteria	Unit	Value
Average Manganese Recovery*		
Magnetic Separation	% tMn	86
Acid Leaching	% tMn	75
Purification/Electrowinning/Others	% tMn	94.6
HPEMM to HPMSM	% tMn	98.4
HPEMM and HPMSM Product Purity		
HPEMM Purity	%	>99.9
HPMSM Purity	%	>99.9
Average Magnesium Recovery		
Magnesium as Magnesium Carbonate	%	46

* Recoveries include all the loss from dewatering/washing

The process design is based on the comprehensive metallurgical testwork completed by CRIMM, BGRIMM, and potential suppliers. The design also includes preliminary process circuit and process equipment evaluation and optimization. Mass, energy, and water balances were simulated and estimated using a combination of METSIM™ modelling, calculations using results from the metallurgical testwork program, and BGRIMM and Tetra's experience in designing EMM and MSM process plants and other hydrometallurgical processing plants. Key equipment items were sized and selected by the design team incorporating inputs from potential equipment vendors.

17.2 Waste Production and Management

The NMT (approximately 58% of the plant feed) and washed LR (approximately 46% of the plant feed) will be transported by a tubular conveyor from the south plant site to the CMP tailings site located north of the plant site. The reprocessed tailings/residue material will be conveyed by an overland conveyor and then temporarily stored in the NMT/LR storage, which is part of the CMP raw tailings pulping facility. The NMT/LR materials will be backhauled by the trucks that deliver the extracted CMP tailings to the pulping facility to the lined storage facility at the CMP site where the CMP tailings has been excavated. The reprocessed tailings/residue materials will be levelled by post-deposition bulldozing and pressed by compaction. The dry stacked tailings pad will be covered with progressive reclamation during the operational life. Section 18.11 further discusses tailings/residue management details.

As planned, the gypsum residue (approximately 6% of the plant feed) from the ammonia recovery circuit will be sold to the local gypsum markets as construction materials. A preliminary market for the gypsum demand and supply in the Czech's market has been conducted by Mangan. The magnesium removal treatment will produce a magnesium carbonate as a by-product, which is expected to be sold to the local market for purposes such as a fertilizer suitable for agriculture. Further studies into the material characters and its handling and applications, including marketing studies, should be conducted.

The slimes from the heavy metal removal treatments and the anolytic stream, estimated to be approximately 0.4% of the plant feed, will be stored in dedicated areas prior to being shipped to professional and commercial waste recycling and handling companies.

The used cathodes and anodes will be transported back to suppliers or local metal handling companies for recycling.

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17.3 Reagent Handling and Storage

The main reagents used for the project will include sulphuric acid (H_2SO_4), hydrated lime $(CaOH)_2$, and quicklime (CaO), together with other low-consumption amount reagents, including barium sulphide (BaS), ammonium bisulphite, ammonium sulphate ($(NH_4)_2SO_4$) (initial use only), organic chelating agent, ammonia water ($NH_3.H_2O$), and flocculants. The sulphuric acid and lime will be transported to the site by railcars. The deep purification by activated carbon is currently not included in the base design, but may be added in the future if required. All the liquid reagents will be dosed into the addition points using metering pumps at control rates.

To ensure containment in the event of an accidental spill, all the reagent preparation and storage facility will be located within a containment area designed to accommodate 110% of the volume of the largest tank. For the liquid chemicals, the storage tanks will be equipped with level indicators and instrumentation to ensure that spills do not occur during normal operation. Smaller reagent containers such as drums and/or 1-m^3 plastic steel-caged containers will be stored in their respective containment areas. Appropriate ventilation, fire and safety protection, and Material Safety Data Sheet (MSDS) stations will be provided at the various reagent storage and preparation areas. Each reagent line and addition point will be labelled in accordance with Workplace Hazardous Materials Information Systems (WHMIS) standards or equivalent. All operational personnel will receive WHMIS or equivalent training, along with additional training for the safe handling and use of the reagents.

17.3.1 Sulphuric Acid (H_2SO_4)

There are two types of sulphuric acids, one smelter grade sulphuric acid for magnetic concentrate leaching and one high-quality sulphuric acid for HPEMM dissolution.

- Mode of delivery: Bulk railcar
- Form of delivery: Liquid
- On-site bulk storage: Three tanks, each 1,150 m^3, total capacity 3,450 m^3. Bulk on-site storage capacity represents approximately 10 days regular production.

Sulphuric acid will be delivered by railcars to the site. From the railcars, the acid will be pumped into three (3) on-site bulk storage tanks, which will be installed within a secondary containment. Two tanks will be used for storage smelter or regular grade sulphuric acid and one tank will be used for storing the higher-grade acid.

The acid will then be pumped to smaller day-tanks for process use.

17.3.2 Hydrated Lime ($Ca(OH)_2$) and Quicklime (CaO)

There are two types of lime used for this project: hydrated lime and quicklime.

- Mode of delivery: Bulk railcar
- Form of delivery: Powder
- On-site bulk storage: Seven silos, each 318 m^3, total capacity 2,226 m^3. Bulk on-site storage capacity represents approximately 10 days regular production.

Hydrated lime and quicklime will be delivered by railcars to the site respectively. From the railcars, the hydrated lime and quicklime will be pneumatically conveyed separately into seven on-site bulk storage silos located adjacent to the rail facilities. Each silo will be equipped with a dust collector to prevent dust from escaping the silo.

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Both the hydrated lime and the quicklime will then be pneumatically conveyed to smaller day-silos/tanks for process use. The hydrated lime will be added to leach circuit for neutralization directly while the quicklime will be slaked as lime milk slurry and delivered to the use points via a pressurized loop.

17.3.3 Barium Sulphide (BaS)

- Mode of delivery: Bulk silo-truck
- Form of delivery: Powder
- On-site bulk storage: One silo, 28 m^3 capacity (approximately 82 t storage).

Barium sulphide will be delivered by trucks to the site. From the trucks, the BaS will be pneumatically conveyed into the on-site bulk storage silo. The BaS powder will then be conveyed via screw conveyor to smaller day-silos/tanks for preparing the barium sulphide solution for process use.

For dust-control, the BaS silo will be equipped with dust collector to prevent dust from escaping to the exterior.

17.3.4 Organic Chelating Agent

- Mode of delivery: Bulk tanker-truck
- Form of delivery: Liquid
- On-site bulk storage: 1 tank, 56 m^3 capacity.

Organic chelating agent will be delivered by trucks to the site. From the trucks, the reagent will be pumped into the on-site bulk storage tank, which will be installed inside the pregnant solution purification building within a secondary containment. The reagent will be pumped from the storage tank to smaller day-tanks for process use.

17.3.5 Ammonium Bisulphite (65%) (NH_4HSO_3)

- Mode of delivery: Bulk tanker truck
- Form of delivery: Liquid
- On-site bulk storage: Two tanks, each 38.5 m^3, total storage capacity of approximately 77 m^3.

Ammonium bisulphite will be delivered by trucks to the site in liquid form. From the trucks, the reagent will be pumped into the two on-site bulk storage tanks. The tanks will be installed within a secondary containment.

The ammonium bisulphite will then be pumped to smaller day-tanks for process use.

17.3.6 25% Ammonia Water (25% NH3-H_2O)

- Mode of delivery: Bulk tanker truck
- Form of delivery: Liquid
- On-site bulk storage: One tank with a capacity of 100 m^3.

Ammonia water will be delivered by trucks to the site. From the trucks, the liquid will be pumped into the on-site bulk storage tank, which will be installed in the ammonia recovery area, within a secondary containment. The ammonium water will then be pumped to smaller day-tanks for process use.

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17.3.7 Hydrogen Peroxide (H_2O_2)

- Mode of delivery: Truck
- Form of delivery: Liquid, in 1 m^3 (IBC) plastic containers encased in steel frame.
- On-site storage: Two 1 m^3 plastic containers will be stored at the site in the HPMSM purification area.

Hydrogen peroxide will be delivered by trucks to the site. The containers will be placed within a dedicated secondary containment. The hydrogen peroxide will then be diluted and pumped to other downstream tanks for further process use.

Hydrogen peroxide will then be pumped to other downstream tanks for further process use.

17.3.8 Flocculant

- Mode of delivery: Truck
- Form of delivery: Powder, in 700 kg big bags on pallets
- On-site storage: The process will use different types of flocculants. They will be stored on the site in the dedicated areas.

Flocculants will be locally prepared in separate wetting and mixing systems, diluted to 0.5% strength, and stored separately in holding tanks. The flocculant solutions will then be further diluted to approximately 0.1 to 0.2% strength and fed to the thickener feed wells by metering pumps.

17.3.9 Glass Water ($SiO_2/(Na_2O)_x$)

Glass water will be delivered to the site by trucks in 1 m^3 IBC tanks encased in steel frame. The reagent will be placed within a secondary containment and pumped to serving points via metering pumps.

17.3.10 Cooling Towers and Water Treatment Chemicals

Several chemicals will be required for protecting cooling water systems and wastewater treatment. The main chemicals to be used include:

1. Bactericide (10%)
2. Corrosion and scale inhibitors
3. Reducing agent for reverse osmosis water treatment
4. Alkali agent (40%) – for reverse osmosis water treatment

All the chemicals will be transported to the site by trucks. Like the other chemicals, the reagents will be stored in designated storage areas and contained inside secondary containment areas. They will be added as undiluted or diluted solution and dosed into the addition points by metering pumps.

17.3.11 Ammonium Sulphate ($(NH_4)_2SO_4$) – For One-Time Initial Use Only

- Mode of delivery: Truck
- Form of delivery: Powder, in 1,000 kg big bags on pallets, one bag per pallet.

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- On-site storage: A total of approximately 375 t for one-time initial use only for the magnetic concentrate leaching. A separate charge used for the plant expansion will be shipped to the site in Year 3. The chemical in solid form will be dissolved and diluted with water to the desired solution strength in a mixing tank and stored in a holding tank before being pumped to the addition points by metering pumps.

17.4 Water Supply

Water supply systems to support the operations will include fresh make-up water, process water, demineralized water, and high-purity water.

17.4.1 Fresh Water Supply System

Fresh make-up water will be supplied from the adjacent power plant and supplemented with treated contact rain water as required. Fresh water will be used primarily for the following:

- Firewater for emergency use
- Reagent preparation
- Dust suppression
- Cooling water make-up
- Process make-up water

The freshwater tank by design will be full at all times and will provide at least two hours of firewater in an emergency. Fresh water supply system is detailed in Section 18.5

17.4.2 Process Water

Process water will consist primarily of recovered water from the magnetic concentrate and NMT thickener overflows, the water recovered from ammonium recovery system, and the water from the contact water treatment plant. Fresh and recovered water will be directed to a process water storage tank, from where the water will be pumped to the processing areas. The recovered water from the magnetic separation circuit will be mainly reused in preparing the slurry for the magnetic separation feed.

17.4.3 High-purity Water

High-purity water will be from:

1. The condensed water from the HPMSM production circuit and
2. The water produced from a dedicated pure water treatment plant.

The demineralized water from the adjacent power plant will be used as feed to produce the pure water. The pure water treatment plant will incorporate two-stage reverse osmosis treatment. The water will mainly be used in HPMSM production circuits, harvested manganese cathode washing, and rectifier cooling water systems.

17.4.4 Demineralized Water

Demineralized water will be made available from the adjacent power plant and will be used mainly for the in-house production of steam, and also as feed for generating pure water.

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17.5 Air Supply

Central plant air service systems will supply air to the various process areas, including:

- Iron purification circuits: high pressure air by dedicated air compressors
- Filtration circuits: high pressure air for filter pressing and drying of various filtration cakes
- Electrowinning plant service air: high pressure air for various services
- HPMSM plant service air: high pressure air for various services
- Instrumentation: plant site instrument air will come from the central plant air supply system and the air will be dried, de-oiled, and stored in dedicated air receivers prior to being used to service plant control systems.

17.6 Steam Supply

Steam will be produced in-house using three 25 t/h boilers fired by a combination of nature gas and hydrogen recovered from the HPEMM dissolution process.

17.7 Assay and Metallurgical Laboratory

A central assay laboratory will be constructed to support overall production. The laboratory will be equipped with necessary analytical instruments to provide routine assays for the CMP tailings extraction, various processes, and environmental departments. The instrumentation will be capable of providing routine assay for various products and supply materials and QA/QC. The assay will include chemical and physical characteristic analysis for high-purity products. The central assay laboratory will be located at the central area of the process site.

A metallurgical laboratory with required laboratory equipment and instruments will be constructed to undertake all necessary test work to monitor metallurgical performance and to improve the process flowsheet and efficiency.

Overall site process control centre will be located in the building as well.

17.8 Process Control and Instrumentation

The CMP will use an advanced and integrated a distributed control system (DCS) for process control. The central control room will be located within the Technical and Engineering Services central where the assay and metallurgical testing laboratories will be housed as well.

The DCS is configured as a three-tiered pyramid network. The lowest tier comprises the field instrumentation and control equipment. The middle tier is process control level, which includes monitoring computer, operator station, and engineer station. At this level, all the information of each station is integrated, and the operation, control loop configuration, parameter modification, and optimization process processing are shown centrally. The top tier is the plant-integrated management system; it can coordinate and control overall operations, starting from the CMP tailings extraction through the final product production. The automatic controls will be completed by the software programs developed for the CMP. A data logging system will be integrated into the control system for various data inputs.

The DCS should provide continuous control of the plant. The control system includes operator interface workstations, system administration consoles, application-level servers, networks, and field level controls. It also includes security firewall function to facilitate remote accesses to the control system. The functions performed by the DCS include

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operator interface for control and monitoring using graphical display screens, alarm information screens, and trend screens. All network communications and controllers shall be redundant.

The DCS will collect, store, and present online and historical information and generate reports. DCS also performs the control functions. The DCS will perform communication functions to vendor control packages through Profibus-DP or Ethernet. The DCS communication to vendor control packages will allow the operator to directly monitor and control the equipment even if the actual control logic is performed within the vendor control system.

Motor controls for starting and stopping of drives at local control stations are via the DCS or hardwired, depending on the drive classification. All drives can be stopped from the local station at all times. Local and remote starting is dependent on the drive class and control mode. Control loops work via the DCS except where exceptional circumstances apply.

The system will be able to monitor all operation relevant conditions and record and select information for data logging or trending. There are individual programmable logic controllers (PLC) for various sections of the plant or individual equipment that are supplied as complete vendor packages. These will communicate via a data link, alarm, and status information to the plant DCS for recording and monitoring purposes.

Major equipment is interlocked to the subsequent downstream equipment. For example, a feeder cannot be started unless the downstream process unit is running and is at a healthy automated state. These process interlocks are managed only by the DCS system.

The system will be hard wired interlocks for personnel safety.

The control system will provide a comprehensive suite of graphics configuration tools including templates for operating graphics, graphic windows and pop-up windows, face plates and pop-up face plates, detail pages, alarm summaries, trend displays, overview displays, etc. Standard libraries of graphic symbols and icons will be available.

Figure 17-2 shows PC-based operator interface stations (OIS) located in various local control rooms.

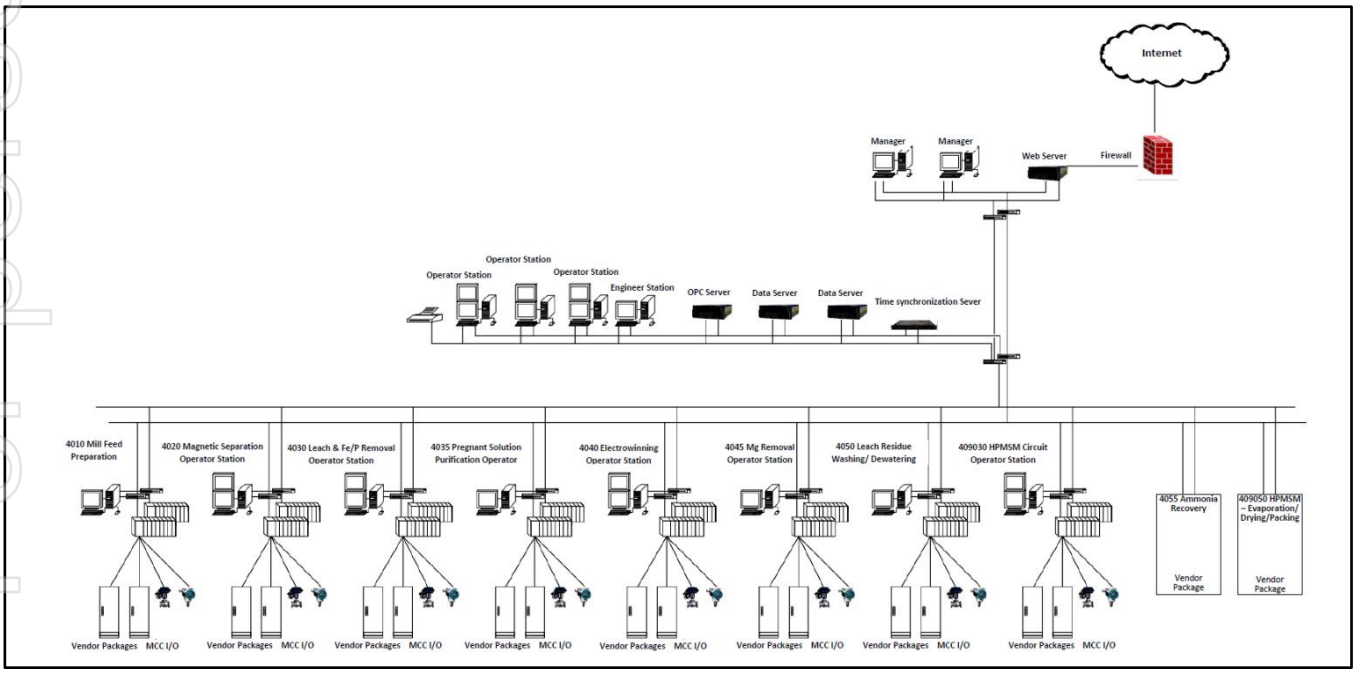

Figure 17-2: PC-Based Operator Interface Stations

Source: BGRIMM (2022)

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The plant central control room will be staffed by trained personnel 24 hours per day. The operation system can realize centralized control of various “domains” operations; meanwhile, respective local operations at each domain can be conducted in respective sub-systems to keep relative independence and real-time performance. The control software can realize real-time control of the production process parameters and ensure the operations are at target performance.

Alarm systems, including process data alarm, equipment failure, and system failure alarm, will provide both display alarm and audio alarm based on different alarm information. The alarm can be cancelled after the failures are identified or resolved.

A production report can be generated automatically (shift/day/month) for production management. The production report can include operation parameters, process analysis, on-line performance calculation, and economic analysis. Historical operation data and various parameters will be recorded according to production management requirements.

Closed-circuit television (CCTV) cameras shall be installed at required key process and security points. The CCTV cameras shall be analogue format and be connected to the communications box for transmission to the Central Control Room. The cameras shall be web enabled with direct Ethernet node connectivity.

Cameras shall be located to provide adequate coverage of plant operations for access and control. Critical areas will be adequately illuminated so that camera vision will have sufficient clarity at night. The cameras will be monitored from local control rooms and the central control room.

Process control will be facilitated with the installation of automatic samplers. The metallurgical accounting system will include the collection of samples from various streams for online analysis and the daily metallurgical balance.

For the protection of operating staff, monitor/alarm systems for various gases, including ammonia, sulphur dioxide, carbon dioxide, and hydrogen gases, will monitor the various operation areas. Portable personal monitors will also be provided for operators.

17.8.1 Metal Production Projection

According to the metallurgical performance projections developed from the test work and the proposed CMP tailings extraction plan, the HPMSM and magnesium carbonate by-product productions on an annual basis are projected as shown in Table 17-2.

Table 17-2: Annual HPMSM Production Projection

Year	CMP Tailings (Plant Feed)			Manganese Product		Magnesium By-Product
	Dry Tonnes Extracted (kt/a)	Grade (% tMn)	Grade (% Mg)	HPMSM (kt/a)	Manganese Recovery to Final Product (% tMn)	Magnesium Carbonate (kt/a)
1	323	8.13	0.91	45.3	56.0	4.3
2	550	7.54	0.92	77.4	60.6	8.2
3	582	7.22	0.94	77.4	59.7	8.9
4	1,079	7.06	0.97	139.1	59.3	17.0
5	1,149	7.29	0.98	154.8	59.9	18.2
6	1,014	8.03	1.00	155.4	62.0	16.5
7	1,031	7.89	1.10	154.4	61.6	18.5

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Year	CMP Tailings (Plant Feed)			Manganese Product		Magnesium By-Product
	Dry Tonnes Extracted (kt/a)	Grade (% tMn)	Grade (% Mg)	HPMSM (kt/a)	Manganese Recovery to Final Product (% tMn)	Magnesium Carbonate (kt/a)
8	1,083	7.60	1.15	154.3	60.8	20.3
9	1,104	7.50	1.15	154.3	60.5	20.7
10	1,058	7.73	1.13	154.1	61.2	19.5
11	1,064	7.70	1.12	154.3	61.1	19.4
12	1,055	7.76	1.12	154.5	61.3	19.2
13	1,039	7.85	1.08	154.5	61.5	18.3
14	972	8.25	1.03	154.6	62.6	16.3
15	881	8.89	0.99	154.7	64.1	14.2
16	1,042	7.82	1.01	154.3	61.4	17.2
17	1,199	7.05	1.18	154.3	59.2	23.0
18	1,235	6.90	1.28	154.3	58.8	25.7
19	1,300	6.64	1.34	154.1	58.0	28.3
20	1,314	6.59	1.36	154.3	57.8	29.0
21	1,326	6.44	1.33	151.0	57.3	28.7
22	1,352	6.46	1.28	154.5	57.4	28.3
23	1,314	6.60	1.28	154.5	57.8	27.4
24	1,263	6.79	1.28	154.5	58.4	26.3
25	1,163	7.22	1.23	154.6	59.7	23.2
26	468	8.08	1.19	72.4	62.1	9.1
Total	**26,960**	**7.32**	**1.15**	**3,651.9**	**60.0**	**505.7**

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18.0 PROJECT INFRASTRUCTURE

The CMP is located in the western area of the Pardubice region of the Czech Republic, approximately 89 km by road east of Prague, on the southern shore of the Labe River. The CMP is a comprehensive brownfield development that will reprocess fine-grained tailings material from the three tailings cells, produced from historical open pit mining operations and processing of pyrite from 1951 to 1975, to produce HPEMM and HPMSM. The proposed CMP project site is immediately adjacent to existing infrastructure which includes an 820 MW coal-fired power station operated by Severní Energetická a.s. (Sev.en), a pre-cast concrete plant operated by TIBA Chvaletice s.r.o., a main railway, and railway spur lines. A new cast iron foundry by KASI spol.s r.o. and a new asphalt plant by Obalovna Chvaletice a.s. were recently constructed immediately adjacent to the proposed CMP plant site. Highway #322 connects to Prague via Kolin and Highway #12. The railway acts as a main transportation line from Prague to communities in Eastern Czech Republic.

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Figure 18-1: CMP Tailings Site and Proposed Processing Plant Site

Source: Google Maps (2026)

The proposed metallurgical refinery is planned to be located immediately south of Highway #322, which is to the south of the tailings cells (a rail line is located between the highway and the CMP tailings facility). The proposed metallurgical process plant site will be partially located at the industrial park, which is the site of the former processing facilities that produced the CMP tailings. Existing railway spurs enter the proposed plant site at the northeast edge and extend west and south along the middle of the proposed process plant site. Figure 18-1 shows the CMP tailings site, proposed process plant site, and main existing infrastructure.

18.1 Site Layout

The plant feed will be extracted from the CMP tailings cells, starting with Cell #3. The tailings will be trucked to a pulping facility located at the south edge of the CMP tailings deposit between Cells #2 and #3. The tailings slurry will be pumped via an overhead bridge gallery that crosses the existing railway and Highway #322. The tailings will be upgraded via magnetic separation, and the manganese will be leached by sulphuric acid. The pregnant solution produced from the acid leaching will be purified to remove iron, phosphorous, heavy metals, and other minor impurities. The resulting qualified solution will be processed to HPEMM metal using electrowinning. Magnesium will be partially removed from the electrolyte solution to mitigate the potential effect of magnesium on HPEMM production. The entire HPEMM production will be further processed into HPMSM powder. The NMT and washed LR will be conveyed back to the CMP tailings site and then hauled by trucks to the excavated tailings areas where the NMT/LR blend will be dry stacked in a geomembrane lined facility. Gypsum produced from the ammonia recovery circuit will be trucked off site for sale. Anode sludge and other waste materials will be sent to professional material handling companies for recycling or disposal. Magnesium carbonate will be bagged and trucked off-site for sale as by-product.

Due to staged plant expansion strategy from the nominal throughput of 75,000 t/a HPMSM during Year 1 and Year 3 to the full capacity of 150,000 t/d at Year 4 and onward, some of the process facilities will be constructed in stages, mainly including magnetic separation, leaching, leach residue dewatering, electrowinning, HPEMM flake dissolution, HPMSM evaporation, and other supporting facilities.

Figure 18-2 shows the general site layout at the full production capacity stage. The proposed on-site infrastructure for the CMP will include:

- CMP tailings site:
  - Extracted CMP tailings storage and pulping facility
  - CMP tailings extraction maintenance workshop complex, including maintenance workshop, spare part storage, worker change rooms, and dining room
  - Tire washing system
  - Fuel and lubricant storage facility and fuel dispatch system
  - Parking lots for hauling trucks, excavators, and other mobile equipment and employee’s cars
  - Tailings excavation area water management system including drainage channels, collection ponds, and water pumping system to pump the collected water for use as process makeup water or to the contact water collection pond for treatment at the plant site
  - Lined dry stacking storage facility for the NMT/LR blend
  - Sewage Treatment Plant
- Conveyor/piping line overhead gallery (bridge) connecting the north and south sites. The section above the highway and rail lines will be covered.
- Gate control.
- Process plant site:
  - Process complex

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- Two 400 kV step-down substations (400 kV/37.5 kV/10 kV) and four rectifier transformers and local step-down transformers
- Process equipment maintenance workshop
- Spare part and maintenance supply warehouses and a cold storage facility
- Water supply and management system, including a fire water system
- Water treatment facilities, including run-off water collection and treatment, process water treatment, and cooling water blowdown treatment
- Assay and metallurgical test laboratories
- Central process control system
- General management office complex
- Change rooms and dining facility
- Sea container and general storage yards
- Commercial truck and private car parking areas
- Upgraded railway spur system and related loading and unloading facilities, including sulphuric acid storage tanks and lime storage silos
- Onsite road network
- Parking building
- Plant site water management system, including various diversion channels
- Waste storage and management facility, including anode sludge storage and other waste material temporary storages prior to being shipped offsite for recycling or disposal.

According to the topography, some of the process facilities are planned to be located on the sloped hillside at the southwest corner of the plant site. These facilities will be constructed on elevated pads, which will be protected with retaining walls to minimize significant cutting.

The infrastructure for the tailings extraction, process, NMT/LR storage and operation support were designed based on the information available.

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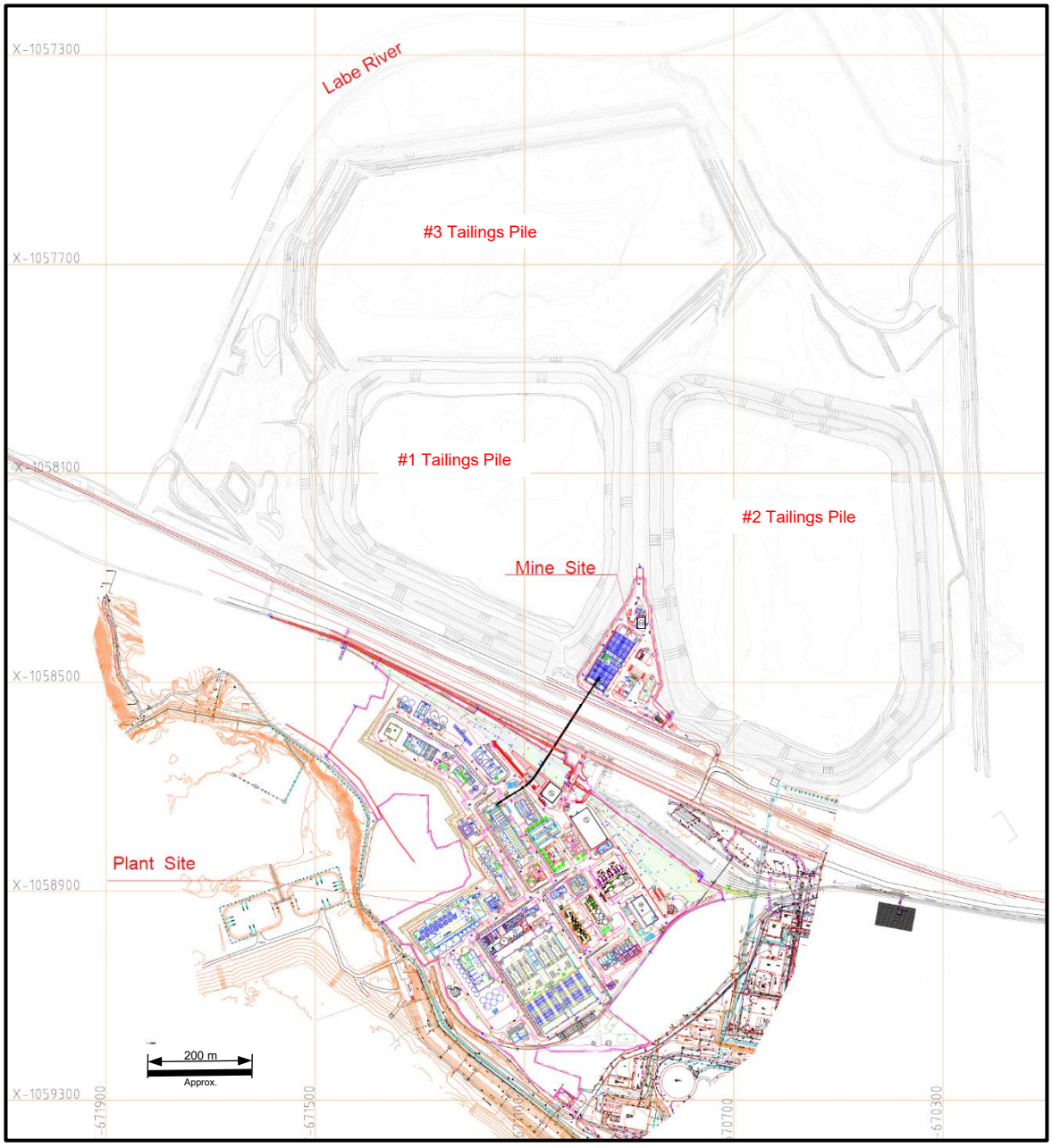

Figure 18-2: General Project Facility Layout

Source: Tractebel + BGRIMM (2026)

As planned, all plant site facilities will be connected via a paved internal road network. Division channels along the roads will be constructed to direct the contact water to the plant site water collection pond located at the southeast corner of the plant site. The collected water will be treated at the water treatment plant adjacent to the water collection pond. Gravel roads will be constructed on the CMP tailings site to support the tailings extraction and the NMT/LR dry stacking operations.

The existing infrastructure immediately adjacent to the CMP site includes an 820 MW coal-fired power station operated by Severní Energetická a.s. and a pre-cast concrete plant operated by TIBA Chvaletice s.r.o. A new cast iron foundry by KASI spol.s.r.o. and a new asphalt plant by Obalovna Chvaletice a.s. were recently constructed. The proposed location for the high-purity manganese sulphate plant is the same site of the former flotation plant that produced the Chvaletice tailings piles.

18.2 Internal Roads, Pads and Railway Spurs

Internal site roads will connect various on-site facility pads. Internal site roads at the south plant site will be paved roads 7 m wide to accommodate two opposing lanes for unconstrained two-way traffic, while the secondary roads will be 4 to 6 m wide. The entrance to the south plant site at the middle of the north edge of the south site has been planned. At the main south plant gate, a 100-t truck weight scale will be installed to weigh incoming and outgoing trucks. Two separate parking facilities, one open parking lot for commercial trucks and one 3-level parking building for personal cars, have been included in the preliminary design. All the personal cars and commercial trucks will not be allowed to enter the plant site without permits.

There are existing railway spurs at the north edge of the proposed plant site that will be used to transport supply materials, mainly sulphuric acid, lime, spare parts, and the HPMSM product. The annual reagent consumables are estimated to be approximately 300,000 t. The annual HPMSM production is estimated to be approximately 150,000 t. The annual magnesium carbonate by-product production is estimated to be approximately 21,000 t.

The on-site storage facilities will be capable of storing approximately 10 days worth of the main reagents of sulphuric acid and lime.

The main roads at the north CMP tailings site will be 11.4 to 12.4 m wide gravel roads to accommodate two opposing lanes for unconstrained two-way traffic, or 7.0 to 7.6 m wide single lane gravel roads.

The internal roads will be sprayed with water to suppress fugitive dust that may generate during the operation. A tire washing system will be constructed at the gate of the north CMP tailings site for incoming and outgoing trucks.

18.3 Process Plant Layout

Main process facilities are planned to be located at the south site, excluding the CMP tailings pulping facility, which is planned to be located at the north site between Cells #1 and #2 at the south edge of the CMP tailings. The main processing workshops at the south site will include:

- Magnetic separation facility, including NMT dewatering circuit
- Magnetic concentrate dewatering and concentrate re-pulping facility
- Concentrate leaching using sulphuric acid and iron and phosphorus removal facility
- LR dewatering with LR washing and residual manganese recovery (from LR washing water solution) facilities
- Ammonia recovery facility
- Pregnant solution purification facility
- HPEMM electrowinning, washing, stripping, packing, and storage facility
- Magnesium removal facility, including magnesium carbonate cake drying and packing system

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- HPMSM production facilities, including HPEMM flake dissolution, hydrogen gas collection, solution purification, crystallization, HPMSM crystal dewatering and drying, and product handling facilities. This facility has been expanded to be capable of converting all the HPEMM flakes produced to HPMSM. One high temperature crystallization system is also incorporated into the circuit for removing sodium and potassium accumulated during the low temperature evaporation crystallization.

All the process circuits/facilities where may generate dust and off-gases will be equipped with dust and off-gases control systems. The off-gases will be scrubbed prior to being discharged into the air.

Figure 18-3 shows the general arrangement for process facilities, service facilities, water handling systems, and updated railway spurs located at the north side of the plant site. Figure 18-4 to Figure 18-7 illustrate process equipment layouts for some of the process workshops.

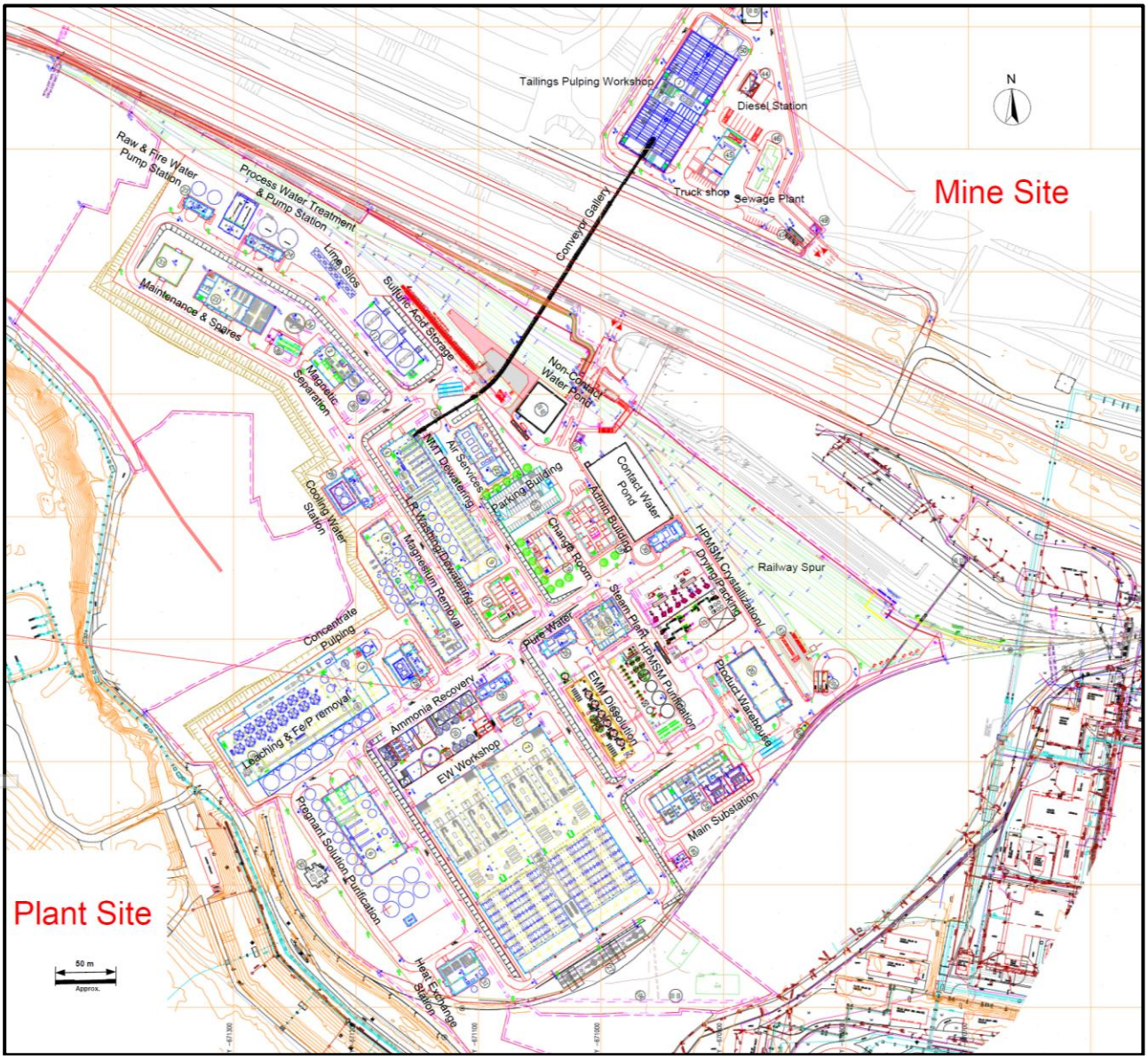

Figure 18-3: Plant Site General Layout

Source: Tractebel + BGRIMM (2026)

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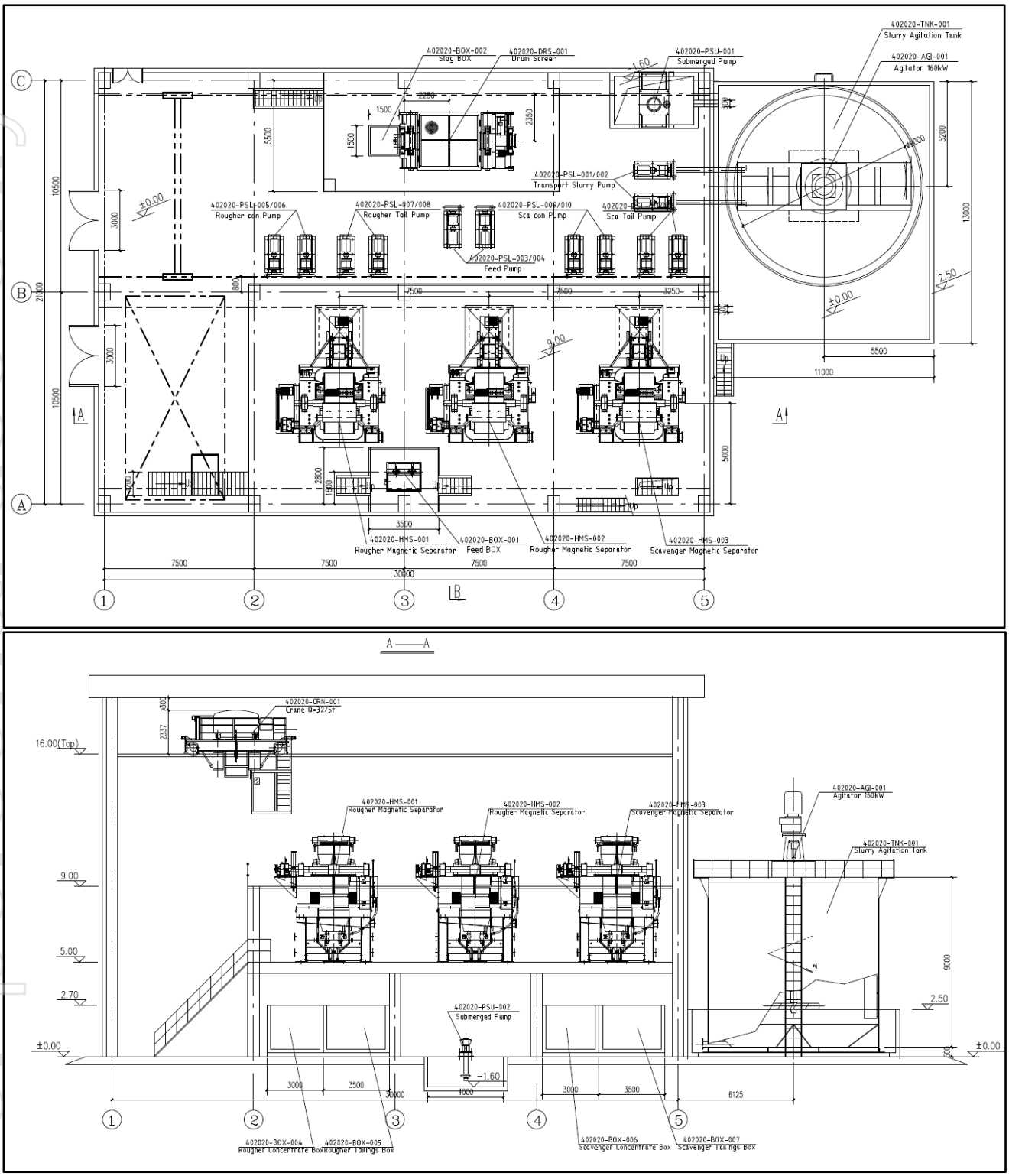

Figure 18-4: Magnetic Separation Facility General Layout

Source: BGRIMM (2022)

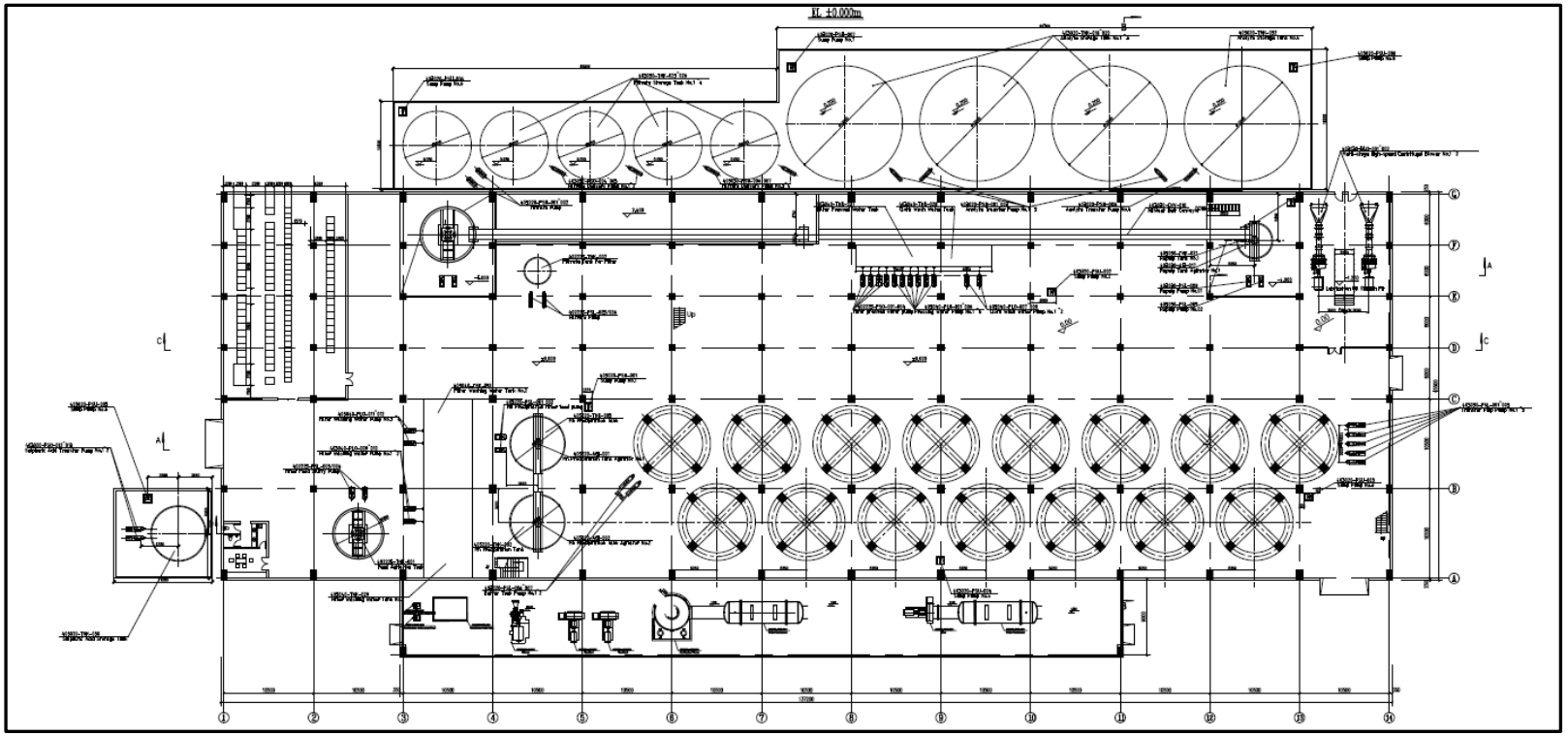

Figure 18-5: General Layout – Acid Leaching and Iron and Phosphorous Removal Facility

Source: BGRIMM (2022)

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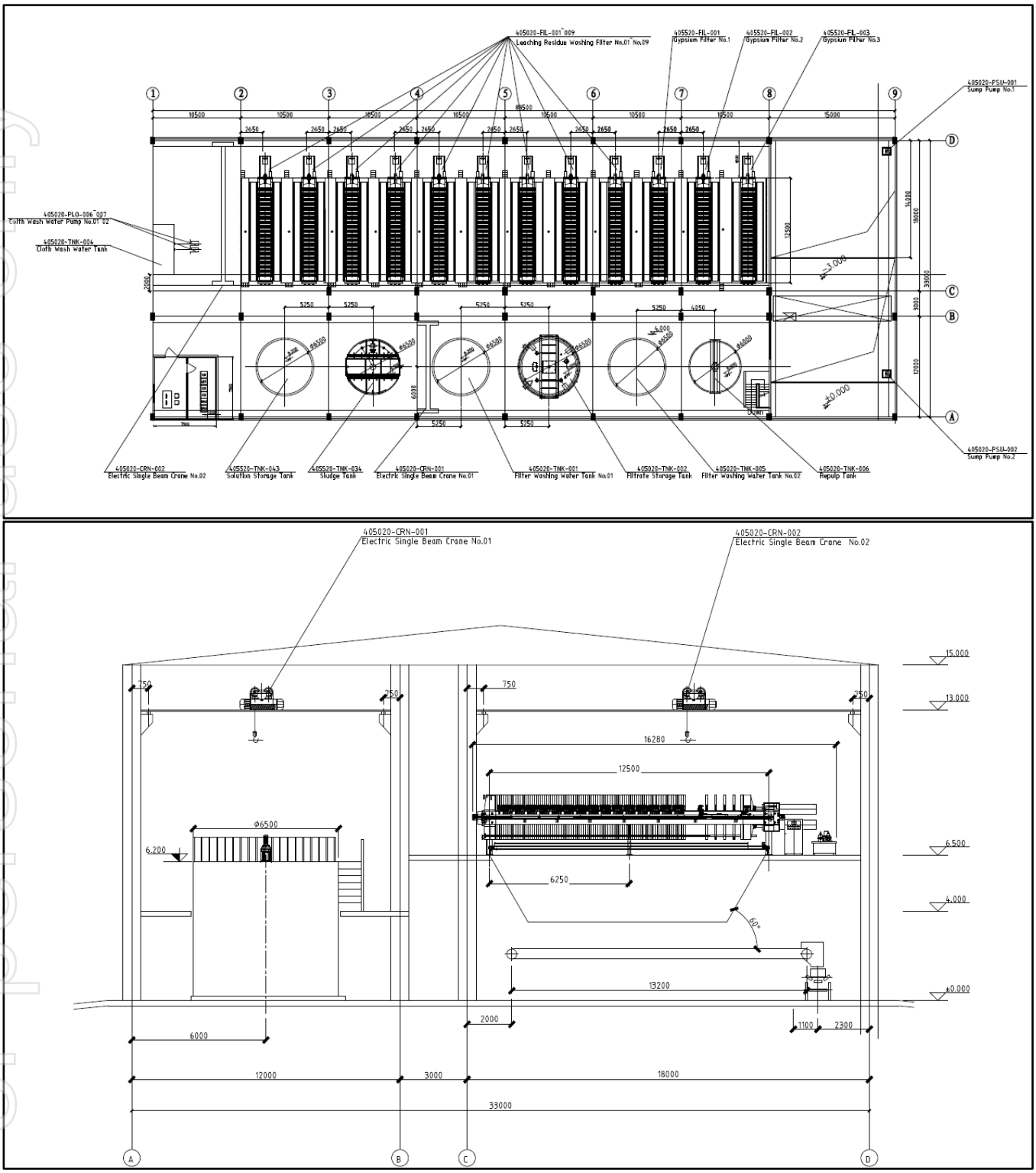

Figure 18-6: General Layout - Leach Residue Washing/Dewatering Facility

Source: BGRIMM (2022)

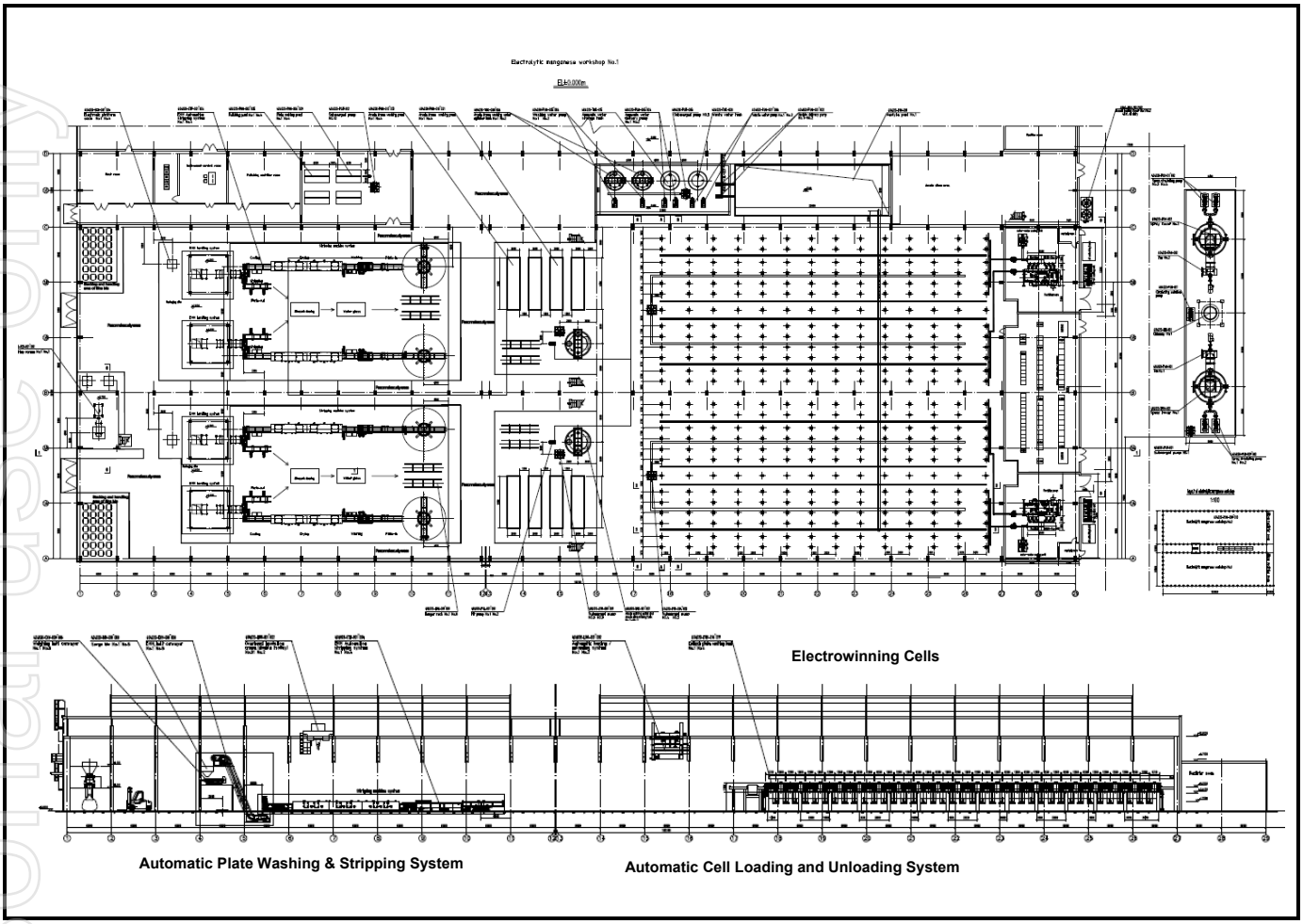

Figure 18-7: General Layout – Electrowinning Facility

Source: BGRIMM (2022)

18.4 Power Supply

The electrical power supply for the facility will be supplied at 400 kV from the existing 400 kV substation at the Elektrarna Chvaletice power plant owned by Sev.en. A new connection point at the Elektrarna Chvaletice Power Plant Substation for a 400 kV underground high voltage power cable to the Chvaletice plant site will be required. Figure 18-8 illustrates the proposed 400 kV power connection arrangement.

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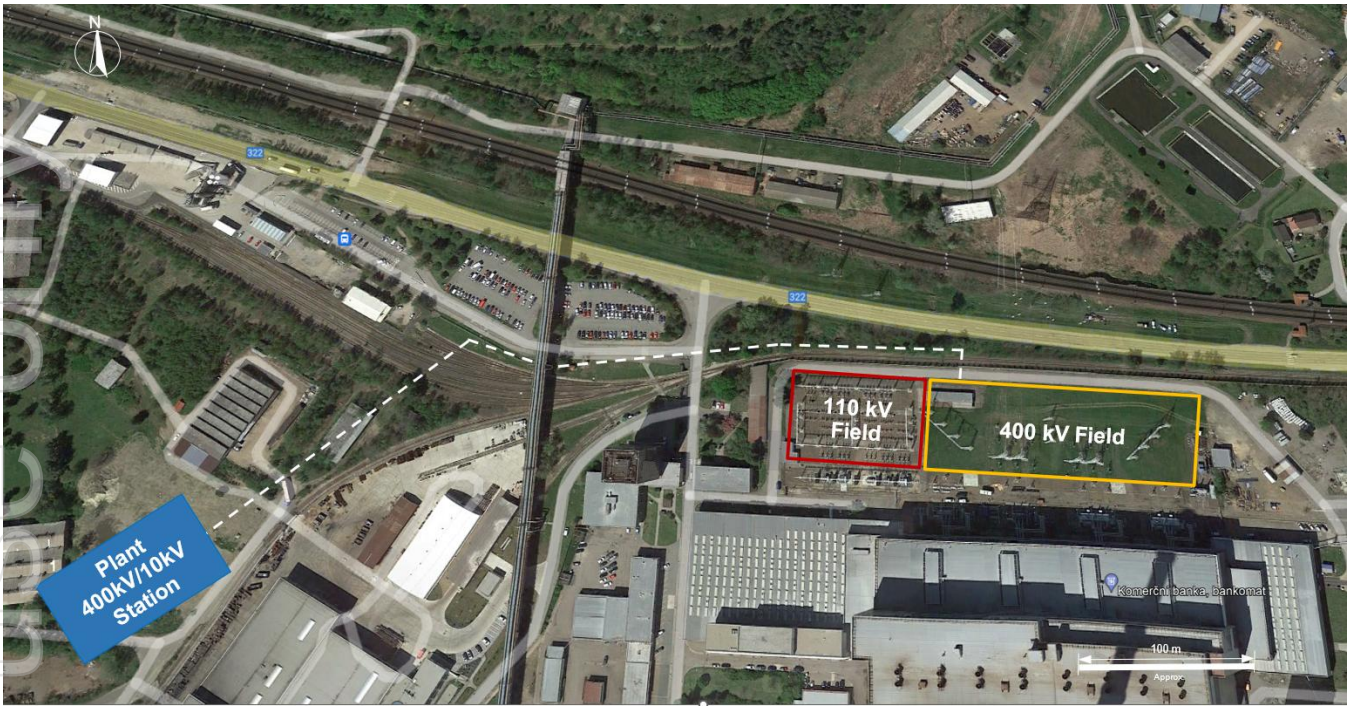

Figure 18-8: Proposed 400 kV Power Supply Connection Arrangement (Illustration Only)

Source: Photo from Google Maps (2022)

The 400 kV supply power will feed to two 80 MVA, 400 kV/37.5 kV/10.5 kV three-winding step-down transformers for a three-phase alternating current power supply. The main power consumers will be four electrolytic manganese rectifier transformers, which will be supplied from the 37.5 kV windings of the main transformers. The estimated power demand of the CMP is approximately 80 MVA, with a power factor of 0.93. The main step-down substation will be located at the east side of the plant site, adjacent to the electrowinning workshop, which will be main power consumer of the CMP.

The main step-down substation is equipped with a 400 kV gas insulated substation (GIS) housed in the power distribution building, which also contains the main control room, a 35 kV power distribution, and a 10 kV power distribution. The main step-down substation is unmanned and will be equipped with an automated control system with integrated microcomputers for collecting all switching quantities and analog quantities and providing microcomputer relay protection. Transformer oil containment pits will be provided for the main 400 kV transformers.

The plant area electrical distribution system will be at 10 kV, which will be used to supply local substations based on the load and process requirements.

Electric equipment enclosures, metallic frameworks, electricity cable pipes and trays, and neutral points of the transformers will be grounded.

The main step-down substation will be equipped with ohms (Ω) independent lightning rods and will be independent of the main grounding systems for protection from direct lightning strikes.

Two site lighting systems are planned: one regular lighting and emergency lighting based on the requirements of different places. Power supply for lighting will be from 220 V low-voltage power. Emergency, battery-powered lighting will be installed site wide to provide necessary lighting for not less than 60 minutes in case of power loss.

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18.5 Water Supply and Management

Two separate water management systems are planned to manage CMP water. At the plant site, collection channels along the roads will be constructed to direct the contact water to the plant site water collection pond located at the north side of the plant site. The collected water will be treated at the water treatment plant adjacent to the water collection pond. As a part of the plant site water control system, a separate water division system will direct the non-contact water to a non-contact pond located at the north area of the plant site prior to being released to the environment at a control rate.

Gravel roads will be constructed on the CMP tailings site to support the tailings extraction and the NMT/LR dry stacking operations. Similar to the plant site water management, two separate site water division systems will be constructed: the water control system will direct the contact water to a contact water collection pond where an oil-water separator will be supplied to separate contaminated oils from the water. Then the water will be pumped to two contact water surge tanks located at northside of the raw tailings storage facility. The water will be used for raw tailings pulping. Any excessive water collected during the heavy raining events will be pumped to the contact water collection pond located at the plant site and then treated at the water treatment plant at the plant site. Non-contact water will be directed away from the operation site and discharged into the environment.

The water supply system will consist of process make-up water, cooling circulation water, potable water, demineralized water (for steam generation), 130°C hot water (for process heat loads and building heating), and fire water supply systems. The pore water from the existing CMP tailings will form part of the process makeup water. All the process water used in the process circuits will be directly re-used or treated and re-used as process make-up water or discharged into the environment after it meets the local water discharge criteria. Contact water from direct runoff from the south and north sites will be collected and treated at a dedicated water treatment plant prior to being discharged into the environment. The waste process water from processing activities will be collected and sent to manganese and ammonium recovery circuits for treatment prior to being reused as process makeup water. Apart from the process water treatment plant and the site run-off water treatment plant, a separate sewage water treatment plant for the wastewater generated from human activities has also been designed for the CMP. The sewage treatment plant will be located at the tailings extraction site north of the process plant.

18.5.1 Water Sources

18.5.1.1 Potable Water Sources

Potable water will be from public water mains and used for hygienic, sanitary, and other needs of employees. The consumption of potable water is calculated in accordance with Decree 120/2011 Coll., par. VII 'Establishments', Item 46. With the maximum number of 435 employees for the processing plant site and the mine site operations, the consumption of drinking water is estimated to be approximately 15,225 m3/year.

Most of the buildings in both the processing and mining complex will be connected to the potable water supply system. These buildings will also be connected to the sewage system.

The potable water will be sourced from the public water supply system and will not be used for processing purposes.

18.5.1.2 Process Water Sources

Industrial (process) water will be taken from several sources listed below:

- Captured mine water from the area of mining and reclamation

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- Captured rainwater from the area of tailings extraction and reclamation
- Water from the Chvaletice power plant – blowing from cooling towers
- Process water from the Chvaletice power plant – feed water
- Collected rainwater from paved and handling areas in the area of the processing plant (roads, handling areas, and other paved surfaces)
- Non-contact rainwater collected from the area in the processing plant (roofs, green areas, etc.)

According to the current permits, the CMP does not plan to use groundwater from the two newly built wells located at the north-eastern border of the Demonstration Plant.

Process water used for the mining and reclamation areas in the mining area will be mainly from the water collected from the mine site and recycled water from the process circuits. According to Section 40(1) of the Mining Act, mine water is all groundwater, surface water, and precipitation water that has entered underground or surface areas in the mine site, regardless of how it entered them. According to the Mining Act, an organization is entitled to use mine water for its own use free of charge during mining activities. Similarly, according to Section 8(3)(f) of the Water Act, a water management permit is not required for the use of mine water by an organization that is conducting mining activities for its own use or for the discharge of mine water by the organization.

Mining Site

Captured Mine Water from Area of Mining and Reclamation

In the area of raw material extraction, the void water with the tailings will be part of the process water. The seepage water at the mine site will be collected locally, from there it will be drained into a retention reservoir and from there the water will be pumped to an excavated tailings pulping station, where it will be used to mix with the raw material to generate a tailing slurry for downstream processing.

The amount of mine water will be approximately constant throughout the lifetime of the project (the size of the excavated area will change slightly), the water amount will be mainly dependent on the nature and intensity of precipitation. With an average wet year, mine water formation is expected to be approximately 42 m^3/day (see Table 18-2).

Captured Rainwater from Area of Mining and Reclamation

Clean rainwater in the areas where reclamation has been completed will be captured. This water will not be used for the process usage, it will be collected in a retention water pond in the centre of the tailings storage area and from there it will be discharged in a controlled manner into the Elbe to limit the peak water flow.

Clean rainwater will begin to be generated in approximately 3 years after the start of activities (after the reclamation of the first part of the mined area) and its amount will gradually increase with an increase in the reclaimed area.

Captured Rainwater from Paved Areas in Area of Infrastructure Area of Mine Site

Rainwater from roads and material handling areas at the triangle area is expected to potentially be contaminated. The water will be collected in a contact water collection pond (approximately 20 m^3) and from there pumped into the mine water storage tanks (next to the excavated tailings pulping building) and. The collected water together with the recovered mine water from the mining areas and the makeup water from the process plant will be used for:

- Pulping the magnetic separation feed
- Washing mobile equipment

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- Anti-dust water spraying

The extracted raw material has an average moisture content of approximately 21% while the backfilled blend of leach residue and magnetic separation tailings contains approximately 18 – 20% moisture. Tailings extraction and storage operation takes place 5 days a week. In the area of mining and storage, a high dust levels can therefore only be considered during periods of prolonged drought and windy days. During the normal mining operation the dust levels in the work area are not expected to exceed the required levels due to the naturally high humidity. Spray water will be used mainly on the dust suppression for the roads where the surface dries quickly and have heavy traffic.

Water consumption for anti-dust measures in the mining area can be estimated with a reserve at 10 m^3 per day (i.e., 300 m^3 per month, and only for the dry and warm months. In the other seasons, water consumption for anti-dust measures will be significantly lower.

Processing Plant Site

Process Water from Chvaletice Power Plant – Bleeding from Cooling Towers

Bleeding water from the Chvaletice power plant will be the main source of process water. The bleeding water is currently being discharged into the Elbe river. The planned amount of bleeding water for process purposes is significantly lower than the amount produced by the Chvaletice power plant (approximately 16% to 30% of the produced amount).

The amount of used bleeding water will fluctuate in the range of approximately 1,209 - 2,170 m^3/day. Such a wide range of bleeding water consumption is given by the fact that the amount of bleeding water will be compensated by fluctuations in the amount of incoming water from the water sources, including the water collected at the mine site, rainwater used, and raw material moisture, that are significantly line installed on a technological bridge over a purpose-built road in the northeastern part of the site.

Process Water from Chvaletice Power Plant – Treated Water

The treated water from the Chvaletice power plant is suitable for feeding steam boilers and subsequently for steam production. The amount of this water will be 696 m^3/day. The process water can be temporarily replaced by the bleeding water from the power plant. The process water will be supplied to the processing plant from the power plant's process water system through a pipeline running parallel to the bleeding water pipeline.

Collected Rainwater from Paved and Material Handling Areas in Processing Plant Area

This is rainwater from roads and material handling areas that can potentially be contaminated. It will be collected separately from clean rainwater in the retention pond (pond capacity 10,660 m^3) and will also be used as process water.

In case of emergencies, this water will be drained to a wastewater treatment plant, and after treatment it will be subsequently discharged into the environment.

Collected Clean Rainwater from Processing Plant Area

The processing plant will also generate clean rainwater (green areas, roofs, etc.). This water will be collected separately from rainwater from roads and material handling areas in a separate retention pond (pond capacity 3,220 m^3).

Rainwater from paved areas will normally be used as a source of process water. Rainwater from unpaved, green areas such as lawns, etc. will be infiltrated. In extreme rainfall, clean rainwater will be drained from the non-contact water pond through an existing pipeline that runs under road 322 and the railway corridor and leads into an open concrete channel that runs in parallel with the railway and the road on the south side of the tailings. In the end part, the riverbed is piped and leads into the Elbe at the port of Chvaletice.

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The water management system of the processing plant is quite complex. The basis of the system is the main circuit of process water, in which a water treatment plant is included that maintains a stable quality/composition of water in the process water circuit. As part of the main process water circuit, there is a water storage tank that serves to balance the required amount of water in the processing plant.

In addition to the main water circuit, there are several secondary water circuits in the system that are connected to the main circuit, such as water from filter cake dewatering, bleeding water from cooling towers, or condensate from reactors. Secondary water circuits are often interconnected so that water leaving one stage (e.g., filter presses) is still used in a production step where the quality/stability of service water is not essential. This arrangement allows for better use of water and also for reducing the capacity of the water treatment plant in the process water circuit.

In addition to the secondary circuits of water connected directly to the main circuit, there are also:

- Water circuits for cooling towers – fresh water is replenished to this circuit directly from the bleeding water supply pipe from the Chvaletice power plant.
- Water circuit of gas scrubbing – fresh water is replenished from the main water circuit; spent solution (weak sulphuric acid, ammonium sulphate solution) is reused in the production process (leaching, ammonia regeneration).
- Steam and condensate circuit (steam production and usage) – condensate is returned as feed water; blow-off from boilers is fed into the main water circuit.
- Condensate from the evaporator of the manganese sulphate solution – the condensate is returned to the manganese metal dissolution production circuit.
- Condensates formed by cooling of exhaust gases in pipeline systems are mostly returned to the production stage where they originate (via the slope of the pipes); in rare cases they are returned to the main water circuit.

18.5.1.3 Firewater Sources/Hydrant Circuit

A closed fire water network is planned for the CMP project. The existing fire water system (KASI Foundry a.s.) will be upgraded to service for the project.

The overall water management scheme is shown in Figure 18-9.

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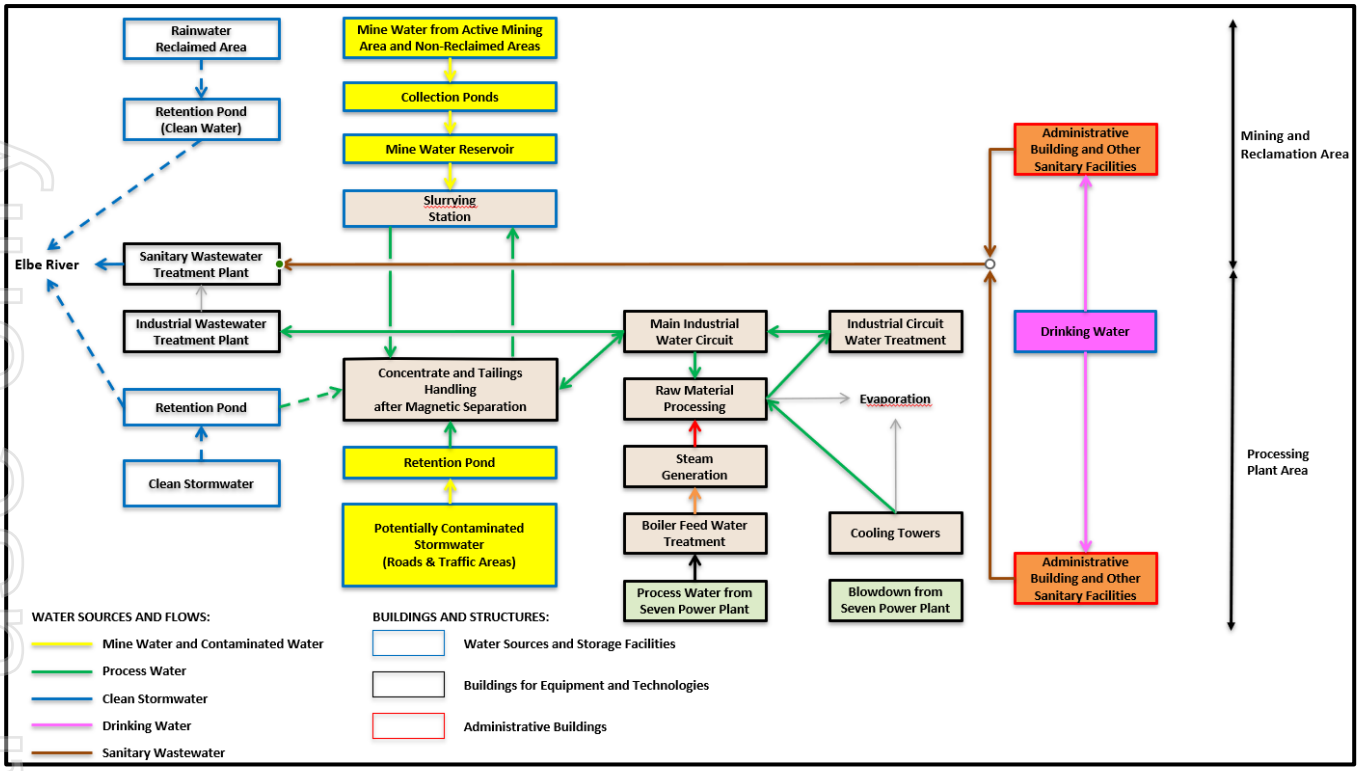

Figure 18-9: Overall Water Flow Chart

Source: ESIA (2023)

18.5.2 Process Water

Main Areas of Process Water Consumption and Major Process Hubs

Pulping Station

The facility is located at the mining area. In this building, the raw material is pulped to form a slurry, which is pumped through the technological gallery to the processing plant to the magnetic separation facility. Mine water from the area of mining and reclamation, including rainwater captured in the area of the mining area, and water returned from the dewatering of the concentrate and the non-magnetic tailings. If the aforementioned streams prove inadequate, the deficient water volume will be replenished from the primary water circuit.

Magnetic Separation

The facility is located in the processing plant area. In this process, the magnetic concentrate and the non-magnetic tailings are produced. The separation process takes place in a relatively diluted slurry. After the separation, the concentrate and tailings will be thickened and filtered and the water generated from the dewatering processes is reused in the magnetic separation and in the tailings pulping process.

Cooling Towers

In the processing plant, there are two cooling towers (open system) installed. One of them serves exclusively for the electrowinning unit, and the other for the rest of the plant. In cooling towers, water is lost through evaporation. A larger part of the bleeding water from the cooling towers is drained into the main circuit of process water, a small part is then (after treatment in the industrial wastewater treatment plant) discharged into the watercourse as wastewater.

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Off-gas Scrubbing

These off-gas treatments are located in the process plant area. The process is equipped with six off-gas scrubbing systems. Water is lost in the washing towers. Water loss in the scrubbing systems is replenished from the main water circuit. The exhausted absorption solutions from the scrubbing are reused in the production process.

Process Circuit for Producing Manganese Metal and Manganese Sulphate Monohydrate

The process from the raw tailings to produce pure manganese metal and pure manganese sulphate monohydrate constitutes various process circuits. Apart from the final steps—drying of metal manganese and drying of manganese sulphate monohydrate—the entire processes are operated through wet methods, such as in slurry or/and solution. Water from the water circuit is added to the individual circuits of the production process as needed, and the excess water is then returned to the main process circuit or treated and discharged.

In addition to the above, other circuits with water consumption are:

- Concentrate leaching
- Washing the filter cake after leaching
- The process of recovering manganese and removing magnesium from the spent anolyte
- The process of recovering manganese from the leach residue cake washing solution
- Dissolution of metallic manganese
- Evaporation and crystallization of manganese sulphate
- Ammonia recovery process
- Reagent preparation (e.g. preparation of hydrated lime, dilution of sulphuric acid)
- Auxiliary processes
- Watering for greenery plants in case of intense drought (water from the Chvaletice power plant would be used)

Water Treatment Plant in Main Water Circuit

The aim of this water treatment circuit is not to purify the water, but to maintain its properties within the set limits. During the water treatment, the pH will be adjusted with hydrated lime or sulphuric acid if needed and decantation will be carried out in settling tanks. Treated water will be returned to the main process water system, and the sludge generated will be dewatered and disposed of by an authorized person outside the production plant as waste.

Under exceptional circumstances, such as a complete shutdown of the production due to intense rainfall, there is a possibility that all the retention pond capacities project wide, including the contact water retention ponds, could be filled. In such instances, any surplus water captured would undergo discharge into the watercourse after treatment.

18.5.3 Fire Water/Hydrant Circuit

A fire water system with hydrants will be built in the plant site and the mine site. This circuit will be connected to the fire water circuit of the Chvaletice power plant and KASI FOUNDRY a.s. (this connection already exists at present; the existing system will be modified for the new layout of the processing plant).

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The fire water system is a closed system that is not connected to the process circuits or other uses and therefore does not consume any water or generate any wastewater.

18.5.4 Total Water Balance

The overall water balance in the tailings extraction and processing systems is shown in Table 18-1 to Table 18-3. All water flows are accounted for when considering the use of wet raw materials and the transfer of residues that contain a substantial water content, to the water balance, including moisture water in the raw tailings and the residual water in the reprocessed backfill materials.

Table 18-1: Total Mass Balance of Water In Processing and Mining Areas

Water Inputs and Outputs – Average	m^3/day	m^3/year
Water Inputs		
Water/liquid - all inputs (detailed in Table 18-2 and Table 18-2)	2,193	723,596
Water - moisture raw materials	810	267,300
Water contained in used reagents	42	13,860
Water produced by chemical reactions	81	26,730
Total amount of water - inputs	***3,126***	***1,031,486***
Water Outputs		
Water - evaporation from cooling towers	1,585	523,050
Water - evaporation from other devices	121	39,930
Wastewater from industrial water treatment plants	84	27,720
Water contained in products	51	16,736
Water - humidity of residues for storage (NMT/LR)	1,078	355,740
Water - gypsum moisture	110	36,300
Water - humidity $MgCO_3$	70	23,100
Water in filter cakes (waste)	12	3,960
Watering for greenery plants	15	4,950
Total amount of water - outlets	***3,126***	***1,031,486***

Table 18-2: Process Water Resources - Average Level/Average Rainfall

Process Water Resources			
Flows	**m^3/day**	**m^3/year**	**%**
Total water consumption	***2,193***	***723,596***	***100.0***
Mining water from mining and storage	42	13,860	1.9
Rainwater (clean water) from mining and storage areas	not be used		

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Process Water Resources			
Contact water from the processing plant area	77	25,410	3.5
Rainwater (clean water) from the processing plant area	44	14,487	2.0
Process water/steam water used in ammonia recovery	696	229,680	31.8
Bleeding water from the power plant	1,314	440,159	60.8
Total inputs	***2,193***	***723,596***	***100.0***

Table 18-3: Process Water Sources - Dry Season

Process Water Resources			
Flows	**m^3/day**	**m^3/year**	**%**
Total water consumption	**2,193**	**723,596**	**100.0**
Mining water from mining and storage	0	0	0
Rainwater (clean water) from mining and storage areas	not be used		
Contact water from the processing plant area	0	0	0
Rainwater (clean water) from the processing plant area	0	0	0
Process water/steam water used in ammonia recovery	696	229,680	31.7
Bleeding water from the power plant	1,476	493,916	68.3
Total inputs	**2,193**	**723,596**	**100.0**

18.6 Heat Utilities

18.6.1 Hot Water

Hot water at 1.0 MPag and 130°C is planned to be provided by the neighbouring power plant, Sev.en.

This hot water will be strictly used as a heating medium, in a closed loop, and shall be returned in full to the power plant after using its heat value as required. No portion of this water is allowed to be consumed within the Chvaletice Manganese Plant. Return water temperature is not restricted and can be as low as 40 to 45°C.

The hot water will also be used as an indirect heat source for process heating in the process plant, as well as for space heating in industrial and office buildings. Leaching and iron/phosphorus removal will be the main heat loads for the hot water.

When used for space heating in industrial buildings, the hot water shall be used as the primary heating fluid to transfer heat through heat exchangers to the glycol-water mixture (glycol). This glycol heating system is then to be pumped to the industrial buildings that require space heating. Forced-air unit heaters and make-up air units shall be used in the industrial and process buildings for transferring heat from the glycol water loop to the indoor space.

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For office buildings, the temperature of the primary heating fluid will need to be reduced from 130°C to a range of 82 – 87°C. Baseboard heaters may be used for providing heat to the offices.

Flow-metering and temperature recording shall be installed at the battery limit of the CMP plant, both for the hot water entering and leaving the plant.

18.6.2 Steam

Steam will be supplied from an onsite boiler plant using natural gas and recovered hydrogen gas as fuels separately. Natural gas available from the local utility company will be used as fuel for the boilers to produce the steam. The produced steam will service various processes, mainly for ammonia recovery, start-up of $(NH_4)_2SO_4$ evaporative crystallization circuit, HPMSM evaporative crystallization, and HPMSM crystal drying.

Three boilers fired by a combination of nature gas and hydrogen recovered from the HPEMM dissolution process, each with a rated capacity of 25 t/h steam are proposed for the project. The steam will have a working pressure of 0.6 MPa. The steam will be mainly used for the ammonia recovery, HPMSM crystallization, and HPMSM crystal drying. The steam will also be used for starting up the ammonium sulphate crystallizer used for magnesium removal circuit.

Demineralized water available from the power plant will be used as feed water for the above-mentioned boilers. The water consumed within the process plant is not required to be returned to the power plant. The demineralized water will also be used as feed for the production of pure water, thus potentially leveraging and optimizing available resources.

Flow-metering shall be required at the battery limit of the Chvaletice Plant.

18.7 Air Supply

Compressed air will be required site wide to service various process circuits, mainly iron/phosphorus removal and filtration circuits, maintenances, and instrumentation systems. The compressed air will be mainly supplied from a centralized compressor station.

Plant air service systems will supply air to the various process areas, including:

- Iron purification circuits – high-pressure air by dedicated air compressors
- Filtration circuits – high-pressure air for filter pressing and drying of various filtration cakes
- Electrowinning plant service air – high-pressure air for various services
- HPMSM plant service air – high-pressure air for various services
- Instrumentation – plant site instrument air will come from the plant air compressors and will be dried and stored in dedicated air receivers prior to being used to service plant control systems

A dedicated compressed air system will be provided for the CMP tailings site for mobile equipment maintenance.

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18.8 Railway Services

An existing railway spur connecting to the Czech railway network is located immediately to the northside of the process plant. The railway spur will be upgraded for service dedicated to the Chvaletice operation. The railway spur will be used for delivering reagents, especially sulphuric acid and lime, and spare parts from suppliers or transfer stations to the CMP site and dispatching products to customers who prefer to receive the products from the project via railway transport. Dedicated loading and unloading systems and separate platforms have been designed, including dedicated sulphuric acid and lime unloading systems. Sulphuric acid storage tanks and lime storage silos will be constructed adjacent to the railway spur. The railway spur will have its own signal and control system which will be interlocked with the central control system.

18.9 Chvaletice Project Site Climatic Characteristics

The area of interest belongs to the warm climatic area T2. This area is characterized by a long, very hot and dry summer and a short, moderately warm to very dry winter. The duration of the snow cover is short. The transitional period is short with both warm a spring and autumn (ESIA, 2023).

Table 18-4: Characteristics of the Climatic Region T2

Characteristic	Value (Temperature in °C, Precipitation in mm)
Number of summer days	50 - 60
Number of days with average temperature above 10 °C	160 - 170
Number of frost days	100 - 110
Number of ice days	30 - 40
Average temperature in January	- 2 - -3
Average temperature in July	18 - 19
Average temperature in April	8 - 9
Average temperature in October	7 - 9
Average number of days with precipitation of 1 mm and more	90 - 100
Precipitation in the growing season	350 - 400
Precipitation in winter	200 - 300
Number of days with snow cover	40 - 50
Number of cloudy days	120 - 140
Number of days clear	40 - 50

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Climatic data according to the Atlas of the Climate of the Czech Republic (average for the period 1961 - 2000):

- Average annual air temperature: 8 - 9°C
- Average air temperature - spring: 8 - 9°C
- Average air temperature - autumn: 8 - 9°C
- Average air temperature - summer: 15 - 16°C
- average air temperature - winter: -1 - 0°C
- Average annual rainfall: 600 - 650 mm
- annual average total of comparator evapotranspiration: 650 - 700 mm
- Average seasonal number of days with snowfall: < 50 days
- Average seasonal number of days with snow cover: 30 - 40 days
- Average of seasonal snow depth maximums: < 15 cm
- Average annual duration of sunshine: 1,600 – 1,700 hours
- Average annual wind speed: 2.0 – 3.0 m.s-1

The wind rose (Figure 18-10 and Table 18-5) for the site in question was taken from CHMI data. The wind rose is divided into 120 wind directions (3 degrees each). The designation of the wind direction is done clockwise, with 0 degrees being north wind, 90 degrees east wind, 180 degrees south wind, 270 degrees west wind. Calm is budgeted into the first class of wind speed. The geographical indication of the wind direction indicates where the wind is blowing from (the north wind blows from the north, the south from the south, etc.).

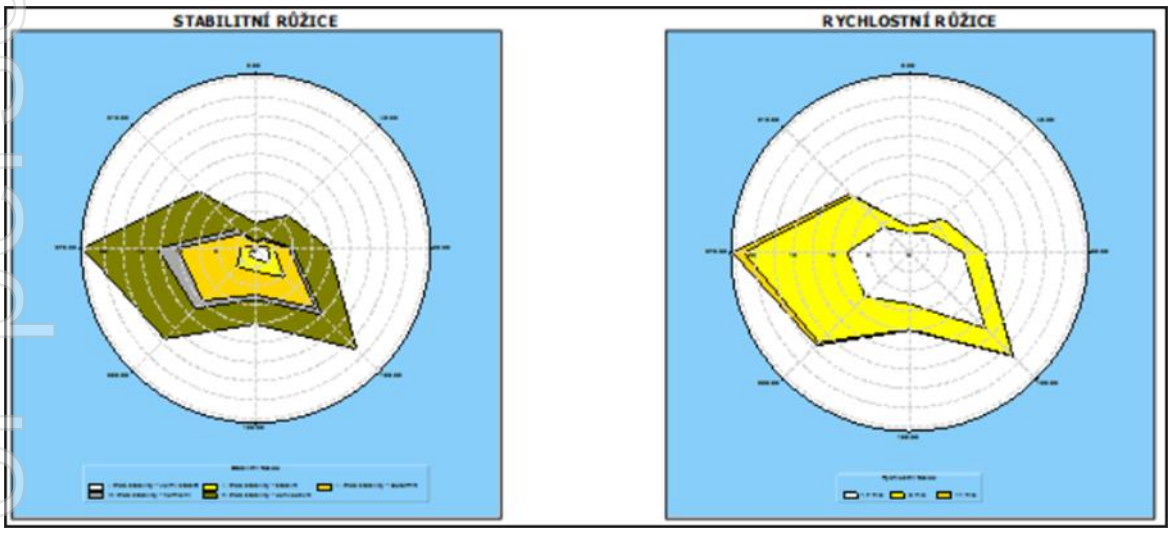

Figure 18-10: Wind Rose for the Locality (CHMI)

Source: ESIA, 2023

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Table 18-5: Total Wind Rose for the Locality of Interest (CHMI)

Total Wind Rose										
m/s	0	45	90	135	180	225	270	315	Calm	sum
1.7	2,42	3,55	6,95	7.20	13,86	6,65	8,05	7,99	4,61	55,51
5	0,93	2,56	2,72	5,01	3,27	8,42	13,38	5,69	0,00	41,98
11	0,01	0,00	0,01	0,08	0,11	0,47	1,44	0,39	0,00	2,51
sum	3,36	6,11	9,68	18,95	10,03	16,94	22,81	10,69	1,43	100,00

18.10 Water Management Infrastructure Design

The sections below summarize the proposed design and geometries for the mine site water management structures. The bulk of the design work was undertaken during the previous study.

18.10.1 Open Channel Drains

Open channel drains are either ditches or newly graded swales. Channels will normally be a trapezoidal cross section or V-shaped and shall comply with the parameters listed in Table 18-6. Swales are V-shaped shallow ditches used for small flows and have lengths not exceeding 150 m. The roughness coefficients to be used for the design of drainage ditches are summarized in Table 18-7.

Unless otherwise specified, the design flow for sizing open channels and culverts (hydraulic structures) is based on a 1:10-year, 1-hour return period.

The clean water ditches and swales, when designed for 1:10 year, 1-hour return period, shall be capable of handling the peak discharge for a 1:100 year, 1-hr return period when flowing full.

Table 18-6: Open Channel Design Parameters

Item	Value	Unit	Source/Comments
Minimum Base Width	0.6	m	Construction consideration
Minimum Channel Depth	0.6	m	Engineering criteria
Minimum Swale Depth	0.3	m	Engineering criteria
Minimum Freeboard	0.1	m	Engineering criteria
Side Slopes	1:2	(V:H)	Construction consideration
Minimum Longitudinal Slope	0.005	m/m	Engineering criteria
Manning's Roughness	Varies	Varies	NRCS Practice Standard 486 (Robinson 1998) and Open-Channel Hydraulics by Ven Te Chow, Table 5-6
Riprap Minimum Depth	2 × d50	mm	Surface Mining Water Diversion Design Manual (OSM 1982)

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Table 18-7: Roughness Coefficients

Material/Surface Conditions	n
Unlined Ditch	0.025
Unlined Swale	0.030
Lined Ditch/Swale	0.015
Riprapped Ditch	0.060
Corrugated Steel Pipe	0.024
Concrete Pipe	0.013
PVC and HDPE Pipe Smooth Interior	0.010

The clean stormwater ditches and contact water collection ditches were sized based on the geometries summarized in Table 18-8 and Table 18-9. These tables show the required ditch depth and bottom width for various ditch bottom slopes of 0.1%, 0.3%, and 0.5%. The clean stormwater ditches were also sized for a half catchment scenario, where the ditch length is less than half of the entire length of the ditch.

Table 18-8: Design Geometry for Clean Stormwater Ditch

Ditch Bottom Grade (%)	Side Slopes	Bottom Width (m)	Ditch Depth (m)
0.5	2H:1V	1	0.5
0.3	2H:1V	1	0.6
0.1	2H:1V	1	0.7

Table 18-9: Design Geometry for Contact Collection Ditch

Ditch Bottom Grade (%)	Side Slopes	Bottom Width (m)	Ditch Depth (m)
0.5	2H:1V	1	0.9
0.3	2H:1V	1	1.0
0.1	2H:1V	1	1.2
0.5	2H:1V	2	0.7
0.3	2H:1V	2	0.8
0.1	2H:1V	2	1.0

18.10.1.1 Seepage Collection Sump

The bottom of the RSF slopes from the outer perimeter towards the center. Seepage from the RSF will be collected into one central seepage collection sump.

The maximum seepage is attributed to the seepage just after each annual RSF placement. The seepage collected within the sump will then be pumped to the mine site collection pond. Five years post closure of the mine, the sump will be plugged/cemented, and the residual moisture will no longer seep out of the RSF.

An approximate maximum pumping rate of 13.5 L/s is required for the sump pump. The actual seepage rates will likely be smaller than this maximum amount. However, the proposed pumping rate considers a wet condition where a heavy rainfall (i.e., wet year x2) infiltrates the dry stack just before it is covered. During operation, an RSF emergency preparedness plan shall be developed to account for emergency conditions.

18.10.1.2 Ponds

Two types of water management ponds will be needed in this project: collection ponds/tanks and stormwater ponds.

Mine Site Collection Pond

The mine site collection pond is designed to collect contact runoff from the mining and RSF area. The collection ponds/tanks are sized to contain the volume of the 1:200 year, 24-hour duration storm event.

To estimate the volume of contact runoff, a hydrology rainfall runoff model using HEC-HMS model was developed for the RSF maximum active mining area under 1:200-year 24-hour storm event. Table 18-10 summarizes the results of runoff volume estimated for the contact runoff from the mining area. Two 14 m diameter by 14 m height contact water surge tanks with an approximate capacity of 3,500 m^3 have been designed to collect the contact water.

Table 18-10: Hydrology Model Results for Contact Runoff from Active Mining Area

Scenario ID	SCS Curve Number	Runoff Volume (m^3/day)	Peak Flow (m^3/s)	Runoff Coefficient
Mining Area – 1:200 Year, 24 hour	80	6,500	1.6	0.45

In addition to the runoff from the active mining area, seepage from the collection sump will also be collected into the mine site collection tanks. The contact water from the mining area must be pumped to a contact water conveying ditch, in which water will gravity flow to a sump where a water-oil separator will be installed. Then, the water will be pumped towards the storage tanks adjacent to the repulping facility. The storage tanks will have approximately 3,500 m^3 capacity, and the excess flow of 3,000 m^3, which may occur during an extreme event such as a 1:200 year, 24-hour storm event, shall be pumped towards the plant site collection pond. The mine site collection sump pump should have a total maximum capacity of 90 L/s.

Mine Site Stormwater Management

The mine stormwater management area was designed to reduce the peak flows of runoff to the environment.

A hydrology rainfall runoff model using HEC-HMS model was developed for the RSF at existing and future conditions under the 1:10 year, 1-hour storm event. For the future scenario (post-development), a conservatively high SCS curve number was used in the model. The runoff volume under this conservative scenario for the mine site is shown in Table 18-11.

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Table 18-11: Hydrology Model Results for Clean Stormwater Pond – Mine Site

Scenario ID	SCS Curve Number	Runoff Volume (m^3)	Peak Flow (m^3/s)	Runoff Coefficient
Post Development	97	21,500	10.3	0.62
Pre-Development - Existing Condition	73	1,800	1.25	0.09

18.10.1.3 RSF Flood Protection Berm

The mining and RSF area shall be protected using dikes against Labe River flooding. The dike crest elevation is higher than the 1:1000 year flood peak elevation plus 0.3 m freeboard; however, it requires erosion protection design during later phase of the project.

In 2024, a hydrotechnical assessment was conducted by Vodohospodářský Rozvoj a Výstavba (VRV), a Czech local company using a detailed 2D mathematical model.

- The area of interest is affected by the overflow of Q20 and Q100 (A 20 or 100-year flood whose peak flow is reached or exceeded once in 20 or 100 years on a long-term average (20 or 100-year flow))
- There is no negative impact on the extent of overflows due to the assessed modifications in both design states
- There is no negative impact on water levels. The influence is below the tolerance value, in the range of up to 2 cm at design flows Q100 in both design cases
- The protective embankment must be fortified depending on the speed of flood flow. Recommended fortification is grass or grain size 5 – 10 mm according to the limit non-eroding speeds (TP204)
- The level of the eastern protective embankment should be designed to be at the level of Q100 with a safety elevation of 0.3–1.0 m (recommended safety elevation of 0.5 m)

18.11 Geotechnical Investigations

The geotechnical setting of the existing tailings piles and foundation soils was determined as part of previous FS work based on the provided project information and test hole drilling programs that included cone penetration testing (CPT), sampling and laboratory analyses, and a geophysical investigation.

Existing and related information included the 160 testholes advanced into the three tailings piles using sonic and mobile percussion drilling methods in 2017 and 2018 as part of mineral resource assessment (Tetra Tech, 2019). Samples were logged, photographed, and retained for various laboratory tests that included field and laboratory moisture-content measurements, particle-size analyses, specific gravity, and chemical analyses. Hydrogeological investigations completed at the site involved drilling and testing boreholes at the site and groundwater flow modelling (Geomin, 2019 and 2021).

A CPT investigation and a downhole seismic geophysical testing program were undertaken in 2018 to characterize existing geotechnical conditions and provide information in support of the tailings excavation plan development and the RSF conceptual design (SGS, 2018). CPT holes were targeted across all three cells to assess the variation in material properties from the perimeter (coarser-grained tailings) to the interior (finer-grained tailings) of the cells. Selected test hole depths penetrated through the tailings and into the foundation. Pore pressure measurements were collected during the cone push (CPTu) to provide continuous digital data collection of the cone sleeve friction, tip resistance, and pore pressure. Dissipation tests were undertaken at selected depths to permit determination of hydraulic characteristics of the existing tailings.

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An additional geotechnical testhole and CPTu investigation program was undertaken in 2021 to support feasibility level design work (Geotest, 2021). This program included 11 boreholes and 6 CPTu holes. Selected soil and bedrock samples were retained for laboratory characterization tests.

A site plan showing the location of testholes in the proposed mining and residue storage area is shown in Figure 18-11.

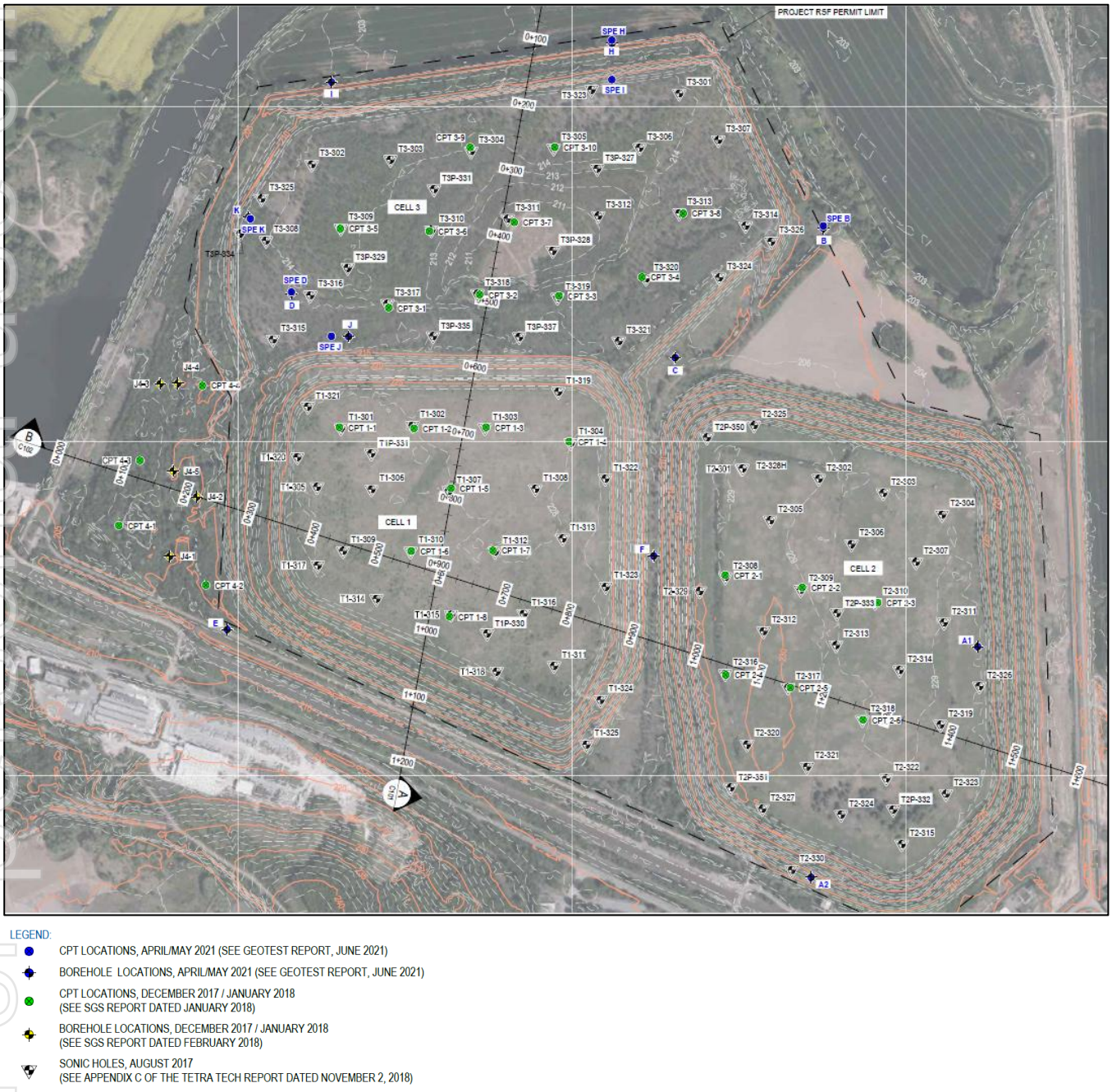

Figure 18-11: Geotechnical Testhole Locations at Existing Tailings Area

Source: Tetra Tech (2022)

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18.12 Control Philosophy

The Project will use an advanced and mature fieldbus control system (FCS) for process and water treatment controls. The system will integrate instrumentation, electrical management, and control. Electrical equipment on/off operation, operating status, and process control parameters can be displayed and controlled from the FCS operation station. The local control systems provided by the equipment venders will connect to the computer system through communication buses and will be operated as independent nodes of the whole plant control system.

One central control room is designed for the CMP. PC-based OIS will be located in the local control rooms.

The central control room will be the operation control center of the whole computer control system. The plant's central control room will be staffed by trained personnel 24 h/day. The operation system will realize centralized control of various operations "domains"; meanwhile, respective local operations at each domain can be conducted in respective sub-systems to ensure relative independence and real-time performance.

Control room LCD screens will display various process flowsheets and show real-time dynamic information, including process parameters, pump operating states, and emergency alarms.

The master step-down substation will be an unmanned station equipped with the automation system integrated with microcomputers for collecting all switching quantities and analog quantities and providing microcomputer relay protection.

In addition to the plant control system, a CCTV system will be installed at various locations throughout the project site, including process facilities, water treatment plants, product loading and supply unloading facilities, railway spurs, north site operation areas (CMP tailings extraction and dry stacking areas), and main access and internal roads. The cameras can be monitored from local control rooms, the central control room, and management offices.

18.13 Communication

A sitewide communication system and a premise distribution system (PDS) will be constructed with independent LAN for data communications in key processing facilities. Data exchange units, servers, fibre optical transceivers, and other equipment will be set up in the central control room and management office complex. Local telephone stations at various workshops, working sections, duty rooms, control rooms, and office buildings will be installed. A very-high frequency (VHF) two-way radio system with several public channels will also be set up for on-site communications. The communications between the project site and external parties will be via public communication services, including internet and mobile phone services, because the project is located immediately adjacent to well-developed communities.

As indicated above, a sitewide CCTV system will monitor various key equipment, circuits, and production facilities, especially in high risk areas where operators may be exposed to potential dust, noise, or hazardous gases.

18.14 Residue Storage Facility

The RSF design involves placement of washed and filtered process residue in an engineered containment area constructed within the same footprint as the existing tailings cells. The prepared RSF foundation will incorporate perimeter surface water diversion and a geomembrane liner for contact water collection from the filtered residue stack. The RSF will be constructed in stages to suit residue storage requirements.

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18.14.1 Geotechnical Setting

The surface soil at the property is 'Holocene loam' containing silt, sand, and clay (Bateria Slany 1989 and Geomin 2019, 2021). It is typically 0.5 m to 2.0 m thick, and locally up to 5.0 m thick. Fluvial sands associated with the Labe River underlie the surface soils and are up to 10.0 m thick. These sands are connected to a shallow regional aquifer. Bedrock underlying the project site comprises terrestrial freshwater to marine claystones, siltstones, sandstones, and conglomerates of the Upper Cretaceous (Tetra Tech 2019).

The existing tailings can be geotechnically classified as fine-silty sand at the perimeter, and silt to clayey silt at the interior. The CPT results indicate "sand-like" soil-behaviour-type tailings near the perimeter embankments and "clay-like" soil-behaviour-type tailings near the centre of each cell.

Groundwater conditions at the site are described in GET, 2017, and Geomin, 2021, 2019, and 2016. Geomin, 2019, included hydrogeological investigation undertaken in December 2018 that included eight boreholes with the installation of standpipe piezometers and modelling to assess groundwater conditions.

The groundwater elevation prior to project development and below the tailings cells is near the water level of the Labe River, which is at approximately 202 masl and 1 to 3 m below original ground. Figure 18-12 provides a site plan with the location of the surface water monitoring points and groundwater monitoring wells in 2022.

The Quaternary-age terraces of the Labe River form an aquifer approximately 10 m thick and up to 2 km wide below the CMP site. The terraces are overlain by "semi-permeable Holocene loams" (Geomin 2016) that are typically less than 4 m thick. The water in this aquifer does not meet drinking water criteria due to excess sulphates, iron, nitrates, and other parameters. The water quality has likely been affected by the existing tailings cells and also by the old waste rock dumps and the fly-ash storage area at the thermal power plant upgradient (south) of existing tailings cells.

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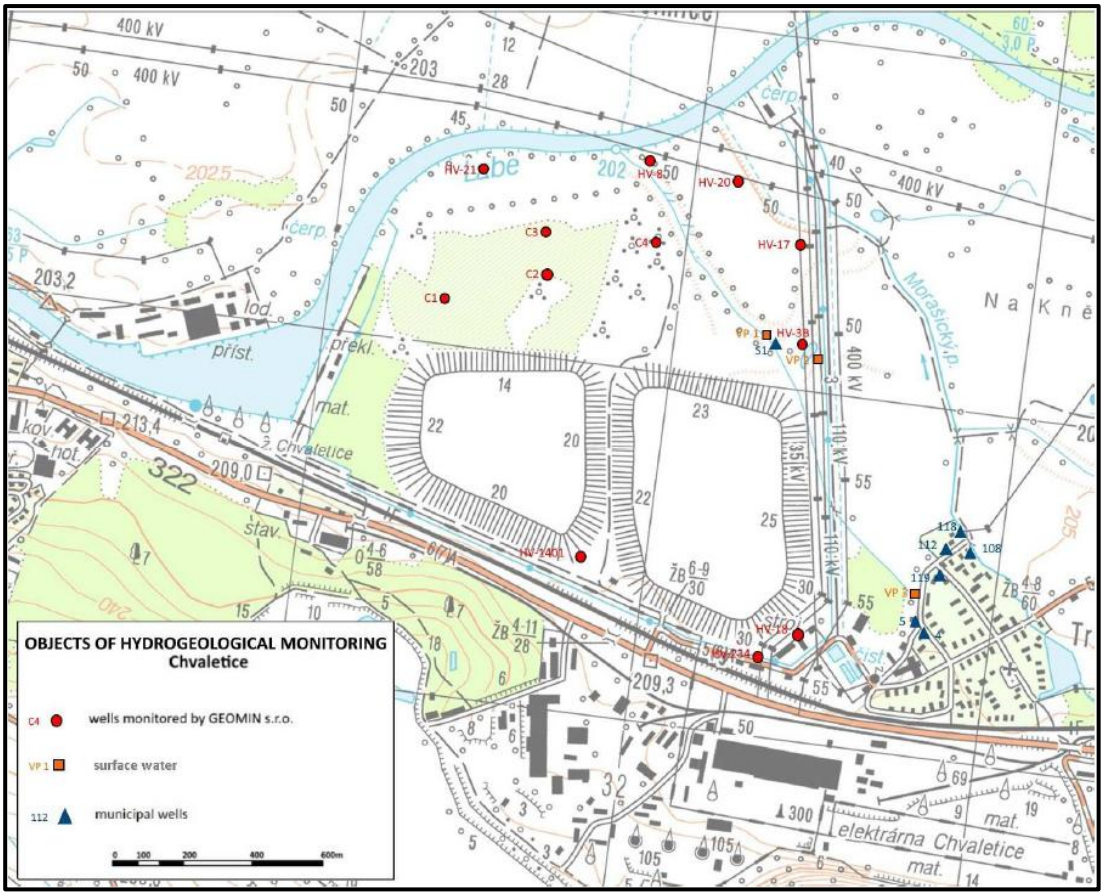

Figure 18-12: Surface and Groundwater Monitoring Well Locations

Source: GET (2017)

18.14.2 Residue Geotechnical Characterization

Geotechnical laboratory testing was undertaken during previous study work to characterize residue behavior with test settings established based on RSF design criteria and expected geotechnical conditions. The tests were conducted on a representative sample prepared as a 54:46 blended mixture of NMT and LR obtained from metallurgical testing residue.

The laboratory test program included: index testing including particle size analysis, hydrometer testing, and Atterberg Limits; standard proctor compaction test (ASTM D698); specific gravity test (ASTM D854); laboratory vane shear tests (ASTM D4648); direct simple shear tests (ASTM D6528); triaxial strength tests under UU, CU, and CD conditions; one-dimensional consolidation tests (ASTM D2435); hydraulic conductivity tests (ASTM D5084); cyclic and post-cyclic direct shear tests; and a soil water characteristic curve test.

Results indicate that the filtered residue sample is classified as low-plasticity silt (ML) with 11% fine sand, a plastic limit of 26% and a liquid limit of 38%. The maximum dry density is 1,567 kg/m^3 at an optimum moisture content of 24.8% (mass water/mass solids) and a specific gravity of 2.98 for the blended sample. Hydraulic conductivity test measurements ranged from 1x10^{-8} m/s to 1x10^{-9} m/s on samples prepared at 90% SPMDD and 25% MC. The post liquefied residue showed some cyclic softening and a reduction in the Shear Modulus (G) during cyclic and post-cyclic direct shear tests.

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18.14.3 Tailings and Residue Geochemistry

Geochemical characterization testing was undertaken to assess potential ARD and ML of the existing tailings and the re-processed tailings residue. The characterization results indicate that the NMT/LR blend to be backfilled is expected to be an acid generating material.

18.14.4 Design Requirements

A filtered RSF design was selected over conventional slurry tailings storage methods to mitigate environmental risks associated with seepage and to achieve the benefits of a relatively smaller storage footprint area and the potential for concurrent reclamation. Table 18-12 presents a summary of the RSF design criteria and input data.

Table 18-12: Filtered RSF Design Criteria and Input Data

Item	Design Criteria and Input Data
1.0 PRODUCTION	
1.1 Residue Production	Total Residue Production: 27.7 million metric tonnes (dry) Average Residue Production per year: 1.1 million metric tonnes (dry), excluding Years 1 to 3 which will have approximately 0.5 to 0.6 million metric tonnes (dry) Mine Life: 27 years
2.0 RESIDUE PROPERTIES	
2.1 General Residue Properties	▪ The residue will consist of non-magnetic tailings (NMT) and leach residue (LR) blended at a ratio of 55:45 (NMT:LR). ▪ Low plasticity silt (ML).
2.2 Acid Generating Potential	NMT/LR blend is potentially acid generating and with potential for metal leaching.
3.0 RESIDUE STORAGE FACILITY	
3.1 Residue Storage Concept	Filtered residue stack.
3.2 Containment	Geomembrane liner and cover system. Internal underdrainage system to collect seepage.
3.3 Residue Deposition	RSF to be constructed in stages to suit residue production in available post-mining space. The filtered residue will be transported to the RSF by truck and compacted in lifts. External starter cell to avoid double handling.
3.4 Facility Geometry/ Development	3.5H:1V perimeter slope. Maximum RSF crest elevation is 229 m including final cover.
4.0 WATER MANAGEMENT	
4.1 Surface Water	Contact water collection for reuse at process plant or treatment/testing and release. Non-contact water diversion.
4.2 Internal Drainage	The internal underdrainage system will consist of a network of slotted pipes and aggregate that drains to a central seepage collection sump.
5.0 CLOSURE	
5.1 Landform	The final landform will incorporate an internal runoff collection area that drains to the Labe River. The final cover will incorporate a 0.5 m to 2 m thick growth media layer over top of the geomembrane liner.

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18.14.5 Filtered RSF Design and Construction

A plan view drawing of the ultimate RSF shape showing key features is shown in Figure 18-13. The key elements to the design include:

- A prepared pad foundation
- A containment system
- Water management features that include contact water collection sumps and stormwater management ponds

The RSF is designed to contain the proposed nominal 28 Mt of residue, which is a blend of filtered NMT and rinsed LR. The ultimate RSF shape will be approximately 24 m high over an area of approximately 110 ha.

The facility will be constructed in stages when space becomes available from the mining excavation sequence. To facilitate residue storage at the start of residue production, an external starter cell will be constructed immediately north of existing Cell #2. Subsequent cells will be constructed sequentially within the mined-out excavation footprint of the existing tailings cells.

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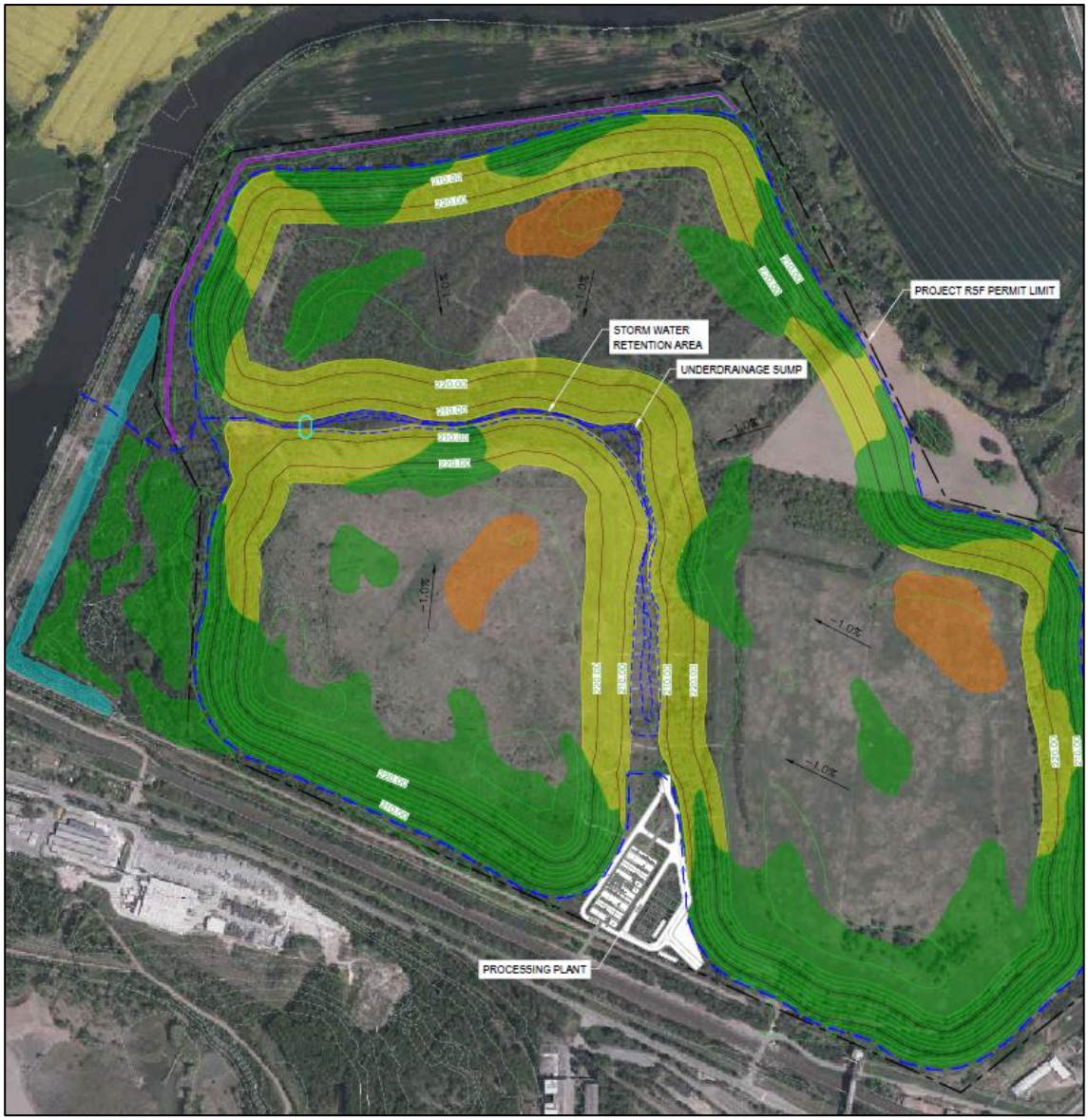

Figure 18-13: Residue Storage Facility Design – Final Landform

Source: Tetra Tech (2026)

18.14.5.1 Filtered Residue Storage Facility Seepage Containment System

As a first step in RSF construction, a pad will be constructed in the post-mining footprint that will form the foundation of the RSF. The RSF foundation pad surface will be graded towards a contact water collection sump. Fill will be placed and compacted in the post-excavation surface to facilitate drainage to the sump.

The residue will be fully contained within the RSF liner system to mitigate the risk of environmental impact from seepage. A 1.5 mm (60 mil) thick geomembrane liner will be installed on the filtered residue foundation and connected with the low permeability cover that will be installed progressively on the ultimate residue surface. A typical cross section of the RSF containment is shown in Figure 18-14.

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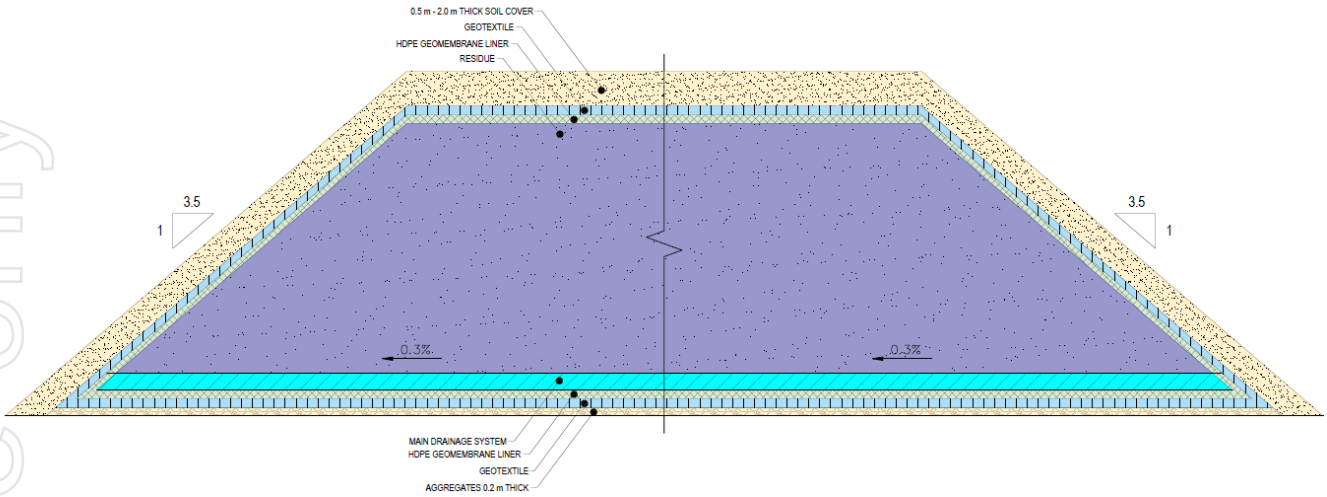

Figure 18-14: Residue Storage Facility Design – Typical Cross Section

Source: Tetra Tech (2026)

18.14.5.2 Filtered Residue Placement

The filtered residue will be transported to the RSF by haul truck, dumped in the active placement area and spread into trafficable lifts with a bulldozer. Residue will be compacted with a roller compactor. A method specification will be developed to determine the maximum lift thickness and the minimum number of compactor passes required.

The filtered residue perimeter slopes have currently been designed at a maximum grade of 3.5H:1V to suit expected geotechnical and closure construction requirements. This slope grade may be refined during the detailed design phase based on further geotechnical characterization data.

Dust management will include traffic control outside residue placement areas and the application of water and dust suppressant (if required) on the interim stack surfaces and haul roads. To further mitigate potential residue dust and erosion issues, the footprint of residue exposed to the atmosphere will be minimized and progressive cover placement will be undertaken during the operational life, as soon as reasonably possible. Residue compaction and progressive cover placement will also mitigate oxygen and moisture infiltration to reduce the risk of ARD/ML.

Surface water management to promote runoff on the uncovered and active placement areas of the filtered residue stockpile will be achieved through grading and sequencing of residue placement.

18.14.5.3 Filtered RSF Monitoring

The RSF monitoring program will include periodic and documented visual inspections by operators and technical specialists, geotechnical instrumentation and data collection, and measurements of surface and groundwater flow quantity and quality. Staged development of the RSF will require compilation of annual construction monitoring reports, completed by the Engineer of Record, that summarize construction methods and quality control and assurance results.

18.14.5.4 Filtered RSF Closure

The closure plan for the RSF will include placement of a low permeability geomembrane and soil cover over the filtered residue stack. The landform design was developed to incorporate engineering features while providing enhanced habitat for biodiversity. Final land use and closure requirements will be developed in accordance with outcomes from ongoing consultations with local communities and regulators, and design constraints. The residue stack cover will consist of a

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1.5 mm thick geomembrane liner to inhibit infiltration overlain by a soil growth media layer to support grass vegetation growth. The cover will be placed progressively and hydroseeded when residue crest and perimeter stockpile slopes meet design grades. The RSF will be monitored during the post-closure period to assess cover performance and environmental impact against regulatory requirements and design targets. The potential requirement for treatment of residue contact water during the post-closure period will be reviewed as part of future geochemical assessments.

18.14.6 RSF Design Assessments

Engineering analyses conducted as part of previous study work to support the RSF design were based on a geological model generated from site investigation data, laboratory test data, the expected physical and environmental properties of the residue, and the proposed operating conditions. The analyses included mine waste storage facility hazard classification, evaluation of liquefaction potential, geotechnical slope stability analyses, seepage, and hydrotechnical analyses.

The RSF design hazard classification was determined to be ‘moderate’ under the Waste Dump and Stockpile Stability Rating and Hazard Classification (WSRHC) system (Hawley and Cunning, 2017) and the level of effort for investigation, analysis, and proposed monitoring and operation was developed to meet those standards.

Liquefaction analyses for the existing foundation were completed using the CPT data, which indicated that the current subsurface conditions are not susceptible to liquefaction, but some degree of post-seismic strength and stiffness degradation may occur. The liquefaction potential of the residue in the proposed RSF is considered to be minimal based on laboratory cyclic testing of the residue.

Stability analyses of the proposed design were completed using two-dimensional limit equilibrium methods. The model results exceeded the target FoS of 1.50 for static conditions and 1.05 for pseudo-static conditions.

18.14.7 Filtered RSF Construction and Operation Requirements

The main RSF construction tasks include the following items:

- Foundation preparation, earthwork, and grading
- Geomembrane liner for the foundation and the cover
- Contact and non-contact water management infrastructure
- Closure soil cover placement and reclamation
- Engineering and construction management

The main operating costs associated with the RSF are considered under mining costs and include:

- Labour
- Owner operated equipment operation
- Dust suppression

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18.14.8 Residue Storage Facility Design Future Considerations

The RSF design was developed based on available information and to meet CMP requirements and design standards. Future design considerations and uncertainty include the following:

- The actual ground conditions encountered may not be as interpreted. This geotechnical risk is associated with the need to extrapolate borehole and test pit information across a site, and the fact that ground conditions can change over time, including material properties and groundwater levels.
- If the filtered residue characteristics are significantly different to those tested/expected, particularly with respect to water content and geotechnical properties, issues associated with residue trafficability, dust generation, and geotechnical stability may arise. This risk can be mitigated by advancing the understanding of metallurgical domains and process equipment variation as part of final design.
- There is limited space within the proposed mining and residue placement area, which does not provide operational flexibility in mining plan or residue placement. This may result in periodic double-handling of material, and/or construction of the RSF cells in relatively small and inefficient steps.
- Water management: contact water quantity and quality variation from design expectations may result in additional cost and time for contact water management and treatment.
- Closure cover: the potential for damage to the cover system could lead to increased infiltration and then potentially to increased contact water treatment requirements.

RSF design alternatives that may be required in the event the design requirements change include the following:

- Additional containment measures.
- Larger than designed flood erosion protection berms or thicker than anticipated closure cover.
- Additional effort for pumping, storing, and treating residue contact water.
- Temporary storage facility for thickened but unfiltered residue to facilitate process plant maintenance or upset conditions.
- Addition of a temporary residue stockpile may be needed for additional residue drying time or if the excavation operation is unable to release adequate footprint in time for staged RSF cell construction. This temporary stockpile could potentially be placed on the existing tailings surface or an external temporary or permanent residue storage cell.

Some of the opportunities associated with the RSF design that may be realized with further work include the following:

- Optimize containment system design. The relatively low permeability of the compacted residue presents an opportunity to replace the geomembrane in the cover or base with a liner system that integrates compacted residue, compacted soil, and a growth media layer. Additional residue characterization and modelling of seepage for alternative cover options would be required to support this.
- The benefits of the proposed residue contact water drainage layer on the liner surface will depend on several factors, including the actual moisture content and density of the residue. The value of this feature can be evaluated in future design work, and assessed during the early phase of the mine life.

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19.0 MARKET STUDIES AND CONTRACTS

As an updated production strategy for this study, EMN plans to convert all the HPEMM produced from the CMP tailings material to HPMSM. The EMN management team has conducted HPEMM and HPMSM market investigations and contacted potential users to better understand market potential and product quality requirements. EMN also generated high purity manganese sample products for their potential customers for testing.

EMN commissioned the Marketeye (Marketeye or Marketeye.org) to provide an HPEMM and HPMSM products market outlook study for the CMP, mainly focusing on HPMSM product and its applications in battery industry.

Electrolytic manganese metal ("Conventional" or "standard quality" EMM containing ~99.7% Mn) is used principally by comparatively small markets of steel and aluminium alloys, while manganese sulphate monohydrate (MSM, 98% $MnSO_4 \cdot H_2O$) is used mainly by the agrochemical and battery industries.

Marketeye is an independent research and consultancy company based in London, UK. Marketeye provides market research and general consultancy as well as expert witness work in mining, mineral exploration, and commodities markets. A comprehensive market research report was prepared by Andrew Zemek of Marketeye. The report summarizes market information for high purity manganese products, including manganese applications, market demand, and supply and projected HPMSM prices. This summary from the market outlook study entitled "High-Purity Manganese Market Report", dated April 20, 2026, is added to this section.

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19.1 High Purity Manganese Products

19.1.1 Manganese Use in Batteries

Ever since lithium-ion batteries started being commercialised in the early 2000s, manganese was an integral part of their cathodes, but received little attention. Still popular today, the NMC (Nickel Manganese Cobalt) rechargeable battery chemistry was introduced in 2008. Its cathode (the positive electrode) contained equal parts of nickel, manganese, and cobalt, and the first letters of these elements' names formed the basis of the naming convention for many other chemistries. This first battery came to be known as NMC-111, and it is still used today in small quantities. With the passage of time and development of ever more efficient batteries, the role of manganese grew, and the 2020s can without a doubt be called "the decade of manganese" in the battery industry.

Manganese is used in cathodes of rechargeable batteries. It is also used in primary (non-rechargeable) batteries, but they are not the focus of this report.

Each of the metals used in cathodes of Li-ion (and Na-ion) batteries has a specific role to play: nickel contributes to higher energy density (Wh/kg) and overall performance; cobalt helps with thermal stability and longevity, and manganese is a "jack of all trades". It enhances battery stability, mitigates thermal runaway (the risk of battery fire), increases energy density (by raising the voltage), and extends cycle life (the number of charge-discharge cycles a battery can undergo before degrading).

Manganese is often used in the same proportions as cobalt (e.g. NMC (Nickel Manganese Cobalt) -111, NMC-622, NMC-811), but it is 7 to 23 times cheaper than cobalt, and its price is far less volatile than the price of cobalt. The latter, apart from being expensive with volatile prices, has one more serious drawback: nearly 70% of the cobalt mined globally comes from the Democratic Republic of Congo. The country has a reputation for being an unreliable supplier, ravaged

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by civil wars and plagued by issues like child labour. For these reasons, battery engineers started looking to eliminate cobalt from battery cathodes, or at least significantly reduce its use. Their favourite alternative was manganese. The era of high-manganese batteries has arrived.

As a result of the "elimination or reducing cobalt use imperative", the number of battery chemistries with increased manganese content has risen significantly and is likely to continue to rise during this decade. Today, many battery chemistries use as much as 80% Mn in their cathodes (e.g., BASF's NMC-370, or LMFP with 80% Mn). In practical terms, it means that more manganese (by weight) is used per kWh of battery capacity, so even with the same volume of batteries produced (measured in kWh), the consumption of manganese (in tonnes) will increase as the industry shifts towards Mn-rich chemistries.

19.1.2 Battery Chemistry Trends

Rechargeable batteries are used in every aspect of life today, from toothbrushes to spaceships. Their main applications are usually aggregated into three groups: electric vehicles (70% of rechargeable battery demand in 2025), stationary storage, known as BESS (Battery Energy Storage Systems) (26%), and portable electronics (4%).

19.1.3 Rechargeable Battery Market Today

The rechargeable battery market is dominated by two large "chemistry families": NMC (nickel, manganese, and cobalt in the cathode) and LFP (lithium iron phosphate). These two families accounted for nearly 90% of all secondary (rechargeable) batteries produced in 2025.

The NMC family has at least 10 members – battery chemistries with different proportions of the three main metals (Ni, Mn, Co) in their cathodes. The rough approximation of these proportions is usually short-coded in the battery name, e.g., NMC-622 is a battery with 6 parts of Ni, 2 parts of Mn, and 2 parts of Co in its cathode, while NMC-9.5.5 would have 9 parts of Ni, 0.5 parts of Mn, and 0.5 parts of Co. In 2025, the NMC family accounted for 27% of all rechargeable batteries (measured by capacity, in MWh).

The LFP family has just two members – the main LFP chemistry and the emerging LMFP (lithium manganese iron phosphate) chemistry, in which 40%-80% of the iron in the cathode is replaced with manganese. In 2025, the LFP family accounted for 60% of global rechargeable battery production. Nearly all of them (99%) were produced in China, where this battery type is dominant – more than 73% of all batteries produced in China were LFPs. For now, the volumes of LMFPs are small – <1% of all LFPs – but this is rapidly changing.

19.1.4 NMC vs LFP vs LMFP

As recently as 2019, NMCs accounted for nearly 60% of the market, while LFPs were considered "yesterday's technology" (with <5% market share) heading for the exit. The main attraction of NMCs, particularly those with 80% to 90% nickel in the cathode, was their high energy density (up to 280 Wh/kg), but this came at a cost – both literally, due to the high cost of nickel and cobalt, and in terms of safety (prone to thermal runaway, i.e. fire or explosion) and in terms of convenience (bad performance in cold temperatures, limited cycle life).

In contrast, LFPs "ticked all the boxes" and would be an ideal battery except for one thing: relatively low energy density (~160 Wh/kg), which translates into a shorter range for electric vehicles.

Incremental improvements in LFP technology have enabled its resurgence since 2020. LFP batteries can now reach 210 Wh/kg without the many drawbacks of NMCs. One of the improvements to LFP chemistry was the introduction of manganese, resulting in LMFPs. Replacing 40% to 60% (or even 80%) of iron with manganese increased energy density by 15% to 30% at the same or lower production cost. Analysts (including Marketeye) began speculating that LMFPs could account for as much as 50% of the LFP family by 2035.

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And then the Chinese LFP makers released “Generation 4” of “straight” LFPs, signified by “high compaction” – a production method enabling them to achieve Cathode Active Material (CAM) with a specific density of >2.7g/cm^3. This improvement increased energy density by up to 30% without the issues associated with introducing manganese. The development of LMFPs slowed down, overshadowed by Gen 4 LFPs.

However, shortly after the unveiling of this significant improvement in LFP chemistry, China introduced export controls that prevented the technology from being exported to the West. The export of CAM, their precursors, and the equipment used to make them was essentially banned or heavily restricted.

In Marketeye’s view, this restriction may accelerate the development of LMFPs in Europe and North America as the “next best thing” to Gen 4 LFPs. In China itself, many companies continue to develop LMFPs, and in 2025, LMFPs were produced by 16 plants (3 pilot installations and 13 commercial operations).

Many cathode makers consider LMFPs to be a variation of LFP chemistry and do not separate the two in their announcements of future production capacity. This led Benchmark Mineral Intelligence, a pre-eminent London-based battery consultancy, to abandon forecasting LMFP production as a separate entry. This chemistry is now included in the larger figure for LFPs.

In Marketeye’s forecast, we assumed that 15% of LFPs produced outside China will be LMFPs and that, in China, LMFPs will account for 5% of all LFPs over the next 15 years.

A recent announcement by Gotion, a JV between Volkswagen and its Chinese partners, was described by CRU consultancy as a “game-changer” – the Gotion LMFP battery has higher density than Gen 4 LFO and is 13% cheaper to produce (per kWh).

19.1.5 Mn-Rich Chemistries

Lithium-Manganese-Rich (or LMR) is the term coined by the Korean battery maker LG Chem and General Motors and later adopted by others, particularly Ford. Today, it is frequently used as an umbrella term for all chemistries with a significant proportion of manganese in the cathode (up to 80%+). Individual companies often use their own names for their specific variation of the LMR concept: LMR (LG Chem, Ford, GM), NMx (Svolt), FeMn-x & NiMn-y (Stellantis), HLM (Umicore).

The very Mn-intensive LNMO chemistry, used by Panasonic and Haldor Topsoe, is also included in this group.

LMR batteries are a variation of NMCs and can also contain smaller amounts of nickel and cobalt, with manganese as the dominant cathode metal. These batteries are also described as 5 V batteries* because they have a higher nominal voltage than other NMCs (3.2–3.7 V).

General Motors, working closely with LG Chem (under their JV’s ‘Ultium’ brand), intends to make LMR its main battery chemistry and intends to start large-scale commercial production from 2028. The Ford Motor Company also works with LG on their own version of LMR.

In 2025, the only commercial producer of LMRs (under their own name, NMx) was the Chinese mid-tier battery producer SVOLT. NMx batteries accounted for 8.3% of SVLOT's total production.

Benchmark Minerals expects demand for these types of batteries to grow by nearly 1,500 times by 2040, but they do not name any specific companies that would make them.

** In Benchmark Minerals’ research materials, LMRs are described as “5V Mn-based”.*

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19.1.6 Sodium-ion Batteries

Sodium-ion rechargeable batteries are not new. They use sodium instead of lithium. Their main attraction is the abundance of sodium and its low cost. They score very high in safety ratings, and their performance is not affected by low (freezing) temperatures. Their main disadvantage is a relatively low energy density of 140–175 Wh/kg, on par with the older versions of LFPs. In 2025, commercial volumes of Na-ion batteries accounted for less than 1% of the battery market, but technological advances are expected to bring them into the mainstream within the next several years.

There are several variations of sodium-ion batteries that use a mix of transition metals in their cathodes. They are usually classified into three groups: layered oxide, polyanionic, and Prussian Blue Analogue (PBA)**.** The Na-ion layered oxide type is not usually included in the “manganese-rich” heading, but *they are very manganese-rich* – much more than LMRs and LMFPs.

The main application for them in the near future will be in stationary storage (BESS), where their lower energy density is not much of an issue. However, the first electric vehicles with Na-ion batteries began appearing.

The potential widespread use of Na-ion batteries in BESS is of great interest to producers of high-purity manganese. At present, close to 98% of new BESS installations rely on “straight” LFPs (without Mn), and hence the fast-growing BESS sector is almost irrelevant to high-purity manganese demand. Bringing Mn-rich Na-ion batteries to the stationary storage applications is likely to change that.

19.1.7 Manganese Intensity

To quickly assess the demand for HP Mn from the battery sector, we need to determine the manganese intensity for each battery chemistry. For several years, Marketeye has been developing its manganese-intensity calculator in collaboration with battery experts. By combining the first-principles atomic-mass equations with empirical data on energy density and battery weight, the calculator provides a convenient measure of manganese intensity across the main battery types. The results are expressed in kg of Mn (in metal units, i.e., manganese contained in whatever compound or cathode material) per kWh of battery capacity. These conversion factors can be used at any level – from a single electric vehicle to the whole factory or market.

The differences in Mn-intensity between various Mn-using battery chemistries can be stark, even within the same chemistry family: e.g., NMC-9-0.5-0.5 (with just 5% Mn) needs just 36 grams of Mn per kWh of its capacity (0.036 kg), while NMC-370 needs 821 g. The “manganese-rich” chemistries are very Mn-intense: LG/GM’s LMRs @ 535g/kWh, LNMO @ 970g /kWh, and LMFPs between 300 and 600 g Mn/kWh (depending on the Mn/Fe replacement ratio). Sodium-ion batteries consume between 800 g and 1,000 g+ Mn/kWh.

What matters most for HP Mn demand is not the market's total GWh capacity, but its chemistry mix. If all NMC-811s expected to be produced in 2026 were to be replaced with 600 g Mn/kWh LMFPs, it would immediately create additional demand for 652 kt of HPMSM – more than twice the total global production of this chemical in 2025.

19.1.8 High-purity Manganese Feedstocks for Batteries

Until about three years ago, the market for Mn feedstocks for batteries was straightforward: electrolytic manganese dioxide (MnO_2, or EMD) was used for alkaline, non-rechargeable batteries, and high-purity manganese sulphate monohydrate was used for lithium-ion batteries.

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The advent of high-manganese chemistries and advancements in cathode production technology changed that. Today, cathode makers may want to buy possibly as many as seven different HP Mn products listed below:

- **$MnSO_4 \cdot H_2O$:** High-purity manganese sulphate monohydrate, commonly known as HPMSM. The main manganese feedstock of today and tomorrow. Can be produced directly from manganese ore (by leaching it with sulphuric acid), or by dissolving electrolytic manganese metal (EMM) in sulphuric acid. Mn content 32%.
- **Mn_3O_4:** Trimanganese tetraoxide (sometimes called TMT), the main challenger to HPMSM. Mn content 72%. It can be produced by two methods: either by chemical conversion of HPMSM, or by blowing hot air (oxygen) over the powdered HPEMM.
- **$MnCO_3$:** Manganese carbonate. Mn content 48%.
- **Mn_2O_3:** Dimanganese trioxide (sometimes called DMT), much less used than others. Mn content 35%
- **MnO_2:** Electrolytic manganese dioxide, known as EMD. Its use in rechargeable batteries is growing slowly despite the phasing out of LMOs, the main secondary battery chemistry that previously used it. Mn content 63%. EMD is the main Mn feedstock for non-rechargeable (primary) batteries, such as alkaline and zinc-carbon batteries.
- **$Mn_3(PO_4)_2$:** Manganese phosphate. Some LMFP cathode makers may ask for it, but they typically use Mn_3O_4 or HPMSM. Mn content 46%.
- **Mn:** 99.9% pure electrolytic manganese metal, known as HPEMM. Not to be confused with “ordinary” (or “standard quality”, or “metallurgical”) 99.7% Mn EMM used mainly in steel making. The less pure version may contain selenium, which should not be present in a battery-grade product. HPEMM can be used either indirectly, as a feedstock for making HPMSM by dissolving metal flakes in sulphuric acid, or directly, as a metal powder in some cathode active material processes.

  The HPEMM market is currently very small (~30–40 ktpy), but it may grow in the future. The metallurgical EMM market is much bigger, ~1,400 ktpy. Production of HPEMM consumes vast amounts of electricity – ~10,000 kWh per tonne of metal – which is not only costly but may create carbon footprint issues if the electricity used to make it is not “green”.

All but one of the manganese compounds listed above are not soluble in water. HPMSM is soluble in water and is used in the wet-coating cathode production process, which currently dominates the industry. However, a new dry-coating method has been developed that could bring cost and factory floor space savings for battery makers. Those using this method have a greater choice of Mn feedstocks, as they can also use insoluble compounds. But the dry coating method has its own issues, the main one being the difficulty of achieving a uniform coating layer.

Marketeye expects HPMSM to remain the primary manganese battery feedstock for the foreseeable future, followed closely by Mn_3O_4, the use of which, in tonnage terms (measured in metal units, i.e., the tonnage of metal contained in the compound), may soon equal that of HPMSM.

19.1.9 Manganese Market Overview

19.1.9.1 Mining

Manganese ore is mined in about 30 countries, but the top four account for about 80% of production (South Africa, Gabon, Ghana, and Australia).

The annual global production fluctuates around the 20-million-tonne mark (metal contained in the ore). In the past decade, the lowest yearly production of 14.8 million tons was recorded in 2016, and the highest, 22.1 Mt, in 2019. In 2025, 20.5 Mt was mined.

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Metal content in manganese ore varies widely, from less than 10% Mn to 55% Mn. The internationally traded ore is usually 38% Mn (from South Africa) or 44% Mn (from Gabon and Australia). Prices for these two benchmark grades are widely published. China is the largest importer, accounting for 72% of global Mn ore imports, which is not surprising given the size of the Chinese steel industry.

Manganese ores come in two main types: carbonate ores ($MnCO_3$), which are rare (2% of global resources), and oxide ores (MnO_2), which are the most common (98%). Carbonate deposits are mainly found in China and Ghana but are of low- or medium-grade (<13% Mn in China; 28% in Ghana). For metallurgical applications, both types of ore are equally suitable, but for producing Mn chemicals, carbonate ore is preferred because it is readily soluble in sulphuric acid. Oxide ores need to be calcinated (heated to 500°C – 1,000°C) to break down MnO_2 to MnO, which is acid-soluble. Reductive leaching of oxide ores can also be used, but it is not as common as roasting.

Global manganese resources and reserves are vast – the 17 billion tonnes of known resources would last for 300 years at current mining levels. The better-estimated reserves would last more than 35 to 80 years without making a single new discovery. Ore availability is not a problem in the manganese industry.

19.1.9.2 Processing

Processed Products

Approximately 90% of manganese mined is converted into ferroalloys by the pyrometallurgical route (smelting). Out of the remaining 10%, the majority is claimed by EMM, an electrolytic metal, also used mainly in metallurgical applications. Overall, approximately 97% of the manganese mined is used in steel and aluminium metallurgy (Figure 19-1). The remaining 3% goes into various chemical applications, including its use in primary and secondary batteries. Lithium-ion batteries consume approximately 1.7% of all manganese mined (350 ktpy).

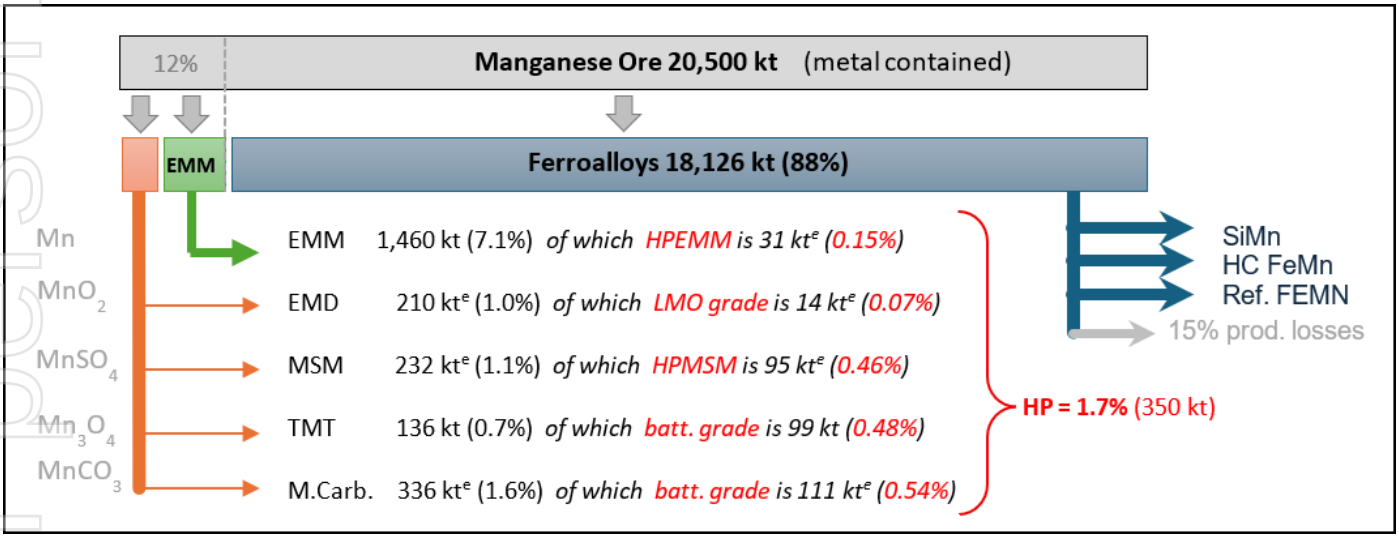

Figure 19-1: Manganese Market Segments in 2024

Source: Marketeye (2026)

Ferroalloys are produced by smelting manganese ore with the addition of silicon or iron (Mn ore typically contains a fair amount of iron already). They contain 60% to 85% Mn, varying quantities of silicone and iron and 2% to 7% carbon. Silicomanganese (SiMn) is the most traded Mn alloy, which finds its main application in carbon steel for the construction industry. It is followed by high-carbon ferromanganese (HC FeMn), which is also used in carbon steelmaking. Refined ferromanganese (Ref FeMn) claims the smallest share of the Mn ferroalloys market. It is used to produce stainless steel for domestic appliances and equipment, architecture, vehicles, and other applications.

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Production of metal and battery chemicals is done via hydrometallurgy. It usually starts with the leaching of ore with sulphuric acid. Carbonate ores can be leached as they are, while oxide ores need to be calcinated (roasted) first before they can be dissolved in acid. From here, there are two routes to final products:

- Electrolytic Manganese Metal (EMM) and Electrolytic Manganese Dioxide (EMD) are made by electrowinning. Depending on the characteristics of the electric current and the reagents used, we obtain either EMD or EMM (99.7%-99.9% Mn metal flakes).
- Manganese Sulphate Monohydrate (MSM) is made by precipitation (heating) of the $MnSO_4$ solution and crystallization of the final product. Impurities are removed using various reagents. Mn carbonate is made in a similar way, but using carbonic acid (H_2CO_3) instead of the sulphuric acid.

Other manganese compounds can be made using EMM or MSM as starting materials. EMM flakes can be dissolved in sulphuric acid to produce HPMSM, or ground to a powder and used for Mn_3O_4 production by blowing hot air (oxygen) over it. In some flowsheets (e.g. Giyani Metals), Mn_3O_4 is produced first and then converted to HPMSM.

Most manganese chemicals come in a variety of grades. The lower-purity ones can be called agricultural grade or technical grade, while the high-purity ones could be called pharmacy grade or battery grade. The term “high purity” (HP) is often used as well. Depending on the product and its application, “battery grade” could be as low as 92% for Mn carbonate or as high as 99% for HPMSM.

Processing Geography

As the largest global importer of manganese ore and the largest consumer of manganese products of any kind, China also dominates manganese processing, despite contributing only 4% to manganese ore production. The country accounts for 61% of global Mn ferroalloy output, 92% of EMM, 69% of EMD, and 71% of MSM across all grades.

In the case of battery-grade HPMSM, China controls 93% of the market (2025 data). It is also the main consumer and exporter of these products.

The Importance of Purity

Manganese chemicals and metal powders used for cathode production must be of exceptional purity. This requirement applies as much to the Mn contents as it does to the various impurities contained in the metal or a chemical compound. Battery makers list no fewer than 17 elements, levels of which cannot exceed very tight limits, often as low as 5 or 10 parts per million (ppm).

Selenium is one of the impurities of special significance. This element is deliberately added to the MnSO4 leach prior to electrowinning EMM to reduce the process's electricity consumption. The energy saving is significant – up to 30%. However, this practice has unintended consequences – if battery chemicals, like HPMSM, are made from the metal obtained in this way, they may contain elevated levels of selenium, sometimes as high as 800 to 1,800 ppm. For metallurgical applications, the selenium content is irrelevant, but for battery applications, the maximum level is 5 ppm; ideally, there should be none. Magnesium and calcium are also very problematic. Purity requirements differ a lot between cathode makers – some will accept 200 ppm of a particular impurity, while others will reject a product with more than 20 ppm.

19.1.10 Manganese Demand Drivers

EMM demand comes mainly from the steel (~80%) and aluminium alloy (11%) industries. Stainless steel is the largest single consumer of EMM (44% of demand). Most steels of any kind contain varying amounts of manganese (typically 0.08% to 1%), but the 200-series stainless steels stand out for their high Mn content, between 5.5% and 15.5%. It is also the most likely steel to use EMM, while other types can also use manganese ferroalloys (SiMn, FeMn) to satisfy their manganese requirements.

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Consumption of EMM is not dominated by China as much as production is, but in 2025, China was still the largest consumer (of 83% of global output) and exporter (59% of global exports) of the product. The largest consuming countries (apart from China) are South Korea, Europe as a region, and Japan, which together consume ¾ of the world's exports.

In the case of HPEMM, most of it is still used for various special metallurgical applications, while its use in the battery sector is stagnating or falling. In 2024, 13% of all HPEMM produced was used to produce Li-ion batteries (down from 24% in 2020). This situation may change in the future.

Agriculture applications used to dominate the MSM market, but battery applications are gradually taking over: in 2021, 32% of all MSM was HPMSM. In 2024, this ratio grew to 50%, with “high-manganese batteries” being produced in ever greater numbers. We expect this trend to continue.

19.1.11 Battery Market Outlook

Rechargeable batteries are used in three main sectors of the economy: transportation (electric vehicles, bikes, trains, boats, etc.), stationary storage (batteries storing energy from wind and solar farms and other grid-related applications), and portables (consumer electronics: anything from toothbrushes and mobile phones to power and garden tools). The transport sector dominates the rechargeable battery market, with a 70% market share in 2025, and is also the largest consumer of manganese in batteries. It is also the sector which will drive manganese consumption in batteries over the next decade (Figure 19-2).

The relative drop in the share of battery transport applications (from 85% in 2023 to 70% in 2025) is not due to a decline in electrical vehicle (EV) production, but rather to an extraordinary rise in stationary storage applications (BESS). The deployment of batteries in BESS installations in H1/2025 was 50% higher than a year before with some countries recording a triple-digit growth (Saudi Arabia +701%, Chile +317%, and Australia +785% – data from BMI) This is a mature industry now with 14 projects >1 GWh entering operation so far this year (up from just 5 in 2024). More than 300 of similar size are expected to be completed before the end of 2027. The total number of BESS installations worldwide exceeds 7,500, and their combined storage capacity tops 2.1 TWh.

However, these numbers do not generate much enthusiasm among producers of manganese feedstocks for batteries, as nearly all new installations use “straight” LFPs (without Mn). Their share in the global BESS installations in 2024 was 86% (98% in China). For now, at least, LFPs are a better choice for BESS than LMFPs or other chemistries, but sodium-ion batteries are expected to make significant inroads into BESS applications over the next five years. The transport sector is expected to remain the main driver of future manganese demand from the battery sector. In 2024, battery demand from EVs exceeded 1 TWh for the first time in history. This demand is expected to triple by 2030, according to IEA.

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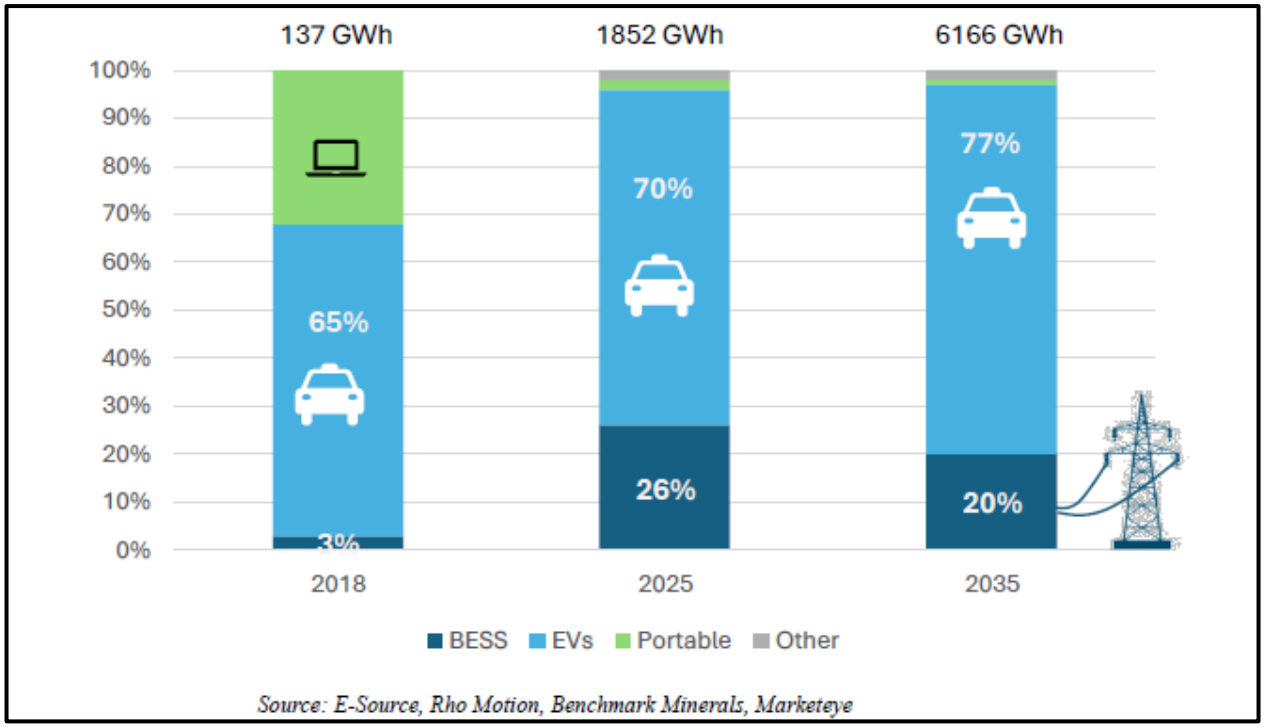

Figure 19-2: Global Li-ion Batteries by End Use (2018, 2025, 2035p)

Source: Marketeye (2026)

In 2024, for the first time, 50% of all new cars sold in China were electric. In 2025, China produced an average of 1.3 million EVs per month. EV sales in China in 2025 grew by 17%. In Europe, 34% more EVs were sold in 2025 than in 2024, while North America recorded a 2.4% YoY decline in EV sales for the first time, mainly due to President Trump's EV-unfriendly policies. China produced 72% of the world's EVs, Europe 15.5%, and North America 6.4%.

19.1.12 HP Manganese Market Outlook

The growth in demand for HP manganese from the battery sector is obviously linked to the ever-increasing number of EVs produced, but other compounding factors make this demand growth more rapid than EV sales alone would suggest.

One of these factors is a shift to manganese-rich battery chemistries, which results in greater consumption of HP Mn per kWh or per battery capacity; i.e., Mn demand would still grow even if the total battery capacity (in GWh) did not.

Another factor is the growing size of battery packs in electric vehicles, which gives them greater range. This is linked to both technological progress and the falling cost of batteries – OEMs (Original Equipment Manufacturers) can afford to fit larger battery packs without increasing the vehicle's showroom price. This would also increase the demand for HP Mn, even if the number of EVs sold did not change.

19.1.12.1 Calculating HP Mn demand

Battery Raw Materials Supply Chain

There are several ways to estimate the demand for HP manganese from the battery sector. We can start with EV makers (car companies) and review their production plans, then make assumptions about the battery pack sizes and chemistries they are likely to use. Or we can look at the announcements relating to the building of battery factories (so-called “gigafactories”). Going further upstream, we can look at the expected capacity of cathode makers, or indeed the pCAM* makers, who are the natural “first port of call” for battery raw materials suppliers like Euro Manganese.

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The key issue with any of these approaches is the vagueness of the announcements regarding the chemistry mix for future production. Because of rapidly changing technology and market preferences, EV and battery makers themselves do not quite know what types of batteries they will produce in the next 10 or 15 years. Many different types (battery chemistries) can be made on the same production lines, so investment decisions can be taken even without a clear view of the specific chemistry mixes of the future.

The issue becomes even more complex when we try to get to the regional granularity of the forecast. Electric cars made in Europe may use batteries made in China, Korea or Japan, and even if they use batteries also made in Europe, the battery components (like CAMs or pCAMs) could have been made elsewhere. Finally, the raw materials to make pCAMs and CAMs made in Europe could come from outside the region. Nearly all future producers of HPMSM have the European market firmly in their sights, even those from the USA and Canada.

Capacity, Supply, and Utilization Rates

Markeye's forecast of HP Mn demand in this study is based on the listing of 875 present and future cathode-making plants** in the database of Benchmark Minerals Intelligence. 699 of these production lines are (or will be) located in China, 32 in Europe, 34 in North America, and 110 in other countries, mostly in Asia (100).

The declared combined production capacity of these plants in 2035 totals 16.7 TWh (vs 4.5 TWh in 2025). However, the declared capacity (or "nameplate capacity") is a shaky base for the HP Mn demand forecast. Plans change, expansions get cancelled, capacities are reduced, or projects can not get financing, and companies go bankrupt. Permitting and geopolitical issues can delay even very solid projects. And when plants are built on time and on budget, they hardly ever operate close to 100% of their theoretical capacity.

Because of the factors mentioned above, Benchmark Minerals quotes two sets of figures: "capacity" – the declared nameplate capacity of plants, and "supply" representing a more realistic production figure likely to be delivered to the market. This correction includes all the factors mentioned above, including the probability (in Benchmark's view) that projects will go ahead. Comparing the two sets of numbers, we can calculate a "capacity utilization rate" in a broad sense of the term (in a narrow sense, "utilization rate" is the output of an operating plant expressed as a percentage of its nameplate capacity).

We agree that the battery industry has an overcapacity problem, particularly in China, but we find Benchmark's views very conservative: according to BMI's "Cathode Capacity, Supply, Demand and Price Forecast" published in March 2026, only 22% to 24% of the declared global cathode production capacity will materialize in the 2030-2040 decade.

The numbers for China are even more pessimistic at 17% to 19%. Europe looks better at 44% to 47%, and North America at 32% to 38%. For sodium-ion batteries, BMI expects only 8% of the announced capacity to materialise.

Marketeye finds these numbers over-conservative. In our assessment, they should be 5% to 10% higher, and this is what we used in our supply forecast (see Table 19-1).

** pCAMs are precursors to Cathode Active Materials (CAMs) – ready mixes of specific chemistries which need an addition of lithium, binders and solvents to become CAMs – materials used to coat an aluminium foil to become a battery cathode*

*** Some plants are listed multiple times if they have, e.g. an operating plant and an expansion plan for Phase II, Phase III, etc. Each will have a separate entry in the database because each may be making different batteries.*

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19.1.12.2 HP Mn Supply

On the supply side, Marketeye sees significant delays of 2-3 years or more, particularly among non-Chinese future producers of HP Mn, resulting in the supply deficit arriving sooner than previously expected – possibly as early as 2028. In fact, various indicators, including the rising price of the HPMSM, suggest we may already be in a small supply deficit.

In Marketeye's HP Mn supply calculations, it is assessed all the projects in China and the rest of the world as listed in BMI's "Manganese Sulphate Market Outlook Data Q1-2026". Marketeye's views on the supply side are broadly aligned with the BMI, despite Marketeye having a different approach to the project risk assessment, and we also differ on the timing of certain projects coming on stream. For example, BMI already includes potential Phase II capacities of projects like Element 25's Louisiana plant (from 2031), while the Phase I project is in trouble despite claimed 85% financing being in place. According to the most recent Australian research note* Phase I of E25's Louisiana plant will only reach its design production capacity by 2031. The same research note uses a 50% probability of this project (Phase I) going ahead for the company's valuation purposes.

In Marketeye's view, Phase II (and later stage) projects should not be included in the supply forecast until Phase I is in production.

** Research Note on Element 25 published by Petra Capital (petracapital.com.au) on 20 March 2026*

19.1.12.3 Market Balance

The future HP Mn demand is likely to be significantly affected by the rise of LMR, LMFP, and sodium-ion chemistries. These batteries use 3 to 13 times more manganese per kWh than the current mainstream chemistries, such as NMC-622 or NMC-811.

Another distinguishing feature of the future HP Mn market is the greater variety of feedstocks used by battery makers, as discussed earlier in this summary.

Geopolitical issues will also shape demand and supply, both directly (through tariffs and the removal of EV incentives) and indirectly (through the broader impact of President Trump's policies on the US and global economy).

Table 19-1 below shows Marketeye's assessment of the supply-and-demand balance for high-purity manganese products (mainly HPMSM) at three future milestone dates: 2030, 2035, and 2040. 2025 results, calculated using the same principles as for future dates, are included for comparison.

Marketeye sees the HP Mn market tipping into deficit in the very near future and strongly disagree with the view that the HPMSM market is, and will remain, in surplus until 2035. The reasons for this disagreement were outlined above.

Our price forecast reflects our view that the market will enter a supply deficit in the next few years.

Table 19-1 Global High Purity Manganese Demand & Supply Forecast 2030-2040

		2025	2030	2035	2040
HP Mn Demand (thousand metric tonnes of manganese contained in HP Mn products)					
HP manganese demand from the battery sector is calculated using:					
Demand from Lithium-ion batteries					
1	CAM Factory Capacity (NMC)	175.0	710.0	900.0	910.0
2	CAM likely supply (NMC)	80.0	200.0	250.0	280.0
3	*CAM supply as % of Capacity (NMC)*	*46%*	*28%*	28%	31%

		2025	2030	2035	2040
4	CAM Factory Capacity (LMFP)*	51.7	176.2	221.3	238.4
5	CAM likely supply (LMFP)	27.3	66.0	83.1	87.7
6	CAM likely supply (LMR, '5 V Mn-based')	0.0	6.8	45.4	101.7
7	pCAM Factory Capacity** *(for info only)*	296.2	551.8	618.7	618.7
	Demand from Sodium-ion batteries* **				
8	CAM Factory Capacity (Na-ion)	107.0	366.0	470.0	490.0
9	CAM likely supply (Na-ion)	11.7	70.0	90.0	95.0
10	*CAM supply as % of Capacity (Na-ion)*	*11%*	*19%*	19%	19%
	Totals				
11	TOTAL HP Mn Demand at CAM Factory Capacity *(lines 1+4+8)*	333.7	1,252.2	1,591.3	1,638.4
12	TOTAL HP Mn Demand at likely CAM Supply *(lines 2+5+6+9)*	119.0	342.8	468.5	564.4
13	Add 15% for production losses (line 12*15%)	17.9	51.4	70.3	84.7
14	TOTAL HP Mn Demand from the battery sector *(lines 12+13)*	136.9	394.2	538.8	649.1
15	Add HP Mn Demand from non-battery applications	20.0	25.0	25.0	25.0
16	**TOTAL HP Mn likely Demand** *(lines 14+15)*	**156.9**	**419.2**	**563.8**	**674.1**
	Demand figures based on Benchmark Minerals Intelligence's Cathode Forecast, March 2026 (see main text for details)				
	HP Mn Supply (thousand metric tonnes of manganese contained in HP Mn products)				
17	Global HP Mn Supply (metal units) – includes HP EMM	126.2	264.3	480.1	480.1
	HP Mn Market Balance				
18	HP Mn Supply Demand Balance (metal units) *(lines 17 minus 16)*	**-30.7**	**-154.9**	**-83.7**	**-194.0**
	** See the main text for comments on the calculation method* *** Does not include Na-ion batteries* **** Only layered oxide Na-ion batteries are included. Polyanionics and Prussian Blues are not likely to use manganese.*				

19.1.13 Price Projections

HPMSM Prices

Table 19-2 to Table 19-4 illustrate Marketeye's view on the HPMSM across three key markets: China, Europe, and North America (in practice, mostly the USA).

The methodology Marketeye uses in price forecasting works as follows:

- 93%+ of HPMSM production comes from China; it is also the largest consumer of HP Mn products. Marketeye's views are guided by an earlier analysis of the global supply-and-demand balance for HPMSM.

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- Euro Manganese's target markets will be Europe and North America. Chinese HPMSM suppliers will be your main competitors there, so the benchmark price your product must match to be competitive will be the "landed Chinese price," i.e., the price of the Chinese competitor delivering their product to your potential customer's door.
- Marketeye calculates the "landed price" by adding the cost of freight, insurance, and any import tariffs the Chinese product may face on entering Europe or the USA. The freight rates are based on actual quotes from shipping brokers (pre-Iran War).
- Western HPMSM consumers (battery makers) are willing to pay a premium for a product which is of non-Chinese origin, comes with green credentials (i.e., has a recycling element in it) and/or is of better quality (purer) than the standard Chinese specification. We estimate that these combined premiums might amount to 10% to 20% of the Chinese price. This figure is highly discretionary and must be verified through direct negotiations with potential clients.
- The 'European price' and 'North American price' that a seller like Euro Manganese should be able to receive for its products. Marketeye presents this price in our forecast as 'real price' (in 2025 dollars, assuming there is no inflation), and as a 'nominal price' (in dollars of the day, including the inflation).

Table 19-2: HPMSM (32% Mn) Price Projection to 2035 (China, Ex Works)

Year	Real Prices, USD$	% Change	Nominal Prices, USD$	% Change
2020	**1,034**	-16.5%	**823**	-14.5%
2021	**1,538**	48.7%	**1,241**	50.8%
2022	**1,422**	-7.5%	**1,228**	-1.0%
2023	**871**	-38.8%	**812**	-33.9%
2024	**793**	-8.9%	**770**	-5.2%
2025	**846**	6.7%	**846**	9.9%
2026p	**922**	9.0%	**950**	12.3%
2027p	**996**	8.0%	**1,057**	11.2%
2028p	**1,096**	10.0%	**1,185**	12.2%
2029p	**1,260**	15.0%	**1,391**	17.3%
2030p	**1,512**	20.0%	**1,702**	22.4%
2031p	**1,663**	10.0%	**1,910**	12.2%
2032p	**1,796**	8.0%	**2,114**	10.7%
2033p	**1,886**	5.0%	**2,275**	7.6%
2034p	**1,924**	2.0%	**2,379**	4.6%
2035p	**1,981**	3.0%	**2,511**	5.6%

Source: Bloomberg, Asian Metal, Marketeye

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Table 19-3: HPMSM (32% Mn) Price Projection to 2035 (Europe, DDP Berlin)

Year	Real Prices, USD$	% Change	Nominal Prices, USD$	% Change
2020	**1,254**	-15.5%	**998**	-13.5%
2021	**2,085**	66.3%	**1,683**	68.6%
2022	**2,285**	9.6%	**1,974**	17.3%
2023	**1,251**	-45.3%	**1,167**	-40.9%
2024	**1,162**	-7.1%	**1,128**	-3.3%
2025	**1,265**	8.9%	**1,265**	12.2%
2026p	**1,378**	8.9%	**1,419**	12.2%
2027p	**1,445**	4.9%	**1,533**	8.0%
2028p	**1,569**	8.6%	**1,698**	10.8%
2029p	**1,775**	13.1%	**1,959**	15.4%
2030p	**2,014**	13.5%	**2,268**	15.8%
2031p	**2,196**	9.0%	**2,521**	11.2%
2032p	**2,355**	7.3%	**2,772**	10.0%
2033p	**2,463**	4.6%	**2,972**	7.2%
2034p	**2,508**	1.8%	**3,102**	4.4%
2035p	**2,577**	2.8%	**3,267**	5.3%

Source: A local EU supplier in Berlin, Germany; Marketeye, 2026-04-20

Table 19-4: HPMSM Price Projection to 2035 (USA, DDP Detroit)

Year	Real Prices, USD$	% Change	Nominal Prices, USD$	% Change
2020	**1,634**	-14.3%	**1,301**	-12.3%
2021	**2,583**	58.0%	**2,084**	60.3%
2022	**2,943**	14.0%	**2,542**	21.9%
2023	**1,549**	-47.4%	**1,445**	-43.2%
2024	**1,490**	-3.8%	**1,446**	0.1%
2025	**1,700**	14.1%	**1,700**	17.6%
2026p	**1,717**	1.0%	**1,769**	4.0%
2027p	**1,771**	3.1%	**1,879**	6.2%
2028p	**1,884**	6.4%	**2,038**	8.5%
2029p	**2,136**	13.4%	**2,358**	15.7%
2030p	**2,524**	18.1%	**2,841**	20.5%

Year	Real Prices, USD$	% Change	Nominal Prices, USD$	% Change
2031p	**2,756**	9.2%	**3,165**	11.4%
2032p	**2,950**	7.1%	**3,473**	9.7%
2033p	**3,088**	4.7%	**3,726**	7.3%
2034p	**3,146**	1.9%	**3,891**	4.4%
2035p	**3,235**	2.8%	**4,101**	5.4%

Source: A North American supplier in Detroit, USA; Marketeye; 2026-03-27

A separate marketing study note was prepared by Marketeye for EMN on June 09, 2026. The note indicates that it is clear for the technological trends observed over the last few years that the 'direction of travel' in the battery industry is to use more high-purity manganese, while the supply side, particularly outside China, is plagued by delays. Marketeye projected that it is reasonable to use a long-term (project life) HPMSM price of approximately USD$3,250 to USD$3,300 for the upper case of the Chvaletice PEA, particularly if a significant proportion of the Chvaletice output would be destined for the USA.

HPEMM Prices

The High-Purity Electrolytic Manganese Metal (HPEMM) market is extremely small, opaque, and quasi-monopolistic. In recent years, its total volume was no higher than 40 thousand tons, of which some 65% was produced by one company – MMC in South Africa. The other producer of this material is a Chinese company, South Manganese. In the past, there were two small Chinese swing producers, but Chinese production of HPEMM never exceeded 12 ktpy.

There are no publicly quoted prices for this product. About 25% of production is used by battery makers (to produce HPMSM and Mn_3O_4), and the rest is used in some specific metallurgical applications.

It is virtually impossible to make a price forecast for HPEMM because of MMC's quasi-monopolistic position and the opacity of pricing.

The 'metallurgical' EMM (99.7% Mn) is a much larger market (more than 1.4 million tonnes in 2025). The main difference between the two is the level of impurities, particularly selenium, which in the 'metallurgical variety' can be as high as 800-1600 ppm, and in HPEMM should be none (or max 5 ppm). Metallurgical EMM contains 99.7% Mn, and HPEMM 99.9%.

Price forecasting for metallurgical EMM is beyond the scope of this report, because a) it does not qualify as a "high-purity manganese" product; b) it serves an entirely different market (steel-making) than HPMSM (batteries).

Below, we provide some historical information on metallurgical EMM (99.7% Mn) for context and reference. Figure 19-5 graphically illustrates the relationship between prices of manganese ore, 997 EMM, and HPMSM.

The long-term average price of 997 EMM (Ex Warehouse Rotterdam), calculated over 21 years (2006-2026), was USD$2,505/mt in nominal terms, or USD$3,295/mt in 2025 dollars. In March 2026, it exceeded USD$2,900/mt.

Although there are no official quotations for HPEMM prices, we know from discussions with industry insiders that, historically, the price differential between "high-purity" and "metallurgical" EMM has ranged from USD$300/mt to USD$1,500/mt. In the last two years, it was closer to the USD$300 – USD$500 range.

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The majority of HPMSM producers make it directly from ore, not from HPEMM. More than 92% of global HPMSM production is made directly from ore, but several producers in Japan use HPEMM as a starting point for HPMSM production.

HPMSM is considered a premium product compared to 997 EMM, and its price reflects this most of the time. However, over the last 8 years, there have been at least two periods of price reversal, when HPMSM was cheaper than 997 EMM.

Both prices are characterised by significant volatility, clearly visible in Figure 19-5.

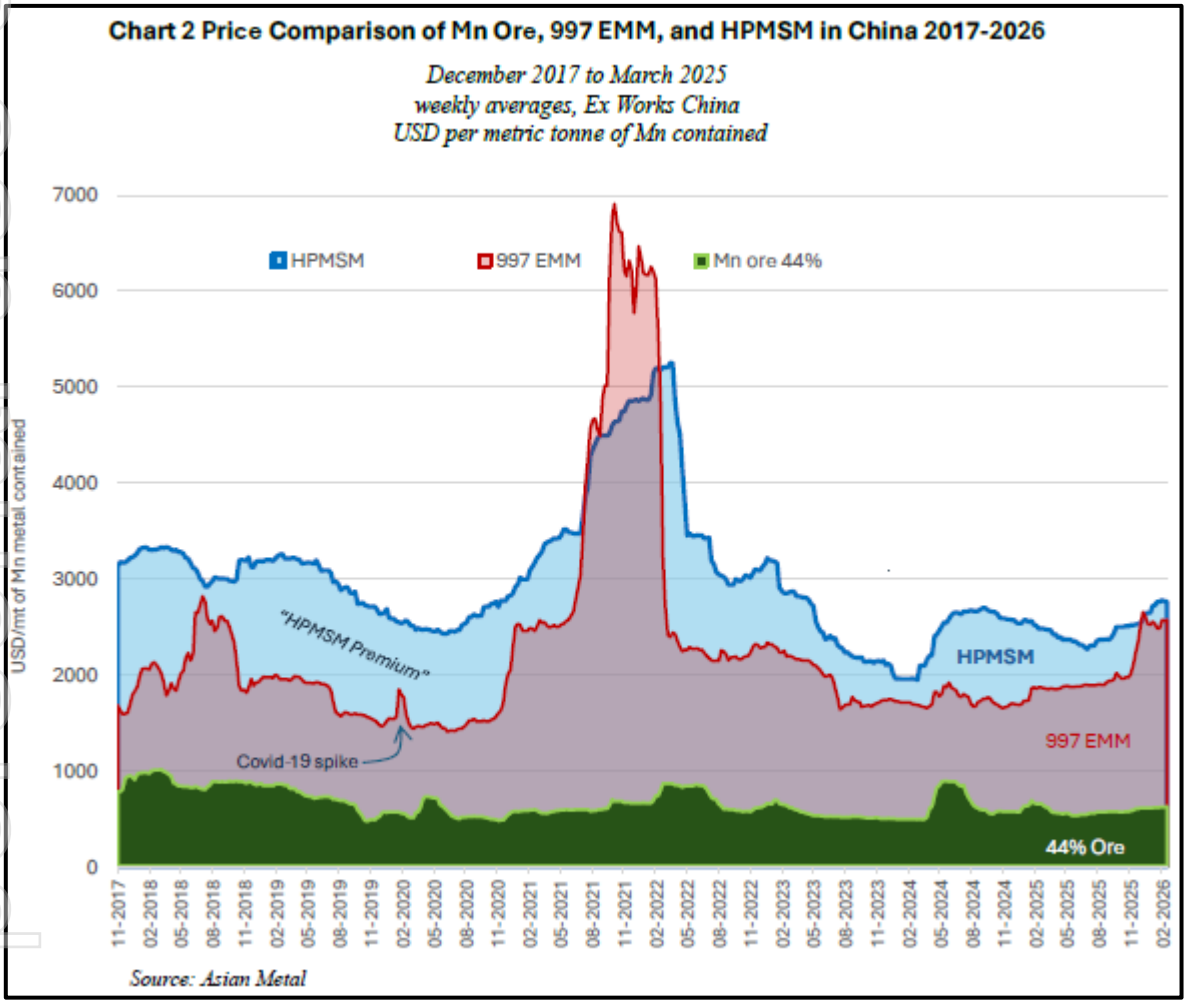

Figure 19-3: Price Comparison of Mn Ore, 997 EMM, and HPMSM in China 2017-2026

Source: Marketeye (2026)

The chart above shows 434 data points per product (weekly averages), i.e., 8⅓ years' worth of data. For 93% of that time, HPMSM commanded a “premium” over the EMM price. The price differential ranged from USD$2/mt of metal content to USD$2,857/mt of metal content, with an average of USD$865/mt of metal content (46% of the EMM price).

In the periods of price reversals, the “discount” applicable to HPMSM price ranged from USD$83/mt to USD$2,273/mt with an average of minus USD$1,075/mt of metal content (-17% of the EMM price).

Overall, HPMSM traded at the average “premium” of USD$727/mt of metal content (42%).

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Figure 19-5 illustrates that the markets for HPMSM and metallurgical EMM are shaped by different factors, as these products serve entirely different markets.

19.2 Magnesium Carbonate

Mangan has conducted preliminary investigations into local magnesium carbonate ($MgCO_3$) market. Due to no detailed product specifications available, it is assumed that the magnesium carbonate by-product should be an industrial grade material.

Magnesium carbonate by-product selling values are based on the current market price estimated by Tetra Tech.

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20.0 ENVIRONMENTAL STUDIES, PERMITTING, AND SOCIAL OR COMMUNITY IMPACT

20.1 Introduction

This section presents environmental, permitting, and social information for the Project.

An Environmental Social Impact Assessment (ESIA) was developed and approved in March 2024, after the previous study was filed. Additional data and studies have since been completed. A summary of this work and its key details is included below, including updated reclamation work and other studies.

This Section is based on:

- The approved ESIA and the ESIA Binding Statement
- Current permits and land status information
- Available environmental studies and data
- The current PEA project definition

This PEA reflects an updated configuration, including phased development and ramp-up of tailings mining, residue placement, and process plant production. The production schedule has been adjusted in response to market supply and demand. These changes affect the timing of activities. Total mined volumes, mineral resources, and the overall Project footprint (which influences the assessment of potential environmental and social impacts) have not materially changed (Tetra Tech, 2022 and ESIA, 2024).

This section includes conceptual assumptions where the current Project differs from previously assessed conditions and is appropriate for a PEA. Some aspects have not been revalidated for the current Project and will likely require further work as part of future updates.

20.2 Project Description

The Project refers collectively to the over 26,960,000 metric tonnes of the raw material (manganese tailings) located in a proposed mining area of 1.2 square kilometres within the municipalities of Chvaletice and Trnávka in the Czech Republic, around 89 kilometres (km) east of Prague (MANGAN Chvaletice, s.r.o. 2024).

The proposed Project will be situated in two locations (Figure 20-1):

- Chvaletice – Trnavka Tailings area, known as the Protected Deposit Area.
- The processing plant area of EP Chvaletice which is an existing industrial area, south of the Protected Deposit Area.

The two areas are separated by road II/322 and the railway line 010 Prague – Ceska Trebova. The two sites will be connected by a technological bridge over the road and the railway and by road II/322 to minimize the traffic burden on local roads.

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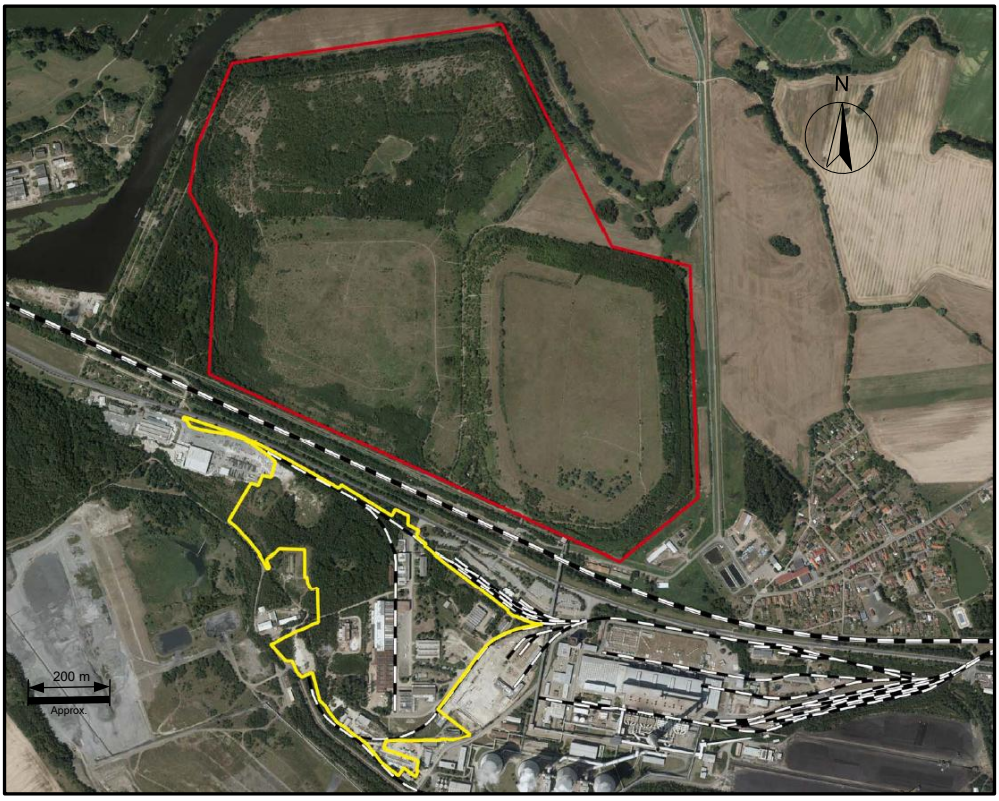

Figure 20-1: Area of Interest

Source: Mangan (2023)

The following activities are to be undertaken as part of the Project:

- Reclaim the 26.960 million tonnes of tailings by excavation over a 26-year period.
- Complete construction of a high-purity manganese processing plant for processing of approximately 1,037,000 tonnes of tailings (on dry basis) per annum to produce approximately 150,000 tonnes of high-purity manganese sulphate monohydrate (HPMSM), or approximately 50,000 tonnes of manganese metal on a metal basis.
  - The production process is planned to be conducted in two phases:
    - Phase 1: 75,000 t/a HPMSM during Years 1 to 3, and
    - Phase 2: 150,000 t/a HPMSM after Year 4.

A magnesium carbonate ($MgCO_3$) by-product will be produced together with the HPMSM production.

- Construct a RSF as part of the tailings recycling. As tailings material is gradually extracted and the useful component removed, it is neutralized and stabilised, and then will be returned to the remediated area (the same location of extracted tailings), which will be lined to meet modern environmental standards.
- At present the current tailings area is not lined. There are documented pollutions within the area of interest, which spreads from the tailings area to the surrounding environment and the nearby the Elbe River. The intention is therefore not only to extract and recover manganese, but also to stop the spread of contamination from the affected area to the surrounding environment and the Elbe River by lining the new RSF, thus remediating the area.

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- Progressively rehabilitate the RSF area. There will be no influence on the surrounding landscape, only the operation areas where the earthworks will be excavated will be temporally disturbed. The proposed method of biological reclamation will ensure rapid biological recovery of the disturbed area, fully rehabilitating the entire tailings will be in parallel with the operation.

Project History

The first records of manganese mining in this area date back to the 1930s. Between 1951 and 1975 the mining focused to extraction of pyrite, which was used to produce sulphuric acid. The waste from these operations created the three existing tailings piles that form the Chvaletice deposit. In the late 1980s, extensive studies of the tailings was undertaken to determine the feasibility of producing manganese dioxide. The deposit lay dormant until its mineral rights were granted in September 2014 to a Czech group of companies. The rights to the Project were then consolidated to form a jointly owned holding company, Mangan Chvaletice s.r.o. In May 2016, Euro Manganese Inc. acquired 100% of Mangan Chvaletice s.r.o.

Since the acquisition of the Project, Mangan Chvaletice s.r.o., under Euro Manganese Inc. ownership, set out to achieve several key objectives to advance the Project. These included completion of:

- Environmental baseline studies (Environmental Risk Assessment, Environmental and Social Screening Study, Survey of potential contamination and others),
- An extensive drilling assaying to updating the Mineral Resource Estimate and resource estimation program,
- A comprehensive beneficiation and hydrometallurgical test work program,
- An extraction and reclamation plan development,
- Advanced process flowsheet development,
- Community engagement and consultation on an ongoing basis,
- A preliminary economic evaluation (PEA) published in June 2019,
- Market studies to feed into the feasibility study,
- A Feasibility Study published in July 2022,
- A Life Cycle Assessment published in August 2022,
- Construction of a demonstration plant on-site at Chvaletice in 2022,
- Acquisition of EP Chvaletice, that owns an industrial area adjacent to the tailings and was the location of the former pyrite processing operation to produce sulphuric acid,
- Hydrotechnical Assessment of the influence on the runoff conditions of the floodplain of the Labe River in relation to the Project in October 2024,
- Finalizing remaining permitting and Land Acquisitions.

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20.3 Environmental and Social Baseline Conditions

Environmental and social baseline programs for the Project have been ongoing since the summer of 2015 together with work in support of the ESIA and Feasibility Study.

The following studies and surveys were prepared as part of the environmental and social assessment:

- Acoustics Study together with on-site Noise Monitoring
- Air dispersion modelling study
- Impact assessment on public health
- Hydrogeological Assessment together with long-term (since 2015) on site Monitoring
- Biological Assessment
- Dendrological Assessment
- Traffic Assessment
- Landscape Impact Assessment
- Socio-economic assessment
- Comprehensive Plan for Remediation and Reclamation.
- Additional geotechnical survey as part of the previous Feasibility study.

The study results for air quality, noise, hydrology, hydrogeology, ecosystems, vegetation and soils, wildlife and wildlife habitat, and socioeconomics were used for various environmental and social impact assessments. Local features of interest were identified and recorded, including sensitive and protected areas, vegetation, landscape elements, and areas or sites of historical, cultural, archaeological, or geological importance.

20.4 Air Quality

The area of the Project is characterized as a moderately exposed area with rather average climatic characteristics (the average total annual precipitations about 650 – 700 mm, prevailing western and south-western wind direction). The Project area is characterized by annual air pollution concentrations below the legal limits.

Dispersion modelling

Dispersion modelling was conducted as part of the ESIA with the aim to assess the potential impact of the Project on the air quality in the vicinity of the tailings area and the new processing plant.

Emission inventory

Emissions of dust (PM_{10} and $PM_{2.5}$ particles), benzo(a)pyrene, benzene, H_2SO_4, NOx and Mn were evaluated in the dispersion study.

The results of the calculations based on the previous FS data showed that the air pollution contributions of the project under consideration involving the extraction of the material and its processing in the new plant combined with the increased unrelated background automotive transport in the location under consideration to the average annual

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concentrations of nitrogen oxides, PM_{10} and $PM_{2.5}$ particles, ammonia and benzene will not exceed relevant applicable air pollution limits for the annual average of these pollutants.

Table 20-1: Cumulative Annual Emissions from Operation of Mining Part and Processing Plant (Maximum Annual Emission Flow)

	H_2SO_4 (kg/year)	NH_3 (kg/year)	NOx (kg/year)	PM_{10} (kg/year)	$PM_{2.5}$ (kg/year	Benzene (kg/year	BaP (kg/year	Mn (kg/year
Total	**53.7**	**541.8**	**59530.5**	**1909.3**	**1503.4**	**2.2**	**0.0006**	**82.8**

Table 20-3 shows that with the highest emission flow of less than 60 t/year, nitrogen oxides will be emitted from the cumulative operation of the Project. The dominant source of emissions is due to consuming hydrogen and natural gas as fuel and diesel for rail transport and mining mobile machinery. The emission flow of PM_{10} particles is expected to be about 1.9 t/year, and $PM_{2.5}$ particles at about 1.5 t/year. The emission of ammonia is expected to be 0.54 t/year, and the emission flow of sulphuric acid is estimated at the level of approximately 54 kg/year due to the installation of scrubbers. According to the projection documents, manganese emissions are expected to be approximately 83 kg/year. Emissions of benzene and benzo(a)pyrene from generated from car traffic can be described as insignificant.

Table 20-2: Summary and Evaluation of Cumulative Air Pollution Contributions to Average Annual Concentrations

	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	$PM_{2,5}$ ($\mu g/m^3$)	Benzen ($\mu g/m^3$)	BaP (ng/m^3)
Air pollution background	max. 10.8	max. 21.3	max. 15.2	max. 0.8	0.9
Highest air pollution contribution	0.8	0.8	0.4	0.0016	0.0011
Total with the project – maximum	11.6429	24.44	17.274	0.806	0.9043
Air pollution limit	40	40	20	5	1.0

Table 20-4 shows that the operation of the Project will not exceed the pollution limits for average annual concentrations of nitrogen dioxide, particulate matter of PM_{10} or $PM_{2.5}$, benzene or benzo(a)pyrene.

Techniques and procedures that will be used to minimize or avoid the impacts on air quality in the processing plant include management and technical measures, such as best practices in storage and handling of raw materials and products to minimize air emissions and installation of scrubbers and filters to clean the exhaust air before it is discharged into the atmosphere.

Greenhouse Gases

As an industrial activity, the Project will unavoidably generate greenhouse gas (GHG) emissions. The key sources of GHG emissions from the Project are:

- Fuel consumption
- Decomposition of carbonate minerals
- Electricity consumption

The total GHG emissions have been estimated by forecasting the amount of fuel, and electricity to be consumed throughout the life of the Project as well as the decomposition of carbonate minerals.

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The forecast total GHG emissions related to diesel fuel for the Project is 2,700 tonnes of carbon dioxide equivalent per year (tCO_2e; an index used to compare the global warming potential of various GHGs in terms of the equivalent amount of carbon dioxide). Although most of the thermal energy will be taken from the power plant, additional superheated water is required for some applications that will require steam to be generated by burning natural gas mixed with hydrogen. Emissions from this combustion were estimated at approximately 33,000 – 52,000 tonnes per year.

During the process of leaching the concentrate with sulphuric acid, carbonate minerals are decomposed to form CO_2. To reduce the environmental impact of the Project, waste CO_2 is used for carbonate precipitation to a generate manganese carbonate by-product, which leads to an overall reduction in CO_2 emissions. The total amount of CO_2 emissions produced and released into the atmosphere from the raw material processing process per year is about 59,000 tonnes.

Electricity will be consumed, the main point of consumption being the electrowinning manganese metal. The total electricity consumption will be 680 GWh/year. In the Czech Republic (according to data from the Ministry of Industry and Trade for 2021), this means the production of 268,000 tonnes of CO_2. However, it should be noted that the company intends to purchase only electricity produced from renewable sources.

A corporate energy and carbon management system is being implemented to manage and mitigate GHG emissions, including the procurement of low carbon energy supplies. Potential emission reduction strategies are part of the processing plant engineering plans.

Baseline GHG emissions were estimated for future operation. Emission reduction approaches are being considered during engineering and also with our suppliers.

20.5 Acoustics

The Project is located in an area with mixed urban and rural land uses and many sources of stationary and linear noise, i.e. industrial buildings, railways, and roads. Hygienic noise limits and associated regulations are determined by Government Regulation No. 272/2011 Coll., on Health Protection against the Adverse Effects of Noise and Vibrations.

The current hygienic noise limits are already exhausted and exceeded in the Project area. Therefore, the conditions for the implementation of the Project were formulated and designed in such a way that the Project would not increase this burden.

The acoustic study was prepared in 2023 to identify the sources of noise and to calculate the noise burden of the Project at 56 locations in the vicinity of the Project. The noise study includes the current noise pollution in the area from traffic and from existing stationary sources (data gathered from on-site noise monitoring).

The outcome of the acoustic study and the tightening of the requirements for acoustic protection, it can be stated that the impact of noise from the operation of the Project, from railway and road transport, as well as the impact of noise from construction will be at a level below the hyg. limits $L_{Aeq,8h}$ = 50 dB for day and $L_{Aeq,1h}$ = 40 dB for night, with a margin of 10 dB or more for day and 20 dB for night in most cases.

Noise emissions assessed by MANGAN Chvaletice, s.r.o. include:

- Construction noise
- Noise from the mining area
- Noise from the operation of the processing plant
- Traffic noise (road and railways)

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The acoustic modelling and study were prepared based on the FS data by an authorized company. This modelling was guided by Government Regulation No. 272/2011 on the protection of health from adverse effects of noise and vibration and evaluated the noise contributions of extraction within the tailings area, processing plant activities, and other connected activities in the surrounding areas. Based on the outcomes from the acoustic modelling it can be stated that the Project will not increase the noise level above the legislative limits under the condition that following acoustic modifications and mitigation measures are implemented:

- Material of construction of the buildings
- Method of ventilation of the buildings
- Selection of equipment based on low acoustic emissions
- Installation of the dampers at the outlet of fans
- Additional acoustic damping of point of high noise (e.g. equipment covers)
- Construction of an acoustic screen at the II/322 road, which will reduce the acoustic pollution of traffic noise in the Chvaletice built-up area.
- Train movement in the area of the Project will only occur during the day.
- All traffic on roads in the area of the Project will be out of operation at night.
- Mining activities are carried out only during daytime hours.

20.6 Health Impacts Assessment

A separate study has been prepared as part of the ESIA to assess the impact on public health. The Project is acceptable from the point of view of possible impacts to public health, as it is unlikely to unbearably worsen the burden of the affected population by spreading above-limit noise emissions or assessed air pollutants compared to current conditions. In conclusion of the Health Impact Assessment, based on a summary of the findings, it can be stated that the implementation of the Project brings virtually unchanged exposure scenarios regarding noise emissions and air pollutants, and therefore its implementation can be expected not to change the level of risks to public health in the concerned area.

20.7 Water Sources

The area of interest is located on the left bank of the Elbe River in the Pardubice Region. The width of the Elbe River ranges between 100 and 250 meters. The average flow of the Elbe in this area is considered moderate, which is influenced by regulation and the presence of weirs and other water management structures.

This river extends into the site through its floodplain, however only the edge of the tailings is in direct contact with the floodplain. Figure 20-2 shows the existing protective embankment on the north side of the tailings.

Ongoing support of the Project includes two recent workstreams:

- Hydrotechnical evaluation in 2024,
- Continuous monitoring of soil and groundwater since 2016.

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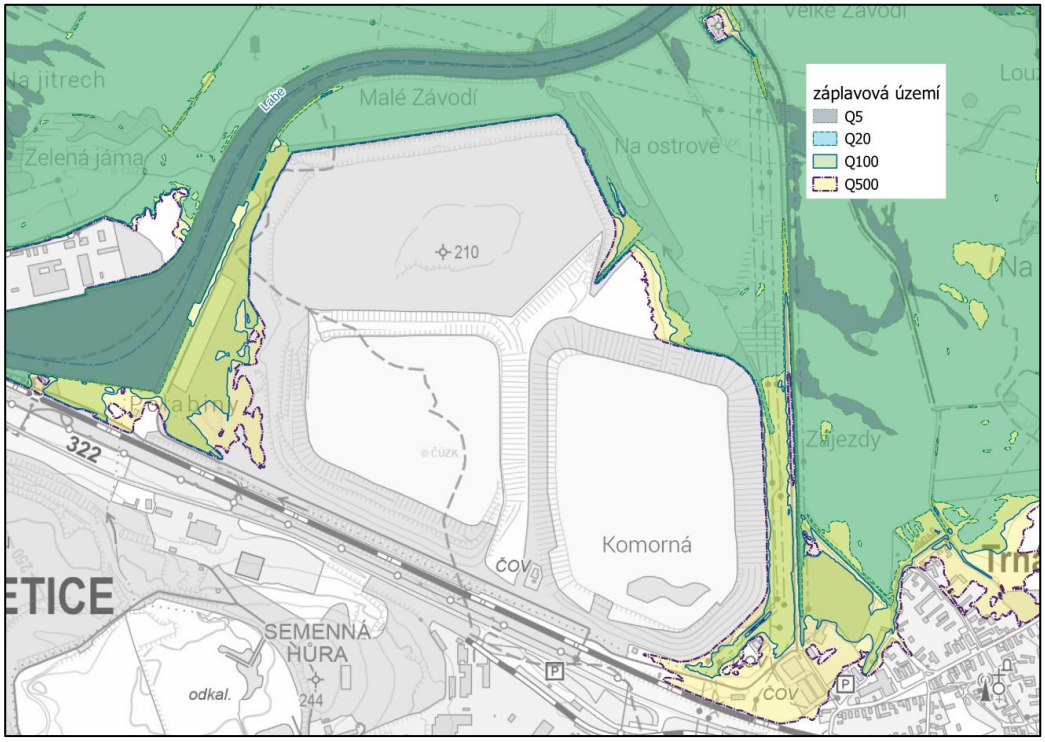

Figure 20-2: Current Terrain Conditions with the Flood Plains

Source: Vodohospodářský rozvoj a výstavba, a.s. (2024)

Hydrotechnical Assessment

In 2024, a hydrotechnical assessment was completed to determine the influence of the runoff conditions of the Elbe River floodplain in relation to the Project, particularly how modifications in the area of interest might affect runoff.

The hydrotechnical assessment was carried out using a detailed 2D mathematical model. The conclusion of the assessment indicated there would be no anticipated negative impacts on the extent of overflows due to the assessed modifications in design states, and no anticipated negative impact on water levels.

Chemistry of Surface and Groundwater

The impact on groundwater and surface water was evaluated summarily in the hydro-geologic (HG) evaluation and ESIA. The evaluation used other professional studies based on drill works, hydro-geologic monitoring, determination of groundwater and surface water quality and groundwater flowing modelling since 2015.

The area is stipulated by Act No. 254/2001 Coll. And Decree No. 401/2015 Coll.

The chemical composition of groundwater at the tailings piles and in the wider surrounding area, is considerably affected by anthropogenic activity. Groundwater samples collected from the tailings piles and their immediate surroundings show distinctly higher concentrations of some parameters, particularly manganese (Mn concentrations reaching tens up to lower hundreds of mg/L, 997 mg/L max.), sulphates (SO_4^{2-} concentrations reaching lower units of g/L, 9,200 mg/L max.), iron (Fe concentrations reaching tens up to lower hundreds of mg/L, 979 mg/L max.), and aluminium (Al concentrations reaching tens up to lower units of mg/L, 22.9 mg/L max.).

Other observed parameters are also elevated more or less compared to, for example, hygienic limits for potable water; however, they are far from reaching the values of the indicators above. Elevated concentrations of the indicators

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described are directly related to the deposited materials at the tailings. According to the transport model results, up to 45.5 kg of Mn, 37.6 kg of Fe and 234 kg of S (and thus 701.6 kg of sulphates) could be released daily into the Elbe River through underground water.

The ESIA assessed potential impacts on surface and groundwater resources. Regarding the identified contamination of groundwater and surface water in the tailings and its vicinity, where the source of the pollution is demonstrably deposited material, the excavation of the tailings can be considered a positive intervention.

As mining progresses, the surface of the tailings will be drained, and rainwater captured on the surface of the bodies will be managed by directing water away from the mined area for use in the processing plant. This procedure will significantly reduce the total volume of surface water infiltrating into the stored material and thus reduces the leaching of pollutants from the tailings into the groundwater of the collector of the Quaternary Elbe terraces and subsequently into surface water.

In relation to the quality of surface water in the Elbe River and the quality of bottom sediments, the implementation of the Project will have a clear beneficial effect according to the assessment.

In terms of water planning (EU Directive 2000/60/EC), the Project will not cause deterioration or failure to achieve good chemical status and ecological potential of the surface water body and will not lead to a negative change in the quantitative and qualitative status of the surface water body concerned or hinder the achievement of the objectives of the Water Framework Directive.

Water Inputs

Water is an important consideration in mining; water will be used for drinking, hygienic, and technological (e.g., processing) purposes. The Project will utilize several water sources. Public water mains will be used as drinking water source. This water will be used for hygienic and sanitary needs. The consumption of drinking water is about 15,225 m^3/year.

Industrial water will be taken from several sources such as captured mine water from the area of mining and reclamation, water from Chvaletice Power Plant (bleeding water from cooling tower), and captured rainwater. The average industrial water consumption is about 2,172 m^3/day.

Wastewaters

Two types of wastewaters will be generated by the Project – sewage wastewater (annual production about 12,800 m^3) and industrial wastewater from the processing plant (27,720 m^3/year). Wastewaters will be treated at the wastewater treatment plant to the extent that the output paraments will comply with the legislative limits given by Decree No. 401/2015 Coll. The quality of the effluent discharged into the Elbe River are provided in Table 20-3.

Table 20-3: Quality of treated wastewater released into the Elbe river

Indicator	Unit	Expected concentrations of pollutants	Legislative limit (CZ-NACE 7.00, 7.10., 7.29)
Arsenic	[mg/l]	<0.02	0.5
Ca	[mg/l]	<400	--
Cu	[mg/l]	<0.04	1
Fe	[mg/l]	<0.8	5
Mg	[mg/l]	<60	--

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Indicator	Unit	Expected concentrations of pollutants	Legislative limit (CZ-NACE 7.00, 7.10., 7.29)
Na	[mg/l]	<150	--
Pb	[mg/l]	<0.002	0.5
Zn	[mg/l]	<0.25	3
C_{10} - C_{40}	[mg/l]	<0.1	3
Cl	[mg/l]	<150	--
pH	-	6.5 – 7.5	6 - 9
SO_4	[mg/l]	<350	--
CHSK-Cr	[mg/l]	<100	75-140 (max. according BAT)
BSK5	[mg/l]	<30	22-30 (max. according BAT)
RAS	[mg/l]	<30	25-35 (max. according BAT)
NH_4	[mg/l]	<20	12-20 (max. according BAT)
Ntotal	[mg/l]	<40	
Ptotal	[mg/l]	<40	

20.8 Raw Tailings and NMT/LR Characteristics

Preliminary geochemical characterization to assess the potential for acid rock drainage and metal leaching of the existing tailings and the reprocessed tailings residue was completed as part of the PEA study (Tetra Tech, 2019a). Further geochemical characterization of the residue has since been conducted as part of the previous FS.

20.8.1 Existing Tailings Geochemistry

There are four samples of the tailings material which have undergone geochemical characterization for Acid Base Accounting (ABA) and Shake Flask Extraction (SFE) as part of the evaluation of acid rock drainage (ARD) and metal leaching (ML) characterization. Sample MA-200 (Head) was analyzed in December 2015, and Sample No.216 was analyzed in January 2016. Both samples are characterized as acid generating with the potential for metals leaching. In July 2017, Tetra Tech collected two additional samples from moisture saturated and unoxidized material in Cell #1 from Test Holes T1-312 (22-23 m, sample CT1312) and T1-313 (18-19 m, CT1313). These samples were classified as non-potentially acid generating and uncertain for acid generation, respectively, based on the Sobek neutralization potential ration method and classification scheme presented in Mine Environmental Neutral Drainage (MEND) report 1.20.1 (Price, 2009). Using a carbonate neutralization potential ratio, both samples would be classified as non-potentially acid generating. A multi-element sequential leach extraction test was performed on these samples but was not used to evaluate potential metal leaching.

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20.8.2 Filtered Residue (Reprocessed Tailings) Geochemistry

Preliminary geochemical characterization of one sample of representative final residue has been completed. The original tailings (magnetic separation feed) sample, identified as the P2 composite, was relatively fine particle-size tailings material, and the reprocessed tailings sample was a blended mixture of the washed LR cake and the NMT material. ABA and SFE tests were undertaken on a prepared mixture of NMT and LR obtained from metallurgical testing.

The results indicate that the sample classifies as potentially acid generating (PAG), based on NPR values less than 1. Table 20-4 provides a summary of NPR values based on different calculation methods.

Table 20-4: Sample Classification Based on NPR Value

Sobek NPR		Carbonate NPR		Sample Classification
Sobek NP/MPA	Sobek NP/AP	Carbonate NP/MPA	Carbonate NP/AP	
0.27	0.71	0.14	0.35	PAG

Notes: NP – neutralization potential; MPA – maximum potential acidity; AP – acid potential

The paste pH is 6.6 indicating near neutral conditions at the time of testing. Neutral paste pH values indicate either that acid generation has not occurred or that it has been sufficiently buffered to remain as a neutral leachate.

Total sulphur content is 4.79%. The sulphide sulphur content is 1.86% while the sulphate sulphur content is 2.90% sulphur. Sulphide and sulphate sulphur are the dominant forms of sulphur in the system, the remaining 0.03% of total sulphur content may be elemental or organic sulphur. The ratio of sulphide to sulphate sulphur indicates that a majority of sulphide oxidation may have already occurred and produced sulphates.

The carbonate neutralization potential value of 20.5 kg of calcium carbonate (CaCO3) per tonne is about one half of the Sobek NP value of 41 kg of calcium carbonate per tonne. This indicates that the neutralization potential in the sample is provided from both carbonate and non-carbonate sources. The mineralogy of the sample is unknown, but the non-carbonate sources are likely hydroxide and silicate minerals. Carbonate minerals provide the most readily available and fastest reacting source of neutralization potential. Other forms of neutralization potential may not be available to provide effective buffering under natural conditions. The effective neutralization potential of the system is likely somewhere in between the Sobek and Carbonate neutralization potential values.

The detection limits of analysis applied during SFE testing had to be increased due to the high amounts of dissolved solids in the sample, particularly with respect to calcium, manganese, hardness, and sulphate.

Further geochemical characterization of the residue is required and will need to consider variability of the source material and the potential variability in the NMT/LR due to imperfect mixing as part of the proposed RSF operation. It is recommended that samples representing the potential geochemical range of the final residue mixture undergo ABA and SFE analysis as a basis for preliminary characterization. The results from these tests will be used to inform and prepare a more comprehensive geochemical characterization program.

Three residue samples were generated from the 2019-2021 metallurgical test program for further geochemical characterization. These samples were tested by ALS Environmental and ALS Metallurgy, accredited laboratories in Canada, and include non-magnetic tailings, washed leach residue, and a blend from the non-magnetic tailings and the washed leach residue. The LR sample was washed five times to simulate the planned leach residue washing procedure which will involve on-stream filter cake washing. The tailings and leaching residue sample chemical and mineralogical characteristics, metal leachability, and acid generation potential were determined as part of the work. The test results show:

- LR is classified as potentially acid generating (PAG) with a very low net potential ratio (NPR) value. The sample has very low (below detection limit) carbonate content, as well as very little neutralization potential (NP) contributed

from non-carbonate minerals. Paste pH value is 6.3, which is mildly acidic, and is expected in the first few weeks of HC results. Total sulphur is high with a value of 9.78% and sulphide sulphur makes up 2.05% of the total sulphur.

- NMT is classified as uncertain PAG potential with NPR values slightly over 1.0 and with a paste pH of 7.0. This sample has some carbonate content and slightly less sulphide content than the LR sample at 1.58%.

SFE analysis results indicated that one leachable metal, manganese (Mn), is measured to exceed more than one magnitude greater than the CCME (Canadian Council of Ministers of the Environment) and/or BCAWQG-FST (BC Approved Water Quality Guidelines - Freshwater Short Term) guidelines (8.0 mg/L) in both the LR (41.2 mg/L) and NMT (21.3 mg/L) samples. Leachable phosphorus (P) measured is below detection limit values. Measured pH values of 6.95 and 7.76 are neutral pH within the guidelines (pH 6.5 – 9.0) for LR and NMT respectively.

The non-magnetic tailings and washed leach residue blend was tested by humidity cell procedure to determine the rate of acid generation and variation over time in leachate water quality. The testing period lasted 40 weeks. The test results are summarized below:

- pH continues to decrease towards 40 weeks to pH 3.49
- Acidity gradually increased from approximately Week 21 to Week 40 with a spike at Week 33
- Alkalinity continually dropped from Week 1 to Week 19, then remained below detection limit <2.0 mg/L from Week 19 to Week 40
- Sulphate remains relatively consistent throughout the 40 weeks with no apparent trend
- Sulphate production and carbonate consumption are consistently variable along a continual trend for the 40 weeks after an initial ‘flush’ from Week 1-3
- Dissolved aluminium remained below detection limit to Week 23, followed by a significant and consistent increase from Week 23 to Week 40. The measured aluminium content is approximately 1.7 mg/L at Week 40.
- Dissolved copper remained below detection to Week 23, followed by an increase to Week 40, but measured copper content is below 1.0 mg/L at Week 40
- Dissolved zinc increases from Week 1 to Week 25 then decreases to Week 40. Values remain below 3.0 mg/L
- Dissolved manganese increased initially from Week 1-7 then remained variable along a relatively consistent trend at 250 mg/L to Week 40
- Dissolved cobalt and nickel follow relatively similar trends with an increase initially to Week 16 (nickel) and Week 26 (cobalt), followed by a decrease to approximately 0.2 mg/L for the metals at Week 40
- Dissolved cadmium increased overall to Week 26, then decreased to approximately 0.003 mg/L at Week 40

The humidity cell test results confirm that the non-magnetic tailings and washed leach residue blend is expected to be a potentially acid generating material. The material should be stored in a lined storage facility.

Residue Storage Facility Material (RSF)

Material from manganese ore treatment will be deposited back into the mining area and will be used for remediation and land reclamation. After treatment and obtaining the utility component (manganese), the same (in fact slightly higher) amount of material remains.

The stored material will consist of two components – NMT (non-magnetic, non-magnetic fractions after magnetic separation) and LR (leaching residue, leaching waste). Basic classification analysis and compaction tests (Proctor Standard), IBI (Immediate Bearing Index) and CBR (California Bearing Ratio) were performed. Material management

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after modification will be fully subject to Act No. 157/2009 Coll., on Mining Waste Management. Material from the treatment is in terms of legislation characterized as mining waste according to the Waste Act. The inclusion is based on the opinion of the Czech Mining Authority from 2019.

In summary, it was stated that the examined materials are fine-grained, with a character corresponding to clay with low plasticity. Their deteriorated geotechnical characteristics correspond to this. Of particular significance is the almost absolute loss of cohesion and bearing capacity in the case of high material moistening.

Furthermore, tests of geochemical properties were carried out, especially with regard to the limits set by the Decree of the Ministry of the Environment No. 273/2021 Coll., on the details of waste management. The absolute content of pollutants, leachability and classification into leachability and ecotoxicity were determined.

The conclusion of the analytical activities is that the NMT and LR material fulfils the limits for class IIb of Decree No. 273/2001 Coll and can be deposited back to RFS with given technical measures which the project design comply with.

Details are provided in ESIA.

Non-Mineral Waste

Waste from Construction

During the construction of quarry facilities and the processing plant, it is expected that standard construction waste will be generated from used building materials and technological units, as well as packaging waste and municipal solid waste. Waste will be sorted on-site and subsequently transferred for disposal or recycling to authorized waste disposal facilities; recycling will be prioritized.

Waste from Operation

In addition to the mineral wastes, non-mineral wastes will be generated by the Project. These wastes include general waste and regulated waste. Regulated wastes are considered to be more hazardous, relative to general wastes, all waste will be managed in accordance with legal requirements, specifically in compliance with Act No. 541/2020 Coll., on Waste. Waste will be collected and sorted separately, and all non-recyclable waste will be transferred to a waste management facility for disposal or recovery.

20.9 Ecosystems, Protected Areas

There are no protected parts of nature in the area of the Project or in its immediate vicinity in the sense of Act No. 114/92 Coll. Specially protected areas do not occur in the vicinity of the proposed construction.

The nearest small-scale specially protected areas in the vicinity of the area of interest are:

- Nature Reserve Týnecké mokřiny found approximately 2.5 km to the northwest,
- Natural Monument Labské rameno found approximately 4.0 km to the southeast,
- Nature Reserve Na Hornické found approximately 7.0 km to the southwest of the area of interest.

No natural park exists in the immediate vicinity of the assessed objective location. The closest national park is over 15 km away from the objective area (e.g., the national park Heřmanův Městec, Doubrava).

None of the Natura 2000 system elements reach into the area of interest and all that are relatively near are north of (i.e., separated by) the Elbe River. The EVL Louky u Přelouče (code: CZ 0537011) approximately 170 m to the west, EVL Kladruby nad Labem (code: CZ 0533698) approximately 1 km to the north and EVL Týnecké mokřiny (code: CZ

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0213061) approximately 2.4 km to the northwest are found near the area of interest. No bird areas are found near the area of interest.

Cultural Monuments, UNESCO

According to the National Heritage Institute, no World Heritage Sites, national cultural monuments, or cultural monuments administered by the National Heritage Institute are registered within the Project area.

The nearest UNESCO World Heritage Site is the Landscape for Breeding and Training of Ceremonial Carriage Horses in Kladruby nad Labem, located about 200 m north of the Project area, on the other side of the Elbe River.

To mitigate any impact on landscape character emphasis is given to maintaining the view and composition links to urban and landscape values of the UNESCO World Heritage Site particularly with respect to maintaining the existing silhouette and panorama and the overall height of the RSF will not be increased compared to the present topography.

20.10 Plants, Wildlife, and Wildlife Habitat

A biological and dendrological assessment of the project was performed in 2019 and updated in 2022 in the Tailings and Processing Plant areas. The surveys focused on determining the current biological condition of the area and the occurrence of specially protected plant and animal species as listed in Decree No. 395/1992 Coll. of the Ministry of the Environment and Act No. 114/1992 Coll.

During the survey, the presence of 335 plant taxa was found. The only specially protected species found is the European yew on the premises of the processing plant, however those individuals were specifically planted. There is existence of 8 species listed on the Red List of Plants of the Czech Republic.

During the inventory surveys, 23 specially protected animal species were found.

The ESIA Biding Statement defines the mitigation (protection) and compensatory measures, which are incorporated into the Project schedule (ground works out of the protected periods, relocation, replacement planting, etc.) and ensure the minimum impact on the wildlife.

20.11 Socioeconomics

The ESIA process in the Czech Republic reflects European legislative requirements for environmental impact assessment disclosure and stakeholder engagement.

The Project has a favourable and manageable socio-economic profile. The strongest positive aspects include brownfield reclamation, local and regional employment, supplier opportunities, skills development, and increased municipal revenues. No forced resettlement is required. No material social constraints have been identified.

For PEA purposes, the Project can therefore be described as socially positive, locally significant, and dependent on sustained good stakeholder practice.

Socio-economic Setting

The ESIA concludes that the Project will generate positive impacts for local communities, with the social and economic effects assessed as long-term and favourable.

No known Indigenous Peoples, land claims, or cultural heritage constraints have been identified within the Project area, based on ESIA findings and applicable national regulatory frameworks. There are no indications of social polarization, segregation, or housing-related disruption.

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The labour catchment is expected to be primarily local and regional. The future plant is expected to become a significant employer in the micro-region.

Positive Socio-economic Effects

The main positive effects include employment, training, local procurement, and increased municipal income. The Project is expected to be a significant employer in Chvaletice and the surrounding region.

During the three-year construction period, approximately 800–1,000 direct jobs will be created, with a peak workforce of around 500 personnel. During operations, the Project is expected to employ approximately 380–400 direct staff, of which about 85% are anticipated to be local residents.

The Project is also expected to generate meaningful financial benefits for affected municipalities. In accordance with the Czech Mining Act, Act No. 44/1988 Coll., and related implementing regulations, the Czech State would receive royalties calculated on contained manganese using a reference price of CZK 2,308 per tonne, corresponding to approximately CZK 115.4 million annually, of which 38% would be allocated to local municipalities. In addition, the City of Chvaletice city will also receive annual rent under a land access agreement and that the funds to Chvaletice and Trnávka municipalities will represent a significant increase in regular income.

These socio-economic contributions are considered material at the local and regional level and are expected to provide sustained economic benefits over the life of the Project.

Land, Community and Residual Social Issues

No forced land acquisition or resettlement is required for the Project. The processing plant site was secured through the acquisition of the site owner, EP Chvaletice, and the tailings area is designated for mining use. To date, additional land access agreements cover in excess of 85% of the resource within the tailings, with the remaining agreement under negotiation.

Key social issues raised by stakeholders include noise, air emissions, transport, road conditions, transparency, and future employment arrangements. These concerns have been documented in the ESIA consultation record and subsequent stakeholder engagement materials. Overall, the Project has been well accepted by stakeholders, with no critical opposition identified. Stakeholder issues are monitored on a regular basis, with mitigation measures in place and ongoing consultation with local communities. While these issues are not considered critical, they represent ongoing management items that may influence stakeholder perception and, if not properly managed, could affect permitting timelines or the Project's social licence to operate.

The primary residual social risk relates to labour market competition. The Project will become a major employer in the micro-region and may increase competition for labour with existing employers in the Chvaletice industrial area. This risk is considered manageable but remains relevant for recruitment strategy, wage positioning, and workforce development.

Overall, residual social risks are assessed as low to moderate and are considered manageable through standard industry practices, regulatory compliance, and ongoing stakeholder engagement.

Stakeholder Engagement and Social Management

The Project complies with Czech ESIA disclosure requirements and applies transparent and auditable principles of information disclosure, meaningful consultation, and ongoing stakeholder engagement.

Engagement activities have included public presentations across seven local municipalities, site visits, and meetings with permitting authorities, mayors, municipal councils, schools, and other stakeholders. An information centre has been established in the Community centre in Chvaletice and is accessible to the public. Additional engagement initiatives include public discussions, site excursions, school programs, informal community meetings, newsletters, a dedicated local website, and media outreach.

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A zero-tolerance approach to retaliation is in place, supported by a formal and accessible grievance mechanism. Stakeholders may raise concerns online, by email, by telephone, or in person, including anonymously. These measures are appropriate for the current stage of the Project and should remain in place through permitting, construction, operation, and closure.

Effective stakeholder engagement and grievance management are considered critical to maintaining the Project's social licence to operate and supporting timely permitting and development. No material barriers related to stakeholder acceptance have been identified. Stakeholder engagement activities and current levels of community acceptance are not expected to constrain the permitting process.

Overall Conclusion

Based on the reviewed documentation, the Project demonstrates a favourable and manageable socio-economic profile. Key positive factors include brownfield reclamation, employment creation, supplier opportunities, skills development, and increased municipal revenues. No forced resettlement is required, and no Indigenous Peoples or Aboriginal populations are present in the Project area. No social or community-related issues have been identified that would constitute a material impediment to the development of the Project.

The main areas requiring continued management include labour market competition, noise and air quality, traffic and road conditions, and sustained transparent engagement with stakeholders. For PEA purposes, the Project can therefore be characterised as socially positive, locally significant, and dependent on continued effective stakeholder management. The residual social risk profile is considered low to moderate and is typical of comparable brownfield industrial projects in the region. Social factors, including labour availability and community acceptance, have been considered at a conceptual level in the Project's economic analysis and are not expected to materially affect Project viability.

The information centre in the Cultural Palace in Chvaletice, the grievance mechanism, and ongoing local engagement activities are key components of the Project's social licence to operate.

20.12 Permitting

The Project must meet requirements set out by the Czech State as part of the legislated regulatory system and permit obligations. Czech environmental legislation is aligned with the European legislation. The Project is also committed to meeting international standards and best practice standards as part of its financing agreements and commitment to continuous improvement).

Legislative background, responsible authorities

Crucial milestone of the project is the Environmental and Social Impact assessment process. Several strategies for the ESIA process were considered initially and the following strategy for the ESIA process was assessed as being the most efficient. A consolidated ESIA was prepared for tailings extraction, dry-stacking, and process plant, and two-staged process was pursued for submission to authorities.

- Stage 1 – the ESIA Notification together with expert studies and surveys with a full assessment of the project's anticipated impacts and proposed mitigation measures. ESIA Notification was based on PEA data.
- Stage 2 included ESIA documentation according to the legislative requirements taking into consideration the requirements arising from the ESIA Notification. Comments from the relevant authorities, affected municipalities, and the public were taken into account in the project design and, together with the outputs from FS, were assessed as part of the ESIA process.

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In March 2024, MANGAN Chvaletice, s.r.o.'s mining and processing plant activities at the Chvaletice_Trnávka Tailings Reclamation Project were granted the positive Environmental & Social Binding Statement, in effect the environmental permit with the conditions set by the Ministry of Environment by which the Project needs to comply.

The ESIA permit is the most critical milestone to start project implementation because ESIA appropriation is a trigger point for equipment, material and works supply contracts, land-plan request, and construction permit initiation.

The ESIA process is followed by a subsequent permitting process. Given this, the project is divided into two parts, each of which will be assessed according to the relevant permitting systems in the given area. The first part comprises mining and dry-stacking activities, which are governed by Act No. 44/1988 Coll. on the Protection and Utilization of Mineral Resources (Mining Act), and related regulations.

The processing plant and related infrastructure are governed by Act No. 283/2021 Coll., the Building Act, and related regulations. The plant's operations will be governed by Act No. 76/2002 Coll. on Integrated Pollution Prevention and Control. The manufacture of products will also be subject to an authorization process based on EU Regulation No. 1907/2006 (the REACH Regulation).

The permitting process can be summarized as follows:

1. Baseline Phase – includes several activities and permits to Carry Out Mining Activities, Establishment of an Exploration Area for Deposit Exploration, Delimitation of a Protected Deposit Area and others.
2. Preparation Phase – includes rezoning of the relevant municipalities' Zoning plans, the ESIA process, related infrastructure permitting procedure.
3. Land Planning, Construction Proceeding and Operation Phase – at this stage, the permitting process consists of the Land Planning Permit Proceeding, the Construction Permit Proceeding, and the Operating Permit Proceeding. The project is divided into three sub-phases at this stage, when each of these parts will undergo a separate permitting process:
    a. Mining area and RSF Proc
    b. Processing Plant
    c. Railway Siding

Each phase of the permitting process involves statements from the relevant authorities and concerned parties, such as infrastructure owners and adjacent landowners. The main responsible authorities are the Ministry of the Environment, the Ministry of Industry, the Czech Mining Authority, the Transport and Energy Construction Authority (DESU), the Regional Authority of the Pardubice Region, the Local Authority of Prelouc City, Chvaletice, Trnavka Local Authority, the Regional Hygiene Station.

List of Permits and Authorizations

The Project will require numerous permits and authorizations in order to proceed. Several permits/authorizations have already been secured, additional permits/authorizations need to be obtained. The list of the permits/authorizations are listed in Table 20-5.

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Table 20-5: Permits and Authorizations

	Name of Permit / Opinion	Legislation	Requirement	Status
Baseline Phase	**Baseline Phase**			
	Permit to Carry Out Mining Activities	Act No. 61/1988 Coll., on Mining Activities	Permit granted by the State Mining Administration for mining activities.	obtained 2017
	Establishment of an Exploration Area for Deposit Exploration	Act No. 62/1988 Coll., on Geological Works and the Czech Geological Survey	Geological work for the prospecting for and exploration of reserved mineral deposits and exploration of exclusive non-reserved mineral deposits must be authorized.	obtained 2014, renewed 2021, Ministry of Environment
	Official certificate of the Exclusive Deposit	Act No. 44/1988 Coll., on the Protection and Utilization of Mineral Resources (Mining Act)	The Ministry of the Environment issues a certificate of exclusive deposit for reserved minerals.	obtained 2019, Ministry of Environment
	Delimitation of a Protected Deposit Area	Act No. 44/1988 Coll., on the Protection and Utilization of Mineral Resources (Mining Act)	The protected deposit area is designated by the Ministry of the Environment in consultation with the other competent authorities.	obtained
	Prior consent to the establishment of the mining-lease district	Act No. 44/1988 Coll., on the Protection and Utilization of Mineral Resources (Mining Act)	An organization must have a predecessor approval from the Ministry of the Environment of the Czech Republic before submitting a proposal for the delimitation of a mining space.	obtained April 2018, Ministry of Environment
Preparation Phase	**Preparation Phase**			
	Change of the Zoning plan (Rezoning)	Act No. 283/2021 Coll., Building Act	With the approval of the amendment to the municipal Zoning plan (Trnávka, Chvaletice), the project is in accordance with the zoning documentation of the municipalities concerned.	obtained September 2023 Trnavka and Chvaletice Zoning Plan update realized
	Environmental Impact Assessment	Act No. 100/2001 Coll., on Environmental Impact Assessment	Mangan Chvaletice Project was assessed with respect to its impacts on the environment, social area and human health. Positive Biding Statement was issued, about 32 biding conditions and measures were given.	obtained March 2024, Ministry of Environment
	Demolition Permit	Act No. 283/2021 Coll., Building Act	The demolition of buildings is hereby approved to the extent necessary for the implementation of the proposed construction of the Processing Plant.	obtained May 2024, Local Authority MU Chvaletice
	Permit for trees deforestation	Act No. 114/1992 Coll., on the Conservation of Nature and Landscape	The municipal authority issued the permit for the cutting of trees growing outside the forest area, along with the order for substitute planting.	obtained October 2025, Local Authority MU Chvaletice
	Construction permit for Infrastructure relocation	Act No. 283/2021 Coll., Building Act	As part of the preparation of the site for Project realization, the infrastructure relocation can be realized based on the permit.	obtained May 2026, DESU Authority

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	Name of Permit / Opinion	Legislation	Requirement	Status
	Technological Bridge Construction Permit	Act No. 283/2021 Coll., Building Act	The technological bridge is an integral part of the project and must be approved in accordance with the Building Act.	obtained March 2026, DESU Building Authority
	Intermediate Storage Construction Permit	Act No. 283/2021 Coll., Building Act	The location for intermediate storage of useable materials from demolition and materials for reclamation must be approved in accordance with the Building Act.	in progress
	Grid Connection Construction Permit	Act No. 283/2021 Coll., Building Act	Connection to the network can be implemented based on a permit issued upon fulfillment of the specified conditions.	obtained January 2025, DESU Building Authority
Land Planning, Construction Proceeding and Operation Phase	**Processing Plant**			
	REACH Registration Permit of the EMM, MSM	EU 1907/2006, REACH Regulation	Manufacturers and importers of substances (whether on their own or in mixtures) must register them with the European Chemicals Agency. EMM and MSM obtained the permit.	obtained April 2022, European Chemical Agency
	Land Planning Permit - Processing Plant	Act No. 183/2006 Coll., Building Act	The location of the structures or facilities is possible only based on the zoning decision.	obtained April 2026, Local Authority Prelouc
	Construction Permit - Processing Plant	Act No. 283/2021 Coll., Building Act	In case of structures of any type, a building permit is necessary for any construction activities.	no risks so far identified, design must be in line with EIA Statement requirements
	Operational permit - Final Building Approval Permit - Processing Plant	Act No. 283/2021 Coll., Building Act	The Final Building Approval Permit is the final approval issued by the building authority, which allows the completed building to be legally used for the purpose for which it was built and confirms that it complies with the building permit and safety standards.	no risks so far identified, design must be in line with EIA Statement requirements
	Integrated Permit - Processing Plant	Act No. 76/2002 Coll., on Integrated Pollution Prevention and Control	Integrated permits must be granted by the Regional Authority for the Processing Plant and define the conditions and limitations for Plant operations such as emission limits etc. The rights associated with the building permit cannot be exercised until the integrated permit comes into force.	no risks so far identified, design must be in line with EIA Statement requirements
	Railway Siding			
	Land Planning Permit - Railway Siding	Railway Act No. 183/2006 Coll., Building Act	Zoning permit is necessary for railway zoning.	obtained June 2026, Local Authority Prelouc
	Construction Permit - Railways siding	Act No. 283/2021 Coll., Building Act	Building permit is necessary for railway construction activities.	no risks so far identified, design must be in line with EIA Statement requirements
	Operational permit - Final Building	Act No. 283/2021 Coll., Building Act	The Final Building Approval Permit is the final approval issued by the building authority, which allows the completed buildings and building projects to be legally used for the	no risks so far identified, design must be in line with

	Name of Permit / Opinion	Legislation	Requirement	Status
	Approval Permit - Railway Siding		purpose for which they were built and confirms that they comply with the building permit and safety standards.	EIA Statement requirements
	Operating Permit for Railway siding	Railway Act No. 266/1994 Coll	Operating permit is necessary for railway construction activities.	no risks so far identified, design must be in line with EIA Statement requirements
Land Planning, Construction Proceeding and Operation Phase	**Mining area and RSF Proc**			
	Determination of Mining Lease Permit	Act No. 44/1988 Coll., on the Protection and Utilization of Mineral Resources (Mining Act)	The organization's authority for mining a reserved deposit comes into an existence of the delimitation of a Mining-Lease.	obtained January 2025, Mining Authority
	Mining Activities Permit (POPD)	Act No. 61/1988 Coll., on Mining Activities, Explosives, and the State Mining Administration	The opening, preparation and mining of reserved deposits must be permitted by the District Mining Office.	in progress (draft already prepared)
	Classification into mining waste category	Act No. 157/2009 Coll., on mining waste management	The District Mining Authority will decide on the categorization of the storage place and on the category.	after obtaining the Mining Activities Permit (POPD).
	Settled property rights (conflicts of interest)	Act No. 61/1988 Coll., on Mining Activities, Explosives and the State Mining Administration	The documents on the resolution of conflicts of interest must be submitted if interests protected by law are endangered by mining activities.	no risks so far identified, design must be in line with EIA Statement requirements
	Decision on the construction of storage of mining waste	Act No. 157/2009 Coll., on mining waste management	The operator must establish a storage system for mining waste. The location, modification and use must be permitted by the District Mining Office.	no risks so far identified, design must be in line with EIA Statement requirements
	Operating permit storage of mining waste	Act No. 157/2009 Coll., on mining waste management	The construction and operation of a storage site must be authorized by the district mining office.	no risks so far identified, design must be in line with EIA Statement requirements

20.13 Closure and Reclamation

Current conditions, which are influenced primarily by the chemistry of the substrate, significantly slow down natural succession toward an ecologically more stable and species-rich habitat. Furthermore, undesirable substances are leaching from the tailings piles through interaction with infiltrating precipitation. These waters subsequently mix with shallow groundwater and result in contamination.

Therefore, the plan to re-use the manganese bearing tailings materials can also be viewed as a plan to recycle mining waste and remediate the current tailings. The design and safety measures of the tailings reflect the technical capabilities and practices of the time they were built, and they no longer meet today's technical and safety requirements for mining

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waste storage sites. Of particular concern is the potential for pollutants to leach into the subsoil, groundwater and Elbe River, and for the tailings material to be removed through wind and water erosion.

Therefore, an important objective is to remediate the existing site and replace the inadequate technical design of the tailings with a modern containment method for the stored material. This will prevent substances from spreading into the soil and water environment.

The aim of remediation and reclamation is to create a near-natural area with improved biodiversity and stability, which will be used for recreational and sports activities.

To increase the biodiversity and overall diversity of the environment after changes in the shape of the relief related to the transfer of matter within the deposit, it is necessary to create such conditions that will lead to the creation or strengthening of ecological, aesthetic, water management and landscaping functions in the area of interest.

From the point of view of nature conservation and the above-mentioned functions, the Remediation and Reclamation proposal worked with the following basic points:

- The creation of terrain depressions as a living aquatic ecosystem,
- To ensure the greatest possible water subsidy, shape the hopper area as one micro-basin (most areas with a minimum slope with runoff in the direction of the water features),
- A more detailed morphology of the terrain is suitable for more rugged area,
- For the proper thriving of planted tree species, a minimum layer of fertilizable soils of 1.5 – 2 m is necessary and then the top humus layer.

At the same time, the objectives of remediation and reclamation were chosen to respect the document "Biodiversity Protection Strategy of the Czech Republic for the period 2016–2025 (Ministry of the Environment, 2016)", which defines priorities in the field of protection and sustainable use of biodiversity in the Czech Republic.

These include, for example:

- Maintain or increase the extent of natural habitats,
- Improve landscape structure,
- Improve the permeability of the landscape to biota,
- Reduce pollution and improve physio-chemical water quality,
- Increase the retention capacity of the landscape,
- Increase the share of reclamation of areas after mining by spontaneous succession.

The proposed remediation and reclamation, facilitated by modelling of the terrain as one micro-basin will ensure the accumulation of rainwater in shallow terrain depressions and thus allow the formation of wetland communities. Simultaneously, the varied topography of the terrain, with its rugged features, will enhance the diversification of site conditions. In combination with subsequent biological reclamation (forest-free areas, forest, scattered greenery), this strategy will contribute to higher biodiversity in the area. The proposal respects the proposed measures to minimise impacts on fauna, flora and ecosystems.

The following types of biological reclamation are proposed in the area of interest, as shown in Figure 20-3:

- A – areas of grass-herb communities (65.34 ha)

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- B – continuous planting of trees (35.71 ha)
- C – shrubs and loose planting (22.61 ha)
- D – dry polder
- E – succession areas without humic substrate (3.62 ha)
- F – forest park (1.38 ha)
- G – terrain depression – periodically flooded waters (0.31 ha)

Figure 20-3: Visualization of the Rehabilitated Area at Project Closure

Source: Mangan (2023)

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20.14 Impact Mitigation and Project Design Approach

The process plant is being designed to reliably and cost-effectively produce products that are destined for advanced battery cathode formulations, while complying with the stringent Czech Republic and European Union health, safety and environmental standards.

Rehabilitation of the Chvaletice_Trnávka Tailings will reduce the identified contamination of groundwater and surface water in the tailings and its vicinity, where the source of the pollution is demonstrably deposited material. As extraction, reprocessing and proper disposal of the Chvaletice tailings is carried out, the site will be progressively rehabilitated to be in compliance with Czech and European environmental requirements and returned to productive or recreational use by the community.

Mining manganese tailings material, which is a waste-product of past mining activities, will have an overall positive impact. Furthermore, as the deposit is of anthropogenic origin and the mined material is a waste-product, this constitutes the reuse or recycling of waste, aligning with the principles of the circular economy.

The process design measures that have been identified during the previous FS and environmental impact assessment include the following:

- Washing of leach residues, recovery of manganese and reagents, neutralization of final residue storage placement methods that reduce the further oxidation and leaching of heavy metals.
- The final residue will be dry stacked in lined containments with comprehensive water management systems to capture and recycle runoffs and leachate from the excavation and processing areas. The WTPs will be installed to effectively re-use and treat wide range of water qualities that are expected on site.
- Limiting the duration and extent of open excavated areas of tailings and the areas for dry stacking operations; applying effective dust suppression methods.
- Visual and acoustic barriers will be installed where reasonable to reduce noise-related impacts. Tailings extractions will be limited to daytime weekday periods to minimize noise and traffic.
- The use of toxic (for example selenium, chromium, and fluorine), hazardous reagents and chemicals has been eliminated or minimized.
- The majority of shipments of finished products from the plant, as well as the import of bulk and heavy commodities, will be carried out by rail.
- Mist fumes and odours will be controlled using appropriate ventilation and scrubbing systems. Electrolytic cells will be properly vented.
- Tanks and bunded areas will be designed to ensure safe adequate storage for process reagents, chemicals and solutions.
- Waste products will be recycled or safely disposed in appropriate facilities.

It is planned to extend these design features as the level of design definition is increased in the next phase of engineering.

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20.15 Health, Safety and Environmental Standards

The ESIA has examined the negative and positive, biophysical, and socio-economic effects of Chvaletice Manganese Project. Where potential negative effects have been identified, the ESIA has examined the extent to which these impacts would be mitigated through the adoption of good practice methods of working in line with international standards.

The company has implemented an environmental management system in accordance with the international standards ISO 14001 (environment) and ISO 45001 (occupational health and safety) in 2025.

The central document is the Environmental and Social Management Plan which was prepared together with the Environmental Action Plan as a management tool to ensure effective implementation of mitigation measures from ESIA process, stakeholder, legislation, international standards requirements and best available techniques practices to achieve Project´s goals.

This Plan together with additional Policies and Standards provide an overview of the processes to identify, avoid, mitigate and manage Project environmental and health and safety (EHS) risks during the Project.

The Project will be carried out in accordance with the ESIA commitments according to the following national legislation and the requirements of international standards and guideline documents:

- Technical Requirements of the Project,
- European and Czech national laws, regulations and other legal provisions regarding all environmental, health, safety, socio-economic, cultural heritage and biodiversity issues covered by ESIA,
- Lenders´ Requirements,
- Commitments in ESIA and other related documents.

Euro Manganese together with its subsidiary, MANGAN Chvaletice s.r.o. promote sustainable development and are committed to the integration of environmental, social, health and safety consideration into their procedures for the Project development and operation at all stages. They have developed a set of overarching ESHS company policies, Management Plans and Procedures and have committed to implement these into the Project to guide and ensure conformance to the Project Requirements, Regulations and Standards.

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21.0 CAPTIAL AND OPERATING COSTS

21.1 Capital Cost Estimate

Tetra Tech prepared the PEA capital cost estimate, which includes tailings extraction, all manganese recovery processing, infrastructure, and NMT/LR backfill dry stacking costs to recover manganese and produce high-purity manganese high-purity manganese sulphate monohydrate by re-processing the three CMP tailings cells, including magnesium carbonate as a by-product.

The capital cost estimate was developed based on:

- Updated design for the PEA, including mining, processing, NMT/LR backfill dry stacking, and infrastructure
- Material take-offs (MTOs) developed from the previous FS study for the areas which are the same as the previous study
- Preliminary equipment costs based on the updated quotations from potential suppliers
- Estimated inflation factors.

The capital cost estimate produced for the CMP is classified as a Class 5, PEA Estimate, with an expected accuracy of ±35% according to the American Association of Cost Engineering (AACE). The capital cost estimate is based on an updated design completed by Tetra Tech and BGRIMM in Q2 2026 and is for a preliminary economical assessment.

The capital cost estimates are summarized at the levels indicated by the following tables and stated in United States Dollars (USD) with a base date of Q1/Q2-2026 with no provision for forward escalation. This estimate collectively presents the entire costs for the project including all third-party estimates, Owner's scope, and Tetra Tech's scope.

The estimate has been established using a combination of equipment vendor-solicited preliminary budgetary quotations, local Czech materials, labour, and construction costs, in-house cost data for equipment and bulk material pricing for similar projects, preliminary estimating for most parts of the project, and capacity factor or equipment factor allowance for some components of the project. The cost estimate has been prepared using the project work breakdown structure (WBS).

One of the key updates for the PEA is to plan to develop the project in two stages. The project will start at a nominal process rate of 75,000 t/a (Phase 1) during Year 1 to Year 3, including the project ramp-up duration in Year 1. Then, the plant capacity will be expanded to 150,000 t/a (Phase 2) in Year 4. All the HPEMM produced will be converted to HPMSM. A magnesium carbonate will be produced as a by-product.

The total estimated initial capital cost for the design, construction, installation, and commissioning of the CMP for the 150,000 t/a HPMSM is $825.2 million, including $627.4 million for the initial 75,000 t/a HPMSM.

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Table 21-1 shows a summary breakdown of the initial capital cost for Phase 1 of the project.

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Table 21-1: Initial Capital Cost (Phase 1) Summary – WBS Level 1

WBS Level 1	Description	Cost ($000,000)
10	Overall Site	61.3
30	Tailings Extraction	4.6
35 and 40	Process	283.5
50	Residue Management	6.7
55	Closure Costs	-
60	Environmental	-
70	On-site Infrastructure	74.4
-	**Total Direct Costs**	**430.5**
90	Indirect Costs	108.7
98	Owner's Costs	21.5
-	**Total Indirect/Owners Costs**	**130.2**
99	Contingency	66.7
-	**Project Total**	**627.4**

The additional capital costs for expanding the project capacity (Phase 2) to 150,000 t/a are estimated to be $197.8 million. The cost breakdown is shown in Table 21-2. The overall capital costs estimated for the project to produce 150,000 t/a HPMSM is $825.2 million.

Table 21-2: Project Expansion Capital Cost (Phase 2) Summary – WBS Level 1

WBS Level 1	Description	Cost ($000,000)
10	Overall Site	3.0
30	Tailings Extraction	-
35 and 40	Process	113.7
50	Residue Management	-
55	Closure Costs	-
60	Environmental	-
70	On-site Infrastructure	19.0
-	**Total Direct Costs**	**135.7**
90	Indirect Costs	34.3
98	Owner's Costs	6.8
-	**Total Indirect/Owners Costs**	**41.1**
99	Contingency	21.0
-	**Project Total**	**197.8**

The base currency of the estimate is USD. As shown in Table 21-3, Tetra Tech used the 2024 and 20258 two-year monthly average foreign currency exchange rates for the estimate, where applicable.

Table 21-3: Foreign Exchange Rates

Base Currency (USD$)	Foreign Currency
1.00	CAD $1.36
1.00	CZK 22.57
1.00	EUR €0.91
1.00	RMB ¥7.00

Note: Average monthly exchange rates; some equipment prices were converted from local currency to USD based on 2024 and 2025 monthly average exchange rates.

21.1.1 Estimate Base Date and Validity Period

The capital cost estimate was prepared with a base date of Q1/Q2 2026. No escalation beyond Q2 2026 was applied to the estimate.

21.1.2 Measurement System

The metric system of measurement has been used in this estimate.

21.1.3 Estimate Structure

The estimate is broken out into direct, indirect, Owner's, and contingency costs.

Direct costs pertain to the permanent equipment, materials, and labour associated with the physical construction of the process facility, infrastructure, utilities, and buildings. The direct costs are a build-up of the current project quantities; this includes the installation/construction hours, unit labour rates, contractor indirects, bulk and miscellaneous material and equipment costs, sub-contractor costs, freight, and growth.

Construction contractor's indirect costs are priced in the indirects as a separate line item for contractor profit, insurance, overheads, construction equipment, transportation, etc. The cost item is based on a factor of total labour costs in the Czech Republic. Based on current projects recently completed, cost data was analyzed and confirmed against Tetra Tech's in-house benchmarks and deemed appropriate.

Indirect costs include all costs associated with implementation of the plant and incurred by the Owner, engineers, or consultants in the design, procurement, construction, and commissioning of the project.

21.1.4 Work Breakdown Structure (WBS)

The estimate is assembled according to the following hierarchical structure:

- Level 1 = Major Area
- Level 2 = Area
- Level 3 = Sub-Area

Each sub-area has been further broken down into disciplines such as earthworks, civil, concrete, steel, platework, mechanical, piping, electrical, instrumentation, and fire protection. Each discipline line item is defined into resources

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such as labour, materials, equipment, and sub-contract so that each line comprises all the elements required in each task.

21.1.5 Direct Costs

21.1.5.1 CMP Tailings Extraction Capital Cost

The tailings extraction initial capital cost includes costs for tailings extraction equipment and related infrastructure:

- Purchase of excavation equipment
- Haul road construction
- Capitalized pre-stripping cost

21.1.5.2 Process and Overall Site Infrastructure Capital Cost

The overall process plant circuit design, infrastructure, and various service facilities at the plant site were based on the previous designs by BGRIMM for process and site infrastructures, Sodup, a local Czech engineering firm, for the railway spur system and Tetra Tech for the 400 kV incoming power transformer station.

Major process-related mechanical and electrical cost estimates are based on preliminary quotations from potential equipment manufacturers in China. The 400 kV incoming power transformer station costs and the railway spur upgrading were factored based on the previous budgetary quotations.

Process

The process includes the raw tailings transport from the dump pocket by conveying to the raw tailings storage facility, the raw tailings pulping and pumping to the plant site, magnetic separation, magnetic concentrate leaching, leach solution purification, manganese electrowinning (including cathode harvesting, washing, stripping, and preparation and HPEMM storage), magnesium removal from anolytic solution and storage and packing, ammonia recovery, leach residue washing, HPMSM production from HPEMM, non-magnetic tailings and washed leach residue dewatering, dewatered NMT/LR transport from the plant site to the mine site, NMT/LR temporal storage in the raw tailings pulping facility at the mine site, reagent handling and storage and product handling. Various process buildings, product handling and reagent storage and handling facilities, area electrical distribution, piping, and instrumentation are included in these areas. The additional equipment and building spaces required to convert all the HPEMM to the HPMSM are included in the capital cost estimates. The capital cost upgrading also includes the additional costs for upgrading the magnesium carbonate produced from magnesium removal circuit into a saleable by-product.

Site Services and Utilities

Site services and utilities include the preparation of MTO and cost estimate for water management (contact and non-contact and storm water), water supply and distribution, cooling water systems, wastewater treatment, power supply and distribution, steam generation and distribution, waste management, process controls and communications, air supply and distribution, fire suppression, and railway spur systems. The infrastructure related capital costs required for the increased HPMSM production and for upgrading the opened employee personal car parking lot into a three-level parking building have been included into the capital cost estimates.

Site Infrastructures

Site infrastructure includes the following buildings:

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- Extracted tailings storage and pulping and washed LR/NMT storage tailings storage facility
- Plant site and mine site connection gallery for LR/NMT transport conveyor, tailings slurry pipeline, and utilities
- Magnetic separation and related concentrate and non-magnetic tailings dewatering facilities
- Leaching and iron/phosphorous removal circuits
- Leach solution purification
- Manganese electrowinning for producing HPEMM
- Magnesium removal and magnesium carbonate by-production drying and packing
- Leach residue washing and dewatering
- Ammonia recovery
- Upgraded facility for electrolytic manganese metal flake dissolution to prepare manganese sulphate solution and solution purification
- Upgraded HPMSM crystallization and crystal drying and packing
- Upgraded reagent storage/preparation
- Upgraded steam generation
- Administration building
- Canteen and change room building
- Spares parts storage building
- Emergency power plant building
- Product warehouse
- Maintenance workshop and spares parts storage building
- Technical and engineering services building
- Cooling water systems
- Site water management system, including wastewater treatment plant
- Railway spur system

21.1.5.3 Residue Management Capital Cost

Tetra Tech developed the tailings/residue management capital cost, which is based on local construction labour rates and material costs. The capital cost estimate includes:

- Mobilization/demobilization, insurance, accommodation, overheads, supervision
- Stripping and stockpile of topsoil in external starter cell footprint
- Foundation preparation

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- HDPE geomembrane liner supply and installation, including overliner protection/drainage layer
- Surface water diversion/perimeter collection ditches, including contact water management pipes/pumps
- Pad roller compactor and dozer (loaders will be shared with the CMP tailings extraction)
- Construction QC/QA and environmental/geotechnical monitoring.

21.1.6 Indirect Costs

The total indirect costs are estimated to be $143.0 million, including $108.7 million for the Phase 1 construction and $34.3 million for the Phase 2 construction. The indirect costs include:

- Construction Indirects
- Contractor's Indirects
- Construction Camp, Housekeeping and Catering
- Spares
- Freight and Logistics
- Initial Fills
- Commissioning and Startup
- Engineering, Procurement, and Construction Management
- Vendor Representation.

21.1.7 Owner's Capital Cost

Owner's costs are costs provided by the Owner to support and execute the Project. The Project execution strategy, in particular for construction management, involves the Owner working with an engineering, procurement, and construction management (EPCM) organization and supervising the general contractor(s). The Owner's costs include home office staffing, home office travel, home office general expenses, field staffing, field travel, general field expenses, community relations, and Owner's contingency.

The total Owner's cost allowance for the Project is estimated to be $21.5 million for the Phase 1 construction and $6.8 million for the Phase 2 construction based on approximately 5% of the direct costs.

21.1.8 Contingency

Contingency is a provision of funds for unforeseen or inestimable costs within the defined project scope relating to the level of engineering effort undertaken and estimate/engineering accuracy and applied to provide an overall level of confidence in costs and schedule outcomes. The contingency is meant to cover events or incidents that occur during the Project which cannot be quantified during the estimate preparation; it does not include any allowance for Project risk. The estimated contingencies are $66.7 million for the Phase 1 construction and $21.0 for the Phase 2 construction respectively.

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Contingency excludes:

- Major scope changes, such as changes in end-product specification, capacities, building sizes, or location of the asset or project
- Extraordinary events, such as major strikes and natural disasters
- Management reserves
- Escalation and currency effects

21.1.9 Taxes and Duties and Escalation

The following documents have been used in the preparation of the capital cost estimate.

21.1.9.1 Taxes and Duties

Taxes and duties are not included in the estimate.

21.1.9.2 Escalation

No allowance for escalation has been included beyond Q1/Q2-2026.

21.1.10 Assumptions and Exclusions for Initial Capital Costs

21.1.10.1 Assumptions

The following items are assumed for this capital cost estimate:

- All design is to BGRMM and Tetra Tech standard specifications.
- Competent rock is assumed to be 2.5 m below grade in areas lacking geotechnical test work, with a minimum average allowable bearing capacity of 200 kPa.
- Topsoil is assumed to be 2.2 m deep on average.
- Concrete unit rates based on concrete ready-mix plant located nearby project site.
- Concrete pours to occur in the spring/summer/fall season, additional costs will be required for winterization.
- Steel supply and fabrication pricing based on Q1/Q2-2026 pricing, no additional costs added for future escalation.
- All process assumptions are detailed in the Process Design Criteria.
- Czech Fire Code requirements are assumed to be sufficient for Euro Manganese insurance.
- All process equipment and materials will be purchased new from China.
- Contracts awarded for construction work packages will be based on competitive bids.
- Routing for off-plot piping and overhead power distribution line have been assumed based on available topography and understanding of the terrain.
- All process plant piping is painted, unless galvanized, stainless, or insulated.

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21.1.10.2 Exclusions

The following items are excluded from this initial capital cost estimate:

- Working or deferred capital
- Financing costs
- Refundable taxes and duties
- Currency fluctuations
- Lost time due to severe weather conditions
- Lost time due to force majeure
- Lost time due to pandemic
- Changes to design criteria
- Additional costs for accelerated or decelerated deliveries of materials
- Services resultant from a change in project schedule
- Warehouse inventories, other than those supplied in initial fills, and critical spares as included in the vendor equipment budgetary quotations
- Any project sunk costs (testwork, studies, exploration programs, etc.)
- Escalation costs
- Operating costs
- Sustaining capital costs
- Force majeure issues
- Scope changes
- Special incentives (schedule, safety, other)

21.1.11 Sustaining Capital Estimates

The sustaining capital cost for the life of project is estimated at approximately $139 million, excluding the cost of $197.8 million for the HPMSM production rate expansion from 75,000 t/a to 150,000 t/a. The cost is assumed to be used for major equipment replacements for the CMP tailings extraction and process plant. The costs for routine equipment maintenance, including small equipment replacements and spare parts, are included in operating costs.

21.2 Operating Cost Estimate

On average, the LOP on-site operating costs are estimated as $181.99/t of CMP tailings reprocessed, or $4.14/kg manganese metal produced (equivalent). The on-site operating costs are defined as the direct operating costs including CMP tailings extraction, processing, water treatment, NMT/LR dry stacking, site servicing, and G&A costs and exclude offsite costs such as product freight costs, sales related costs, government, and third-party royalties, which are included in the economic analysis (Section 22.0).

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The estimates are based on an average annual plant feed rate of approximately 1.1 Mt of the CMP tailings, or an average annual HPMSM production of approximately 150 kt, including the Phase 1 operation and the ramp-up years. For the initial years at a nominal process rate of 75 kt HPMSM per year, the overall operating cost was estimated to be higher than the LOP average, which is $223.61/t of CMP tailings processed. Table 21-4 shows the LOP average cost breakdown for various areas and Figure 21-1 shows the cost distribution. The major cost for the CMP is the HPEMM and HPMSM processing and site services related costs, which account for approximately 87.7% of the total cost. A contingency of 5% is included in the estimate.

Table 21-4: LOP Average Overall Operating Cost Summary

Area	Unit Operating Cost	
	($/t processed)	($/kg Mn)*
Tailings Extraction	2.11	0.05
Magnetic Separation, HPEMM and HPMSM Processing	138.30	3.15
Site Services and Water Treatment	21.29	0.48
Residue Stacking/Storage	0.61	0.01
G&A	11.01	0.25
Contingency on Operating Costs	8.67	0.20
Total Operating Cost	**181.99**	**4.14**

*Note: *Unit cost per kilogram manganese metal produced (equivalent).*

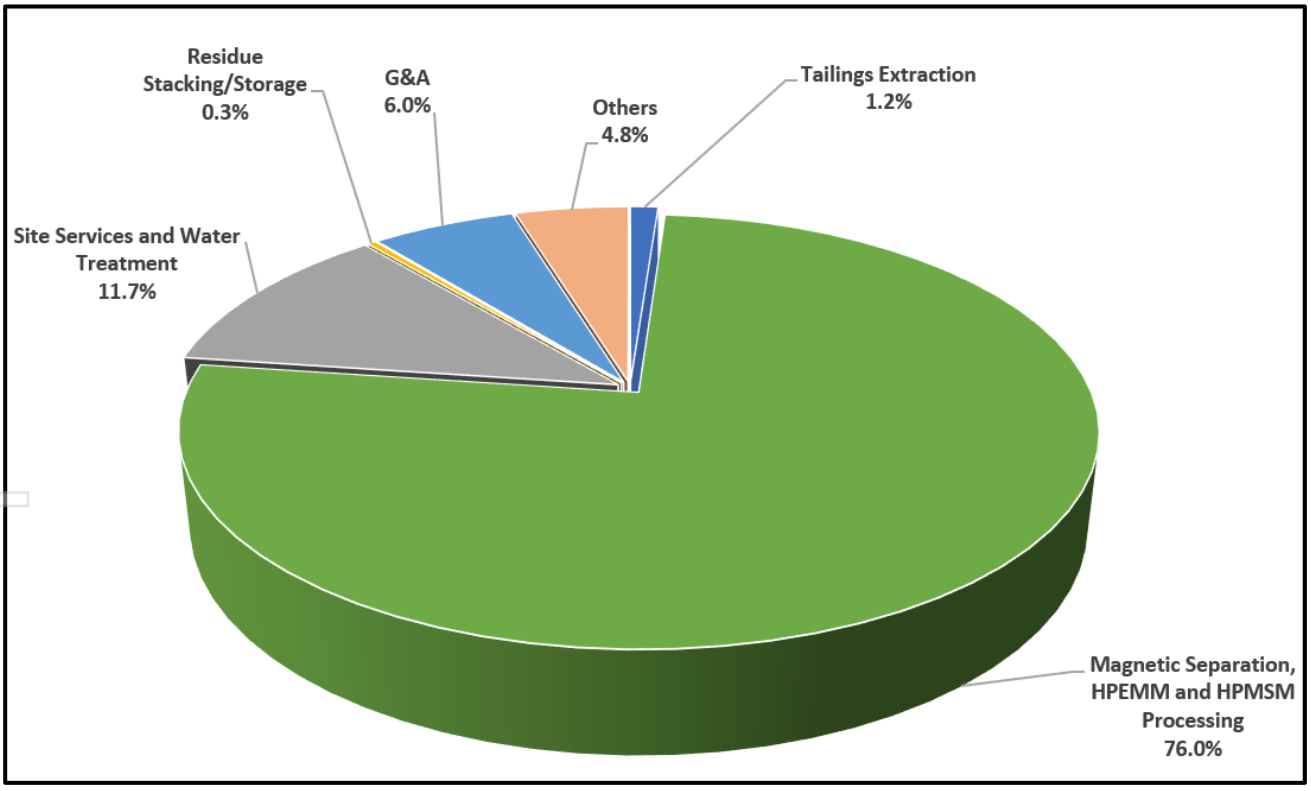

Figure 21-1: LOP Average Overall Operating Cost Distribution by Area

Source: Tetra Tech (2026)

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The operating cost estimates are based on:

- Estimated consumable consumptions based on test results
- Forecast consumable prices by Argus Media Group (Argus) for major chemical consumables, electricity, and diesel
- Quoted/updated consumable prices for minor chemical reagents
- Labour salaries/wages (Q1/Q2 2026)
- Information from Tetra Tech's in-house database.

The estimates do not include any escalation past this date. The expected accuracy range of the operating cost estimate is ±35%. All the costs are estimated in US dollars, unless specified. The foreign exchange rates used for the estimates are shown in

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Table 21-1.

It is assumed that operation personnel will reside in towns or villages nearby. There will be no accommodation provided at site. The CMP will provide one meal catering services for on-shift operators. Personnel will commute to the site at their own expense.

The operating costs exclude shipping charges, insurance, and sales costs for the manganese products and magnesium by-product, as well as government and third-party royalties, which are included in the economic analysis (Section 22.0).

All operating cost estimates exclude taxes unless otherwise specified.

21.2.1 CMP Tailings Extraction

The CMP tailings extraction operating costs have been estimated on an annual basis. The extraction operation will operate 14 hours per day, 5 days per week, excluding weekends and public holidays. A temporary stockpile is planned to be located adjacent to the CMP tailings pulping facility to meet the operating requirement of the hydrometallurgical processing plant, which will operate 3 shifts and 24 hours per day, 7 days per week.

The tailings extraction estimate includes labour, fuel, lubricant, consumables, maintenance, and mining-related G&A costs. Table 21-5 summarizes the average tailings extraction costs over the project life and Figure 22-2 illustrates the cost distribution by category. An average unit cost of $2.11/t of plant feed was estimated, excluding contingency. The major cost for the tailing extraction is the labour-related cost. The extraction costs vary for each year based on the scheduled throughput for each year and on haul distances from the extraction site to the plant feed pulping facility.

Table 21-5: Tailings Extraction Operating Costs

Area	Unit Operating Cost ($/t processed)
Fuel and Lubricant	0.35
Labour	1.42
Maintenance	0.15
Consumables	0.19
Total Tailings Extraction Operating Cost	**2.11**

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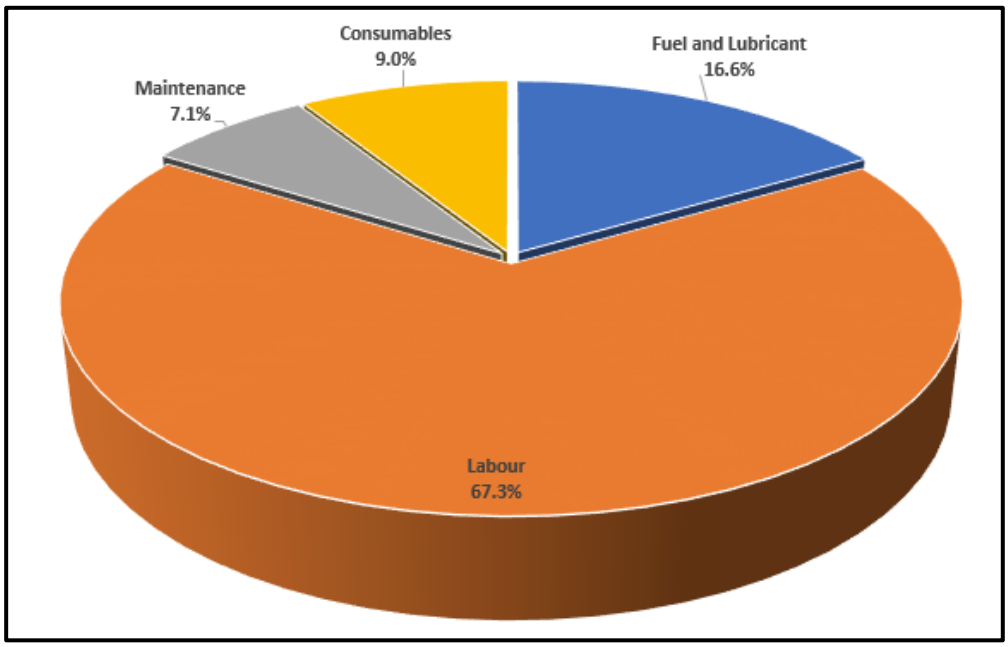

Figure 21-2: Tailings Extraction Operating Cost Distribution by Category

Source: Tetra Tech (2026)

21.2.2 Process Operating Costs

The unit process operating cost for the CMP is estimated as $145.24/t plant feed at the nominal process plant feed rate of approximately 1.1 million per year, or equivalent to approximately 150,000 t HPMSM per year, including the process related other costs (contingency) of 5% of the total process related operating cost. The estimate is based on 12-hour shifts, 24 hours per day, 365 days per year at a plant availability of 90.4%. All the HPEMM produced is planned to be converted to HPMSM. The operating cost includes the processing cost for generating the magnesium carbonate by-product.

Table 21-6 summarizes the estimated process operating costs by processing area and Table 21-7 summarizes the costs by process category. Figure 21-3 and Figure 21-4 show the cost distributions by processing area and by category, respectively.

Table 21-6: Process Operating Cost Summary by Area

Area	Unit Operating Cost ($/t processed)*
Magnetic Separation and NMT Dewatering	3.09
Leaching and Fe/P Purification	35.54
Solution Purification	6.88
Electrowinning	46.56
Residue Washing and Dewatering	2.04
Manganese Recovery	0.82
Magnesium Removal/Recovery	8.40
Ammonia Recovery	8.45
HPMSM Production	25.12

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Area	Unit Operating Cost ($/t processed)*
Product Handling/Packing	0.09
Testing and QA/QC	1.33
Subtotal	138.32
Contingency	6.92
Total Process Operating Cost	**145.24**

** at nominal plant rate of approximately 1.1 Mt tailings/at or equal to approximately 150,000 t HPMSM/a*

Table 21-7: Process Operating Cost Summary by Category

Area	Unit Operating Cost ($/t processed)*
Labour	7.56
Reagents	54.77
Maintenance/Operation Supply	10.85
Electricity	38.39
Other Consumables	26.75
Contingency	6.92
Total Process Operating Cost	**145.24**

** at nominal plant rate of approximately 1.1 Mt tailings/a or equal to 150,000 t HPMSM/a*

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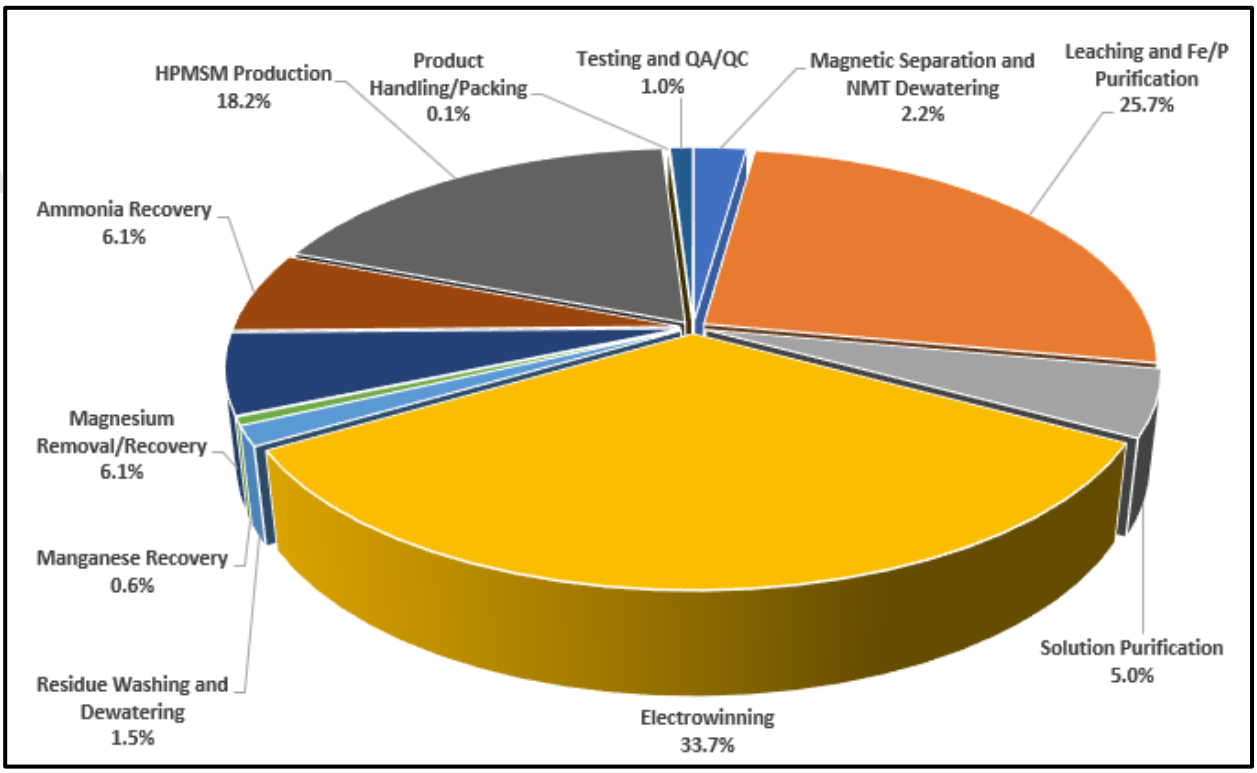

Figure 21-3: Process Operating Cost Distribution by Area

Source: Tetra Tech (2026)

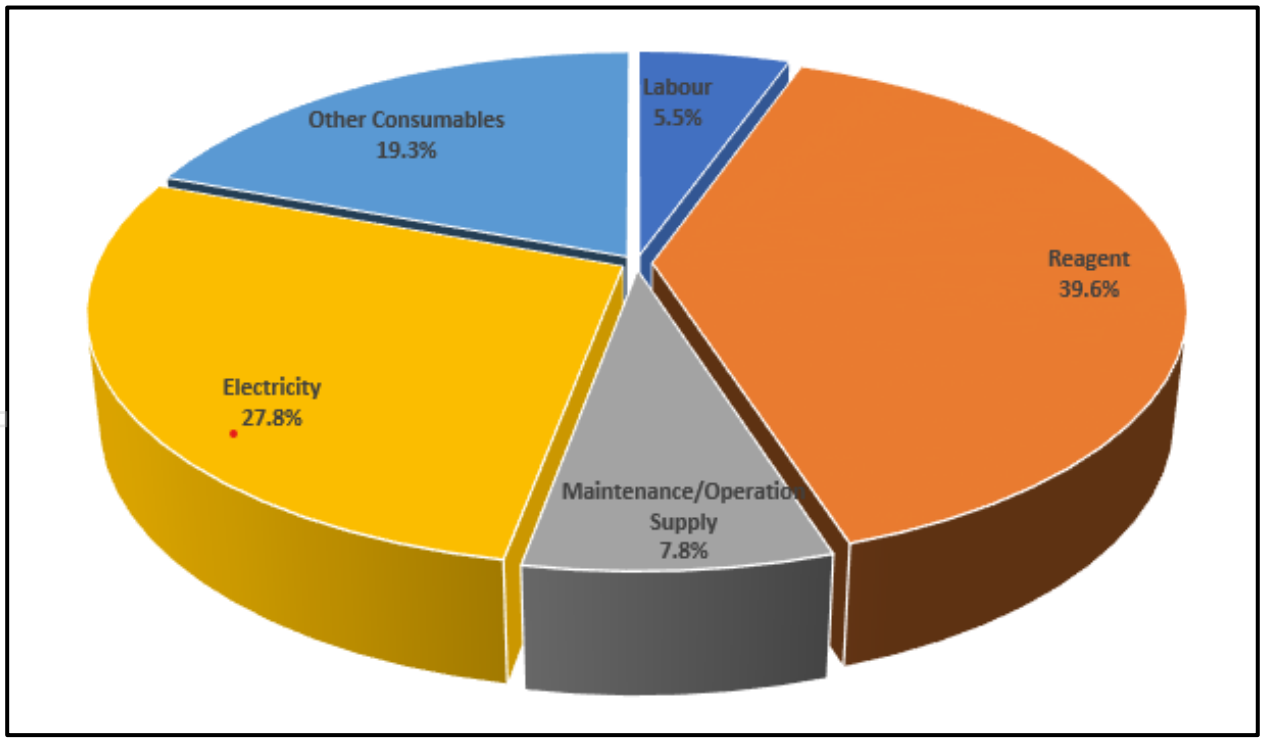

Figure 21-4: Process Operating Cost Distribution by Category

Source: Tetra Tech (2026)

An average unit operating cost of approximately $145.24 plant feed was estimated for HPMSM production, including testing and QA/QC-related costing. The major costs for HPMSM production are HPEMM converting HPMSM related costs, acid leaching, iron, and phosphorous removal-related costs, and HPEMM electrowinning-related costs, which account for 18.2%, 25.7%, and 33.7% of the total processing cost, respectively.

The cost for converting HPEMM to HPMSM is estimated as $26.38/t plant feed with a contingency of 5%.

The cost for testing and QA/QC control is estimated as $1.40/t plant feed, including the contingency.

The major processing costs by category are the costs related to reagents and electricity power, accounting for approximately 39.6% and 27.8%, respectively.

The process operating cost estimate breakdowns by category are detailed in the following subsections.

21.2.2.1 Personnel

Personnel requirements include supervision, operation, and maintenance. Salary/wage levels include various benefit burdens, based on the estimated Q1/Q2 2026 labour rates in the Czech Republic. The burden rate used for the estimates was 34%. The benefit burdens for the workers include retirement savings plans, various life and accident insurances, medical benefits, unemployment insurance, tool allowance, and other benefits.

The preliminary estimates show that approximately 298 workers, including management, technical support, and maintenance will be required for the process plant, excluding CMP tailings extraction, NMT/LR dry stacking, overall site G&A, site services, and water treatment operations. The projected process personnel requirement includes:

- 40 staff for management and technical support, including personnel at laboratories for quality control, process optimization, and assaying
- 207 operators servicing overall operations from CMP tailings pulping to the HPMSM product loadout and control room operators
- 51 personnel for equipment maintenance, including the maintenance management team.

21.2.2.2 Power

Electrical Power consumption is one of the largest operating costs for the CMP, driven by the electrowinning circuit which operates primarily on a baseload profile throughout the year and is responsible for approximately 63% of total electrical energy consumed. The total estimated electrical energy consumption is approximately 500 GW/a, with a nominal operating capacity of approximately 80 MW, and installed capacity of approximately 90 MW. In 2026, Mangan solicited the services of Argus Media Group at United Kingdom to conduct electrical supply market study at Czech Republic. Argus provide projected electrical power unit price for the project.

21.2.2.3 Reagent Consumables

The cost-related operation consumables are estimated to be the largest operating cost, compared to the other costs. It accounts for 40% of the total process operating costs, or $54.77/t plant feed, excluding contingency. Reagent consumptions were estimated based on test results, METSIM™ simulation, and BGRIMM, Tetra Tech, and EMN technical teams' experience. The reagent costs are based on projected future prices by Argus for major chemical consumables and quoted/updated consumable prices (Q1/Q2, 2026) for minor chemical reagents.

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Sulphuric acid, hydrated lime, and ammonium bicarbonate are the main reagents expected to be consumed in HPEMM and HPMSM production. Two different quality types of sulphuric acid, smelter sulphuric acid and high purity sulphuric acid, were assumed to be used for the magnetic concentrate leaching and HPEMM dissolution respectively.

21.2.2.4 Other Operation Consumables

Consumptions for other major consumables, such as filter clothes, cathode, and anode plates, are based on potential suppliers' data and BGRIMM, Tetra Tech, and EMN technical teams' experience; unit prices are based on quotations by potential suppliers or for minor items by BGRIMM and Tetra Tech's in-house database. The steam consumption for acid leaching, ammonia stripping, and crystallization circuits was estimated by BGRIMM design and METSIM™ simulation. Steam will be generated onsite by recovered hydrogen off-gas from HPMSM production and nature gas from local natural gas network.

21.2.2.5 Maintenance/Operation Supplies

The cost for maintenance/operation supplies is estimated as $10.85/t plant feed without a contingency. At the nominal process rate of 1.1 million tonnes of the plant feed, the maintenance supplies were estimated based on approximately 10% of major equipment capital costs based on Tetra Tech's experience.

21.2.2.6 Contingency

A contingency of 5% of the estimated operating cost is included in the operating cost estimate.

21.2.3 NMT/LR Dry Stacking

Tetra Tech developed the tailings/residue management operating cost, which includes equipment operating and annual surface preparation costs. For the life of the project, the average annual NMT/LR dry stacking operating cost is estimated as approximately $0.61/t plant feed. The costs associated with the RSF closure are excluded from the estimate and were estimated separately as closure sustaining capital costs and included in the CMP economic analysis. The operating cost estimate includes:

- Strip and stockpile topsoil in external starter cell footprint
- Clearing and surface preparation of residue placement area
- Bulk fill of material to level residue placement area for drainage
- Operation of one loader for material handling and placement of residue
- Pad levelling by a roller compactor.

21.2.4 General and Administrative and Site Services

The LOP average G&A operating cost and the overall site service operating cost, including water treatment, are estimated as $11.01/t plant feed and $21.29/t plant feed, respectively.

21.2.4.1 General and Administrative Related Cost

The G&A cost at the nominal process rate is estimated as $9.57/t plant feed. Table 21-8 summarizes the G&A cost estimates. The cost for management personnel is estimated as $1.56/t plant feed. The general expense is estimated as $8.01/t plant feed.

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Table 21-8: G&A Cost Estimates at Nominal Process Rate of 150,000 t/a

Area	Labour	Annual Cost ($/a)	Unit Operating Cost ($/t processed)
Labour	37	1,726,000	1.56
General Expenses	-	8,860,000	8.01
Subtotal	37	10,586,000	9.57

Personnel

Personnel includes a general manager and staffing for accounting, purchasing, environmental, sales, and other G&A departments. The total employee number for G&A is estimated as 37. Only personnel working at the CMP site were included.

Salaries and wages are based on the Q1/Q2 2026 Czech Republic labour rates and include a benefit burden of 34% for employees to cover retirement savings plans, various life and accident insurances, medical benefits, unemployment insurance, and other benefits.

General Expenses

General expenses include general administration, contractor services, insurance, security, medical services, legal services, human resources, travel, communication services/supports, external assay/testing, engineering consulting, catering/meal services for onsite workers, land lease, and sustainability, including an environment and community liaison.

21.2.4.2 Site Services

The overall site service cost at the nominal process rate, including the tailings extraction site and the plant site, water treatment and handling and railway spur operation, is estimated as $20.72/t plant feed, including $19.29/t plant feed for general site services, $1.02/t for railway spur operation, and $1.43/t plant feed for site water treatment (Table 21-).

Table 21-9: Site Service Cost Estimates at Nominal Process Rate of 150,000 t/a

Area	Staffing	Annual Cost ($/year)	Unit Operating Cost ($/t processed)
General Site Services			
Labour	51	1,286,000	1.16
General Expenses	-	18,924,000	17.11
Subtotal	**51**	**20,210,000**	**18.27**
Water Treatment			
Labour	6	179,000	0.16
General Expenses	-	1,402,000	1.27
Subtotal	**6**	**1,581,000**	**1.43**
Railway Spur Operation			
Labour	19	552,000	0.50
General Expenses	-	577,000	0.52
Subtotal	**19**	**1,129,000**	**1.02**

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Personnel

A total of 76 employees is expected to be needed for general site services, which cover general service management and operations. The operations will include general yard services, supply unloading, product loading, site water management, small mobile machine operation, steam generation plant, railway spur system operation (including engine operators), and general maintenances.

Six workers are estimated to be required for the water treatment operation, including reagent preparation. Water treatment equipment maintenance will be conducted by a joined maintenance force from general site service and plant service teams.

Salaries and wages are based on the Q1/Q2 2026 Czech Republic labour rates, including a burden rate of 34% for the site service workers. The benefit burdens for the workers will cover retirement savings plans, various life and accident insurances, medical benefits, unemployment insurance, tool allowance, and other benefits. Mangan estimated the labour and burden rates according to local market data.

General Expenses

Operating expenses for general site services include small vehicle equipment operations, potable water supply, process makeup water supply, hot water and demineralized water supplies, waste management, building maintenance, road maintenance, power line maintenance, railway spur operation, steam operation, office power supply and service office/workshop heating.

Process water makeup water and hot water will be supplied from Severn power plant. The industrial water or so-called “green water” from the power plant will be used as process makeup water. The hot water will be used for building heating and process heating for the concentrate acid leach and iron/phosphorous removal circuits. Demineralization water will be used for producing steam, mainly for ammonia recovery, HPMSM evaporative crystallization, and HPMSM crystal drying, and generating pure water for HPMSM production. Whether the process water and hot water sources will be available for the CMP project should be further investigated.

Steam will be generated on site using hydrogen gas recovered from HPMSM production circuit and natural gas from the local natural gas pipeline network immediately adjacent to the CMP’s plant site. The demineralization water will be used for the steam generation.

Operating expenses for the water treatment plant, including cooling system operation, will mainly cover water treatment reagent, electricity power, and maintenance and operation supplies.

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22.0 ECONOMIC ANALYSIS

The PEA is preliminary in nature and may include Inferred Mineral Resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as Mineral Reserves, and there is no certainty that the results of the PEA will be realized. Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability.

Tetra Tech completed a pre-tax economic analysis based on estimated costs and revenues for extracting and reprocessing the tailings from the Chvaletice deposit. The economic analysis for the Chvaletice PEA project is based on the sale of HPMSM with a magnesium carbonate by-product. The economic analysis concluded the following pre-tax financial results:

- Pre-tax NPV of USD$740.0 million at an 8% discount rate
- Pre-tax IRR of 16.0%
- Pre-tax payback period of 6.5 years

Grant Thornton Czech Republic s.r.o. (Grant Thornton), based in the Czech Republic, prepared both the Czech tax depreciation calculations based on the capital expenditure information and the allocation of such expenditures into the Czech tax depreciation groups, and the Czech corporate income taxes payable for the CMP economic analysis based on existing income tax legislation in the Czech Republic.

The post-tax economic analysis for the life of the project yielded the following financial results:

- Post-tax NPV of USD$492.1 million at an 8% discount rate
- Post tax IRR of 13.8%
- Post-tax discounted payback period of 7.3 years

The PEA economic evaluation shows that the project is most sensitive to product prices followed by operating costs.

Key inputs into the financial model include:

- HPMSM pricing, as shown in Table 19-1
- Project start-up (construction commences) in 2028
- Operations start-up in Q1 2032
- Nominal full production rate of approximately 150,000 t/a of HPMSM
- Plant capacity of 50%, or 75,000 t/a during production Year 1 to Year 3
- Plant expanded to the full capacity of production in Year 4
- Life-of-project saleable product includes 3.65 Mt of HPMSM, focusing principally on Europe and USA's rapidly emerging battery industry and 505.7 Kt of magnesium carbonate by-product at USD$800/t
- Czech Koruna to United States Dollar: 22.57 CZK to USD$1.00
- Czech royalty of 2,308 CZK per t of saleable manganese produced

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- Average shipping cost of USD$133.4/t of HPMSM product sold based on the assumption that HPMSM products will be sold in Europe and USA
- Average shipping cost of USD$24.2/t of magnesium carbonate by-product sold locally
- Insurance on saleable products of 0.04% of the product value
- Selling costs of 0.5% of the product value
- Overall manganese recovery of 60% to HPMSM
- HPMSM Mn content of 32.34%
- Overall magnesium recovery of 46%.

In addition to the key inputs, the following estimated inputs have been used in the financial model:

- Pre-production capital costs of USD$627.5 million for the Phase 1 production of 75,000 t/a HPMSM and USD$197.8 million for the project expansion to 150,000 t/a HPMSM, sustaining capital of USD$139.1 million
- Salvage value of USD$43.4 million (5% of initial capital) and reclamation costs of USD$2.0 million.

Table 22-1 shows a summary of the financial modelling results. Figure 22-1: Summary of Financial Results shows a summary of the financial modelling results in graphical form.

Table 22-1: Summary of Financial Results

Financial Summary	Units	Value
Tailings Extraction and Processing Information		
Life-of-project	years	26
Annual Tonnage Processed (Life-of-project Average)	kt	1,037
Manganese Grade (Average)	%	7.32
Contained Manganese (Life-of-project)	kt	1,975
HPEMM produced	kt	1,205
HPMSM produced/sold	kt	3,651.9
Revenue		
Revenue from HPMSM	USD$ millions	10,585
Revenue from MgCO3 By-product	USD$ millions	405
Total Revenue	USD$ millions	10,989
Sales Costs		
Selling and Distribution Costs (Freight, USD$116/t)	USD$ millions	502.1
Selling and Distribution Costs (Insurance, 0.04%)	USD$ millions	4.4
Selling and Distribution Costs (Sale, 0.5%)	USD$ millions	54.9
Total Selling Costs	USD$ millions	561.4
Life-of-Project Operating Costs		
Tailings Extraction	USD$ millions	56.9

Financial Summary	Units	Value
Process – Magnetic Separation	USD$ millions	84.6
Processing to HPEMM	USD$ millions	2,961.9
Processing of HPEMM to HPMSM	USD$ millions	682.1
Tailings Stacking/Storage	USD$ millions	16.5
Site Services	USD$ millions	536.8
Water Treatment and Handling	USD$ millions	37.1
G&A	USD$ millions	296.8
Contingency on Operating Costs	USD$ millions	233.7
Total Life-of-Project Operating Costs	USD$ millions	4,906.4
Other Costs		
Czech Government Royalty	USD$ millions	121.2
CEZ Land Owners Royalty	USD$ millions	172.7
Total Life of Project Costs	**USD$ millions**	**5,761.6**
Capital Costs & Other Costs		
Pre-production Capital Costs (Phase 1 + Phase 2)	USD$ millions	825.3
LOP Sustaining Costs	USD$ millions	139.1
Working Capital	USD$ millions	43.4
Reclamation Costs	USD$ millions	2.0
Salvage Value	USD$ millions	41.3
Total Capital Costs and Other Costs	USD$ millions	923.1
Life-of-Project Pre-Tax Undiscounted Cashflow	USD$ millions	4,304.4
Czech Corporate Taxes Payable	USD$ millions	951.4
Life-of-Project Post-Tax Undiscounted Cashflow	USD$ millions	3,353.0
Pre-tax NPV at 8% Real Discount Rate	USD$ millions	740.0
Pre-tax IRR	%	16.0
Pre-tax Payback Period	years	6.5
Post-tax NPV at 8% Real Discount Rate	USD$ millions	492.1
Post-tax IRR	%	13.8
Post-tax Payback Period	years	7.3

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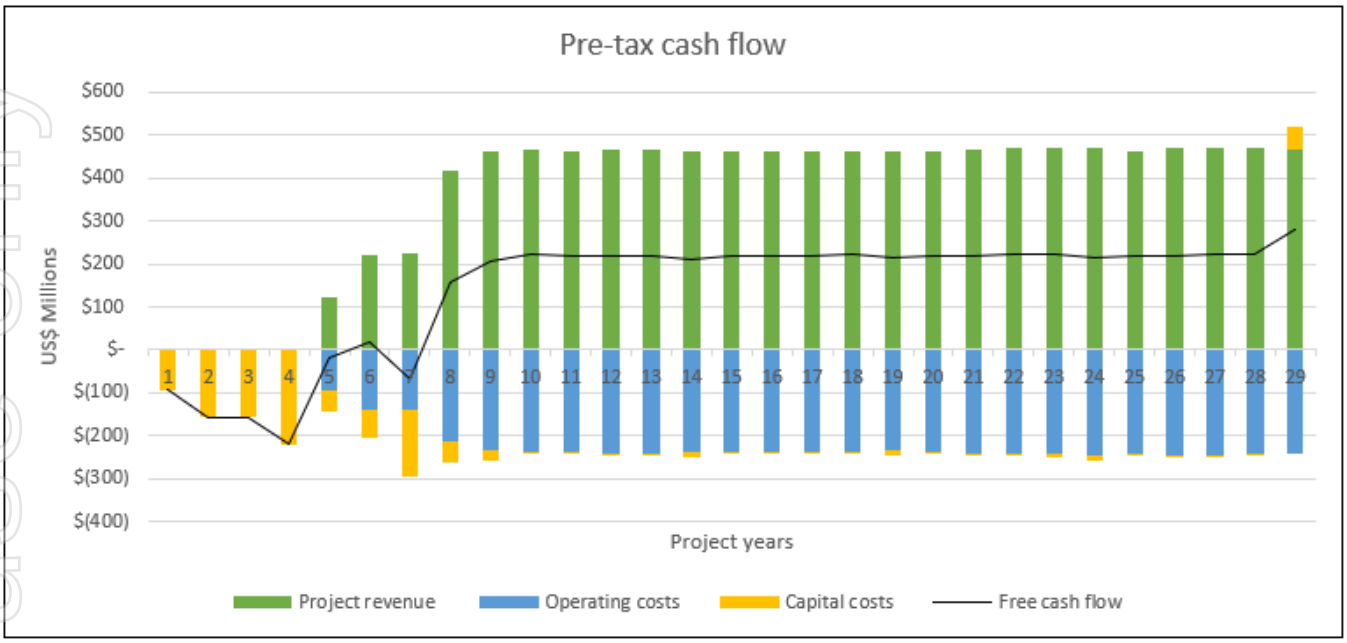

Figure 22-1: Summary of Financial Results

Source: Tetra Tech (2026)

22.1 Basis of Financial Evaluations

The production schedule was incorporated into the 100% equity pre-tax financial model to develop annual recovered metal production from the relationships of tonnes processed, head grades, and recoveries.

Cash flows are discounted to an assumed decision point, which is currently assumed to be the completion of a PEA Update and securing of funding for construction four years prior to commercial production.

HPMSM selling values are based on a price outlook included in an independent marketing study completed for this PEA by the Marketeye. Magnesium carbonate by-product selling values are based on the current market price estimated by Tetra Tech based on an industrial-grade material. Revenues derived from the sale of HPMSM and magnesium carbonate by-product were estimated by subtracting transportation, insurance, and selling costs. Operating costs for tailings extraction, processing, G&A, and other site-wide operating costs were deducted from revenues to derive annual operating cash flows.

Initial and sustaining capital costs, as well as working capital, were incorporated on a year-by-year basis over the life-of-project. Demolition and site reclamation costs were applied to the capital expenditure proceeding the last production year with an add back from the plant salvage value. Capital expenditures were then deducted from the operating cash flow to determine the net cash flow before taxes.

Initial capital expenditures include costs accumulated prior to first production of concentrate. Sustaining capital includes any capital expenditures required during the production period.

Working capital is assumed to be two months change in the annual operating cost (inventory) and two months change in revenues (receivables). Working capital required fluctuates from year to year based on the annual cash flows. The working capital is recovered at the end of the project.

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22.2 Corporate Income Tax Calculations and Assumptions

EMN commissioned Grant Thornton to prepare: (i) the Czech tax depreciation calculations based on the capital expenditure information and the allocation of such expenditures into the Czech tax depreciation groups, (ii) the Czech corporate income taxes payable for the CMP economic analysis based on existing income tax legislation in the Czech Republic. The taxes are based on the pre-tax cash flows.

The following subsections outline the assumptions for tax estimation purposes used in the PEA.

22.2.1 Financing

It is assumed the Project will be 100% funded by equity. As a result, no interest or principal repayments with respect to any debt will be included in the analysis. There is no special transaction (merger/acquisition/purchase or sale of shares/enterprise), consequently, no transfer pricing impacts/adjustments were taken into account. The Model assumes no interest-bearing debt financing, and no interest has been taken into account. The Model assumes no payment of dividends. Please note that transfer of Company's profit to shareholder would generally be a subject to the Czech withholding tax.

22.2.2 Taxation Authorities

The applicable tax jurisdictions of the Project for purposes of the tax model will be the Czech Republic. The Model assumes that all Project profits of the Company are to be taxed under the laws of the Czech Republic, whereas no foreign taxation is applicable, no transfer pricing impacts/adjustments were taken into account.

22.2.3 Tax Rates

The corporate income tax rate of 21% for all the years of the Project was used. The 21% rate will be used under the assumption the currently enacted income tax rate will remain in effect for the life-of-project.

22.2.4 Corporate Tax Calculations

All costs/assets are intended to be incurred/used to achieve, secure, and maintain taxable income; therefore, there are no non-tax-deductible costs which have been taken into account.

The costs/revenues in the Model do not contain:

- The creation or release of the accounting or other reserves
- The creation or release of the adjustment to assets, to stocks of materials, goods, work in progress, semi-finished products, and finished products, to receivables, etc.
- The creation or release of the estimated items for employees' bonuses
- Any financial leasing
- Any debt forgiveness or any write-off of receivables (the proper settlement/payment of all receivables/liabilities is assumed)
- Any contractual fines, default charges, default interest, penalties, and other sanctions from contractual and non-contractual obligations
- Any shares/equity certificates, securities, or any derivative securities

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- Any income received for free

There are no deductible items for:

- Any Research and Development activities
- Any charitable gifts
- Any Professional Education activities

There is no tax relief for disabled employees.

While a number of opportunities exist in the Czech Republic in the form or tax relief and/or tax credits on qualified investments and expenditures, no investment tax credits or other reliefs were considered in the preparation of the tax calculations in the Model.

22.3 Cash Flows

Tetra Tech calculated cash flows based on revenue from sale of HPMSM and magnesium carbonate by-product. Tetra Tech deducted off-site costs from revenue prior to deduction of operating costs to estimate operating income.

Initial, sustaining capital costs, working capital, and reclamation costs were deducted from the operating income to derive an estimate of pre-tax cash flow.

A summary of pre-tax and post-tax cashflows is show in Table 22-2.

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Table 22-2: Pre- and Post-Tax Cashflow

TIMELINE	Units	Total/average																														
Year	Calendar year	31	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058
Plant Year	Production year	26	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Project Year	Project year	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
METAL PRICES																																	
Mn - HPEMM 99.9%	US$/kg	0.000					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Mn -Manganese Sulphate (HPMSM)	US$/kg	2.898					2.65	2.78	2.83	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	
MgCO3 (Industrial Grade)	US$/kg	0.800					0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	
PRODUCTION SUMMARY																																	
Tailings Processed (dry tonnes)	Ktonnes	26,960					323	550	582	1,079	1,149	1,014	1,031	1,083	1,104	1,058	1,064	1,055	1,039	972	881	1,042	1,199	1,235	1,300	1,314	1,326	1,352	1,314	1,263	1,163	468	
Mn Grade	%	7.32%					8.13%	7.54%	7.22%	7.06%	7.29%	8.03%	7.89%	7.60%	7.50%	7.73%	7.70%	7.76%	7.85%	8.25%	8.89%	7.82%	7.05%	6.90%	6.64%	6.59%	6.44%	6.46%	6.60%	6.79%	7.22%	8.08%	
Mg Grade	%	1.15%					0.91%	0.92%	0.94%	0.97%	0.98%	1.00%	1.10%	1.15%	1.15%	1.13%	1.12%	1.12%	1.08%	1.03%	0.99%	1.01%	1.18%	1.28%	1.34%	1.36%	1.33%	1.28%	1.28%	1.28%	1.23%	1.19%	
Contained Mn	Tonnes	1,974,501					26,258	41,440	42,043	76,202	83,791	81,377	81,333	82,344	82,749	81,750	81,944	81,861	81,564	80,193	78,286	81,510	84,565	85,196	86,312	86,612	85,483	87,358	86,718	85,794	83,988	37,832	
Mn Recovery - HPMSM	%	60.0%					56.0%	60.6%	59.7%	59.3%	59.9%	62.0%	61.6%	60.8%	60.5%	61.2%	61.1%	61.3%	61.5%	62.6%	64.1%	61.4%	59.2%	58.8%	58.0%	57.8%	57.3%	57.4%	57.8%	58.4%	59.7%	62.1%	
Mg Recovery	%	46.0%					41.4%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	46.0%	
HPMSM Production	tonnes	3,651,896					45,314	77,435	77,395	139,149	154,758	155,381	154,385	154,325	154,322	154,060	154,279	154,490	154,544	154,584	154,696	154,284	154,342	154,286	154,148	154,268	150,995	154,475	154,508	154,471	154,599	72,405	
MgCO3 Production	tonnes	505,677					4,290	8,198	8,897	16,970	18,240	16,509	18,515	20,260	20,703	19,468	19,431	19,192	18,327	16,342	14,224	17,165	22,958	25,668	28,313	28,985	28,744	28,254	27,368	26,328	23,229	9,101	
OPERATING COSTS																																	
Mining	Million US$	$56.92					$1.62	$1.79	$1.81	$2.23	$2.31	$2.22	$2.21	$2.24	$2.31	$2.21	$2.21	$2.14	$2.14	$2.01	$1.95	$2.30	$2.36	$2.37	$2.41	$2.40	$2.42	$2.44	$2.40	$2.37	$2.32	$1.74	$0.00
Process - MS	Million US$	$84.54					$1.37	$2.10	$2.22	$3.34	$3.55	$3.14	$3.19	$3.35	$3.41	$3.27	$3.29	$3.26	$3.21	$3.00	$2.72	$3.22	$3.71	$3.82	$4.02	$4.06	$4.10	$4.18	$4.06	$3.91	$3.60	$1.45	$0.00
Process - HPEMM	Million US$	$2,961.88					$45.37	$69.77	$69.74	$111.95	$124.51	$125.01	$124.21	$124.16	$124.15	$123.94	$124.12	$124.29	$124.33	$124.37	$124.46	$124.12	$124.17	$124.13	$124.02	$124.11	$121.48	$124.28	$124.30	$124.28	$124.38	$58.25	$0.00
Process - HPMSM	Million US$	$682.11					$10.85	$16.06	$16.05	$25.88	$28.61	$28.72	$28.54	$28.53	$28.53	$28.48	$28.52	$28.56	$28.57	$28.58	$28.60	$28.52	$28.53	$28.52	$28.50	$28.52	$27.95	$28.56	$28.56	$28.56	$28.58	$14.22	$0.00
Tailings Stacking/Storage	Million US$	$16.51					$0.24	$0.37	$0.46	$0.73	$0.71	$0.69	$0.68	$0.70	$0.70	$0.68	$0.65	$0.61	$0.60	$0.58	$0.52	$0.67	$0.71	$0.72	$0.74	$0.73	$0.74	$0.75	$0.73	$0.72	$0.71	$0.35	$0.00
General & Administrative Costs	Million US$	$286.84					$9.72	$9.72	$9.72	$11.20	$11.20	$11.20	$11.20	$11.20	$11.20	$11.20	$11.20	$11.20	$11.20	$11.20	$11.20	$11.20	$11.20	$11.20	$11.20	$11.20	$11.20	$11.20	$11.20	$11.20	$11.20	$11.20	
Land Rental	Million US$	$9.93					$0.08	$0.74	$0.74	$0.74	$0.74	$0.74	$0.74	$0.74	$0.74	$0.74	$0.74	$0.74	$0.74	$0.74	$0.08	$0.08	$0.08	$0.08	$0.08	$0.08	$0.08	$0.08	$0.08	$0.08	$0.08	$0.08	$0.08
Site services, including Railway	Million US$	$536.79					$12.51	$16.06	$16.66	$20.97	$21.92	$20.08	$20.31	$21.02	$21.30	$20.68	$20.76	$20.64	$20.43	$19.51	$18.27	$20.46	$22.60	$23.08	$23.97	$24.16	$24.33	$24.67	$24.17	$23.47	$22.11	$12.66	$0.00
Water Treatment	Million US$	$37.12					$0.67	$0.93	$0.97	$1.43	$1.52	$1.71	$1.58	$1.65	$1.46	$1.41	$1.41	$1.40	$1.38	$1.30	$1.19	$1.39	$1.58	$1.62	$1.70	$1.72	$1.74	$1.77	$1.72	$1.66	$1.53	$0.68	$0.00
Contingency	Million US$	$233.63					$4.12	$5.88	$5.92	$8.92	$9.75	$9.67	$9.63	$9.68	$9.69	$9.63	$9.65	$9.64	$9.63	$9.53	$9.45	$9.60	$9.75	$9.78	$9.83	$9.85	$9.90	$9.96	$9.81	$9.73	$5.03	$0.0038	
Total Operating Costs	Million US$	$4,906.36					$86.55	$123.40	$124.29	$187.39	$204.81	$203.17	$202.29	$203.26	$203.51	$202.25	$202.55	$202.49	$202.25	$200.16	$198.43	$201.57	$204.69	$205.32	$206.47	$206.83	$203.74	$207.82	$207.09	$206.06	$204.23	$105.66	$0.08
Selling and Distribution Costs (Freight, $133.4/t)	Million US$	$502.1					$6.18	$10.58	$10.60	$19.07	$21.20	$21.24	$21.15	$21.19	$21.20	$21.13	$21.16	$21.19	$21.17	$21.13	$21.09	$21.11	$21.26	$21.32	$21.37	$21.40	$20.95	$21.41	$21.39	$21.36	$21.30	$9.93	$0.00
Transportation Insurance (0.04% of Product Value)	Million US$	$4.4					$0.05	$0.09	$0.09	$0.17	$0.19	$0.19	$0.19	$0.19	$0.19	$0.19	$0.19	$0.19	$0.19	$0.18	$0.18	$0.18	$0.19	$0.19	$0.19	$0.19	$0.18	$0.19	$0.19	$0.19	$0.19	$0.09	$0.00
Selling and Distribution Costs (0.5%, sale, third party assay)	Million US$	$54.9					$0.62	$1.11	$1.13	$2.09	$2.32	$2.32	$2.32	$2.32	$2.33	$2.32	$2.32	$2.32	$2.32	$2.31	$2.30	$2.31	$2.33	$2.34	$2.35	$2.36	$2.31	$2.36	$2.35	$2.35	$2.34	$1.09	$0.00
Royalties																																	
Royalties - Czech Government	Million US$	$121.2					$1.5	$2.6	$2.6	$4.6	$5.1	$5.2	$5.1	$5.1	$5.1	$5.1	$5.1	$5.1	$5.1	$5.1	$5.1	$5.1	$5.1	$5.1	$5.1	$5.1	$5.0	$5.1	$5.1	$5.1	$5.1	$2.4	
Royalties - CEZ Land Owners	Million US$	$172.7					$0.25	$0.44	$0.45	$0.84	$0.93	$6.51	$8.34	$8.36	$8.37	$8.34	$8.35	$8.36	$8.35	$8.32	$8.30	$8.32	$8.40	$8.44	$8.47	$8.49	$8.31	$8.49	$8.48	$8.46	$8.42	$3.92	
Total Cost of Sales	Million US$	$5,761.6					$95.15	$138.20	$139.12	$214.17	$234.59	$238.58	$239.42	$240.44	$240.71	$239.34	$239.69	$239.67	$239.40	$237.23	$235.44	$238.61	$242.00	$242.73	$243.96	$244.38	$240.51	$245.39	$244.63	$243.54	$241.61	$123.09	$0.08
Operating cost per tonne mill feed	US$/tonne ore	$213.7					294.44	251.41	239.06	198.49	204.16	235.29	232.21	222.01	218.07	226.18	225.34	227.11	230.32	244.15	267.33	229.04	201.82	196.61	187.70	186.00	181.32	181.56	186.13	192.77	207.78	262.92	
Operating cost per kg EMM equivalent	USD/kg Mn Equ	$4.14					5.89	4.91	4.95	4.15	4.08	4.03	4.04	4.06	4.06	4.05	4.05	4.04	4.03	3.99	3.95	4.03	4.09	4.10	4.13	4.13	4.16	4.15	4.13	4.11	4.07	4.50	
CASH FLOW																																	
HPMSM Gross Revenue	Million US$	$10,584.7					$120.2	$214.9	$218.8	$404.4	$449.7	$451.5	$448.6	$448.5	$448.5	$447.7	$448.3	$448.9	$449.1	$449.2	$449.5	$448.3	$448.5	$448.4	$448.0	$448.3	$438.8	$448.9	$449.0	$448.9	$449.3	$210.4	$0.0
MgCO3 Credit	Million US$	$404.5					$3.4	$6.6	$7.1	$13.6	$14.6	$13.2	$14.8	$16.2	$16.6	$15.6	$15.5	$15.4	$14.7	$13.1	$11.4	$13.7	$18.4	$20.5	$22.7	$23.2	$23.0	$22.6	$21.9	$21.1	$18.6	$7.3	$0.0
Total Operating Costs	Million US$	$5,761.6					$95.2	$138.2	$139	$214	$235	$239	$239	$240	$241	$239	$240	$240	$239	$237	$235	$239	$242	$243	$244	$244	$241	$245	$245	$244	$242	$123	$0.080
Operating Profit	Million US$	$5,227.6350					$28.5	$83.3	$87	$204	$230	$226	$224	$224	$224	$224	$224	$225	$224	$225	$225	$223	$225	$226	$227	$227	$221	$226	$226	$226	$226	$95	-$0.080
Operating Margin, % of sales	%	48%					23%	38%	38%	49%	49%	49%	48%	48%	48%	48%	48%	48%	48%	49%	49%	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	43%	
Capital Costs																																	
Initial capital	Million US$	$627.49	$94	$157	$157	$220																											
Sustaining Capital - Plant Capacity Expansion	Million US$	$197.78					$9.9	$39.6	$148.3	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.000
Sustaining Capital - Mining	Million US$	$10.00					$1.0	$0.2	$2.8	$1.3	$0.7	$0.2	$0.1	$1.2	$0.1	$0.1	$0.1	$0.0	$0.0	$0.0	$0.6	$0.2	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1	$0.000
Sustaining Capital - RSF	Million US$	$101.12					$1.0	$2.4	$3.5	$3.6	$4.1	$3.6	$3.6	$3.7	$3.6	$4.7	$3.8	$3.7	$3.7	$3.8	$4.2	$4.7	$4.6	$4.5	$4.5	$4.8	$3.6	$3.6	$3.7	$3.7	$3.8	$4.2	$0.000
Sustaining Capital - Process & Others	Million US$	$28.00					$0.0	$0.0	$0.0	$0.0	$7.0	$0.0	$0.0	$0.0	$0.0	$7.0	$0.0	$0.0	$0.0	$0.0	$7.0	$0.0	$0.0	$0.0	$0.0	$7.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.000
Total Capital Expenditure	Million US$	$964.389	$94	$157	$157	$220	$12.0	$42.1	$154.7	$4.9	$11.8	$3.9	$3.7	$4.9	$3.8	$11.8	$3.9	$3.8	$3.8	$3.8	$11.8	$4.9	$4.7	$4.7	$4.6	$12.0	$3.7	$3.8	$3.8	$3.8	$3.9	$6.3	$0.000
Other Expenses																																	
Environmental Bond (included in Initial Capex)	Million US$	-$2.000																															-$0.40
Reclamation	Million US$	$2.000																															$0.40
Process plant salvage value	Million US$	-$41.263	$0.00	$0.00	$0.00	$0.00																											-$41
Working Capital																																	
Change in Inventory	Million US$	$0.000					$15.9	$7.2	$0.2	$12.5	$3.4	$0.7	$0.1	$0.2	$0.0	-$0.2	$0.1	$0.0	$0.0	-$0.4	-$0.3	$0.5	$0.6	$0.1	$0.2	$0.1	-$0.6	$0.8	-$0.1	-$0.2	-$0.3	-$19.8	-$20.5
Change in Receivables	Million US$	$0.0000					$20.0	$15.8	$0.6	$30.9	$7.6	$0.3	-$0.5	$0.0	$0.0	-$0.1	$0.1	$0.1	$0.0	$0.0	$0.1	-$0.2	$0.0	$0.0	-$0.1	$0.1	-$1.6	$1.7	$0.0	$0.0	$0.1	-$39.8	-$35.1
Pre-tax Cashflow (EBITDA)	Million US$	$4,304.43	-$94.1	-$156.9	-$156.9	-$219.6	-$19.4	$18.2	-$68.7	$155.5	$207.0	$221.3	$220.6	$219.2	$220.5	$212.4	$220.2	$220.7	$220.6	$221.6	$213.9	$218.2	$219.5	$221.4	$221.9	$215.0	$219.8	$219.8	$222.6	$222.8	$222.6	$147.9	$96.8
Cumulative pre-tax cash flow	Million US$	$4,304.4	-$94.1	-$251.0	-$407.9	-$627.5	-$646.9	-$628.7	-$697.4	-$541.9	-$335.0	-$113.6	$107.0	$326.2	$546.7	$759.2	$979.3	$1,200.1	$1,420.7	$1,642.2	$1,856.2	$2,074.4	$2,293.9	$2,515.3	$2,737.2	$2,952.2	$3,172.0	$3,391.9	$3,614.4	$3,837.2	$4,059.8	$4,207.7	$4,304.4
Pre-tax results																																	
Net present value	**8%**	**$740.0**																															
Internal rate of return	**16.0%**																																
Pre-tax payback period	**6.5**																																
Tax assessment																																	
Assets																																	
Tax Purchase Price of Depreciated Capex	Million US$	$974.6	$0.00	$0.00	$0.00	$0.00	$628.86	$2.58	$6.38	$202.62	$14.54	$3.87	$3.74	$4.87	$3.76	$14.58	$3.87	$3.78	$3.78	$3.84	$14.55	$4.91	$4.75	$4.66	$4.63	$14.72	$3.72	$3.77	$3.82	$3.81	$3.90	$6.31	$0.00
Annual Tax Depreciation	Million US$	$974.6	$0.00	$0.00	$0.00	$0.00	$26.45	$48.08	$41.15	$60.41	$56.63	$53.20	$53.39	$53.17	$52.13	$52.75	$42.62	$30.47	$30.32	$20.32	$20.74	$20.90	$21.07	$21.23	$21.38	$21.70	$17.38	$17.46	$17.55	$17.01	$16.89	$16.90	$123.34
Taxes																																	
Revenue	Million US$	$10,989.2	$0	$0	$0	$0	$123.6	$221.5	$225.9	$417.9	$464.3	$464.7	$463.5	$464.7	$465.0	$463.3	$463.9	$464.3	$463.8	$462.3	$460.9	$462.1	$466.9	$468.9	$470.6	$471.5	$461.8	$471.5	$470.9	$470.0	$467.8	$217.7	$41.3
Operating Costs	Million US$	$5,588.9	$0	$0	$0	$0	$94.9	$137.8	$138.7	$213.3	$233.7	$232.1	$231.1	$232.1	$232.3	$231.0	$231.3	$231.3	$231.1	$228.9	$227.1	$230.3	$233.6	$234.3	$235.5	$235.9	$232.2	$236.9	$236.2	$235.1	$233.2	$119.2	-$0.2
Capital Depreciation	Million US$	$981.7	$0	$0	$0	$0	$26.5	$48.1	$41.2	$60.4	$56.6	$53.2	$53.4	$53.2	$52.1	$52.7	$42.6	$30.5	$30.3	$20.3	$20.7	$20.9	$21.1	$21.2	$21.4	$21.7	$17.4	$17.5	$17.6	$17.0	$16.9	$16.9	$130.4
Taxable Income	Million US$	$4,549.0	$0	$0	$0	$0	$2.3	$35.6	$46.1	$144.2	$174.0	$179.5	$179.0	$179.4	$180.5	$179.5	$189.9	$202.5	$202.4	$213.1	$213.0	$210.9	$212.2	$213.4	$213.7	$213.9	$212.2	$217.1	$217.2	$217.9	$217.8	$81.6	-$89.0
Losses Carried Forward	Million US$	-$18.7	$0	$0	$0	$0	-$2.3	-$15.1	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	-$1.3	$0.0
Net Taxable Income	Million US$	$4,530.4	$0	$0	$0	$0	$0.0	$20.6	$46.1	$144.2	$174.0	$179.5	$179.0	$179.4	$180.5	$179.5	$189.9	$202.5	$202.4	$213.1	$213.0	$210.9	$212.2	$213.4	$213.7	$213.9	$212.2	$217.1	$217.2	$217.9	$217.8	$80.3	$0.0
Corporate Tax Rate	%		21%	21%	21%	21%	21%	21%	21%	21%	21%	21%	21%	21%	21%	21%	21%	21%	21%	21%	21%	21%	21%	21%	21%	21%	21%	21%	21%	21%	21%	21%	21%
Corporate Tax Obligation Before Tax Relief	Million US$	$951.4	$0.0	$0.0	$0.0	$0.0	$0.0	$4.3	$9.7	$30.3	$36.5	$37.7	$37.6	$37.7	$37.9	$37.7	$39.9	$42.5	$42.5	$44.7	$44.7	$44.3	$44.6	$44.8	$44.9	$44.9	$44.6	$45.6	$45.6	$45.8	$45.7	$16.9	$0.0
Corporate Tax Due	Million US$	$951.4	**$0.0**	**$0.0**	**$0.0**	**$0.0**	**$0.0**	**$4.3**	**$9.7**	**$30.3**	**$36.5**	**$37.7**	**$37.6**	**$37.7**	**$37.9**	**$37.7**	**$39.9**	**$42.5**	**$42.5**	**$44.7**	**$44.7**	**$44.3**	**$44.6**	**$44.8**	**$44.9**	**$44.9**	**$44.6**	**$45.6**	**$45.6**	**$45.8**	**$45.7**	**$16.9**	$0.0
After-Tax Operating Cash Flow	Million US$	$3,311.8	-$94	-$157	-$157	-$220	$16.5	$36.8	-$77.6	$168.6	$181.4	$184.6	$182.7	$181.7	$182.6	$174.4	$180.4	$178.3	$178.1	$176.5	$168.9	$174.3	$175.6	$176.7	$177.1	$170.2	$173.0	$176.7	$176.8	$176.9	$176.6	$71.4	-$0.1
Net Cash Flow																																	
Net Cash Flow, excluding debt	Million US$	$3,353.0	-$94	-$157	-$157	-$220	-$19.38	$13.86	-$78.41	$125.20	$170.43	$183.64	$183.05	$181.54	$182.59	$174.75	$180.28	$178.22	$178.10	$176.82	$169.18	$173.94	$174.97	$176.60	$176.99	$170.08	$175.22	$174.25	$176.95	$177.05	$176.87	$130.99	$96.75
Total Cash, excluding debt	Million US$	$3,353.0	-$94	-$251	-$408	-$627	-$646.87	-$633.0	-$711.4	-$586.2	-$415.8	-$232.2	-$49.1	$132.4	$315.0	$489.8	$670.0	$848.3	$1,026.4	$1,203.2	$1,372.4	$1,546.3	$1,721.3	$1,897.9	$2,074.9	$2,245.0	$2,420.2	$2,594.4	$2,771.4	$2,948.4	$3,125.3	$3,256.3	$3,353.0
After-tax results (excluding debt)																																	
Taxes payable		**$951.4**																															
Net present value	**8%**	**$492.1**																															
Internal rate of return	**13.8%**																																
Post-tax payback period	**7.27**																																

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22.4 Sensitivity Analysis

Tetra Tech evaluated the sensitivity of the Project economics to capital costs and operating costs. Tetra Tech also evaluated the sensitivity of the Project economics to manganese recovery and manganese product prices.

The analysis indicates that the project is most sensitivity to the manganese product prices. Table 22-3 compares base case, potential upside price and +/-15% price variation cases:

- Potential upside price case: unaltered forecast by Marketeye.org predicting a potential long-term (project lifetime) HPMSM price of approximately US$3,250-$3,300 per tonne
- +/-15% price variation for comparison to the base case and potential upside case.

To evaluate Project economic risks, Tetra Tech conducted sensitivity analysis on the post-tax financial performance. Figure 22-2 to Figure 22-4 show the Project economic sensitivities.

Table 22-3: Selected Financial Analysis Parameter Comparison for Different HPMSM Prices

Metrics	-15% of Base Price Case	Base Price Case	Upside Price Case	+15% Base Price Case	Unit
HPMSM Price	2,464	2,888	3,275	3,333	$/t
Magnesium Carbonate Price	800	800	800	800	$/t
Total project revenue	9,402	10,989	12,365	12,577	$ million
Site operating costs	4,906	4,906	4,906	4,906	$ million
Selling and distribution costs	553	561	569	570	$ million
Royalties	269	294	315	319	$ million
Total cost of sales	5,728	5,762	5,790	5,795	$ million
Operating income	3,673	5,228	6,574	6,782	$ million
Total capital costs	964	964	964	964	$ million
Project cash flow	2,750	4,304	5,651	5,859	$ million
Pre-tax net present value 8%	302	740	1,130	1,178	$ million
Pre-tax IRR	11.6	16.0	19.5	19.8	%
Pre-tax payback period	8.5	6.5	5.5	5.5	Years
Post-tax net present value 8%	148	492	798	836	$ million
Post-tax IRR	9.9	13.8	16.9	17.1	%
Post-tax payback	9.4	7.3	6.2	6.1	Years

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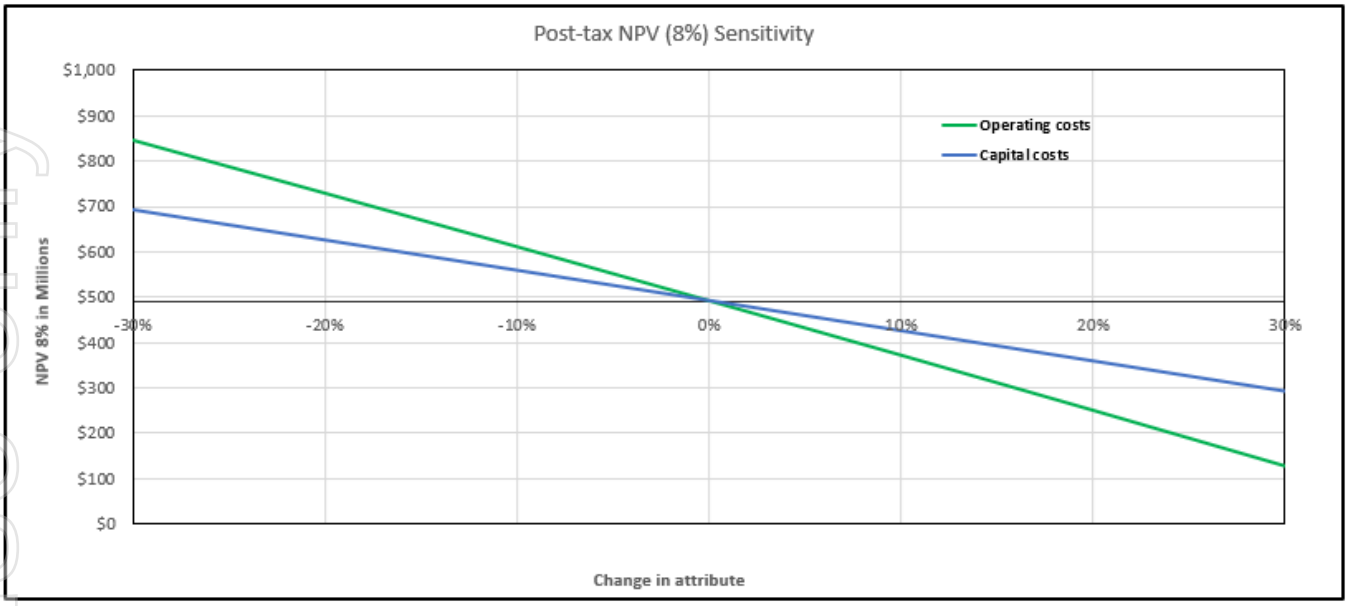

Figure 22-2: Sensitivity of NPV to Changes in Costs

Source: Tetra Tech (2026)

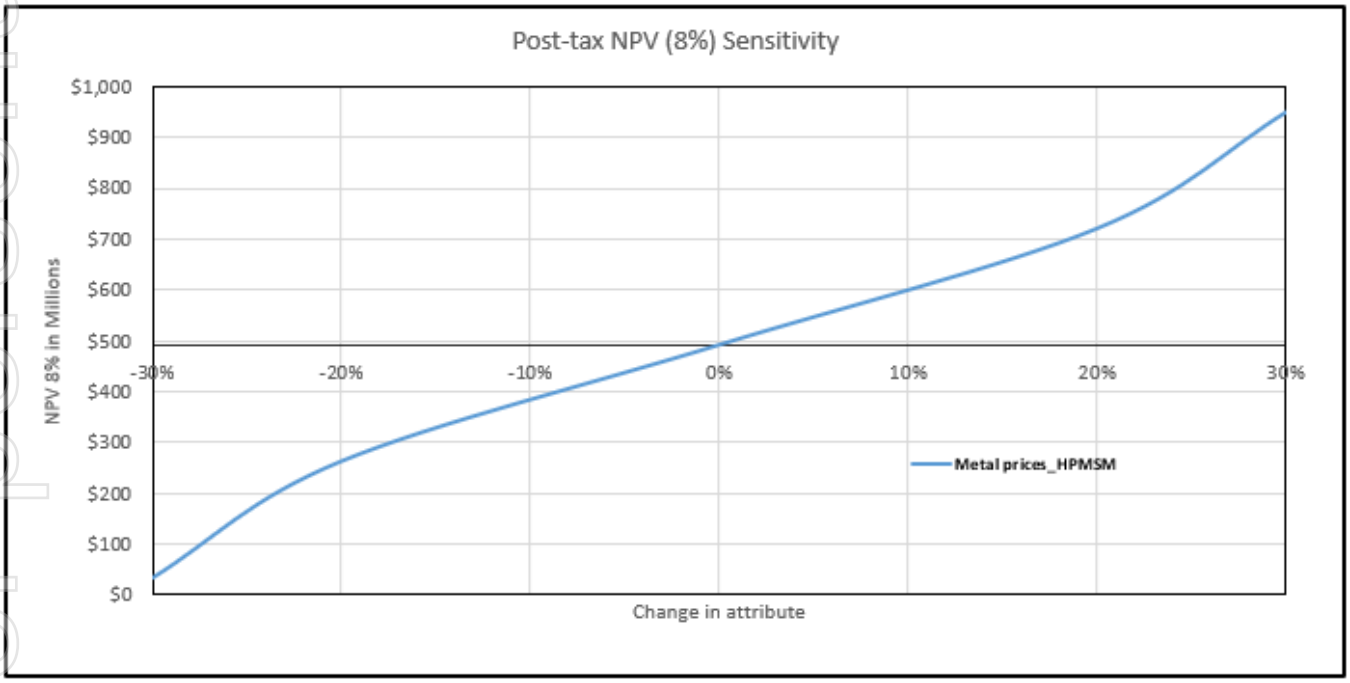

Figure 22-3: Sensitivity of NPV to Changes Metal Price

Note: HPMSM Price only

Source: Tetra Tech (2026)

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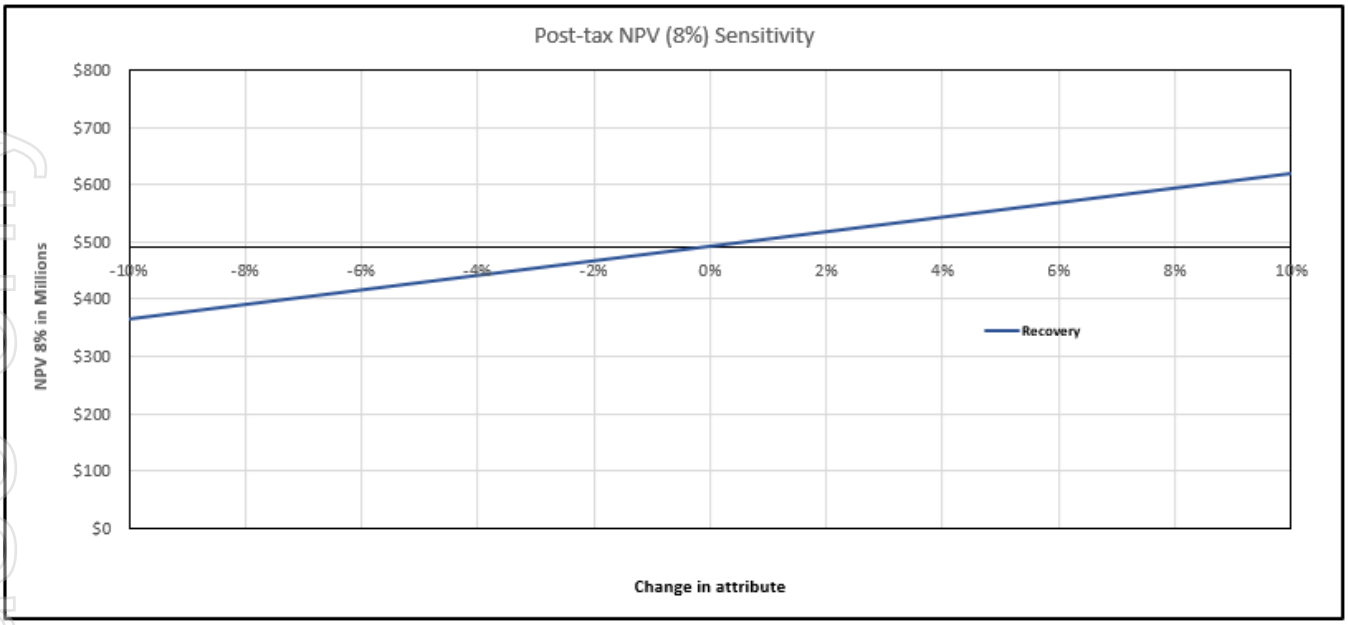

Figure 22-4: Sensitivity of NPV to Changes in Mn Recovery

Source: Tetra Tech (2026)

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23.0 ADJACENT PROPERTIES

Adjacent to the Chvaletice manganese deposit (tailings deposit) is an 820 MW coal-fired power station, a pre-cast concrete plant, a ready-mix plant, an asphalt plant, and a cast iron foundry, with an infrastructure of highways and railways running through the centre of these properties. These industrial plants are opposite of the Chvaletice deposit, separated by highway and most frequent railway in the Czech Republic. The rest of the area, especially on the other side of the river, belongs to agriculture use including horse breeding.

Additionally, two small granite bedrock crush quarries are located to the south of the power plant.

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24.0 OTHER RELEVANT DATA AND INFORMATION

24.1 Project Execution Plan

24.1.1 General

This Project Execution Plan (PEP) is to describe the strategy for executing the project engineering, procurement, construction, and commissioning phases. As the PEA plan, the project will be constructed in two phases: Phase 1 to produce 75,000 t/a HPMSM, starting from Year 2032 and Phase 2 to expand the HPMSM production capacity to 150,000 t/a in Year 4 (2035). The overall project production life is estimated to be 26 years.

The CMP consists of the following facilities at two primary locations, the process plant site (south site), and raw tailings and NMT/LR storage site (north site). The following list is based on the project WBS:

- Area 10 – Overall Site (includes railway spur and substation)
- Area 30 – Raw Tailings Extraction (north site)
- Area 35 – Mill Feed Transport, Storage, and Pulping (north site)
- Area 40 – Process Plant (south site)
- Area 50 – NMT/LR Management (RSF, north site)
- Area 70 – On-site Infrastructure

24.1.2 Codes and Standards

The project will abide by and implement Czech and EU design, environmental, regulatory, health, and safety codes and standards. These codes and standards have been incorporated into the design criteria and design basis documents prepared for the PEA.

24.1.3 Scope

In order to achieve a commencement of commercial production by Q1 2032, an aggressive front-end initiative must be established. The project will transition from the PEA Phase to FS and then to EPCM in the second quarter of 2027, at which point the company expects to award an EPCM contract. The project is anticipated to move forward in the following phases:

- Feasibility Study Update
- Financial Decision
- Phase 1 Engineering Design, including:
  - Overall site geotechnical investigation
  - Basic engineering to finalize and freeze the design in addition to assess further value engineering opportunities for the primary purpose of CAPEX cost reductions and process improvements
  - Long leading equipment identification, vendor selection and purchase order

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- Detailed engineering
- Additional project permitting

- Phase 1 construction, mainly including:
  - Construction team mobilization
  - Plant site preparation, including site preparation for Phase 2 construction
  - Tailings extraction site preparation
  - Building construction and equipment installation
  - Completion of railway spur
  - Completion of grid interconnection/substation
- Phase 1 plant commissioning
- Phase 1 plant ramp-up
- Start initial HPMSM production
- Engineering design for Phase 2 plant expansion, mainly including:
  - Additional engineering design
  - Phase 2 long leading equipment purchase order
  - Additional project permitting
- Phase 2 construction, including building construction and equipment installation
- Phase 2 plant commissioning
- Phase 2 plant ramp-up
- Start plant operation at the full design capacity.

A Level 1 Project Development Schedule (Figure 24-1) was prepared for this PEA in order to outline the overall timeline and key constraints. The critical path of the project currently falls through the FS update, detailed engineering, construction, and commissioning phases.

Based on preliminary estimates, the detailed design phase is estimated to be approximately 26 months (inclusive of basic design), during which time long lead equipment will be identified and ordered. Construction duration of approximately 30 months has been estimated due to the small and restricted plant site working area, process complexity, careful interface required with the local community, and labour work hour restrictions in the Czech Republic.

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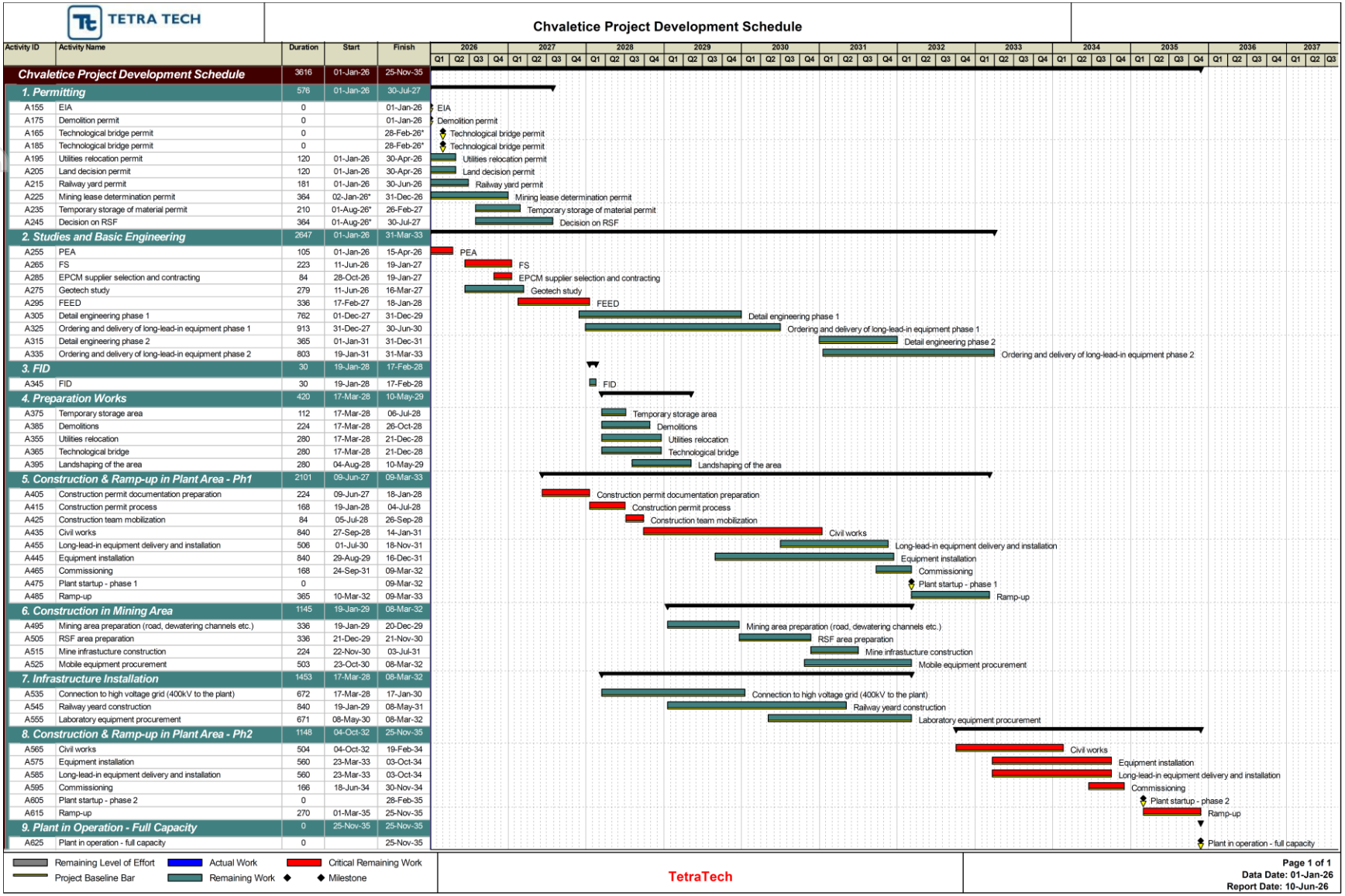

Figure 24-1: Project Development Schedule – Level 1

Source: Tetra Tech, 2026

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24.2 Logistics

No logistics study has been conducted for the PEA study. It is expected that the equipment and construction materials would be sourced worldwide, especially process equipment which may be mainly sourced from eastern Asia. The equipment and construction material shipment and transport plan are expected to be similar to the 2022 study (Tetra Tech, 2022). It is recommended that a combination of road, rail, and ocean transportation should be considered and further investigated.

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25.0 INTERPRETATION AND CONCLUSIONS

25.1 Mineralogy and Mineral Resources

The CMP is located in the Pardubice region of the Czech Republic approximately 89 km east of Prague by road. A long history of mining has occurred in the area, with continued industrial activity from the 820 MW coal-fired power generation plant and several other industrial operations now located on and around the former plant site that produced the CMP tailings.

The CMP tailings deposits are located within easy access of road, rail and river transportation, energy, power, and a plentiful workforce that resides in numerous local communities. The tailings deposits were constructed above ground using dried and compacted manganiferous tailings as the perimeter dams to hold the slurries that were deposited from the historical pyrite flotation plant.

Delineation drilling completed by EMN in 2017 and 2018 resulted in the completion of 160 drill holes, totaling 3,188.8 m, spaced at approximately 75 m throughout each of Cells #1, #2, and #3, which have allowed for continuous sampling through the full vertical profile of the tailings material. A resultant 1,485 samples were sent for analysis of geochemistry, particle size analysis, specific gravity, and in situ bulk density measurements, and original pore moisture content determination. Economic concentrations of manganese were confirmed within the materials forming the outer perimeter embankments by 2018 drilling investigation and sampling. The full drilling database makes for a comprehensive and robust foundation for high-confidence Mineral Resource estimation.

Sample digestion using aqua regia has been used as a proxy for the soluble manganese mineral components of the materials; however, actual solubility may vary relative to the solvents and processes determined from the metallurgical testwork. Total manganese concentrations were determined using lithium borate fusion and XRF analysis, which has provided consistent results between drill programs and between laboratories. Elevated concentration of manganese was measured in all samples collected from the tailings material with laboratory reported ranges for total manganese between 1.16 to 12.32% tMn with average of 7.33%, soluble manganese between 0.66 to 10.50% sMn with average of 5.86%, and an average of 79% of the total manganese measured to be soluble, occurring predominantly as the manganese carbonate minerals rhodochrosite and kutnohorite. The manganese concentrations were well-distributed throughout each cell; however, a slight decrease in average grade is observed towards the center of each cell. The upper portion of Cell #2 has a manganese concentration that is slightly lower compared to the lower portion of the cell. A similar, but less pronounced trend is observed for Cell #1. This may reflect changes to mining or processing methods, increased dilution, or removal of materials with less manganese during the historical pyrite mining activities.

Magnesium, which has been included in the Mineral Resource Estimate as by-product, was measured in the laboratory with aqua regia digestion and ICP-AAS with concentrations ranging between 0.06 to 3.64% Mg, with average concentration of 1.26%. Host minerals include dolomite and various Mg-bearing silicates. Preliminary inspection of the grain size distribution analysis indicates that the dominant particle size is silt-sized. Overall, approximately 6.2% of the material is clay-sized (less than 2 µm), approximately 56.6% of the material is silt-sized (greater than 2 µm, less than 63 µm), 37.2% is sand-sized (greater than 63 µm, less than 2 mm), and less than 1% is gravel-sized (greater than 2 mm) based on the European ISO TS 17892-4 standard. A general trend in all three cells is observed whereby particle size grades from coarse to fine towards the center of each cell. This is evidently related to particle size sorting in a playa-like environment, due to the hydraulic placement of the tailings material from spigots located on the periphery of the tailings piles and direction of flow towards the center of the piles, where decantation of liquid overflow took place using a perforated decantation tower at the center of each pile that fed a pipeline situated below the tailings which flowed into the adjoining Labe river.

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Moisture content measured from each sample ranges from approximately 1.2 to 39.3% and averaging 21.1% overall. As with particle size distributions, moisture shows a strong zonation towards the center of each cell where the material is observed to be saturated with above average moisture contents. This is attributed to the moisture retention capacity and low permeability of the fine silt and clay-sized materials predominant around the center of each cell. Measurement of conductivity and pH in moisture recovered from the tailings samples at the laboratory was conducted to estimate in situ pore water quality. Electrical conductivity values ranged from 0.77 ms/cm to 7.91 ms/cm with an average of 3.94 ms/cm, and pH ranged from 4.1 to 7.6 with an average of 5.99. These measurements indicate pore water was moderately acidic to circumneutral, with elevated conductivity indicating moderate dissolved solids in solution.

In situ dry bulk density has been calculated for each sample based on estimated core recovery volumes in the field and measured sample mass and moisture content in the laboratory. The in situ dry bulk density variable is considered critical for the accurate estimation of tailings mass. Immeasurable moisture loss in the field and visual estimation of core recovery influences the range of in situ dry bulk density. The calculated values ranged from 0.35 to 3.15 t/m^3, with 95% probability interval of 0.87 to 2.01 t/m^3, and average of 1.49 t/m^3 ±0.017 t/m^3 (95% chlorine). The in situ dry bulk density is a function of the composite mineral densities in addition to the degree of compaction in the tailings.

The Mineral Resource Estimate was classified as Measured and Indicated based on sample spacing and variance assessment. The MREs are shown in Table 1-1 with an effective date of April 27, 2026. QA procedures were prepared by EMN and Tetra Tech and implemented by EMN. Implementation was verified by CP James Barr, P.Geo., during two separate two-day site visits to the Property (2017 and 2018). Quality control was undertaken by the CP following receipt of the laboratory data. The MRE was prepared and validated by the CP using guidelines set forth by NI 43-101 and the CIM Best Practices resulting in Measured and Indicated MREs for each of the cells. The CP is satisfied that integrity of samples has been preserved during handling, preparation, and analysis and believes that the resulting mineral resource model to accurately represents the in situ material.

25.2 Mineral Processing and Metallurgical Testing

Comprehensive metallurgical test programs were completed by CRIMM with an independent verification test program conducted by BGRIMM.

The previous process mineralogical study verified that manganese mainly occurs in the form of manganese carbonates, including rhodochrosite and kutnohorite, both of which are soluble in diluted acid. The manganese carbonates account for approximately 80% of the total manganese. The second main manganese mineral group, approximately 19% of the manganese, is in the form of manganese silicate minerals, which are refractory to acid dissolution. The main gangue minerals are quartz, feldspar, sericite/muscovite, pyrite, apatite, and others. Pyrite is the primary sulphide mineral present in the samples tested. Particle sizing of the samples tested varies substantially within the tailings storage piles, ranging from 43 to 97% passing 74 µm, averaging 74% passing 74 µm. It appears that the particle size of the material located at the edge of the tailings storage piles is coarser than the material at the center of the pile.

The test results show that the mineral materials of economic interest respond well to high-intensity magnetic separation. On average, manganese recovery to the magnetic concentrate is expected to be approximately 86% to 87%, varying from 76 to 95% tMn. The magnetic separation can improve the feed manganese content from 7.2% tMn (the MB Composite) to approximately 14% to 15% tMn, ranging from 12.0 to 16.0% tMn.

On average, sulphuric acid leaching can extract approximately 75% of the manganese from the magnetic separation concentrate, ranging from 71.9 to 82.8% tMn. When considering the downstream iron/phosphorus removal treatment, the optimized leach conditions were determined as leach temperature at approximately 90°C, with a leach retention time of five to six hours, and 0.42 acid to 1.0 feed ratio.

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The test results show that with the purification treatments, the impurity contents in the pregnant solution can be reduced to the levels meeting the requirements for HPEMM production using a selenium-free process.

Three semi-continuous HPEMM pilot plant runs were conducted on the MB Composite, high-grade composite (Composite P1), and low-grade composite (Composite P2) using the conditions developed from the batch tests. With further optimized test conditions (Pilot Plant Runs 2 and 3), a higher than 63% average current efficiency was achieved. According to the assay data by CRIMM, it is anticipated that the impurity contents of the HPEMM products should be lower than the criteria required by most of potential users of HPEMM. During 2023 and 2024, Mangan conducted a Demonstration Plant campaign. EMN declared that the on-site Demonstration Plant successfully completed a 5-day continuous operation program for the production of high-purity electrolytic manganese metal in the Czech Republic (EMN 2024). In 2026, BGRIMM conducted additional tests to assess the solubility of two residue samples generated during the Demonstration Plant electrowinning trials. The test results indicate that both the materials respond well to the SO_2 reduction leaching. More than 98% of manganese in the anode residual materials from the Demonstration Plant and sludges can be leached by using sulphur dioxide reduction treatment.

HPMSM generation test programs confirmed that HPMSM can be produced from the CMP Mineral Resource. CRIMM's test results indicated that the best-quality HPMSM powder was produced from the HPEMM flakes generated during the CMP HPEMM pilot plant runs. The target specifications were not achieved during the CMP testwork program when using CMP magnetic separation concentrate (without electrowinning) or purchased EMM flakes produced using a selenium-addition procedure. According to the assay data by CRIMM, it is anticipated that the impurity contents of the HPMSM products should be lower than the criteria required by most of potential users of HPMSM. BGRIMM's testwork verified the HPEMM to HPMSM process feasible.

Both the HPEMM and HPMSM manganese products produced were assayed to determine minor impurity contents by CRIMM. Separate analyses on the minor element concentrations were also conducted by BGRIMM and other independent laboratories. In general, the separate assay results show that impurity contents of the HPMSM and HPEMM produced should be lower than the criteria required by most of potential users.

The dewatering test results were conducted by various potential equipment suppliers. The thickening and filtration rates of the leach residue and the magnetic tailings were determined. Also, the material handling tests on the raw tailings and NMT/LR blend confirmed the materials are sticky with poor flowability, special attention is required for the material handling design.

25.3 Tailings Extraction Methods

The CMP mine plan is designed to produce approximately 3,000 t/day of tailings feed over a 26-year project life. The mine plan is based on truck and shovel equipment extracting the tailings in benches from the three tailings cells. The mine design criteria was based on the project and regulatory requirements, and permits the tailings to be extracted at a rate that allows the residue to be placed within the existing footprint. A main haul road between the tailings cells to a plant feed storage area will provide access to all cells and temporary haul ramps will be developed in each cell as they advance.

Selected mine equipment can be sourced and maintained in close proximity to the Project. The equipment fleet will be able to be used for tailings extraction and residue placement. On-site infrastructure includes a truck maintenance workshop, fuel station, truck washing facility, and temporary stockpile for tailings and residue.

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25.4 Recovery Methods

The CMP process plant is designed to have a 26-year project life at a nominal production rate of 150,000 t/a of HPMSM by extracting approximately 1.1 Mt/a of the CMP tailings. All the HPEMM flake production will be converted into HPMSM. The process plant is planned to start from a nominal production capacity of 75,000 t/a HPMSM in the initial three years and then expand to a nominal process rate of 150,000 t/a HPMSM from Year 4 and onward. The CMP HPMSM product will be designed to contain no less than 99.9% MSM, a minimum of 32.34% manganese, and will be sold in powder form, produced without the use of fluorine. Magnesium carbonate will be produced from the magnesium removal circuit as a by-product for sale as well.

The proposed process flowsheet was developed based on the various test results, including a comprehensive testwork program with semi-continuous pilot plant testing and current industrial operations. The flowsheet includes following key process circuits:

- CMP tailings pulping
- Wet magnetic separation to upgrade the leach feed from 7.41% tMn to approximately 15% tMn, and on average reject approximately 57% of the feed to NMT, with an expected 86% manganese recovery.
- Sulphuric acid leach to dissolve the acid leachable manganese, mainly from the manganese carbonate minerals.
- Leach solution purification, including magnesium content management in anolyte solution, to ensure efficient electrowinning operations and high-quality products; the rejected magnesium in magnesium carbonate form will be dried and packed and sold as a by-product.
- Washing of LR using a combination of filter cake repulping and on-stream washing, including manganese and ammonia recovery from washing solution to minimize their losses and produce washed leach residues for dry stacking with NMT.
- Manganese electrodeposition from qualified solution to produce HPEMM, including post-electrowinning treatments and handling, such as washing, stripping, and stripped plate handling.
- Acid dissolution of HPEMM flakes, leach solution deep purification, crystallization by evaporation, and crystal drying to produce HPMSM; a new high temperature crystallization is incorporated into the HPMSM crystallization circuit to minimize impurity contents in the final HPMSM powder.
- Dry stacking of non-magnetic separation tailings and washed leach residues onto the lined RSF.

The flowsheet and equipment proposed for the CMP have been widely used in the manganese metal and sulphate industry and it is expected that the equipment can be operated and maintained effectively in the local environment. Further optimization of the flowsheet, equipment sizing, and layout should be conducted.

25.5 Project Infrastructure

25.5.1 General Project Infrastructure

The CMP is a brownfield project immediately adjacent to existing infrastructure which includes an 820 MW coal-fired power station operated by Severní Energetická a.s. (Sev.en), a pre-cast concrete plant, an asphalt plant, a newly constructed cast iron foundry, a main railway, highway #322, and a railway spur. Highway #322 connects to Prague, 89 km by road, via Kolin and Highway #12. The railway acts as a main transportation line from Prague to communities in Eastern Czech Republic. The proposed location for the high-purity manganese production plant is planned to be located at the same site of the former flotation plant that produced the CMP tailings. The infrastructure proposed for the

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tailings extraction, process, NMT/LR storage, and operation supports were designed based on the information available. The design for the PEA Update is expected to meet project requirement and local design standards.

A detailed site plan was developed; all process facilities and operation supporting infrastructure will be located at the proposed south project site, excluding the CMP tailings pulping facility, which will be located at the north site where the CMP tailings are stored.

All the process circuits that may generate dust and off-gases will be equipped with dust and off-gases control systems. The off-gases will be scrubbed prior to being discharged into the air.

A covered utility bridge has been designed to connect the south and north project sites to accommodate the CMP tailings slurry pipeline, filtered NMT/LR conveying system, water pipelines, and electricity cables. The bridge will also provide access to both the sites for maintenance workers and operators. The NMT and LR material will be backfilled to the excavated CMP tailings area using a dry stacking storage method. The NMT and LR will be stacked on a lined containment and the stacked NMT/LR will be progressively reclaimed during the operation.

The proposed upgraded railway spurs will provide more efficient material handling for large amounts of incoming and outgoing materials, as compared to trucking. This existing railway facility will benefit the CMP with cost effective material handling. Various material handling and storage facilities have been planned for the CMP, including railcar loading and unloading facilities, lime storage silos, and sulphuric acid storage tanks.

25.5.2 Power Supply

Local electrical power is supplied by the Czech electrical grids. The incoming power for the CMP is expected to come from 400 kV electrical grid of the Czech grid network. The power will feed to two, 400 kV/37.5 kV/10 kV step-down substation systems for alternating current power supply. The main power consumers will be four electrowinning lines which will be supplied from four 350 V/36 kA rectifier transformers for direct current supply. The estimated power demand of the CMP is approximately 80 MW. The master step-down station will be located at the east side of the plant site, close to the incoming power source and adjacent to the electrowinning workshop which will be main power consumer of the CMP.

25.5.3 Steam Supply

Steam, for process use, will be produced on-site by the Project, as required by process design. Three (3) 25-t per hour, 0.6 MPa, steam generators fired by a combination of natural gas and hydrogen recovered from the HPEMM dissolution process. The steam will be mainly used for ammonia recovery and HPMSM crystallization and drying, as well as for magnesium removal.

25.5.4 Water Supply and Process Water Management

The water supply system will consist of process make-up water, cooling circulation water, potable water, fire water supply, pure water, demineralized water, and 130°C hot water. The pore water from the existing CMP tailings will form part of the process makeup water. All the process water used in the process circuits will be directly re-used or treated and re-used as process make-up water. A cooling-towers blowdown water treatment plant, a pure water generation plant, a sewage water treatment plant for the waste water generated from human activities, and a site run-off contact water treatment plant have been designed for the CMP. The process makeup water will be mainly sourced from the “green water” generated from Sev.en power plant with supplement by the treated contact water from the project site. The demineralized water to be used for steam generation and pure water generation and the hot water to be used for building heating and process heating will be also sourced from the power plant.

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25.5.5 Air Supply

Compressed air will be required site wide to service various process circuits, mainly iron/phosphorus removal circuit and filtration circuits, maintenances, and instrumentation systems. The compressed air will be supplied from a centralized compressor station.

A dedicated compressed air system will be provided for the CMP tailings site for mobile equipment maintenance.

25.5.6 Site Water Management

Two separate water management systems are planned to manage CMP site water for both the south and north sites. Contact water from direct runoff from the south site, including the seepage from the dry stack pile, and the north site will be collected and directly used as process make-up water or after treatment at the dedicated water treatment plant at the south site. Any excessive treated run-off water will be discharged into the environment. As a part of the site water control, two separate water division systems have been designed to direct the non-contact water away from the plant site and the CMP tailings site. The non-contact water will report to non-contact water surge ponds located at the south and north sites prior to being released to the environment at a controlled rate.

25.5.7 Residue Storage Facility

The RSF was designed to store the washed and filtered process residue. The geomembrane lined containment area will be constructed within the same footprint as the existing tailings cells and incorporate surface water diversion and contact water containment features. The RSF will be constructed in stages to suit residue storage requirements and the construction footprint made available from excavation of the existing tailings. The RSF slopes and surfaces will undergo progressive reclamation to mitigate dust generation and water infiltration.

25.6 Environmental Studies, Permitting, and Social or Community Impact

The vicinity of the CMP tailings has been significantly impacted by past mining and related heavy industrial activities. Mining activity at Chvaletice ended in 1975. Czech law exempts land owners and developers from impacts prior to 1989, when communism ended in then Czechoslovakia. Due to the location of the CMP on the shore of the Labe River and a shallow aquifer in the Labe Valley, there are significant environmental sensitivities related to ongoing tailings runoff and related impacts to local groundwater. Currently, EMN has knowledge of impacted groundwater caused by the historical mining and processing activity in the area, in particular, the ongoing leaching of metals and other pollutants from the tailings. EMN continues to regularly monitor these impacts in groundwater wells and expects that the reprocessing of the Chvaletice tailings would result in a significant reduction or elimination of ongoing groundwater pollution caused by the currently unlined tailings facility. Environmental baseline studies and other environmental studies have been in progress since the summer of 2016. These studies include a comprehensive site wide Biological Survey, a detailed Air Dispersion Model and Study, an Acoustic/Noise Impact Study, a Road and Rail Transportation Study, a site wide Hydrogeological Survey, a Health Impact Assessment, an Impact on Landscape Character study, and a Reclamation and Remediation Study.

In March 2024, the Czech Ministry of Environment issued a favourable EIA Statement for the Chvaletice Manganese Project. Several additional permits were granted to the company: Determination of Mining Lease in January 2025, Construction Permit for the Technological Bridge in March 2026, Land Planning Permit for the Processing Plant in April 2026, Construction Permit for Infrastructure Relocation in May 2026. and Land Planning Permit for the Railway and Shunting Yard in June 2026.

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25.7 Project Execution Plan

A Level 1, Project Development Schedule has been prepared during the PEA in order to outline the overall timeline and key constraints. According to the schedule, it is expected that the project should take approximately four years to develop to achieve a commencement of commercial production by Q1, 2032. The critical path of the project currently falls through the FS update, FEED, detailed engineering, construction, and commissioning phases.

25.8 Capital and Operating Cost Estimates

25.8.1 Capital Cost Estimate

The total estimated initial capital cost for the design, construction, installation, and commissioning of the Project was estimated to be $825.2 million, including $627.4 million for the Phase 1 construction and $197.8 million for the Phase 2 plant expansion. The sustaining costs were estimated to be $139.1 million. All costs are shown in US dollars and the accuracy range of the estimate is ±35%.

Tetra Tech established the capital cost estimate using a hierarchical WBS. Where applicable, the quotations used in this estimate were obtained in Q1/Q2, 2026. Tetra Tech used the foreign currency exchange rates shown in Table 21-2, where applicable.

25.8.2 Operating Cost Estimate

On average, the on-site LOP operating costs were estimated as $181.99/t of CMP tailings reprocessed, or USD$4.14/kg manganese metal produced (equivalent). The on-site operating costs are defined as the direct operating costs, including CMP tailings extraction, processing, water treatment, NMT/LR dry stacking, site servicing, and G&A costs, and exclude other costs such as product freight costs, sales related costs, and government and third-party royalties, which are included in the economic analysis.

The LOP average operating cost estimates include two different nominal process rates, starting from 75,000 t/d for Phase 1 and to 150,000 t/a for Phase 2.The major cost for the CMP is the HPMSM processing cost, which accounts for approximately 76% of the total cost, excluding service costs required for water and steam supply and water treatment. A contingency of 5% is included in the estimate. The expected accuracy range of the operating cost estimate is ±35%.

25.9 Economic Analysis

The PEA is preliminary in nature and may include Inferred Mineral Resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as Mineral Reserves, and there is no certainty that the results of the PEA will be realized. Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability.

Tetra Tech completed a pre-tax economic analysis based on estimated costs and revenues for extracting and reprocessing the tailings from the Chvaletice deposit. The economic analysis is based on the sale of two products: HPMSM and magnesium carbonate by-product. The HPMSM price used for the analysis were based on the projection by Marketeye. The economic analysis summarized below shows that the project is economically viable:

- Pre-tax NPV of $740.0 million at an 8% discount rate
- Pre-tax IRR of 16.0%
- Pre-tax payback period of 6.5 years

Grant Thornton Czech Republic s.r.o. prepared both the Czech tax depreciation calculations based on the capital expenditure information and the allocation of such expenditures into the Czech tax depreciation groups, and the Czech corporate income taxes payable for the CMP economic analysis based on existing income tax legislation in the Czech Republic.

The post-tax economic analysis for the life of the project yielded the following financial results:

- Post-tax NPV of USD$492.1 million at an 8% real discount rate
- Post tax IRR of 13.8%
- Post-tax payback period of 7.3 years
- The PEA economic evaluation shows that the CMP is most sensitive to product prices followed by operating costs

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26.0 RECOMMENDATIONS

This PEA and Public Report indicate that re-processing the CMP deposit will provide a good economic return for the project. It is recommended that the Project be moved to the next phase of study and engineering design.

Full details of recommendations by discipline are outlined in the following subsections, and the cost breakdown by discipline for future recommended work is summarized in Table 26-1.

Table 26-1: Recommended Costs for Future Work Up to Feasibility Study

Area	Estimated Cost (USD$)
Tailings Extraction	400,000
Mineral Processing and Metallurgical Testing*	600,000
Recovery Methods/Trade-off Studies	250,000
Infrastructure	200,000
Marketing and Transportation Studies	100,000
RSF Design Related Work	80,000
Total Cost	**1,630,000**

*Note: *including costs for demonstration plant testing*

26.1 Mining Methods

To support the mine design and schedule, additional geotechnical and hydrogeological testing of the tailings should be undertaken.

- The in situ hydraulic properties of the tailing materials need to be verified using methods specifically designed for characterizing a saturated/unsaturated groundwater flow regime. This will include testing and/or monitoring of:
  - In situ volumetric moisture content variations.
  - In situ positive and negative pore pressure variations.
  - In situ saturated hydraulic conductivity testing at various locations and elevations in the tailings cells.
  - Development of soil-water retention curves for tailings at various locations and elevations in the tailings cells.
  - Install lysimeters to directly measure the temporal and spatial variability in tailings cell infiltration.
- An instrumented trial cut should be undertaken with the benching of the first cut. The instrumentation should be installed well in advance of the cut to allow baseline conditions and temporal variability to be assessed. Water management in the vicinity of the trial cut should mimic operational conditions and aim to minimize infiltration.

In addition to the above, geotechnical sampling of moisture content, grain size, and plasticity of finer-grained factions is proposed for each unit within all three tailings cells, both as an initial drill campaign and at annual intervals during the life of the project. This data collection aims to further constrain the boundaries between the differing units within the cells and refine estimates of water levels. Through the investigative work, the locations and volumes of pressurized saturated tailings can be identified, and the mining plan adjusted to allow sufficient time for those zones to drain.

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- When operating, water management should be aimed at minimizing infiltration on the top of the piles and the benches. This will include, but not necessarily be limited to, the following:
  - Maintenance of existing vegetation in place for as long as possible. The vegetation contributes to evapotranspiration effectively reducing the water available to infiltrate into the cells.
  - Grading of benches and temporary ditches to promote runoff and limit infiltration.
  - Control of water from higher benches/vegetated areas to eliminate run of onto lower slopes and benches.

Even after depressurization of the tailings, operating haul trucks in the center of the cells where the material has been previously saturated may be difficult during inclement weather. To reduce the bearing pressure of the trucks and increase mobility, the use of flotation tires for the trucks during these periods is recommended. Composite construction mats ('swamp mats') are also recommend as temporary staging areas for excavators and haul trucks as needed. These mats can be easily conveyed by the excavator to the active mining face and removed when not required.

EMN had completed an assessment of the potential of converting diesel-powered articulated trucks into diesel-hydrogen hybrids. Other opportunities include an evaluation of potential benefits of transitioning to a predominately battery electric vehicle fleet.

The estimated costs associated with the recommended work are summarized in Table 26-2.

Table 26-2: Recommended Budget for Tailings Extraction

Task	Estimated Cost (USD$)
Geotechnical Sampling Program	170,000
Hydrogeological Instrumentation and Monitoring	220,000
Floatation tires and Swamp mats study	10,000
Total	**400,000**

26.2 Mineral Processing and Metallurgical Testing

Further metallurgical testing is recommended to better define metallurgical performance and optimize processing conditions, in particular, the verification testing by the planned demonstration plant campaigns. The samples to be tested should be generated from different spatial locations, including variations in mineralogy, head grade, and particle size distribution. Further metallurgical tests using the demonstration plant that had been set up should be conducted. High temperature crystallization should be further tested. Also, an alternative process option may need to be explored.

Additional bench scale verification tests should be conducted to generate data to support engineering design.

A total of USD$400,000 has been estimated for further testing programs, excluding sample generation and shipment costs and the owner team cost for the demonstration plant testing.

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Table 26-3: Recommended Budget for Metallurgical Testwork

Task	Estimated Cost (USD$)
Bench Scale Verification and Design Data Generation Tests	300,000
Demonstration Plant Runs*	300,000
Total	**600,000**

*Note: * excluding large size sample production for potential users.*

26.3 Recovery Methods

Several trade-off studies and process optimizations have been completed during the previous study. As the project is one of pioneer projects that plan to produce HPMSM products from HPEMM in compliance with all applicable modern environmental standards and regulations and due to rapid equipment and technology evolutions, further trade-off studies and process optimizations should be conducted during the next stage of study. The objectives should be to reduce capital and operating costs, to use automatic operations as much as possible, and to adapt larger and energy efficient equipment if possible.

The costs associated with the process optimization and trade-off studies are estimated to be approximately USD$250,000.

26.4 Marketing and Transportation Studies

Further marketing studies for high-purity manganese products are recommended to better understand the market supply and demand and their pricing. The rechargeable battery industry for electrical cars and energy storage is an emerging industry. The formulations for the battery have been investigated extensively and it appears that no solid conclusion has been drawn so far. The change in battery formulations will affect the market demand to various metals used for the battery production, including lithium, cobalt, nickel, manganese, sodium, and other metals. Further market studies should be conducted with developing the Project.

A further comprehensive transportation study for various equipment, construction materials, and operation consumables and supplies should be conducted, especially the equipment and construction materials which are not feasible to be sourced locally.

Further marketing studies for selling magnesium carbonate by-products for use in the local market and selling potential gypsum by-product for industrial use should be studied to improve project economics.

The Project is expected to consume large amounts of sulphuric acid and lime. The local sources for the reagents and other reagents required for the Project should be further investigated in the next phase of the study and engineering work. The investigations should include reagent sources and logistic arrangements.

The estimated cost for this work will be approximately USD$100,000.

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26.5 Project Infrastructure

Geotechnical drilling investigations for infrastructure foundation studies are recommended for the proposed locations of the process facilities and ancillary buildings at the plant site and the mine site, although the plant site is planned to be partially located at the brownfield where the previous pyrite recovery plant was located. The estimated cost for this work will be approximately USD$200,000.

26.5.1 Residue Storage Facility Design Work

The alignment and thickness of the proposed perimeter drainage layer should be reviewed as part of future study and design work and the proposed reclamation plan for the RSF site. Similarly, the geometry and compaction specification of the perimeter structural zone in the filtered stack should be developed as part of future work in the context of operational requirements, cover design requirements, and constraints with respect to stacked residue consolidation and the geotechnical stability of the stack slopes.

Environmental management plans should be developed for dust, contact water, groundwater, and topsoil.

The costs associated with the studies are estimated to approximately USD$80,000.

26.6 Environmental Studies, Permitting, and Social or Community Impact

EMN/Mangan has completed intensive environmental baseline studies and other environmental studies since the summer of 2016. An Environmental Social Impact Assessment (ESIA) for the Chvaletice Manganese Project was developed and its approval was received in March 2024 from the Czech Ministry of Environment. No further costs associated with the assessment work have been budgeted.

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APPENDIX A COMPETENT PERSONS CONSENT FORMS

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Competent Person's Consent Form

Pursuant to the requirements of ASX Listing Rules 5.6, 5.22 and 5.24 and
Clause 9 of the JORC Code 2012 Edition (Written Consent Statement)

Report name

Public Report and Preliminary Economic Assessment for the Chvaletice Manganese Project, Czech Republic

(Insert name or heading of Report to be publicly released) ('Report')

Tetra Tech Canada Inc.

(Insert name of company releasing the Report)

Chvaletice Manganese Project

(Insert name of the deposit to which the Report refers)

If there is insufficient space, complete the following sheet and sign it in the same manner as this original sheet.

May 14, 2026

(Date of Report)

For personal use only

Statement

I/We,

Chris Johns, P.Eng.

(Insert full name(s))

confirm that I am the Competent Person for the Report and:

I have read and understood the requirements of the 2012 Edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (JORC Code, 2012 Edition).

I am a Competent Person as defined by the JORC Code 2012 Edition, having more than twenty years' experience that is relevant to the style of mineralization and type of deposit described in the Report, and to the activity for which I am accepting responsibility.

I am a Member or Fellow of The Australasian Institute of Mining and Metallurgy or the Australian Institute of Geoscientists or a 'Recognized Professional Organization' (RPO) included in a list promulgated by ASX from time to time.

I have reviewed the Report to which this Consent Statement applies.

I/We am a full time employee of

Tetra Tech Canada Inc.

(Insert company name)

Or

I am a consultant working for

(Insert company name)

and have been engaged by

Euro Manganese Inc.

(Insert company name)

to prepare the documentation for

Chvaletice Manganese Deposit

(Insert deposit name)

on which the Report is based, for the period ended

April 27 2026

(Insert date of Resource/Reserve statement)

I have disclosed to the reporting company the full nature of the relationship between myself and the company, including any issue that could be perceived by investors as a conflict of interest.

I verify that the Report is based on and fairly and accurately reflects in the form and context in which it appears, the information in my supporting documentation relating to Exploration Targets, Exploration Results, and Mineral Resources.

For personal use only

Consent

I consent to the release of the Report and this Consent Statement by the directors of:

Euro Manganese Inc.

(Insert reporting company name)

"original document signed"

Signature of Competent Person

June 29, 2026

Date:

Engineers and Geoscientists of British Columbia

Professional Membership:

(insert organization name)

39423

Membership Number:

"original document signed"

Signature of Witness:

Jianhui (John) Huang, P. Eng., Vancouver, Canada

Print Witness Name and Residence:

(e.g. town/suburb)

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Additional deposits covered by the Report for which the Competent Person signing this form is accepting responsibility:

None.

Additional Reports related to the deposit for which the Competent Person signing this form is accepting responsibility:

None.

"original document signed"

Signature of Competent Person

Original Signed and Sealed

June 29, 2026

Date

Engineers and Geoscientists of British Columbia

Professional Membership:

(insert organization name)

39423

Membership Number:

"original document signed"

Signature of Witness

Jianhui (John) Huang, P.Eng., Vancouver, Canada

Print Witness Name and Residence:

(eg. Town/suburb)

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Competent Person's Consent Form

Pursuant to the requirements of ASX Listing Rules 5.6, 5.22 and 5.24 and
Clause 9 of the JORC Code 2012 Edition (Written Consent Statement)

Report name

Public Report and Preliminary Economic Assessment for the Chvaletice Manganese Project, Czech Republic

(Insert name or heading of Report to be publicly released) ('Report')

Tetra Tech Canada Inc.

(Insert name of company releasing the Report)

Chvaletice Manganese Deposit

(Insert name of the deposit to which the Report refers)

If there is insufficient space, complete the following sheet and sign it in the same manner as this original sheet.

May 14, 2026

(Date of Report)

For personal use only

Statement

I/We,

Hassan Ghaffari, P.Eng.

(Insert full name(s))

confirm that I am the Competent Person for the Report and:

I have read and understood the requirements of the 2012 Edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (JORC Code, 2012 Edition).

I am a Competent Person as defined by the JORC Code 2012 Edition, having more than ten years' experience that is relevant to the style of mineralization and type of deposit described in the Report, and to the activity for which I am accepting responsibility.

I am a Member or Fellow of The Australasian Institute of Mining and Metallurgy or the Australian Institute of Geoscientists or a 'Recognized Professional Organization' (RPO) included in a list promulgated by ASX from time to time.

I have reviewed the Report to which this Consent Statement applies.

I/We am a full time employee of

Tetra Tech Canada Inc.

(Insert company name)

Or

I am a consultant working for

(Insert company name)

and have been engaged by

Euro Manganese Inc.

(Insert company name)

to prepare the documentation for

Chvaletice Manganese Deposit

(Insert deposit name)

on which the Report is based, for the period ended

April 27, 2026

(Insert date of Resource/Reserve statement)

I have disclosed to the reporting company the full nature of the relationship between myself and the company, including any issue that could be perceived by investors as a conflict of interest.

I verify that the Report is based on and fairly and accurately reflects in the form and context in which it appears, the information in my supporting documentation relating to Exploration Targets, Exploration Results, and Mineral Resources.

For personal use only

Consent

I consent to the release of the Report and this Consent Statement by the directors of:

Euro Manganese Inc.

(Insert reporting company name)

"original document signed"

Signature of Competent Person

June 29, 2026

Date:

Engineers and Geoscientists of British Columbia

Professional Membership:

(insert organization name)

30408

Membership Number:

"original document signed"

Signature of Witness:

Jianhui (John) Huang, P.Eng., Vancouver, Canada

Print Witness Name and Residence:

(e.g. town/suburb)

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Additional deposits covered by the Report for which the Competent Person signing this form is accepting responsibility:

None.

Additional Reports related to the deposit for which the Competent Person signing this form is accepting responsibility:

None.

"original document signed"

Signature of Competent Person

June 29, 2026

Date

Engineers and Geoscientists of British Columbia

Professional Membership:

(insert organization name)

30408

Membership Number:

"original document signed"

Signature of Witness

Jianhui (John) Huang, P.Eng., Vancouver, Canada

Print Witness Name and Residence:

(eg. Town/suburb)

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Competent Person's Consent Form

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Report name

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Tetra Tech Canada Inc.

(Insert name of company releasing the Report)

Chvaletice Manganese Deposit

(Insert name of the deposit to which the Report refers)

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May 14, 2026

(Date of Report)

For personal use only

Statement

I/We,

James Barr, P.Geo.

(Insert full name(s))

confirm that I am the Competent Person for the Report and:

I have read and understood the requirements of the 2012 Edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (JORC Code, 2012 Edition).

I am a Competent Person as defined by the JORC Code 2012 Edition, having more than five years' experience that is relevant to the style of mineralization and type of deposit described in the Report, and to the activity for which I am accepting responsibility.

I am a Member or Fellow of The Australasian Institute of Mining and Metallurgy or the Australian Institute of Geoscientists or a 'Recognized Professional Organization' (RPO) included in a list promulgated by ASX from time to time.

I have reviewed the Report to which this Consent Statement applies.

I/We am a full time employee of

_____

(Insert company name)

Or

I am a consultant working for

Tetra Tech Canada Inc.

(Insert company name)

and have been engaged by

Euro Manganese Inc.

(Insert company name)

to prepare the documentation for

Chvaletice Manganese Deposit

(Insert deposit name)

on which the Report is based, for the period ended

April 27, 2026

(Insert date of Resource/Reserve statement)

I have disclosed to the reporting company the full nature of the relationship between myself and the company, including any issue that could be perceived by investors as a conflict of interest.

I verify that the Report is based on and fairly and accurately reflects in the form and context in which it appears, the information in my supporting documentation relating to Exploration Targets, Exploration Results, and Mineral Resources.

For personal use only

Consent

I consent to the release of the Report and this Consent Statement by the directors of:

Euro Manganese Inc.

(Insert reporting company name)

"original document signed"

Signature of Competent Person

June 29, 2026

Date:

Engineers and Geoscientists of British Columbia

Professional Membership:

(insert organization name)

35150

Membership Number:

"original document signed"

Signature of Witness:

Jianhui (John) Huang, P.Eng., Vancouver, Canada

Print Witness Name and Residence:

(e.g. town/suburb)

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Additional deposits covered by the Report for which the Competent Person signing this form is accepting responsibility:

None.

Additional Reports related to the deposit for which the Competent Person signing this form is accepting responsibility:

None.

"original document signed"

Signature of Competent Person	June 29, 2026 Date
Original Signed and Sealed	
Engineers and Geoscientists of British Columbia Professional Membership: *(insert organization name)*	35150 Membership Number:

"original document signed"

Signature of Witness	Jianhui (John) Huang, P.Eng., Vancouver, Canada Print Witness Name and Residence: (eg. Town/suburb)

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Competent Person's Consent Form

Pursuant to the requirements of ASX Listing Rules 5.6, 5.22 and 5.24 and
Clause 9 of the JORC Code 2012 Edition (Written Consent Statement)

Report name

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(Insert name or heading of Report to be publicly released) ('Report')

Tetra Tech Canada Inc.

(Insert name of company releasing the Report)

Chvaletice Manganese Deposit

(Insert name of the deposit to which the Report refers)

If there is insufficient space, complete the following sheet and sign it in the same manner as this original sheet.

May 14, 2026

(Date of Report)

For personal use only

Statement

I/We,

Jianhui (John) Huang, Ph.D., P.Eng.

(Insert full name(s))

confirm that I am the Competent Person for the Report and:

- I have read and understood the requirements of the 2012 Edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (JORC Code, 2012 Edition).
- I am a Competent Person as defined by the JORC Code 2012 Edition, having more 20 years' experience that is relevant to the style of mineralization and type of deposit described in the Report, and to the activity for which I am accepting responsibility.
- I am a Member or Fellow of The Australasian Institute of Mining and Metallurgy or the Australian Institute of Geoscientists or a 'Recognized Professional Organization' (RPO) included in a list promulgated by ASX from time to time.
- I have reviewed the Report to which this Consent Statement applies.

I/We am a full time employee of

Tetra Tech Canada Inc.

(Insert company name)

Or

I am a consultant working for

(Insert company name)

and have been engaged by

Euro Manganese Inc.

(Insert company name)

to prepare the documentation for

Chvaletice Manganese Deposit

(Insert deposit name)

on which the Report is based, for the period ended

April 27, 2026

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I verify that the Report is based on and fairly and accurately reflects in the form and context in which it appears, the information in my supporting documentation relating to Exploration Targets, Exploration Results, and Mineral Resources.

For personal use only

Consent

I consent to the release of the Report and this Consent Statement by the directors of:

Euro Manganese Inc.
(Insert reporting company name)

"original document signed"
Signature of Competent Person

June 29, 2026
Date:

Engineers and Geoscientists of British Columbia
Professional Membership:
(insert organization name)

30898
Membership Number:

"original document signed"
Signature of Witness:

Hassan Ghaffari, P. Eng., Vancouver, Canada
Print Witness Name and Residence:
(e.g. town/suburb)

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Additional deposits covered by the Report for which the Competent Person signing this form is accepting responsibility:

None.

Additional Reports related to the deposit for which the Competent Person signing this form is accepting responsibility:

None.

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Signature of Competent Person

June 29, 2026

Date

Engineers and Geoscientists of British Columbia

Professional Membership:

(insert organization name)

30898

Membership Number:

"original document signed"

Signature of Witness

Hassan Ghaffari, P. Eng., Vancouver, Canada

Print Witness Name and Residence:

(eg. Town/suburb)

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Clause 9 of the JORC Code 2012 Edition (Written Consent Statement)

Report name

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(Insert name or heading of Report to be publicly released) ('Report')

Tetra Tech Canada Inc.

(Insert name of company releasing the Report)

Chvaletice Manganese Deposit

(Insert name of the deposit to which the Report refers)

If there is insufficient space, complete the following sheet and sign it in the same manner as this original sheet.

May 14, 2026

(Date of Report)

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Statement

I/We,

Maureen Marks, P.Eng.,

(Insert full name(s))

confirm that I am the Competent Person for the Report and:

- I have read and understood the requirements of the 2012 Edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (JORC Code, 2012 Edition).
- I am a Competent Person as defined by the JORC Code 2012 Edition, having more than five years' experience that is relevant to the style of mineralization and type of deposit described in the Report, and to the activity for which I am accepting responsibility.
- I am a Member or Fellow of The Australasian Institute of Mining and Metallurgy or the Australian Institute of Geoscientists or a 'Recognized Professional Organization' (RPO) included in a list promulgated by ASX from time to time.
- I have reviewed the Report to which this Consent Statement applies.

I/We am a full time employee of

Tetra Tech Canada Inc.

(Insert company name)

Or

I am a consultant working for

(Insert company name)

and have been engaged by

Euro Manganese Inc.

(Insert company name)

to prepare the documentation for

Chvaletice Manganese Deposit

(Insert deposit name)

on which the Report is based, for the period ended

April 27, 2026

(Insert date of Resource/Reserve statement)

I have disclosed to the reporting company the full nature of the relationship between myself and the company, including any issue that could be perceived by investors as a conflict of interest.

I verify that the Report is based on and fairly and accurately reflects in the form and context in which it appears, the information in my supporting documentation relating to Exploration Targets, Exploration Results, and Mineral Resources.

For personal use only

Consent

I consent to the release of the Report and this Consent Statement by the directors of:

Euro Manganese Inc.

(Insert reporting company name)

"original document signed"

Signature of Competent Person

June 29, 2026

Date:

Engineers and Geoscientists of British Columbia

Professional Membership:

(insert organization name)

176335

Membership Number:

"original document signed"

Signature of Witness:

Jianhui (John) Huang, P.Eng., Vancouver, Canada

Print Witness Name and Residence:

(e.g. town/suburb)

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Additional deposits covered by the Report for which the Competent Person signing this form is accepting responsibility:

None.

Additional Reports related to the deposit for which the Competent Person signing this form is accepting responsibility:

None.

"original document signed"

Signature of Competent Person	June 29, 2026 Date
Original Signed and Sealed	
Engineers and Geoscientists of British Columbia Professional Membership: *(insert organization name)*	176335 Membership Number:

"original document signed"

Signature of Witness	Jianhui (John) Huang, P.Eng., Vancouver, Canada Print Witness Name and Residence: (eg. Town/suburb)

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APPENDIX B JORC TABLE 1

JORC Code 2012 Edition – Table 1

Section 1: Sampling Techniques and Data	
Criteria	**Explanation**
Sampling Techniques	▪ The 2018 sampling program is summarized as: ▪ Sonic rig advanced at 2 m intervals using 100 mm core tube, approx. 14 kg wet weight per sample ▪ 730 core samples (2 m) of tailings material were recovered for analysis ▪ Samples extracted from core tube at 1 m subsamples (approx. 7 kg wet weight) for logging and physical measurements ▪ A quarter split (approx. 3.5 kg wet weight) was extracted from the 1 m subsamples, recombined with the corresponding 1 m quarter split subsample, bagged and shipped to SGS for particle size analysis, lithogeochemistry, metals analysis and bulk density testing (approx. 7 kg for 2 m representative sample ▪ Remaining ¾ sample was split for additional test work in Czech Republic, and for metallurgical test work in China. ▪ All samples were clearly labelled and stored in vacuum-packed and sealed plastic bags to preserve original moisture content and prevent sample deterioration. Geochemical samples were contained in plastic buckets, inventoried and stored in a locked facility in Prelouc, Czech Republic, prior to being shipped to SGS Bor.
Drilling Techniques	▪ The 2018 program completed drilling of 1,509.5 m in 80 holes, ▪ The program included completion of 35 vertical and 19 inclined 100 mm diameter Sonic holes, totaling 1,409.5 m, and an additional 26 mobile percussion drill holes, totaling 100 m, were completed around the perimeter embankments of the tailings piles in areas which were not previously accessed for sampling ▪ Sonic holes were placed as infill holes with approximately 75 metre spacing between 2017 holes and as inclined directed underneath the outer perimeter embankment, using 100 mm diameter size rods and sonic core barrel advance provided by Eijkelkamp SonicSampDrill B.V. and crews from Giesbeek, the Netherlands
Drill Sample Recovery	▪ Recoveries estimated by field crew and recorded on geological logs ▪ No casing was installed and drill rods were pulled for each core run
Logging	▪ Logging was conducted in the field at drill side by GET s.r.o, on hard copy paper and transcribed into digital drillhole database ▪ Records include lithological description, wet mass, estimated recovery, and volume.
Subsampling Techniques and Sample Preparation	▪ Sampling excludes overlying topsoil, and underlying native soil substrate ▪ Assay samples received at SGS Bor were weighed (wet) and homogenized by hand using the “Japanese slab cake method” of kneading and rolling the sample ▪ A 500 g subsample sent to laser diffraction particle size analysis ▪ The remaining sample was dried (105 degrees C) and homogenized ▪ 1 kg was extracted for pulverization to 95% passing 75µm mesh ▪ First stage of analysis was conducted SGS in Bor, Serbia, which included partial digestion using aqua regia with ICP/MS or AAS, and near total digestion using four acids (nitric, perchloric, hydrofluoric and hydrochloric) with ICP/MS or AAS from 0.5g aliquots ▪ The second stage of analysis was conducted at SGS in Lakefield, Ontario, Canada, which included using lithium borate fusion and x-ray fluorescence (XRF) for major concentration of major cation oxide, concentration of in organic sulphur and carbon using LECO furnace, measurement of specific gravity by pycnometer, and for particle size analysis by LD-PSA. Total of 888 samples were analyzed at SGS laboratories.

Section 1: Sampling Techniques and Data	
Criteria	**Explanation**
Quality of Assay Data and Laboratory Tests	▪ Quality control (QC) protocol included insertion of field duplicates (5%), blank (4%) and certified reference samples (5%) in all drill holes, collection of sample preparation duplicate (5%) and pulp duplicates (2%). ▪ Three holes were drilled in 2018 to twin holes completed in 2017 ▪ A database was compiled, and various checks and measures were performed by Tetra Tech. No significant quality assurance (QA) concerns were identified by the Competent Person.
Verification of Sampling and Assaying	▪ Independent analyses were conducted by an external umpire laboratory; Activation Laboratories, located in Ancaster, Ontario, Canada. The lab received 96 representative samples (approximately 1 in 10) ▪ Independent CP sampling was conducted
Location of Data Points	▪ Property topography was provided by GET s.r.o in Czech projection S-JTSK using the Bpv datum ▪ Surveying of drill hole collars was completed on-site by GET using a Trimble model R4 GNSS global positioning system (GPS) receiver equipment
Data Spacing and Distribution	▪ Infill Sonic holes (35) were spaced at approximately 100 m, giving approximately 75m overall average spacing including the 2017 drill holes ▪ Perimeter Sonic holes (19) were inclined at 45 degrees and spaced at two holes per side of the tailings cells ▪ Perimeter percussion holes (26) were drilled vertically and spaced at approximately two to three holes per side of the tailings cells ▪ Downhole sampling continuous at 2 m intervals
Orientation of Data in Relation to Geological Structure	▪ Drillholes were drilled both vertically and inclined through heterogeneous tailings mass
Sample Security	▪ Samples stored at a field warehouse managed by Geomin in Jihlava prior to shipping to laboratory for analyses
Audits or Reviews	▪ Independent site visit, sampling and data review completed by Tetra Tech Competent Person, James Barr, P.Geo., during the delineation drilling campaigns on July 1-3rd, 2017 and on July 30-31st, 2018

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Section 2: Reporting of Exploration Results	
Criteria	**Explanation**
Mineral Tenement and Land Tenure Status	**Mineral Tenement** ▪ Governing authorities that regulate mineral resources and mining activities in the Czech Republic include the Czech Mining Authority, District Mining Authorities, the Ministry of the Industry and Trade, and the Ministry of Environment of the Czech Republic. The CMP lies within the Hradec Králové and Pardubice Region District Mining Authority. These authorities administer the Mining Act (44/1988). Mineral tenure is regulated under the Geological Act (62/1988) and administered by the Ministry of Environment in consultation with the Ministry of the Industry and Trade and with the Czech Mining Authority. ▪ Application for the mineral tenure of the "Trnávka Exploration Area" was made by GET in April 2014. The area of interest was considered to have been discovered by State Resource which allowed for competing bids. Following the Ministry of Environment's review of competing bids, exploration license 631/550/14-Hd which encompasses the "Řečany - Tailings Pond 3" and "Chvaletice - Tailings Ponds 1, 2" was awarded to GET. ▪ Mangan is a private company established in the Czech Republic in 1997. Mangan was used as the corporate vehicle for an incorporated partnership between GET (33%), Geomin (33%), and Orex (34%). On December 15, 2014, an Option Agreement was signed between EMN, Mangan, and its affiliates, granting EMN the right to earn an 80% equity interest in Mangan. In May 2016, the Option Agreement was amended and EMN purchased 100% ownership of Mangan from the Mangan shareholders, for an aggregate share value (EMN common shares) of CAD$1,500,000 and future prorated NSR payments of 1.2% to the original Mangan partners. Conditions precedent to the EMN-Mangan purchase agreement included transfer of the exploration licence number 631/550/14 Hd from GET to Mangan. ▪ Mining Lease District for the Trnávka Mining Area: The establishment of the Mining Lease District for the Trnávka Mining Area currently represents the most significant regulatory decision for the project, surpassing all previously held exploration and preliminary licenses in legal hierarchy and importance. ▪ Mangan submitted the application for the Mining Lease District to the Regional Mining Authority for the territories of the Hradec Králové, Pardubice, Liberec, and Vysočina Regions on December 20, 2024. Following full legal proceedings, the authorization was granted and deemed legally effective on March 2, 2025. This authorization serves as the essential legal framework for subsequent mining permitting procedures, including the final Mining Permit and necessary construction permits. **Summary of Superseded Licenses and Historical Authorizations** ▪ The following licenses and permits are superseded by the Mining Lease District and are maintained here for historical reference and project continuity: ▪ Exploration licence number 631/550/14-Hd is registered to include mineral rights on a total area of 1.2 km^2 (120 ha), of which 0.82 km^2 is located within the Municipality of Trnávka, and 0.16 km^2 is located within the Municipality of Chvaletice. Exploration Licence No. 631/550/14-Hd expires May 31, 2026 (extension reference MZP/2018/550/1484-Hd). On May 4, 2018, the Czech Ministry of Environment issued Mangan an additional exploration Licence No. MZP/2018/550/386-Hd allowing it to drill the slopes on the perimeter of the tailings piles. Exploration Licence No. MZP/2018/550/386-Hd became effective May 23, 2018, and is valid until May 31, 2026. ▪ In December 2017, the Chvaletice tailings manganese resource was accepted in the Czech national register, confirming Mangan as the recognized administrator of these resources.

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Section 2: Reporting of Exploration Results	
Criteria	**Explanation**
	▪ On April 17, 2018, with effect from April 28, 2018, Mangan was issued a Preliminary Mining Permit by the Ministry of Environment, Licence No. MZP/2018/550/387-HD and referred to by the Ministry of Environment as the prior consent with the establishment of the Mining Lease District (the Preliminary Mining Permit). The Preliminary Mining Permit, was valid until April 30, 2023, and covers the areas included in the Exploration Licences and secures Mangan's rights for the entire deposit area. On July 20, 2021, Mangan was issued a new Preliminary Mining Permit, Licence No. MZP/2021/550/92-Hd, valid until May 31, 2026. ▪ The Preliminary Mining Permit provides an exclusivity to proceed with Environmental Impact Assessment and forms one of the prerequisites for the application for the establishment of the Mining Lease District and represents one of the key steps towards final permitting for the CMP. Based on the Preliminary Mining Permit and other documents, including the Environmental Impact Assessment (which may commence after the Preliminary Mining Permit has been issued), Mangan has until May 31, 2026, to apply for the establishment of the Mining Lease District covering the areas included in the Exploration Licences. The establishment of the Mining Lease District, the application for the final Mining Permit, and applications for permits relating to the construction of infrastructure required for the project, are required prior to mining at the CMP. **Land Tenure** ▪ The formal rezoning of 100% of the land underlying the tailings deposit area and commercial plant site is now complete, following approvals by both the Village of Trnávka and the Municipality of Chvaletice. Additionally, a land package totalling 7.2 ha located on the northern portion of the tailings area has been purchased from Helot (owned by the Vaněk family). ▪ On June 6, 2022, Mangan signed a long-term lease agreement with the Municipality of Chvaletice for a total area of 26.6 ha (266,417 m²), which represents approximately 19% of the total land area required for the Project and approximately 15% of the total tailings area. In addition, Mangan holds an active land lease agreement with ČEZ, a.s. (signed October 30, 2023) covering 56.6 ha of land in the Trnávka area under a royalty-based model. ▪ An aggregated parcel of land located immediately to the south and across the highway from the tailings deposit comprising a total 27.19 ha is proposed for development and construction of a high-purity manganese processing facility and related infrastructure. These land purchases and agreements include 19.94 ha of industrial-zoned land fully acquired through the purchase of EP Chvaletice s.r.o. (completed in December 2023), a 1.7 ha parcel of land purchased by EMN's Czech subsidiary (dated November 2017), a pending acquisition of a 5.0 ha parcel of land including a rail spur extension with MABA Prefa spol. s r.o. (successor to Správa nemovitostí Kirchdorfer CZ s.r.o.), a 0.2 ha section of land encompassing Rail Spur No. 1 purchased from Sev.en EC, a.s. (the owner of the Chvaletice power plant), and an active 30-year lease agreement for a 0.35 ha conveyor route option with KP Chvaletice s.r.o. (successor to Galmet Trade, spol. s r.o.). Mangan is also negotiating access for approximately 85,7 ha with Elektrárna Chvaletice a.s.
Exploration Done by Other Parties	▪ Hand auger sampling in 2014, four holes ranging from 2 to 2.5 m depth ▪ Testpit sampling in 2015, seven testpits ranging between 1.8 to 3.8 m depth

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Section 2: Reporting of Exploration Results	
Criteria	**Explanation**
Geology	▪ The mineralization found in tailings at the Chvaletice Manganese Project deposited by manmade processes following grinding and flotation processes of black pyritic shale and is therefore not characteristic of a traditional bedrock hosted manganese deposit ▪ The material can be physically characterized as a compacted soil, with varying degrees of particle sizes from clay to coarse sand. ▪ Mineralogy has been quantified by limited x-ray diffraction (XRD) analyses, with resulting manganese bearing mineral phases as rhodochrosite (and other Mn-bearing carbonates), spessartine (and other Mn-silicates); quartz was the main gangue mineral, and pyrite was the main sulphide mineral.
Drill Hole Information	▪ Drillholes were collared on the surface of the tailings deposits and drilled vertically downwards to completion in the underlying native soil substrate, approximate average depth in Cell 1 = 26 metres, Cell 2 = 27 metres and Cell 3 = 11 metres
Data Aggregation Methods	▪ Raw drillhole samples were composited to 2 metre intervals for use in mineral resource estimation
Relationship Between Mineralization Widths and Intercept Points	▪ Downhole width is equivalent to true width
Diagrams	▪ Diagrams, maps and cross-sections are included in the PEA Report for reference
Balanced Reporting	▪ All of the tailing material which has been assayed has reported elevated concentration of manganese ▪ 2018 Sample assay grades range from 0.19% to 11.69% total Manganese (by XRF analysis), with mean value of 7.29%
Other Substantive Exploration Data	▪ A total of 6.6 km lines of high-resolution electric resistivity tomography (ERT) and seismic refraction was conducted by GImpuls Praha spol. s.r.o., on behalf of Mangan Chvaletice, in 2017
Further Work	▪ No further exploration work is recommended or planned.

Section 3: Estimation and Reporting of Mineral Resources	
Criteria	**Explanation**
Database Integrity	▪ Tetra Tech undertook verification of the data transfer and compilation process at SGS through visual comparison of the issued certificates of analysis with the digital assay records ▪ The drillhole database was visually inspected by Tetra Tech, and corrections made prior to further inspection using digital validation tools within Leapfrog Geo modelling software
Site Visits	▪ A site visit was conducted by Tetra Tech CP, James Barr, P.Geo., from July 1 to 3, 2017, and July 30 and 31, 2018, during both drilling campaigns. Site visits were conducted by Mr. Jianhui Huang, Ph.D., P.Eng on February 5, 2018 and on May 3, 2022, by Mr. Chris Johns, P.Eng., on February 5, 2018 and May 3, 2022, by Mrs. Maureen Marks, P.Eng., and Mr. Hassan Ghaffari, P.Eng. on May 3, 2022,
Geological Interpretation	▪ A mineral resource estimate has been developed for total and soluble manganese concentrations ▪ Total manganese is based on XRF analysis, and soluble manganese is based on results of aqua regia digestion and ICP-MS or AAS analysis. ▪ Additionally, average moisture and grain size distribution indicators are reported for the deposit

Section 3: Estimation and Reporting of Mineral Resources	
Criteria	**Explanation**
	▪ Geological interpretation assumes that deposition of tailings materials was episodic over the life of the historical mining operations, and the material was deposited from processed materials with mixed particle sizes suspended in slurry with thin lateral continuity with a particle gradation from coarse to fine away from the point of discharge
Dimensions	▪ Total surface area is approximately 1,032,800 m², approximate total volume (tailings) 17,528,800 m³, approximate total volume of topsoil is 2,060,030 m³ ▪ The resource is reported using a sub-block model with parent blocks 50x50x4 metres and sub-blocks 12.5x12.5x2 metres
Estimation and Modelling Techniques	▪ The Mineral Resource Estimate was calculated using Aranz Leapfrog Geo v.4.4.2 ▪ Interpolation searches were 150x150x8 metres and were performed using an inverse distance (to the exponent 3) methodology. Data distribution did not conform to reliable variography assessment. ▪ The search was limited to a maximum of two samples per drill hole and required a minimum of two to a maximum of six samples in order to populate a block.
Moisture	▪ The tonnage is reported on an in situ dry material basis ▪ Moisture loss was measured during sample handling and preparation
Cut-off Parameters	▪ A break-even grade of 3.78% total Mn has been estimated for the Chvaletice deposit. The estimated break-even cut-off grade falls below the grade of most of the blocks (excluding 46,613 tonnes which have grades less than 3.78% total Mn, these have not been deducted from the Mineral Resource Statement). It is assumed that material segregation will not be possible during mining due to inherent difficulty of grade control and selective mining for this deposit type. $MgCO_3$ is produced as a raw product in the processing of HPMSM and would otherwise be discarded. This by-product is presented as total insitu concentration, and has been assessed as being a reasonable prospect for eventual economic extraction.
Mining Factors or Assumptions	▪ The deposit sits above ground and is candidate for traditional truck and shovel mining, or other possible surface extraction techniques following dewatering of tailings ▪ It is assumed that material segregation will not be possible due to inherent difficulty of grade control and selective mining for this deposit type ▪ An overall 0.5% manganese loss factor and no dilution have been considered in the tailings extraction. ▪ The entirety of the mined tailings is considered mill feed and will be processed. ▪ The production schedule has been developed entirely from Measured and Indicated Mineral Resources. ▪ The tailings cells are designed to be mined by excavator, loading haul trucks on 3m high benches with a 12 m bench width and face angle of 45°. ▪ Pre-stripping of the topsoil will be completed one year in advance of mining on an annual basis, with material stockpiled on top of each respective cell for replacement as cover material on the residue storage facility during years 2-26 of the life of mine. Blasting of the material is not required. ▪ The table below shows the detailed breakdown of plant feed by Measured and Indicated Mineral Resource categories:

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Section 3: Estimation and Reporting of Mineral Resources

Criteria	Explanation

Schedule Year	Cell	Classification	Dry Tailings to Plant, t	Total Manganese Grade, %	Contained Manganese, t	Total Magnesium Grade, %	Contained Magnesium, t
1-6	3	Measured	4,004,344	7.46	294,130	0.95	38,023
		Indicated	48,440	8.45	4,093	0.84	405
6-16	1	Measured	10,308,613	7.78	818,990	1.07	110,681
		Indicated	161,805	6.56	10,612	0.95	1,540
16-26	2	Measured	12,289,304	6.91	834,804	1.24	152,620
		Indicated	147,011	8.08	11,872	3.21	4,718
1-26	**1-3**	**Measured**	**26,602,260**	**7.32**	**1,947,924**	**1.13**	**301,324**
		Indicated	**357,256**	**7.44**	**26,577**	**1.86**	**6,663**
Total		**M&I**	**26,959,516**	**7.32**	**1,974,501**	**1.14**	**307,986**

Metallurgical Factors or Assumptions

- Manganese process methods include: magnetic preconcentration, magnetic concentrate leaching, pregnant solution purification, manganese recovery by electrowinning, ammonium recovery and reuse, manganese metal dissolution and solution purification and HPMSM crystallization. The plant is designed to produce approximately 150,000 t/a HPMSM or approximately 1.1 million t/a plant feed with a feed grade of 7.3% Mn.
- Process recovery was estimated based on comprehensive metallurgical test results developed by BGRIMM, CRIMM, SGS, in-house demonstration plant campaigns, and METSIM simulations and BGRIMM calculations.
- Product pricing inputs prepared by Andrew Zemek from MarketEye.org (a recognized battery raw materials and high-purity manganese market specialist with over 35 years of industry experience). The marketing study includes market demand, supply and HPMSM pricing forecast.
- Main consumable pricing forecast, including electricity unit pricing, by Argus Media group (a globally recognized provider of independent energy, commodity, and market intelligence pricing data). Product pricing inputs prepared by Andrew Zemek from Marketeye.org (a recognized battery raw materials and high-purity manganese market specialist with over 35 years of industry experience). The marketing study includes market demand, supply and HPMSM pricing forecast.
- Foreign currency exchange rates based on the last two-year average rates, sourced from Czech National Bank.
- Preliminary assumptions include LOM pre-concentration, leaching and refining operating cost estimates of US$182/t feed, total recovery to HPMSM of approximately 60%, and LOM average metal price of 2.90 kg/t for HPMSM (marketing study report prepared by Marketeye.org, April 2026). MgCO3 by-product is presented as total insitu concentration, and has been assessed based on preliminary and approximate estimated market value for MgCO3 of USD $800/t, process recovery of 45%, and an additional treatment cost of USD $1.00/t feed. The actual commodity price for these products may vary.

Environmental Factors or Assumptions

- The area covered by the Chvaletice tailings has been significantly impacted by past mining and other heavy industrial activities
- Environmental baseline studies have been conducted since the summer of 2016. These include hydrological sampling and monitoring, as well fauna and flora surveys

Bulk Density

- In situ dry bulk density is basis for tonnage estimate and was calculated from estimated core recovery along with laboratory measurements for mass and moisture
- Bulk density was a variable modelled into the block model based on the calculated in situ dry bulk density for each sample
- Calculated in situ dry bulk density values for individual samples range between 0.35 t/m3 and 3.15 t/m3, with a mean value of 1.55 t/m3

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Section 3: Estimation and Reporting of Mineral Resources	
Criteria	**Explanation**
Classification	▪ Classification is based on the JORC Code, and divides the mineral resource into Measured and Indicated categories ▪ A variance analysis on the block model determined that blocks supported from five or more samples, within an average distance of 100 m and with the closest sample within 75 metres be classified as Measured Resources, and blocks with greater than three samples within average distance of 150 metres be classified as Indicated Resources. ▪ No blocks were classified as Inferred Resources.
Audits and Reviews	▪ No external audits were performed ▪ Internal peer and senior review audits were performed as part of Tetra Tech's quality management system
Discussion of Relative Accuracy/Confidence	▪ The mineral resource estimate is reported as a weighted average grade and tonnage based on the search methodology and is not reported within error or confidence limits ▪ Indicated resources are considered lower confidence with higher margin of error than Measured resources ▪ The modelling was validated using visual comparison, declustered mean comparison, and swath plots and is considered to be representative of the input data ▪ Reconciliation to the 2017 block model was completed to identify areas with significant changes may have occurred ▪ Bulk density relies on estimated recovery from the field which may introduce some error into the calculation ▪ Assumption of lateral continuity/gradation of particle size may introduce error

Section 4: Estimation and Reporting of Mineral Reserves	
Criteria	**Explanation**
Mineral Resource Estimate for Conversion to Ore Reserves	▪ This is a Preliminary Economic Assessment Report (PEA) ▪ No ore reserves have been defined and reported in the PEA Report.
Site Visits	▪ A site visit was conducted by Tetra Tech QP's, Maurie Marks, P.Eng., Chris Johns, P.Eng., Hassan Ghaffari, P.Eng., and Jianhui Huang, Ph.D., P.Eng. on May 3rd,2022 and Jianhui Huang, Ph.D., P.Eng on February 5, 2018. The three tailings cells were visited as well as proposed infrastructure locations. Jianhui Huang, Ph.D., P.Eng also visited the Changsha Research Institute of Mining and Metallurgy Co. Ltd. (CRIMM) laboratory and pilot plant facility five times between January 20, 2017 and September 20, 2018 to witness sample preparation and test/assay facilities and to discuss test program and results with CRIMM's technical team. Mr. Huang visited Beijing General Research Institute for Mining and Metallurgy (BGRIMM) four times during September 03 2019 to January 25 2020 to witness test/assay facilities and to discuss test program and results with BGRIMM's technical team. Mr. Huang also visited the SGS Minerals Services (SGS) laboratory on June 29, 2017 and Slon Magnetic Separator Ltd. on December 27, 2019 to witness the metallurgical testing.
Study Status	▪ As part of the Preliminary Economics Assessment Study, an economically viable mine plan has been developed that includes material modifying factors.
Cut-off Parameters	▪ A break-even grade of 3.78% total Mn has been estimated for the resource estimate of the Chvaletice deposit. ▪ The estimated break-even grade falls below the grade of most of the blocks (excluding 46,613 tonnes which have grades less than 3.78% total Mn. Material segregation will not be possible during mining due to inherent difficulty of grade control and selective mining for this deposit type. ▪ Calculation of the cut-off parameters was undertaken using a Net Smelter Return (NSR) formula, including the following modifying factors; mined grade, contained metal, recovery rate for HPMSM, mining operating cost, processing cost, (including

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Section 4: Estimation and Reporting of Mineral Reserves	
Criteria	**Explanation**
	HPEMM to HPMSM conversion cost), residue placement cost, general and administrative costs, site service costs, water treatment, shipping cost, product insurance, and royalties. ▪ These parameters were applied to each block in the block model to determine the value. ▪ MgCO3 by-product is presented as total insitu concentration, and has been assessed based on preliminary and approximate estimated market value for MgCO3 of USD $800/t, process recovery of 45%, and an additional treatment cost of USD $1.00/t feed. The actual commodity price for HPMSM these products may vary.
Mining Factors or Assumptions	▪ The tailings cells are designed to be mined by excavator, loading haul trucks on 3m high benches with a 12m bench width and face angle of 45°. ▪ Geotechnical considerations were focused on bench stability and the ability to operate equipment on the benches of the tailings cells. Depressurization of the water contained within the cells is expected to occur during the cut of the first bench and continue with each subsequent advance. ▪ Mining extents used for mineable estimation extend horizontally to the limits of all three cells, and is controlled vertically by original ground, with a shallow-graded floor. This floor is designed to maximise mine extraction whilst allowing the installation of drainage infrastructure and placement of residue immediately following mining. ▪ Pre-stripping of the topsoil will be completed one year in advance of mining on an annual basis, with material stockpiled on top of each respective cell for replacement as cover material on the residue storage facility during years 2-26 of the life of mine. Blasting of the material is not required. ▪ Minimal dilution and losses of <1% are expected to occur at the interface between the lower bounds of the tailings cells and original ground as the surface is uneven. The entirety of material to be mined is considered as mill feed and will be processed. In turn, the entire orebody delineated in resource estimates is expected to be recovered. ▪ Mining infrastructure designed as part of the PEA includes truck maintenance workshop and warehouse, refuel areas, equipment laydown area and admin building. A central haul road is also designed for access to each of the tailings cells throughout the life of mine.
Metallurgical Factors or Assumptions	▪ Several metallurgical test programs have been completed, including three semi-continuous pilot plant runs and large scale batch testing based on preliminary optimized process/test conditions. ▪ A total of 25 composite samples were constructed from the drill core interval samples representing different variation characters, including spatial location, grade variation and particle size variations, and tested. ▪ Purification technologies were tested. ▪ Se-free electrowinning processed has been developed and confirmed for the mineral material. ▪ Cr-free passivation treatment for the cathode plates has been tested and developed. ▪ The metallurgical recoveries were estimated mainly from pilot plant test results that were used to calibrate a mass balance model of the process circuits. The estimated total manganese recoveries for process circuits are shown below: ▪ Magnetic separation: 82.1 to 90.1% tMn, averaging 86.1% tMn; ▪ Leaching recovery: 75% tMn ▪ Purification & Electrowinning: 94.6% tMn ▪ HPEMM to HPMSM: 98.4% tMn. ▪ Magnesium as MgCO3 is produced as a raw product in the processing of HPMSM and would otherwise be discarded. This by-product is presented as total insitu concentration, and has been assessed as being a reasonable prospect for eventual economic extraction. A process recovery of 45% was used for the estimates, ▪ Process plant will be constructed in two phases, starting from 75,000 t/y Year 1 to 3 and then to 150,000 t/y Year 4 and onward.

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Section 4: Estimation and Reporting of Mineral Reserves	
Criteria	**Explanation**
	▪ The sample products produced from the semi-continuous pilot plant tests and large scale batch tests show that high purity electrolytic manganese metal (HPEMM) and high purity manganese sulfate monohydrate (HPMSM) can be produced from the tailings material. ▪ Further the comprehensive metallurgical test work completed by CRIMM, BGRIMM conducted various verification tests, including magnetic separation, concentrate leaching and solution purification, EMM dissolution and solution purification, crystallization, magnetic tailings and leach residue dewatering. The metallurgical test work also conducted equipment type selection and verification tests by potential suppliers and verify suitability for some of the reagents produced by local European suppliers. ▪ Mill feed and leach residue material handling tests were conducted by Jenike & Johanson Ltd. to determine ▪ Head sample, non-magnetic tailings and leach residue samples were submitted to accredited laboratories in both Canada and Czech Republic for determining their chemical and physical properties. ▪ Ultra-high purity assay methods for the HPEMM and HPMSM were investigated. Preliminary product specifications were developed.
Environmental	▪ Environmental impacts are monitored over the long term as part of the project. The environmental and social assessment process was conducted in two phases, supplemented by several expert studies and on-site monitoring. The result of the environmental and social assessment process, which involved participation from relevant authorities and the public, is the positive Environmental and Social Binding Statement, which was issued by the Ministry of Environment in March 2024. The ESIA permit is a crucial permit demonstrating that the assessed impacts on individual environmental components and the social sphere are acceptable and that the project is feasible. The assessment results show that the implementation of the project will not worsen existing environmental conditions and will not have negative social impacts. Furthermore, the realization of the project will reduce the identified contamination of groundwater and surface water in the tailings and its vicinity, where the source of the pollution is demonstrably deposited material. As the deposit is of anthropogenic origin and the mined material is a waste-product, this constitutes the reuse or recycling of waste, aligning with the principles of the circular economy. The aim of remediation and reclamation is to create a near-natural area with high biodiversity and stability, which will be used for recreational and sports activities.
Infrastructure	▪ The existing infrastructure immediately adjacent to the proposed project site includes an 800 MW coal-fired power station operated by Severní Energetická a.s. and a pre-cast concrete plant operated by Eurobeton. ▪ The Property is located along paved Highway #322 which connects to Prague, approximately 89 km by road, via Kolin and Highway #12. The proposed process plant and management office are located immediately south of the highway. A rail line is located between the highway and the Chvaletice Manganese Project tailings facility, immediately to the south of the Chvaletice tailings property, which acts as main transportation line from Prague to communities of Eastern Czech Republic. Spur lines at the south of the highway are used to transport and unload coal to the 800 MW power station, and to service an adjacent industrial park which is the site of the former processing facilities that produced the Chvaletice tailings. ▪ New and refurbished infrastructures that will be built to service the Project include: - north site: one non-magnetic tailings (NMT) and washed leach residue (LR) storage facility, one extracted existing tailings pulping, various service facilities, such as truck shop, office, fuel station and parking lots; - south-north site connection overhead bridge housing one slurry pipeline and NMT/LR transport conveyor and various utility pipelines and power cables; - south site: various process facilities, maintenance workshop and spare part storage facilities, railway spurs and loading/unloading facilities, reagent storage facilities,

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Section 4: Estimation and Reporting of Mineral Reserves	
Criteria	**Explanation**
	laboratories, general office and service complex, power supply, water supply, steam supply and air supply. ▪ The required infrastructure has been incorporated into the Project design and capital cost estimate.
Costs	▪ Capital cost estimates were updated based on the FS level engineering designs. The capital costs include direct costs (equipment, buildings, equipment installation, access and inner roads, railway spur upgrading and others). Indirect costs (shipping, construction indirect, EPCM, spare parts and initial fills), owner costs and contingency (approximately 15.5% of direct costs). The total initial capital cost was estimated to be US$627 million for Phase I (75,000 t HPMSM per year for Year 1 to 3) and US$198 million for Phase II (150,000 t HPMSM per year for Year 4 and onward). ▪ Major equipment prices were based on updated quotations. ▪ Capital costs related to process facilities and other facilities were estimated based on workshop and building layouts prepared according to engineering designs. ▪ Equipment transport costs for capital cost estimates were based on percentage of equipment costs, including land and ocean transport costs, port handling costs and custom fees if applicable. ▪ Operating costs were estimated based on operation functions, including tailings extraction, process, lined NMT/LR dry stacking storage, G&A and site services. The categories included in the operation cost estimates include manpower requirement, various consumables (reagents and other consumables), electricity power consumption, steam consumption, hot water consumption, maintenance spare parts, office and general management related costs, including safety and training costs. The average life of project operating cost was estimated to be US$182/t mill feed. ▪ The major operating consumable costs were based on the forecast conducted by Argus Media group, while the rest of the operating consumable costs were mainly based on the marketing study prepared by logistic team at Mangan. ▪ The foreign exchange rates used in cost estimates and economic analysis were based on current rates and average exchange rates of Year 2024 and Year 2025. ▪ A market study for high purity manganese sulfate monohydrate was conducted by Marketeye (April 2026). The magnesium carbonate price used for this study is based on the publicly available data and is preliminary. ▪ Government royalty was based on 2,308 Czech Koruna (CZK) per tonne of Mn produced. ▪ Both operating cost and capital costs are expected in line with Class 5 or better; the accuracies for both capex and opex estimates are expected to be +/- 35%
Revenue Factors	▪ The products are assumed to be distributed worldwide, mainly in European countries and USA. Preliminary transport costs for the products were estimated based on potential consumer locations and tonnages. The consumable costs and related shipping costs were mainly based on the previous study. ▪ Plant feed grades were based on year-by-year mine plan which was developed from mill feed estimate. Grades throughout the life of mine plan are relatively consistent at an average of 7.3% Mn. ▪ The foreign exchange rates used in costs estimates and economic model were based on current rates and average exchange rates of Year 2024 and Year 2025. ▪ The sale and distribution costs were included in the economic analysis. ▪ Tetra Tech relied on the market study conducted by Marketeye.org as the basis for the financial analysis.
Market Assessment	▪ A market study high purity manganese sulfate monohydrate was conducted by Marketeye.org. in April 2026 ▪ The study includes the market demand and supply for high purity manganese products. High purity manganese sulfate monohydrate (HPMSM) products are mostly used in the manufacture of lithium-ion batteries for electric vehicles (EVs) and energy storage systems (ESS) – the market is expected to experience significant growth over the next two decades.

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Section 4: Estimation and Reporting of Mineral Reserves	
Criteria	**Explanation**
	▪ The report analyzes consumption trends and potential factors that may affect their supply and demand over the life of the project. The report also analyzes supply market, indicating potential competitors appear to mainly be from China. The main demand will be rapidly growing battery industry for electric vehicles and energy storage systems. ▪ The test results show that the products produced from the semi-continuous pilot plant and large-scale batch testing would meet the specifications required by potential customers. ▪ No marketing studies have been conducted for magnesium carbonate by product. The magnesium carbonate by-product price is based on the current market price for industrial-grade magnesium carbonate.
Economic	▪ All the capital costs, operating costs, product packing, shipping, sales as well as revenue streams were included in the financial model. ▪ The base NPV calculations were based on a discount rate of 8%. The post-tax NPV at a discount rate of 8% was US$492 M with a 13.8% IRR and 7.3 years payback period. ▪ Project sensitivity was analyzed to compare the key variables of discount rate, product price, capital cost, operating cost and metal recovery on pre-tax and post-tax NPV. The project is relatively less sensitive to capital costs compared to operating cost and product price.
Social	▪ EMN has initiated the social impact studies, including collection of land-use and socio-economic data, ▪ Significant Economic Catalyst: The Project is expected to act as a primary economic driver in the Pardubice Region, creating approximately 800 to 1,000 jobs during construction and providing stable, long-term employment for approximately 400 direct staff during operations, with a strong 85% local hiring commitment. ▪ Commitment to Transparency: Mangan has established a robust engagement framework, including a dedicated public information center in Chvaletice and dedicated digital platforms (project-specific website and online grievance tools). ▪ Validated Social Acceptance: In March 2024, the Czech Ministry of the Environment issued a favorable binding ESIA opinion, confirming that the Project meets the highest environmental and social standards. The Project currently faces no material barriers to acceptance, reflecting a strong Social License to Operate.
Other	▪ No naturally occurring risks have been identified that may impact the mineable plant feed estimate. ▪ EMN has engaged with several potential customers and been in negotiations around securing contracts for the product. ▪ EMN is progressing negotiations to secure the final remaining surface right for project development. ▪ Foreign currency exchange rates based on the last two-year average rates, sourced from Czech National Bank. ▪ Key Project approvals have been obtained, and the remaining permits and approvals required for construction and operation are considered consistent with the normal project development pathway. The Project has also been designated an EU Strategic Project and the mineral deposit as strategic in the Czech Republic, which is expected to support the permitting process under the Critical Raw Materials Act and local jurisdiction, respectively. ▪ The majority of permits/authorizations for the project have already been secured, with certain additional permits/authorizations remaining to be obtained. The list of permits/authorizations is provided in the list of the permits/authorizations are shown in Error! Reference source not found. below. ▪ Funding Strategy To achieve the range of outcomes indicated in the PEA, funding in the order of US$670.9 million is assumed to be required for initial capital expenditures and working capital. Euro Manganese is progressing a funding strategy for the development of the Chvaletice Project based on a combination of potential commercial, strategic and public-sector funding sources listed below.

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Section 4: Estimation and Reporting of Mineral Reserves	
Criteria	**Explanation**
	1. Strategic Offtake and Partnership Agreements The Company is actively advancing discussions with leading global battery manufacturers and cathode producers to secure offtake term sheets and work towards binding offtake agreements and pursuing government stockpiling initiatives. These agreements are expected to underpin project financing by providing revenue certainty and potential prepayment or strategic investment. Any future offtake agreements may support project financing; however, outcomes remain subject to negotiation and market conditions. *2. Institutional and Government Support* The Company is also exploring opportunities for support from European and international funding institutions, including potential debt financing, grants or other financial support, and export credit agencies (ECAs) supporting European supply chain security. Euro Manganese is also in discussions with relevant authorities regarding potential government incentives and support measures, which may include tax incentives or other forms of assistance. Any such support remains subject to application processes, regulatory approvals and government decisions. *3. Project Level Debt Financing* The Company is in the early stages of engaging with commercial lenders and development finance institutions to structure competitive project debt facilities. Debt financing is expected to form a significant portion of the Project's capital structure. Any debt funding would be subject to customary conditions, including completion of further technical studies, satisfactory due diligence, and market conditions at the time of financing. *4. Equity and Strategic Investment* Euro Manganese continues to evaluate equity financing options, including potential investment from strategic partners in relevant industries including the battery and automotive and/or defence sectors to align long-term interests. It is anticipated that funding will be sourced through a combination of equity and debt, and other means; however, given that the PEA is considered preliminary in nature, the Company expects to finalize its financing strategy for the Project in conjunction with, or after, the completion of the feasibility study is expected in 2027.
Classification	▪ This is a Preliminary Economic Assessment Report (PEA) ▪ No ore reserves have been defined and reported in the PEA Report.
Audits or Reviews	▪ No ore reserves have been defined and reported in the PEA Report ▪ Internal peer and senior review audits were performed as part of Tetra Tech's quality management system ▪ The process engineering design and cost estimates by BGRIMM were overseen and reviewed by Tetra Tech and EMN's technical team. ▪ The comprehensive metallurgical test work conducted by CRIMM in 2017 and 2018 and by BGRIMM and potential suppliers between 2019 and 2020 were overseen and reviewed by EMN's technical team and Tetra Tech. Randomly selected samples were assayed by independent assay laboratories. A demonstration plant to further verify and process and generate sample products for potential consumers was constructed. In October 16 2024, Euro Manganese declared successful completion of demonstration plant continuous operation program.
Discussion of Relative Accuracy/Confidence	▪ No ore reserves have been defined and reported in the PEA Report ▪ The 2017-2021 metallurgical test programs by CRIMM, BGRIMM and other laboratories have widely assessed the variability of the various plant mill feed samples, including a total of 25 composite samples representing different variation characters, covering spatial location, grade variation and particle size variations. A

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Section 4: Estimation and Reporting of Mineral Reserves	
Criteria	**Explanation**
	demonstration plant has been planned and under construction. The semi-continuous campaigns should provide further data for future design work. ▪ The capital cost estimates were estimated according to circuit design and preliminary layout. The main equipment costs are from quotations from potential suppliers. Operating costs were estimated by various categories and on circuit and area basis. Most of consumable prices were based on a supply marketing study conducted by Mangan's logistic team. ▪ Both operating cost and capital costs are expected in line with Class 5 or better; the accuracies for both capex and opex estimates are expected to be +/- 35%. ▪ Some of the potential product and process technology risks are associated with the Project are: - Market changes in high-purity manganese products and their acceptance by customers - Some metallurgical responses and product assays should be confirmed. More metallurgical test work is required to verify key operating conditions, especially impurity controls. - Scale up and control of crystallization and purification processes. ▪ Changes in supply costs.

Table A:

Permits and Authorizations

	Name of Permit / Opinion	Legislation	Requirement	Status
Baseline Phase	**Baseline Phase**			
	Permit to Carry Out Mining Activities	Act No. 61/1988 Coll., on Mining Activities	Permit granted by the State Mining Administration for mining activities.	Obtained 2017
	Establishment of an Exploration Area for Deposit Exploration	Act No. 62/1988 Coll., on Geological Works and the Czech Geological Survey	Geological work for the prospecting for and exploration of reserved mineral deposits and exploration of exclusive non-reserved mineral deposits must be authorized.	Obtained 2014, renewed 2021, Ministry of Environment
	Official certificate of the Exclusive Deposit	Act No. 44/1988 Coll., on the Protection and Utilization of Mineral Resources (Mining Act)	The Ministry of the Environment issues a certificate of exclusive deposit for reserved minerals.	Obtained 2019, Ministry of Environment
	Delimitation of a Protected Deposit Area	Act No. 44/1988 Coll., on the Protection and Utilization of Mineral Resources (Mining Act)	The protected deposit area is designated by the Ministry of the Environment in consultation with the other competent authorities.	Obtained
	Prior consent to the establishment of the mining-lease district	Act No. 44/1988 Coll., on the Protection and Utilization of Mineral Resources (Mining Act)	An organization must have a predecessor approval from the Ministry of the Environment of the Czech Republic before submitting a proposal for the delimitation of a mining space.	Obtained April 2018, Ministry of Environment

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	Name of Permit / Opinion	Legislation	Requirement	Status
Preparation Phase	**Preparation Phase**			
	Change of the Zoning plan (Rezoning)	Act No. 283/2021 Coll., Building Act	With the approval of the amendment to the municipal Zoning plan (Trnávka, Chvaletice), the project is in accordance with the zoning documentation of the municipalities concerned.	Obtained September 2023 Trnavka and Chvaletice Zoning Plan update realized
	Environmental Impact Assessment	Act No. 100/2001 Coll., on Environmental Impact Assessment	Mangan Chvaletice Project was assessed with respect to its impacts on the environment, social area and human health. Positive Biding Statement was issued, about 32 biding conditions and measures were given.	Obtained March 2024, Ministry of Environment
	Demolition Permit	Act No. 283/2021 Coll., Building Act	The demolition of buildings is hereby approved to the extent necessary for the implementation of the proposed construction of the Processing Plant.	Obtained May 2024, Local Authority MU Chvaletice
	Permit for trees deforestation	Act No. 114/1992 Coll., on the Conservation of Nature and Landscape	The municipal authority issued the permit for the cutting of trees growing outside the forest area, along with the order for substitute planting.	Obtained October 2025, Local Authority MU Chvaletice
	Construction permit for Infrastructure relocation	Act No. 283/2021 Coll., Building Act	As part of the preparation of the site for Project realization, the infrastructure relocation can be realized based on the permit.	Submitted to the authority December 2025, DESU Authority
	Technological Bridge Construction Permit	Act No. 283/2021 Coll., Building Act	The technological bridge is an integral part of the project and must be approved in accordance with the Building Act.	Obtained March 2026, DESU Building Authority
	Intermediate Storage Construction Permit	Act No. 283/2021 Coll., Building Act	The location for intermediate storage of useable materials from demolition and materials for reclamation must be approved in accordance with the Building Act.	In progress
	Grid Connection Construction Permit	Act No. 283/2021 Coll., Building Act	Connection to the network can be implemented based on a permit issued upon fulfillment of the specified conditions.	Obtained January 2025, DESU Building Authority
Land Planning, Construction Proceeding and Operation Phase	**Processing Plant**			
	REACH Registration Permit of the EMM, MSM	EU 1907/2006, REACH Regulation	Manufacturers and importers of substances (whether on their own or in mixtures) must register them with the European Chemicals Agency. EMM and MSM obtained the permit.	Obtained April 2022, European Chemical Agency
	Land Planning Permit - Processing Plant	Act No. 183/2006 Coll., Building Act	The location of the structures or facilities is possible only based on the zoning decision.	Obtained April 2026, DESU Building Authority
	Construction Permit - Processing Plant	Act No. 283/2021 Coll., Building Act	In case of structures of any type, a building permit is necessary for any construction activities.	No risks so far identified, design must be in line with

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	Name of Permit / Opinion	Legislation	Requirement	Status
				EIA Statement requirements
	Operational permit - Final Building Approval Permit - Processing Plant	Act No. 283/2021 Coll., Building Act	The Final Building Approval Permit is the final approval issued by the building authority, which allows the completed building to be legally used for the purpose for which it was built and confirms that it complies with the building permit and safety standards.	No risks so far identified, design must be in line with EIA Statement requirements
	Integrated Permit - Processing Plant	Act No. 76/2002 Coll., on Integrated Pollution Prevention and Control	Integrated permits must be granted by the Regional Authority for the Processing Plant and define the conditions and limitations for Plant operations such as emission limits etc. The rights associated with the building permit cannot be exercised until the integrated permit comes into force.	No risks so far identified, design must be in line with EIA Statement requirements
	Railway Siding			
	Land Planning Permit - Railway Siding	Railway Act No. 183/2006 Coll., Building Act	Zoning permit is necessary for railway zoning.	Submitted to the authority December 2025, Local Authority Prelouc
	Construction Permit - Railways siding	Act No. 283/2021 Coll., Building Act	Building permit is necessary for railway construction activities.	No risks so far identified, design must be in line with EIA Statement requirements
	Operational permit - Final Building Approval Permit - Railway Siding	Act No. 283/2021 Coll., Building Act	The Final Building Approval Permit is the final approval issued by the building authority, which allows the completed buildings and building projects to be legally used for the purpose for which they were built and confirms that they comply with the building permit and safety standards.	No risks so far identified, design must be in line with EIA Statement requirements
	Operating Permit for Railway siding	Railway Act No. 266/1994 Coll	Operating permit is necessary for railway construction activities.	No risks so far identified, design must be in line with EIA Statement requirements
Land Planning, Construction Proceeding and Operation Phase	**Mining area and RSF Proc**			
	Determination of Mining Lease Permit	Act No. 44/1988 Coll., on the Protection and Utilization of Mineral Resources (Mining Act)	The organization's authority for mining a reserved deposit comes into an existence of the delimitation of a Mining-Lease.	Obtained January 2025, Mining Authority
	Mining Activities Permit (POPD)	Act No. 61/1988 Coll., on Mining Activities, Explosives, and the State Mining Administration	The opening, preparation and mining of reserved deposits must be permitted by the District Mining Office.	In progress

	Name of Permit / Opinion	Legislation	Requirement	Status
	Classification into mining waste category	Act No. 157/2009 Coll., on mining waste management	The District Mining Authority will decide on the categorization of the storage place and on the category.	After obtaining the Mining Activities Permit (POPD).
	Settled property rights (conflicts of interest)	Act No. 61/1988 Coll., on Mining Activities, Explosives and the State Mining Administration	The documents on the resolution of conflicts of interest must be submitted if interests protected by law are endangered by mining activities.	No risks so far identified, design must be in line with EIA Statement requirements
	Decision on the construction of storage of mining waste	Act No. 157/2009 Coll., on mining waste management	The operator must establish a storage system for mining waste. The location, modification and use must be permitted by the District Mining Office.	No risks so far identified, design must be in line with EIA Statement requirements
	Operating permit storage of mining waste	Act No. 157/2009 Coll., on mining waste management	The construction and operation of a storage site must be authorized by the district mining office.	No risks so far identified, design must be in line with EIA Statement requirements

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