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BARRYTOWN FARMS MINERAL RESOURCE ESTIMATE

Technical Report and Supporting Documentation for the Barrytown Mineral Resource Estimate

Report prepared for:

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Executive Summary

TiGa Minerals and Metals Limited (TiGa) commissioned RSC to prepare an independent mineral resource estimate (MRE) for the Barrytown Farms Block within its Barrytown Project, West Coast, New Zealand. The work reported here, carried out by a Competent Person, and classified and reported in accordance with the JORC Code (2012), will serve to support feasibility work and ore reserve estimation for the Barrytown Farms Block. The effective date of this report is 6 October 2023.

The Barrytown Project is a coastal heavy mineral sands deposit located ~30 km north of Greymouth, New Zealand. Ilmenite, garnet, zircon, gold, and associated heavy minerals (HM) have been concentrated into a series of beach strandlines at Barrytown. Gold has been prospected for and mined from the Barrytown area since the late 1860s. Since the 1960s, Barrytown has been an ilmenite target for numerous companies.

The Barrytown Project comprises the active mining permit (MP) 60785, the extension of land MP application MP 60785.03 and the exploration permit application (EPA) 60917.01. The Barrytown Farms Block MRE presented in this report is fully contained within MP 60785.03. The commodities within the project are a mixture of Crown-owned and privately held minerals.

From April–July 2022, TiGa drilled 176 aircore holes on the Barrytown Farms Block for a total of 1,988 m. In addition to resource definition drilling, five holes were drilled for water monitoring and six holes were drilled for Shelby Tube density sampling. Data from these drillholes form the basis of the MRE presented in this report. Samples were obtained from the 45- μm to 2-mm fraction of 1-m-interval samples from the aircore drilling. A total of 1,988 pulverised samples were analysed by portable X-ray fluorescence to produce a multi-element geochemical dataset. A selection of 58 samples were analysed by laboratory X-ray fluorescence analysis to quality control the portable X-ray fluorescence data.

The abundances¹ of ilmenite, garnet, and zircon were derived from linear regression models, trained on mineral abundances measured by scanning electron microscopy-based automated mineralogy, and geochemical data from portable X-ray fluorescence analysis. In addition to determining the abundances of the heavy minerals, an assessment of impurities and other deleterious compositional qualities of these products was made using scanning electron microscopy data.

RSC interpreted six geological domains, from the downhole lithological data from the 2022 drilling programme at Barrytown Farms Block. Estimation domains were created using a combination of geology and heavy mineral abundance. The heavy mineral abundance was estimated using ordinary kriging.

The Competent Person has classified a Measured Mineral Resource of 7.7 Mt at 7.8% ilmenite, 10.6% garnet, and 0.2% zircon, and an Indicated Mineral Resource of 5.8 Mt at 9.2% ilmenite, 12.2% garnet and 0.2% zircon, reported at a cut-off abundance of 1% ilmenite and within a particle size range of 45 μm to 2 mm (Table 1). The specified heavy mineral products are a 45- μm to 2-mm magnetic concentrate, rich in ilmenite and garnet, and a non-magnetic concentrate rich in zircon. The product specifications and marketability are considered acceptable by the Competent Person.

¹ The term abundance is used here to refer to the weight percentage of a mineral (e.g. ilmenite, garnet, or zircon). The term is used instead of grade, which is typically used to denote the concentration of a chemical element.

Table 1: Barrytown Farms Block in-situ Mineral Resource, reported at a 1% ilmenite (in-situ) cut-off.

Category	Density (g/cm ³)	In-Situ Mass (Mt)	In-Situ Grade (%)				Material Content (Kt)			
			Ilmenite	Garnet	Zircon	VHM	Ilmenite	Garnet	Zircon	VHM
Indicated	2.2	5.8	9.2	12.2	0.2	21.6	530	710	10	1,250
Measured	2.2	7.7	7.8	10.6	0.2	18.7	610	820	15	1,440
Total	2.2	13.5	8.4	11.3	0.2	19.9	1,140	1,530	25	2,690

Notes:

1. The Mineral Resource is classified in accordance with the JORC Code (2012).
2. The Mineral Resource is reported at a 1%, ilmenite abundance cut-off.
3. Zircon is the tonnes of zircon within particle size range 45 µm to 2 mm.
4. Garnet is the tonnes of garnet within particle size range 45 µm to 2 mm.
5. Ilmenite is the tonnes of ilmenite within particle size range 45 µm to 2 mm.
6. VHM% is the abundance of ilmenite, garnet and zircon within a particle size range 45 µm to 2 mm.
7. The Mineral Resource is reported on a dry basis.
8. The effective date of the Mineral Resource is 6 October 2023.
9. The Mineral Resource is contained within the proposed mining disturbance area.
10. The Mineral Resource estimate is rounded to reflect the level of confidence at the time of reporting.



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1 Introduction & Terms of Reference

1.1 Scope

TiGa Minerals and Metals Limited (TiGa) commissioned RSC to prepare an independent mineral resource estimate (MRE) for the Barrytown Farms Block within its Barrytown heavy mineral sands project, West Coast, New Zealand. The work reported here, carried out by a Competent Person, and classified and reported in accordance with the JORC Code (2012), will serve to support feasibility work and ore reserve estimation for the Barrytown Farms Block.

Any future public prospectus, presentations, website postings, or public announcements issued by TiGa that refer to the resource estimation specified in this report, will be required to be reported in accordance with the JORC Code (2012) and will need to contain specific information on:

- geology and geological interpretation;
- sampling and subsampling techniques;
- estimation methodology;
- cut-off grades;
- criteria used for classification; and
- mining and metallurgical methods and parameters.

This information may be extracted from this report to support such public reports or announcements. In addition, these public reports must contain a 'Table 1', the information for which can be extracted from this report. RSC notes that specific written consent for the final version of the public report is required from the Competent Person before it is made public by TiGa.

1.2 Qualifications & Experience

1.2.1 Competent Person

The work completed by RSC and the subject of this report was supervised by René Sterk. René is a Fellow and a Chartered Professional with the Australasian Institute of Mining and Metallurgy (AusIMM), and a Registered Professional Geologist with the AIG. He is a full-time employee and principal geologist of RSC. René holds an MSc in structural geology and tectonics from the Vrije Universiteit Amsterdam (2002) and is the managing director of RSC. He specialises in resource estimation, grade control, reconciliation, QA/QC, and successful sampling, and has a strong skill set in exploration management for gold and base metals. René is recognised under the JORC Code as a Competent Person for gold (alluvial, shear-zone and porphyry), base metals, REE, seabed mineralisation, and industrial minerals (ilmenite sand, garnet sand, diatomite). René is the principal author of many Canadian NI 43-101 and JORC resource and exploration studies and has assisted clients with exploration programmes for these and other projects. He has practised continuously as a mining geologist, exploration geologist, manager and consultant for mining and exploration firms in a range of commodities since 2003.

1.2.2 Technical Team

The work presented in this report was supervised by the Competent Person, and completed by the following people.

Sean Aldrich is RSC's General Manager of Exploration and has more than 20 years of mining and exploration experience in New Zealand, Papua New Guinea, the Middle East, Central Asia, and Africa. Sean is a Competent Person for the interpretation of exploration results of heavy mineral sands deposits. He has been involved with the evaluation, resource estimation, and mining studies of both onshore and offshore heavy mineral sands deposits in New Zealand, Guinea and Greenland. Since 2012, he has held the position of Principal Geologist with RSC, where he has been involved with numerous heavy mineral sands deposits technical reviews and resource estimations in the Pacific and New Zealand. Mr Aldrich's wider experience covers project generation, resource definition and underground and open pit mine geology. Mr Aldrich has undertaken the site visit, which is discussed in section 7.2.

Michael Gazley is RSC's General Manager Geoscience and Principal Geochemist. He was previously a Senior Research Scientist at CSIRO Mineral Resources, based in Perth, Western Australia, for almost five years. Before joining CSIRO, Michael spent over five years working for Barrick Australia Pacific Ltd as an underground geologist based at Plutonic Gold Mine; additionally, he completed his PhD on that deposit. During his time at Plutonic, he worked across multiple Barrick sites developing pXRF best practice and utilising pXRF to gain geological insights into mineral deposits. Michael is an expert in pXRF data collection and interpretation and has written a best-practice paper on the subject. Michael is an expert in collecting, integrating, and interpreting diverse chemical and mineralogical datasets using multivariate techniques in exploration and mining settings. He has worked globally on many different mineral system types, including orogenic Au, epithermal Au, placer Au, shear-hosted Cu, IOCG, Cu-Au porphyry, Pb-Zn-Ag deposits, Li and REE pegmatites, and heavy mineral sands. Michael is also actively involved in using and developing cutting-edge data handling and machine learning techniques to maximise value from geochemical, mineralogical, and remote sensing datasets.

Olivier Bertoli has specialist training in Applied Mathematics and Geostatistics from the Paris School of Mines, complemented by 27 years of experience as a practice-leading Geostatistician. Olivier worked for five years as Technical Director of the QG Group (co-founder), five years as Technical Director of Tenzing Pty Ltd (co-founder) and for seven years with geostatistical software specialists Geovariances (including four as its CEO).

As a consultant, Olivier completed many consulting jobs for major mining companies in diverse locations and geological settings. Olivier has extensive experience in advanced geostatistical modelling: 2D methods, recoverable resource estimation (LMUC, MIK), conditional simulations and multivariate modelling. He has delivered numerous in-house and public training courses on these topics and specialises in staff mentoring on relevant applications of geostatistical techniques to mineral resource estimation. Olivier has experience with a wide range of commodities which includes precious and base metals (including nickel laterite), mineral sands, diamonds, iron ore and coal deposits.

Lauren Tooley is a Consultant Exploration Geologist with RSC based in Dunedin, New Zealand. She holds a Bachelor of Science (Hons) degree from the University of Otago and has worked on technical studies across numerous commodities including gold, copper, uranium, lithium, heavy mineral sands and rare earth elements. Lauren has experience in geological

modelling, mineral resource estimation, code-compliant reporting, and QA/QC reviews. She has worked on resource estimates of orogenic gold, VMS and structurally-controlled copper and heavy mineral sands deposits.

Kat Lilly holds a PhD in Earth Science from the Australian National University and has expertise in electron microprobe analysis, scanning electron microscopy and electron backscatter diffraction. Her 10 years of experience in electron beam analytical techniques include developing new protocols for scanning electron microscope (SEM) analysis of difficult and unusual samples and have resulted in multiple publications on ore geology and mineralogy applications as well as on SEM methodology. She retrained in Computer Science in 2017–2019 and has expertise in machine learning and statistical techniques and their application to geological problems. Kat has been at the forefront of developing RSC's bespoke algorithms for validation and interpretation of geochemical data as well as building and validating workflows to derive mineralogy from geochemistry in a variety of mineral systems. She has published more than 18 peer-reviewed journal articles in diverse fields within geology and computer science including economic geology, SEM methodology, and data compression algorithms.

Marcel Mizera is a structural geologist with a broad knowledge on mineralisation associated with fault, vein, and shear zone systems. He has worked, mapped, and published research articles on seismic active and inactive fault zones all around the world including Switzerland, Greece, Papua New Guinea, and New Zealand. During a postdoctoral research fellow employment in the Netherlands, Marcel was part of the NWO-funded research programme DeepNL where he studied shallow crustal faulting processes (<5–10 km depth) in clay- and carbonate-bearing fault zones. Prior to that, he finished his PhD on a Marsden-funded project studying the youngest and probably best-preserved active low-angle normal fault on Earth — the Mai'iu fault in SE Papua New Guinea. His research made him an expert in using different textural and geochemical techniques to acquire and interpret diverse mineralogical datasets.

Annette Pocock is a geologist with over 16 years' mineral industry experience. She holds a BSc (Geology) and a BCA (Economics) from Victoria University of Wellington, and an MSc in Ore Deposit Geology from the University of Western Australia. Annette worked as an underground mine geologist for seven years for both Barrick and Goldfields in Western Australia. Then Annette spent seven years at New Zealand Petroleum & Minerals, part of the Ministry of Business, Innovation and Employment where her roles covered the Minerals Permitting Team, the Minerals Strategy Team, and the Resource Markets Policy Team. More recently, since joining RSC, Annette has been working in a range of exploration, permit management and resource estimation projects.

Mathijs van de Ven MSc MAusIMM (Consultant Resource Geologist)

Mathijs is a resource geologist with RSC based in Dunedin, New Zealand. He holds a Master's degree (Hons) in Geology and Geochemistry from the Vrije Universiteit in Amsterdam. Mathijs has five years of experience working in Au, base metal and high-tech metal exploration projects in Australia, New Zealand, Indonesia and Papua New Guinea and has authored and co-authored several peer-reviewed research papers. Mathijs has experience in geological modelling, mineral resource estimation, code-compliant reporting and QA/QC reviews, and has worked on resource estimates of orogenic, epithermal and porphyry Au, VHMS Cu-Pb-Zn, skarn W, and heavy mineral sands deposits.

Sean Doyle, MAusIMM CP(Geo) (Principal Resource Geologist)

Sean's career as an exploration and resource estimation specialist spans four decades. Sean has extensive experience in discovery, development, estimation, and reconciliation of mineral resources for gold, tungsten, copper, sulphur, and mineral sands deposits.

He has been involved in project data compilation work, due diligence studies, IPOs, technical reporting (JORC Code, NI 43-101) to regulators, and mineral permit applications and maintenance of permits. He is a Chartered Professional of the AusIMM and holds AusIMM Certificates for JORC Code reporting, VALMIN Code reporting and ESG.

1.3 Independence Declaration

RSC's relationship with TiGa is based on a purely professional association. RSC prepared this report in return for fees based on agreed commercial rates, and the payment of these fees is in no way contingent on the results of this report.

1.4 Sources of Information

TiGa provided the following data:

- project LiDAR DTM; and
- a database of historical exploration.

RSC collected and managed information from the 2022 drilling programme. RSC also validated and verified all 2022 drilling data.

While RSC made every effort to verify the data provided by TiGa, information from third-party sources was used on the assumption that the contents were reliable and accurate.

TiGa, and its consultants involved in the Feasibility Study for the Barrytown Project at Coates South, provided RSC with information relating to economic extraction, mining parameters, costs, and metallurgical processing. Palaris is the consulting group that has provided information relating to mine engineering and pit design, and IHC Robbins has provided information relating to metallurgical processing. Similar mining parameters from Coates South Block (London, 2022) are likely to apply to the Barrytown Farms Block. Where relevant to the estimation and classification of the mineral resource, the overall Competent Person, Mr Sterk, accepts responsibility for the accuracy and precision of the third-party information.

1.5 Site Visit

RSC personnel, under the supervision of Mr Sterk, planned and managed field exploration activities at Barrytown Farms Block from March 2022 to August 2022.

Mr Aldrich completed a site visit during the Barrytown Farms Block/Coates South Block drilling programme between 12 and 13 May. The on-site drilling and sampling procedures, and the sample preparation procedures at the New Zealand Institute of Metals and Minerals Research (NZIMMR, Dunollie, Greymouth) facility, were observed. Mr Aldrich checked whether all processes conformed to standard operating procedures (SOPs) and checked core trays and chip trays against the database

and logging sheets. Overall, Mr Aldrich and Mr Sterk confirm that the work underpinning the resource estimate at the Barrytown Farms Block is of a good standard, and the sample and data quality are appropriate with respect to the data quality objectives. The results of the site visit are discussed in section 7.5.1 and throughout section 7.2.

1.6 Disclaimer

The opinions, statements and facts contained herein are effective as of 6 October 2023, unless stated otherwise in the report.

Given the nature of the mining industry, conditions can significantly change over relatively short periods of time. Consequently, actual results and performances may be more, or less favourable, in the future and their disclosure represents no legal opinion of the authors.

For disclosure of information relating to socio-political, environmental, and other related issues, the authors have relied on information provided to RSC.

Results of evaluation and any opinions or conclusions made by RSC are not dependent upon prior agreements or undisclosed understandings concerning future business dealings with TiGa.

The authors of this report are not qualified to provide extensive comment on legal issues associated with Barrytown Farms Block described in this report.

Similarly, the authors are not qualified to provide extensive comment on risks of any nature (operational, sovereign, terrorist or otherwise) associated with the Barrytown Farms Block.

This document contains certain statements that involve several risks and uncertainties. There can be no assurance that such statements will prove to be accurate; actual results and future events could differ materially from those anticipated in such statements.

The information, conclusions, opinions, and estimates contained herein are based on:

- information available to RSC at the time of preparation of this report;
- assumptions, conditions, and qualifications set out in this report; and
- data, reports, and other information supplied by TiGa and other third-party sources.

The opinions, conclusions and recommendations presented in this report are conditional upon the accuracy and completeness of the existing information.

No warranty or guarantee, be it express or implied, is made by RSC with respect to the completeness or accuracy of the legal, mining, metallurgical, processing, geological, geotechnical and environmental aspects of this document. RSC does not undertake or accept any responsibility or liability in any way whatsoever to any person or entity in respect of these parts of this report, or any errors in or omissions from it, whether arising from negligence or any other basis in law whatsoever.

The statements and opinions expressed in this document are given in good faith, and in the belief that such statements and opinions are not false and misleading at the date of this report. RSC reserves the right, but will not be obligated, to revise this report and conclusions, if additional information becomes known to RSC, after the date of this report.

RSC assumes no responsibility for the actions of the company or others with respect to the distribution of this report.



2 Project General Summary

2.1 Project Description & Location

The Barrytown Project is a coastal heavy mineral sands project located ~30 km north of Greymouth, West Coast Region, New Zealand (Figure 1). The project is located on the Barrytown Flats, a flat-lying to gently undulating coastal plain that extends over ~17 km from north to south and ~2 km from east to west. The southern end of the flats is defined by the headland Seventeen Mile Bluff, and the northern end by Razorback Point. The project area is flanked to the east by the Paparoa Ranges, and to the west by the Tasman Sea. The Barrytown Farms Block is located south of Canoe Creek, just northwest of Barrytown, in the centre of the Barrytown Flats. The Barrytown deposit contains ilmenite, garnet, zircon, and gold (Au) (e.g. Wells and Haverkamp, 2020). The deposit also contains small amounts of monazite, xenotime, scheelite, cassiterite, and rutile. The area of the MRE that is the subject of this report is called the Barrytown Farms Block.

2.2 Tenure & Ownership

New Zealand Petroleum & Minerals (NZP&M) issues permits to prospect, explore and mine Crown-owned minerals in New Zealand under the Crown Minerals Act (1991). All Au, silver (Ag), uranium (U) and petroleum are statute minerals that occur naturally in New Zealand and are owned by the Crown. Ownership of other (non-statute) minerals (e.g. ilmenite, garnet, and zircon) depends on the legislation in place at the time the land was alienated from the Crown. Exploration and mining permits are only granted over minerals that are identified as Crown-owned.

The Barrytown Project consists of one, active, minerals mining permit (MP) granted by NZP&M (MP 60785) and two permit applications (MP 60785.03 extension of land (EOL) application and exploration permit (EP) application 60917.01) that are currently under evaluation (Table 2, Figure 1). The Barrytown Farms Block MRE presented in this report is fully contained within the extension of land application, MP 60785.03. TiGa has priority to have its permit application assessed for the MP 60785.03 area. NZP&M will not accept any later applications for the area while the 60785.03 application is being assessed. The Competent Person considers it highly likely that the MP 60785.03 EOL application will be granted and that TiGa's tenure will be secured.

Prior to the granting of MP 60785, TiGa held the Barrytown Project under EP 51803, which was originally granted to Alloy Resources Ltd in November 2009. TiGa, known as Barrytown JV Ltd at the time, entered the project in 2015 through an incorporated joint venture (JV). An appraisal extension was granted in October 2015 to extend the permit expiry date to November 2018. In 2016, Alloy Resources and TiGa gave consent for MP 41913 to be extended to overlap with the western boundary of EP 51803, now MP 60785.03. Overlap consent was provided specifically for the mining of "alluvial beach gold up to the mean, high water mark, and in cases where an embankment exists, up to 2 m off from that bank on the beach side". This overlap consent has no influence on the Barrytown Farms Block MRE presented in this report; the Barrytown Farms Block is located inland of the mean, high water mark and any coastal embankment.

In 2017, TiGa acquired 100% of EP 51803. An extension was granted to extend the expiry of EP 51803 a further four years to November 2022. In March 2021, TiGa applied for MP 60785, over the portion of EP 51803 north of Canoe Creek, resulting in the granting of the current mining permit (MP) 60785 on 22 July 2022.

On 27 June 2022, TiGa applied for a 245-ha EP in the southeast of the Barrytown Flats (Table 2, Figure 1). On 21 November 2022, TiGa applied to extend the land within MP 60785 by 449 ha, covering the southern half of EP 51803 which includes the Barrytown Farms Block (Table 2, Figure 1). EP 51803 expired on 25 November 2022.

Non-statute minerals of interest within the extension of land application area MP 60785.03 are primarily owned by the Crown, except for several road parcels and one private land parcel to the southwest of the Barrytown Farms Block, where ilmenite, garnet, and zircon are privately owned (Figure 2). Non-statute minerals in the Barrytown Farms Block Mineral Resource are crown-owned.

Table 2: Permit details for the Barrytown Project.

Permit	Ownership	Status	Registered Holder	Date Granted	Expiry Date	Tier	Area (ha)
MP 60785	100%	Active	TiGa Minerals and Metals Limited	21 July 2022	20 July 2042	1	800
MP 60785.03 Extension of Land	100%	Application (Under Evaluation)	TiGa Minerals and Metals Limited	-	-	1	449
EPA 60917.01	100%	Application (Under Evaluation)	TiGa Minerals and Metals Limited	-	-	2	245

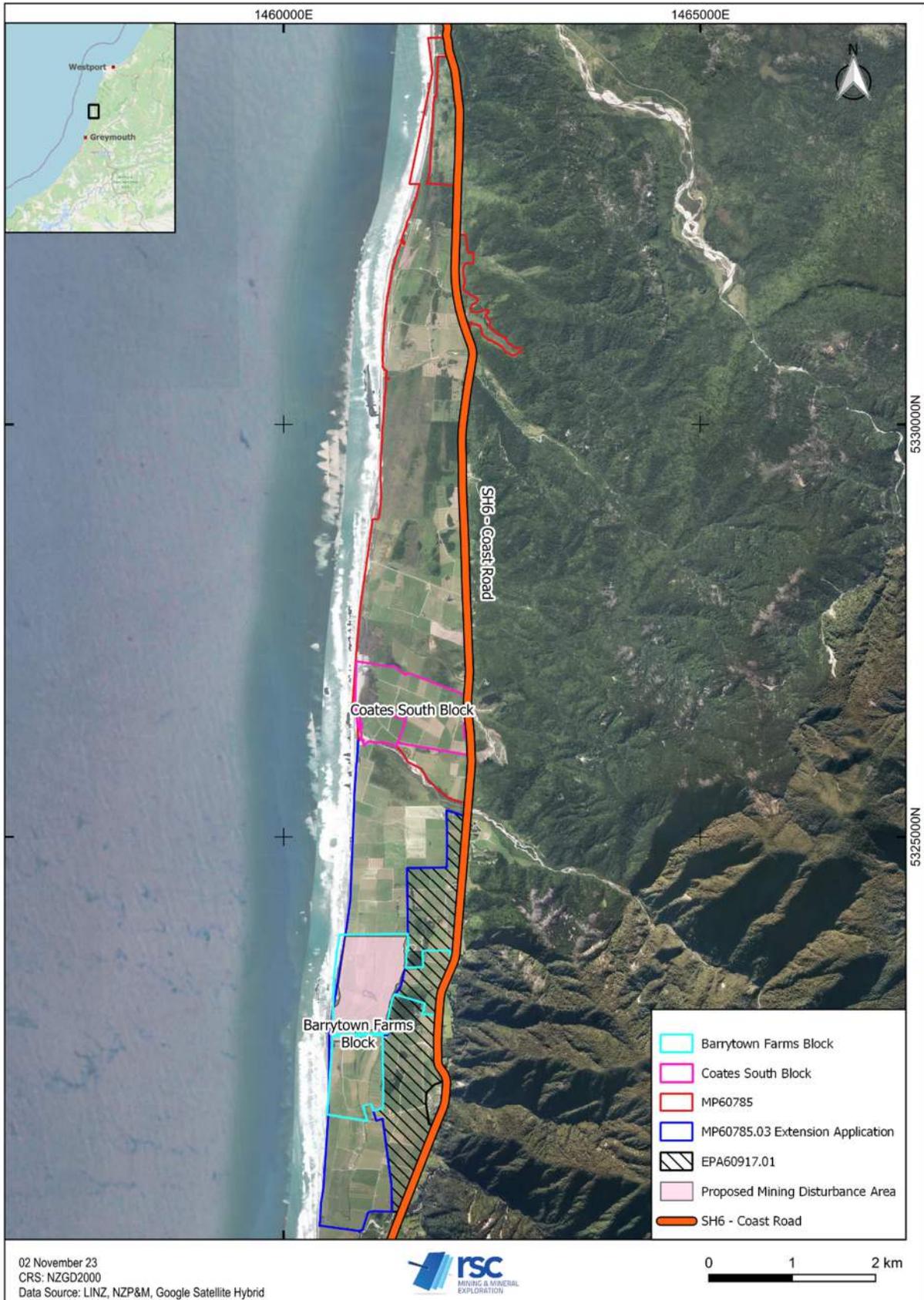


Figure 1: Map of permitted areas and location of Barrytown Farms Block, Coates South Block and proposed area of mining disturbance.

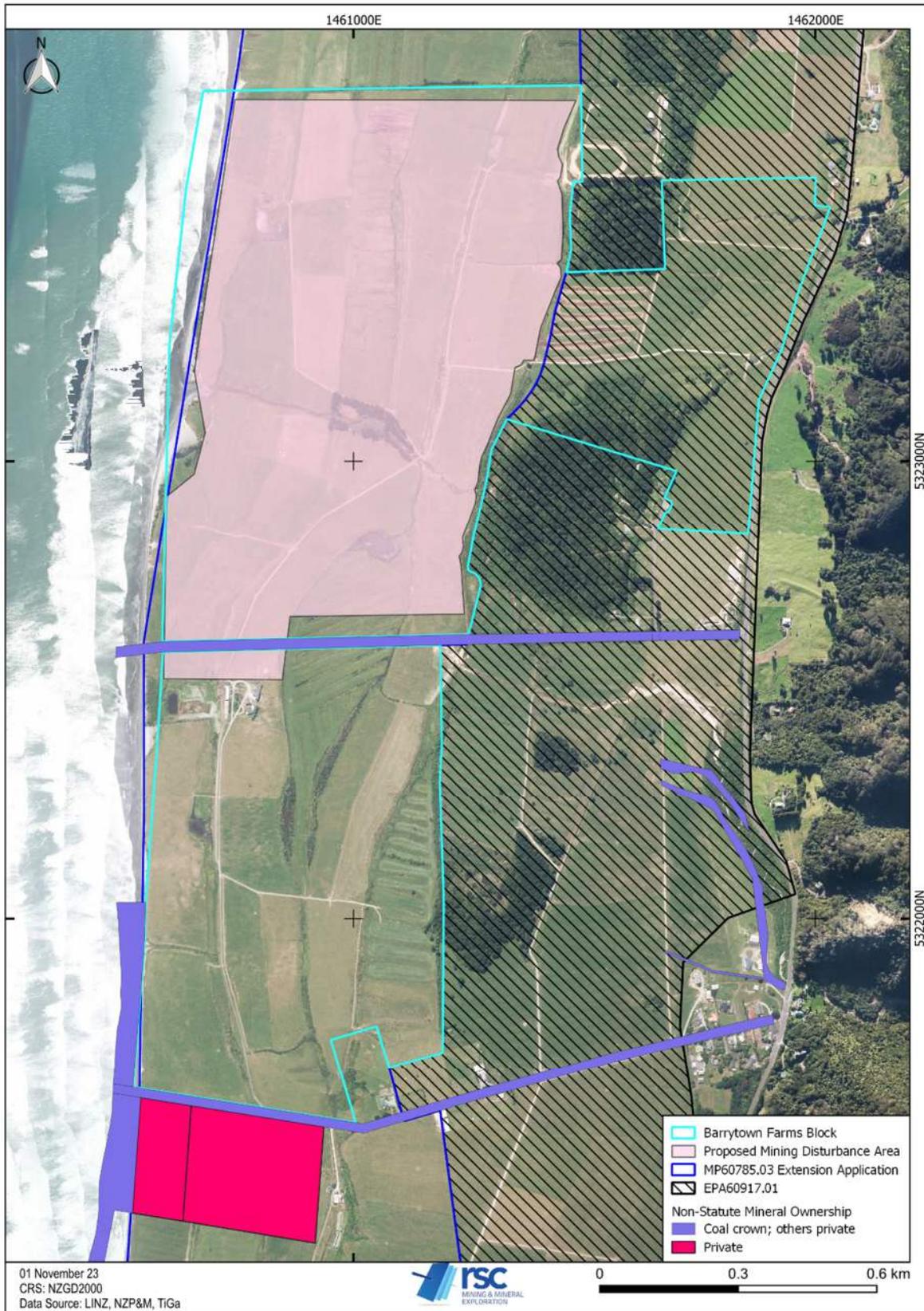


Figure 2: Non-statute mineral ownership, in and proximate to Barrytown Farms Block.

2.3 Royalties

TiGa is liable to pay royalties to the New Zealand government for Crown-owned minerals mined from its permits as outlined in Table 3. For all minerals other than garnet mined from the extension of land application MP 60785.03 (if permitted), the royalty will be calculated in accordance with the Minerals Programme for Minerals (Excluding Petroleum) 2008. For garnet mined from MP 60785.03 (if permitted), the royalty will be calculated in accordance with the Minerals Programme for Minerals (Excluding Petroleum) 2013. The point of valuation for heavy mineral concentrate, produced from MP 60785.03 (if permitted), is the location where the product exits the permit boundary. If, in the future, TiGa establishes a processing plant within MP 60785.03 (if permitted) to process and refine the concentrate into additional product streams, the point of valuation will be the boundary of the processing plant.

Table 3: Royalty details for MP 60785.

Mineral	Royalty Regime	Royalty Rate
Ilmenite Zircon	Minerals Programme for Minerals (excluding Petroleum) 2008	1% of annual net sales revenues (from minerals other than garnet), if net sales revenues are NZD 1.5 million or less; or 2% of annual net sales revenues (from minerals other than garnet) for net sales revenues that exceed NZD 1.5 million.
Garnet	Minerals Programme for Minerals (excluding Petroleum) 2013	2% of the net sales revenue of the garnet obtained under the permit; and 10% of any accounting profits, or provisional accounting profits, as the case may be, obtained under the permit.

2.4 Environmental Liabilities & Permits

Key environmental legislation concerning mining activities includes the Resource Management Act (1991) and the Wildlife Act (1953). Under the Resource Management Act, local authorities manage the environmental consenting process. Resource and land use consent must be obtained before commencing most exploration and mining activities. Other legislation regulating industrial activities, environmental effects, and the health and safety of the workplace also apply to mining activities, such as the Health and Safety at Work Act (2015) and the Heritage New Zealand Pouhere Taonga Act (2014).

The Resource Management Act (1991) (RMA) also provides for recognition of the Treaty of Waitangi (Te Tiriti o Waitangi, New Zealand's founding document) and kaitiakitanga (a way of managing the environment based on the Māori world view). Section 7 of the RMA requires all individuals involved with managing the use, development, and protection of natural and physical resources to have particular regard to kaitiakitanga (the process and practices of protecting and looking after the environment).

The RMA classifies activities into six primary categories: permitted, controlled, restricted discretionary, discretionary, non-complying, and prohibited. These different categories determine whether resource consent is required before carrying out an activity, and what will be considered when resource consent application is assessed. National Environmental Standards and Regional and District Plans regulate which category an activity falls in, and therefore whether resource consent is required.

In February 2021, the New Zealand government proposed to reform the RMA by replacing it with three different pieces of legislation: the Natural and Built Environment Bill, the Spatial Planning Bill and the Climate Adaptation Bill. The Natural and Built Environment Bill and the Spatial Planning Bill were introduced to the House on 15 November 2022, passed their third readings on 15 August 2023, and received royal assent on 23 August 2023. Some changes have already taken effect; however, councils will generally transition to the new arrangements on a region-by-region basis over several years, with many parts of the RMA still in force for the time being.

The New Zealand government also introduced several national policy statements between 2020 and 2023, including the national policy statement for indigenous biodiversity and the national policy statement for freshwater management. These policies provide local authorities with updated guidance on how to manage resources under the RMA. The national policy statement for indigenous biodiversity was gazetted in May 2023 and requires local councils to map significant natural areas. Significant natural areas are sensitive environments that may include special landscapes with remnant native bush or native forests, wetlands, coastal vegetation, lakes and rivers, or geothermal vegetation, that have high ecological value due to their native plants and habitats, many of which are endangered.

Notable environmental features within the Barrytown Farms Block are a small privately-owned wetland area (marsh; not identified as a significant natural area) and the coastline. The wetland is not categorised as a Schedule 1 or 2 wetland in the current West Coast Region District Plan. TiGa has no intention to mine the coastline area and this is therefore excluded from the MRE. Figure 3 indicates the location of the wetland and the coastline area with respect to the Barrytown Farms Block.

TiGa must obtain resource and land-use consents issued under the RMA from the West Coast Regional and Grey District Councils before commencing mining activities. These consents are likely to include conditions relating to water take, erosion, groundwater and treatment water quality monitoring, dust monitoring, radiation monitoring, and avian management as a minimum. Anticipated mine plans propose minimal use of reagents to minimise environmental risk; for example, dewatering tailings by a cyclone before discharging into the mining void, and capping tailings using overburden material.



Figure 3: Barrytown Farms Block and areas of environmental sensitivity in the nearby region.

2.5 Access

The Project is located adjacent to State Highway 6 running north–south along the West Coast of the South Island (Figure 1). State Highway 6 is the sealed national route that provides access to the Westland region and forms the road link between Barrytown and Greymouth to the south, and Westport to the north. The Barrytown Farms Block is adjacent to State Highway 6, off Warren Road, and local farm tracks currently provide access within the property.

Mineral permits granted by NZP&M do not give the permit holder automatic rights of land access to the permit area. Access arrangements are required for all onshore activities other than minimum impact activities. For exploration and mining activities, the permit holder is typically required to negotiate an access arrangement with each landowner and occupier.

The Barrytown Farms Block is owned under Barrytown Farms Limited. Barrytown Farms Ltd has one director, Ian Reynolds, and four shareholders: Ian Reynolds (58.5%), Christina Houston (25%), David Chung (16.4%), and Sally Reynolds (0.1%). TiGa is currently negotiating the terms of an ongoing access arrangement with Barrytown Farms Ltd for the exploration and mining of the Barrytown Farms Block. The Competent Person considers it highly likely that an acceptable arrangement will be achieved in the near term.

2.6 Climate

The climate at Barrytown Flats consists of moist cool temperatures with cloudy and windy conditions, and frequent rain showers near the coast. The climate is classified as Cfb in the Köppen climate classification (<http://koeppen-geiger.vu-wien.ac.at/present.htm>), a temperate oceanic climate with mild temperatures and significant rainfall. Barrytown Flats differs from much of the West Coast in that it has very few frost days. Greymouth, the closest large town, has an annual rainfall of 3,640 mm and an average temperature of 10.8°C. February is the warmest month with an average temperature of 15.3°C. The coldest month is July with an average temperature of 6.3°C. Precipitation varies by 105 mm between the driest month (February, 166 mm) and the wettest month (October, 271 mm) (Table 4).

Table 4: Greymouth monthly climate. Source: <https://en.climate-data.org/oceania/new-zealand/west-coast/greymouth-19392/>.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Avg. Temp. (°C)	15.1	15.3	14	11.7	9.5	7.2	6.3	7.2	8.7	10	11.6	13.7
Min. Temp. (°C)	12.2	12.3	11.2	9	7.1	4.8	3.6	4.4	5.7	7.1	8.7	10.8
Max. Temp. (°C)	18.4	18.6	17.3	14.8	12.4	10.2	9.6	10.6	12	13.3	14.9	17
Precipitation (mm)	241	166	183	204	221	219	190	209	236	271	234	266

2.7 Physiography

The Barrytown Project comprises the Barrytown Flats, a lowland strip within a coastal embayment. Most of the Barrytown Project lies below ~20 m above sea level and is backed to the east by steep slopes along an old sea cliff. The area is drained by creeks from the Paparoa Ranges in the east, flowing west to the Tasman Sea. The Barrytown Project contains several brackish and swampy areas. The beach and dune sands of the Barrytown Flats are rich in ilmenite and have been intensively investigated by drilling and metallurgical testing, as a potentially large source of titanium dioxide, by Carpentaria Exploration

Co Pty Ltd (Caffyn, 1976) and Fletcher Challenge Ltd (e.g., Suggate, 1989). The Barrytown Farms Block comprises farmland with undulating/hummocky ground caused by man-made humping and hollowing for drainage purposes. The Barrytown Farms Block is bounded by Cargill Road to the south, by the coastline to the west, by SH6 to the east, and an unnamed farm track to the north. The eastern end of the MRE, presented in this report, is bounded by fan deposits of the Little Granite Creek and Granite Creek. From 1937 to 1945, dredging was extensive within the Barrytown Farms Block and further south (Suggate, 1989). Dredge tailings and farming within the block may have obscured postglacial shorelines (Suggate, 1989). Notable environmental features within the Barrytown Farms Block are a small wetland area (marsh; not identified as a significant natural area) and the coastline.

2.8 Vegetation

The Barrytown Farms area has been denuded of vegetation for pastoral farming except at the coastal interface and along Canoe Creek. The Canoe Creek Lagoon (wetland), near the coastal interface, hosts wetland vegetation. There is also riparian strip planting along Canoe Creek. Very little vegetation is contained within the mining disturbance area other than pasture or occasional trees at pasture boundaries.

2.9 Local Resources & Infrastructure

The Barrytown Project is typically well connected by state highways and public roads to nearby towns. The settlement of Barrytown has minimal infrastructure and facilities. Greymouth is the nearest large town with a port and hospital. The nearest domestic airport is in Hokitika with flights to and from Christchurch. Christchurch airport is the closest international airport. Mobile phone coverage at the Barrytown Project area is adequate.

The port of Westport, to the north, can be accessed by travelling along State Highway 6 (55 km) and then along State Highway 67 (6 km). Greymouth can be reached by travelling south along State Highway 6, which crosses the rolling topography of the Barrytown Flats before skirting steep bluffs in the narrow coastal region. The road then passes through Rapahoe and Runanga, before crossing the Grey River and entering Greymouth. The ports of Greymouth (30 km to the south) and Westport (60 km to the north) are potential export routes; however, several limitations have been recognised including water depth, cargo handling, and ship capacity at both ports.

3 History & Previous Work

3.1 Tenure & Operating History

Gold has been prospected and mined from the Barrytown Flats since the late 1860s. The earliest mining records date from 1867 when the first gold rush occurred in the Canoe Creek area. Historical prospecting in the 1870s involved bucket line dredging and small sluice operations that worked the terraces along the Barrytown Flats for Au. Gold dredging operations were active in the southern half of the Barrytown Flats during the 1930s and 1940s. Processing efficiencies were purported to be low (50% recovery), with Au loss attributed to high slimes (Maynard and Jones, 2014). McOnie & Bull (2007) reported that historical Au mining had produced more than 62,000 oz of Au from sands at grades of 120–270 mg/m³, despite poor gravity recoveries.

Records indicate that targeted exploration, including drilling, commenced in the 1930s as dredging in the area began to decline. Exploration in the 1930s and 1940s, targeting Au mineralisation, was carried out by the following companies: NZ Gold Options (1931–1932), NZ Prospecting and Mining Ltd (1935–1937), Whites Electric Dredging Company (1936–1941), and Barrytown Dredging Company Ltd (1937–1945).

Investigation of ilmenite potential became the main objective of most proposals over the Barrytown Flats, from the 1960s onwards, including efforts by Carpentaria Exploration Company, Mineral Resources (NZ) Ltd, Amax Exploration NZ Ltd, Fletcher Challenge, and North Broken Hill Peko Limited (later known as Westland Ilmenite Ltd) (Table 5). Poor market conditions in the mid-1970s put the project on hold until increased Au prices in 1979 renewed interest in the area.

Westland Titanium was established in 2013, as a wholly owned subsidiary of Pacific Mineral Resources Ltd (PMRL), following the completion of a farm-in agreement put in place with Alloy Resources in July 2012. A formal joint venture was established with Alloy Resources in 2013. Subsequent work was carried out under Westland Titanium. Barrytown Joint Ventures Ltd (later TiGa) acquired full transfer of the permit in 2018, following a six-year history of assisting Alloy Resources with exploration under a work agreement.

Several phases of exploration drilling have been completed on the Barrytown Flats since the 1930s. Details of the historical drilling campaigns and an overview of the historical drillhole locations are provided in Table 5 and Figure 4, respectively.

Table 5: Summary of historical drilling at Barrytown Flats.

Company	Period	Mineral	Drillholes	Drill Type	Bulk Test Pits
NZ Gold Options Ltd	1931–1934	Au	40	Keystone sledge 152 mm	
NZ Prospecting & Mining Ltd	1935–1937	Au	570	Keystone 127 mm	
Whites Electric Dredging Company	1936–1941	Au	11	Handset (Banka) 89 mm	12 shafts
Barrytown Dredging Company Ltd	1937–1945	Au	229	Keystone 152 mm	
Carpentaria Exploration Company	1966–1976	Au & ilmenite	531	100-mm & 150-mm churn	
Mineral Resources (NZ) Ltd and Amax Exploration NZ Ltd	1980–1984	Au & ilmenite	Nil	Nil	Nil
Fletcher Challenge	1984–1988	Au & ilmenite	136	150-mm churn, & 50-mm hand auger	
Westland Ilmenite Ltd	1989–2000	Ilmenite	95 & 620	Hand auger & aircore	26
Rio Tinto Ltd	2000–2005	Ilmenite	Nil	Nil	Nil
NZ Gold Ltd	2005–2009	Au & ilmenite	19	Auger (not assayed)	Nil
Alloy Resources	2009–2014	Au & Ilmenite	105	Aircore & auger	Nil
Westland Titanium/Alloy Resources	2015–2016	Au & Ilmenite	120	Aircore	5

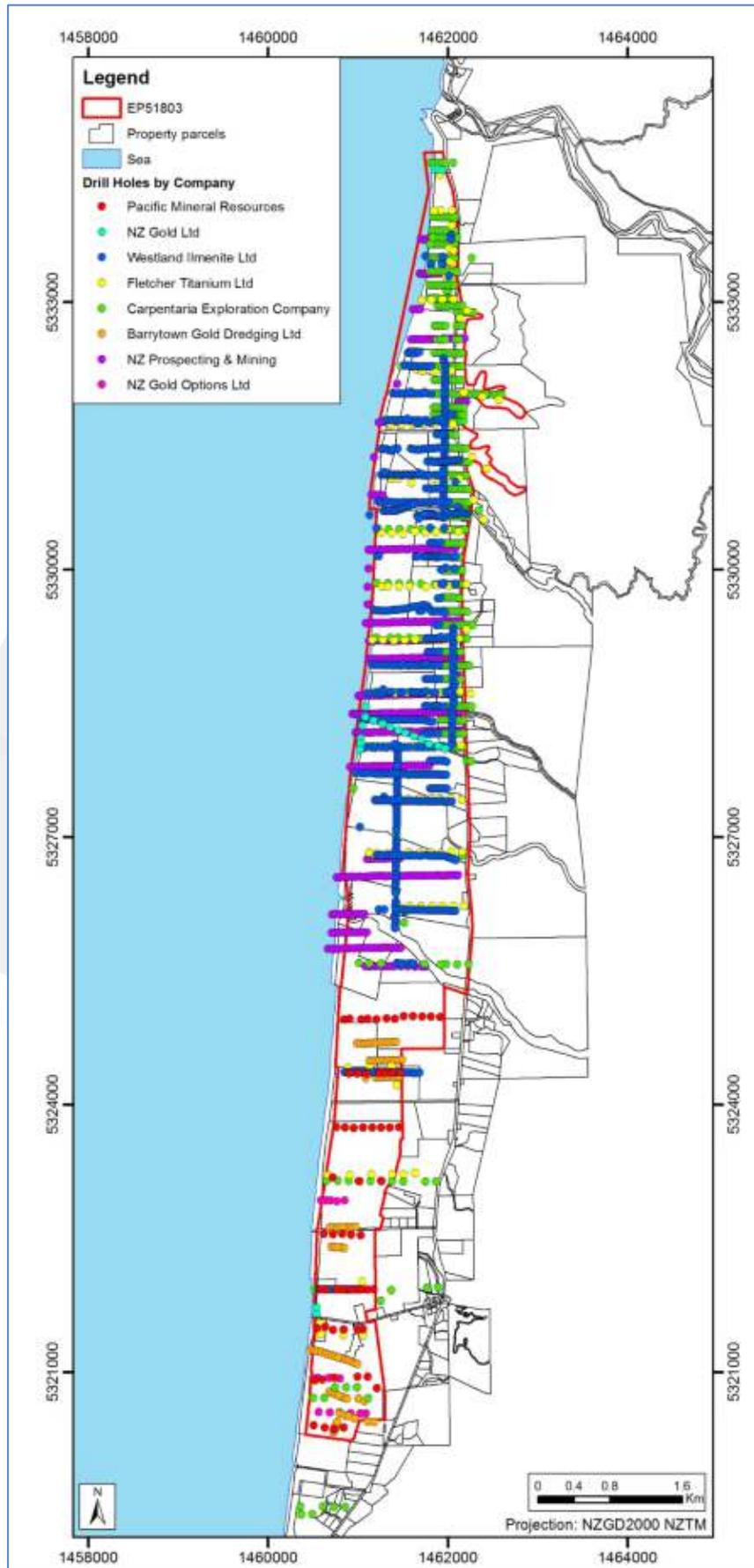


Figure 4: Distribution of historical drilling across Barrytown Flats.

Summary details of the historical drilling work outlined in Table 5 are provided in section 3.2. Table 6 summarises details of the historical drilling within the Barrytown Farms Block; Figure 5 summarises the details and extent of the historical drilling in this area. None of the historical drilling data were used for the MRE presented in this report.

Table 6: Summary of historical drilling within the Barrytown Farms Block.

Company	Date Drilled	Type	Target	# of Holes (Total m Drilled)	Hole IDs	NZP&M Report Reference
Pacific Mineral Resources	2013	AC	Ilmenite	29 holes (403 m)	WTBT001–WTBT028	MR5016
New Zealand Gold Ltd	2005–2009	Auger	Gold	0 holes (23 m)	NA	MR4265
New Zealand Gold Ltd	2005–2009	Trench	Gold	2 holes (5 m)	Channel 1, Channel 2	MR4265
Westland Ilmenite Ltd	1990	RC	Ilmenite	16 holes (136 m)	NTE1300–NTE2800	MR3023
Fletcher Titanium	1985–1986	Churn	Ilmenite/Gold	7 holes (129 m)	TU2000–TU4400	MR4287, MR1424
Carpentaria Exploration Company	1966–1973	Churn	Ilmenite	14 holes (122 m)	TE1600–TE2800, TU1600–TU5600	MR1326
Carpentaria Exploration Company	1966–1973	Churn	Gold	13 holes (115 m)	NA	MR1326
Barrytown Gold Dredging Company Ltd	1937–1945	KSS	Gold	43 holes (328 m)	NA	Summarised in MR1349

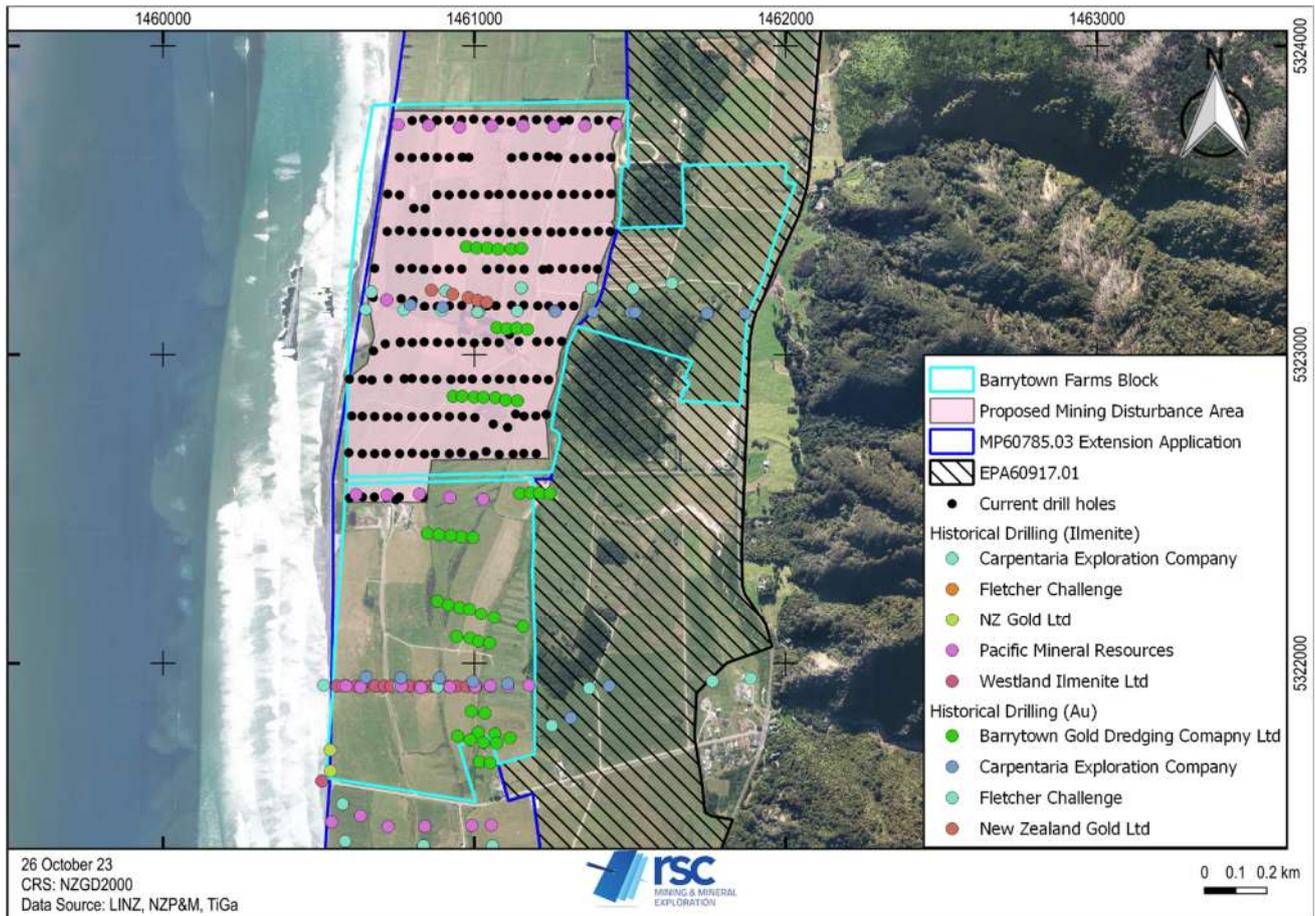


Figure 5: Distribution of historical holes and 2022 drilling at Barrytown Farms.

3.2 Exploration History

Historical data were not used in the MRE for Barrytown Farms Block. A detailed review of the historical drillhole data, and their comparison with the MRE at the Coates South Block, can be found in the previous 'Coates South Block Mineral Resource Estimate' JORC report by RSC (Roux et al., 2023). An overview of the exploration history within the Barrytown Flats, especially within the Barrytown Farms Block, can be found in the following paragraphs.

3.2.1 NZ Prospecting & Mining Ltd

Drilling in the Barrytown Flats area was first undertaken from 1936–1937 by NZ Prospecting and Mining Ltd. NZ Prospecting & Mining Ltd established systematically spaced (200-m spacing) east-west orientated drill lines, concentrated in the north of the Barrytown Flats. This included one east-west line within the Coates South Block, but none in the Barrytown Farms Block. Holes were drilled at 20-m centres and samples were assayed for Au. There is limited information available regarding this work, and the analytical data were not used in the MRE reported here.

3.2.2 Barrytown Gold Dredging Co Ltd

Barrytown Dredging Co Ltd mined 240 ha near the coast, due west of Barrytown, from April 1939 until 1945, recovering an estimated 50,400 oz Au from some 14,287,000 m³, giving a recovery of approximately 120 mg/m³ (1.4 gr/yd³). The company

put down 229 drillholes by bucket dredging. Recovery of Au from the sands proved more difficult than anticipated, with annual, average recovered grades of 85–164 mg/m³, compared to the expected 169–424 mg/m³. The percentage recovery achieved was 60% of the estimated value of the in-ground resource. Some confirmation of the corresponding Au losses is found in the 15 drillholes put down in the tailings by the Barrytown Dredge Company. The low percentage recoveries are attributed to the high slime content and timber in the overburden, together with the fine grain size of the Au.

3.2.3 Carpentaria Exploration Company

Several wide-spaced churn holes were drilled across the Barrytown Farms Block, as part of an exploration campaign over the wider Barrytown Flats, by Carpentaria Exploration Company from 1966–1973. Smaller diameter (100-mm) drilling was completed in the less accessible parts of the deposit, while heavier, 150-mm-diameter drill rigs were used in areas of thick gravel overburden and old mine tailings leftover from historical Au dredging. Holes were drilled up to 20 m deep and samples were analysed for ilmenite and magnetite.

Carpentaria's ilmenite testing was initially by sink float separation, electrostatic and magnetic separation, followed by grain count (Best, 1972). Ilmenite-bearing conductors were separated from the magnetite-bearing conductors using electrostatic separation and a hand magnet. The ilmenite-bearing conductors were analysed for TiO₂ (by sodium bisulphate fusion at 600°C, sulphuric acid digestion, followed by atomic absorption spectrometry).

Carpentaria's efforts ceased in 1976 due to poor market conditions.

3.2.4 Fletcher Challenge

In the mid-1980s, Fletcher Challenge (Grampian Mining Company Ltd and Fletcher Titanium Products Ltd) completed a further series of churn holes, at widely spaced intervals, across the Barrytown Flats area. North of Canoe Creek, the drillholes were spaced at ~120 m (east–west) with lines spaced at 600 m (north–south). South of Canoe Creek, the drillholes have variable spacing ranging from ~150 m to ~240 m (east–west) with lines spaced at between 1,200 and 1,800 m (north–south). Holes were drilled up to 10 m deep. All holes were surveyed by local surveyors. Fletcher also collected bulk density data. Issues with rising sands and sample recovery were recorded.

Samples were composited with a screened magnetic fraction, analysed for TiO₂ by XRF. Highly susceptible (magnetite) and non-magnetic fractions were not included in the sample for TiO₂ analysis, and only the 0.3–6.4 amp magnetic fraction was analysed.

3.2.5 Westland Ilmenite Ltd

Westland Ilmenite Ltd (Westland) completed several drilling campaigns, mainly in the northern half of the Barrytown Flats, continuing the work undertaken by Carpentaria and Fletcher. One RC drill line exists within the southern part of the Barrytown Farms Block from exploration in 1990, which targeted shallow ilmenite mineralisation.

The drilling was contracted to Alton Drilling Ltd, who used a track-mounted Versadrill 300 rig to drill 75-mm-diameter holes. Infill holes were drilled on the same grid lines used by Carpentaria. The programme included some check drilling of Westland programmes using twin holes, distanced 1 m from the original holes, along the strike of the strandlines, and twin holes

adjacent to the previous Carpentaria and Fletcher drillholes. The company also added the first north–south trending drill lines using 30-m spacing between holes. These north–south lines roughly follow the direction of the strandlines. All Westland holes were surveyed by professional surveyors.

Samples were collected from 1-m intervals and near-surface data were excluded from the sampling. Samples were variably composited, screened, and a magnetic fraction (6.4-amp fraction) was weighed and analysed for TiO₂ by XRF. Composited samples were also analysed for Zr.

Westland excavated 26 test pits to assess the bulk mineral content, and to determine the geotechnical characteristics of the ground to optimise potential mining practices (Lee, 1991a). Backhoe pit excavations, each ~1 m x 5 m, were excavated to maximum depths of ~5 m, and from these, up to ~50 kg of sand sample was retained for analysis.

Westland obtained bulk density data from these pits. A total of 26 mineralised sand samples and three overburden samples were collected (Lee, 1990a, b). Bulk density samples were obtained by slowly pressing a thin-walled stainless-steel cylinder, of 115-mm diameter, into the exposed material, to a depth of ~300 mm. The depth to which the cylinder was inserted was measured, the cylinder was then dug out, and the sample material was recovered. The sample volume was determined from the cylinder circumference and measured depth. Samples were dried, weighed, and analysed for TiO₂. The bulk density of the dry undisturbed sand was then established, and the associated ilmenite content was recorded. All samples were collected from above the water table due to the difficulties of sampling water-saturated, loose granular materials.

Westland undertook trial mining and processing at Barrytown Flats in late 1990 and early 1991; this area was located further north than the Barrytown Farms Block and Coates South Block. The six-tonne per hour dry mill, which was commissioned in January 1990, was designed for electrostatic treatment of concentrate, where the conductive ilmenite fraction was separated from the non-conductive garnet. The plant produced a concentrate containing 80% ilmenite (overall recovery of 72%). The non-magnetic fraction containing 25% ilmenite and 5% zircon was stockpiled separately (McOnie and Bull, 2007).

In August 2000, Rio Tinto acquired North Ltd (parent company of Westland) and all its assets worldwide, including Westland's Barrytown project. Rio Tinto did not undertake any exploration or mining on the permit and surrendered the permit in 2005. The wet concentrator plant was dismantled and sold.

3.2.6 NZ Gold Ltd

In February 2008, NZ Gold Ltd undertook a helicopter, airborne geophysical survey of the entire Barrytown Flats, comprising magnetic and radiometric data to identify Au targets (Vidanovich, 2008). Thomson Aviation flew the survey. The geophysical data were processed, and an interpretation was carried out using only the Carpentaria and Fletcher Au drilling and testing data for comparison. Radiometric data revealed moderate responses on the thorium (Th) channel (possible mineral sources are monazite, thorite and thorianite) and weak but detectable U responses (uraninite and thorite), while potassium (K) counts were high. Interpretation of the radiometric data identified two main areas:

- a K anomaly associated with exposed granites south of the Canoe Fault (east of Barrytown Farms Block) and the alluvial outwash on the flats (e.g. the Canoe Creek); and
- a Th and U anomaly, where heavy minerals (HM) are exposed on the surface in strandline accumulations.

Past dredging operations that took place in the Barrytown Farms Block area correlate well with a strong Th and U anomaly. This is to be expected as the historical mining in this area removed the overlying outwash sediments and soils, revealing the heavy mineral sands beneath. Ten centimetres or more of soil and/or alluvium is sufficient to extinguish the radiometric signal.

The magnetic response in the Barrytown deposits is due to the magnetite content and to a lesser extent, the ilmenite content. Vidanovich (2008) noted that magnetite is 10–100 times more magnetic than ilmenite; however, Lee & Burtlet (2018) argued that the Barrytown ilmenite should have a magnetic susceptibility closer to 1/10 of magnetite (rather than 1/100). According to Lee & Burtlet (2018), the Barrytown ilmenite should therefore produce a better response to the airborne magnetometer instrument. This is because the Barrytown ilmenite is very fresh, with a high FeO component, which makes it more magnetic than the oxidised, high Fe₂O₃, ilmenite.

NZ Gold compared the radiometric and magnetic data with historical data to confirm that areas of magnetism and radiometric anomalies highlight and confirm the presence of buried strandlines, where elevated concentrations of Au and HM are present (Vidanovich, 2008).

NZ Gold surrendered its permit, EP 40760, in June 2009, after summarising its work in two reports (MR5265 and MR4438), submitted to the New Zealand regulator.

3.2.7 Alloy Resources Ltd

Alloy Resources Ltd was granted EP 51803 on 26 November 2009 for a period of five years. In 2013, Pacific Mineral Resources Ltd (PMRL) undertook a review of all historical digital data held by Alloy Resources, as part of the process of farming, in order to hold a majority interest in the project. PMRL commissioned Kenex to compile all previous data into a database (Kenex, 2013a, MR4934).

Later in 2013, Alloy Resources completed drilling over the southern portion of EP 51803 for a total of 1,003 m from 105 drillholes. A track-mounted aircore rig was used to drill 923 m from 64 holes, and 79 m were drilled from 41 holes using a motorised auger drill. Horizon Drilling undertook the drilling, and holes were surveyed with differential GPS. Hole depths ranged between 9 and 27 m. Samples were taken every metre, subject to a 25% split on the rig by riffle splitter, with 25% intended for gold assay, 25% for ilmenite assay, and the remainder stored in a polyweave bulk sample bag. Repeat samples were taken every 10th metre or at the end of each hole. Issues with penetrating alluvial gravels were noted, as well as difficulty in retrieving adequate samples from gravel or swampy material, and that drilling through man-made drainage humps resulted in poor sample retrieval owing to poor ground compaction in those areas. Kenex recommended that future drilling should be undertaken by sonic drill rig. CRL Energy analysed the samples for ilmenite and Au. Further information for this drilling can be found in Kenex (2013b, MR5069).

In 2014, Alloy Resources combined with Westland Titanium Ltd (formerly PMRL), through a joint-venture agreement, and continued work on EP 51803, including a scoping study and digital data compilation for the Barrytown Flats. The scoping study recommended a mining operation of 6 Mtpa with an initial 10-year mine life. A resource estimate was completed by Al Maynard & Associates, the results of which are summarised in Table 7. The study made the following conclusions:

- the metallurgical recovery of the ilmenite may be hindered by the immaturity of the deposit;
- much of the sampling from historical drilling was not verifiable as reliable and accurate, resulting in an Inferred resource estimate;
- gold mineralisation occurs coincident to ilmenite mineralisation;
- twin-hole drilling is needed to verify the accuracy of historical drilling;
- closer-spaced drilling (<50 m) is required to raise the resource to an Indicated classification or above; and
- the quality of the 2013 aircore drill programme was considered unsuitable due to poor recoveries and sample contamination below the water table.

In 2015, following a permit extension to appraise the deposit at Barrytown Flats, Alloy Resources and Westland Titanium conducted a preliminary drilling programme over the Barrytown Flats (Kenex, 2016, MR5266). A total of 31 shallow aircore drillholes were completed for a total of 502 m. The drilling was conducted along three east-west traverses targeting shallow heavy mineral sands along Macmillan Road, Burkes Road and Cargill Road (Figure 6).

From November 2016–January 2017, Alloy Resources in a joint venture with TiGa (then Barrytown JV) carried out aircore drilling over the northern area of Barrytown Flats (Kenex, 2017) across three stages. A total of 1,985.3 m was drilled from 154 drillholes; holes were spaced at 10-m intervals along three east-west traverses (Figure 7). The first stage was 89 holes for 985.3m, stage 2 with 36 holes for 565 m, and then stage 3 for 29 holes for 435 m.

In addition to the 2016 drilling programme, Alloy and TiGa collected five small composite bulk samples from surface enrichments and previous drilling samples (Kenex, 2017). The exact location source and size of each sample are not given. Samples were submitted to SGS for QEMSCAN analysis. Results from the five samples revealed that:

- the ilmenite abundance² is consistent with historical drilling;
- the garnet is predominantly almandine;
- the garnet-to-ilmenite ratio is ~2.64 to 1; and
- the vast majority of the garnet has a low number of inclusions.

² The term abundance is used here to refer to the weight percentage of a mineral (e.g. ilmenite, garnet, or zircon). The term is used instead of grade, which is typically used to denote the concentration of a chemical element.

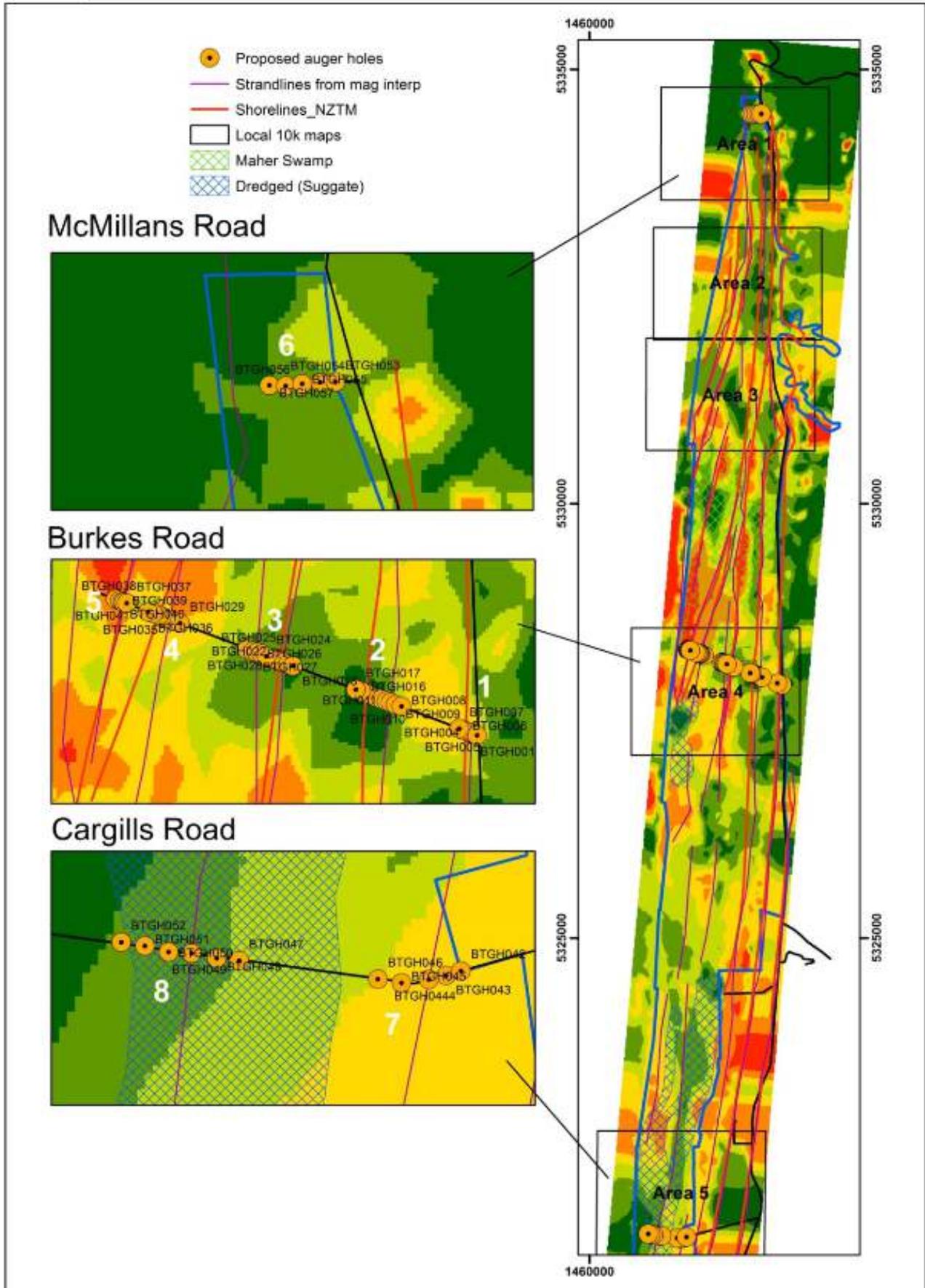


Figure 6: 2015 Drilling by Alloy Resources and Westland Titanium at Barrytown Flats.

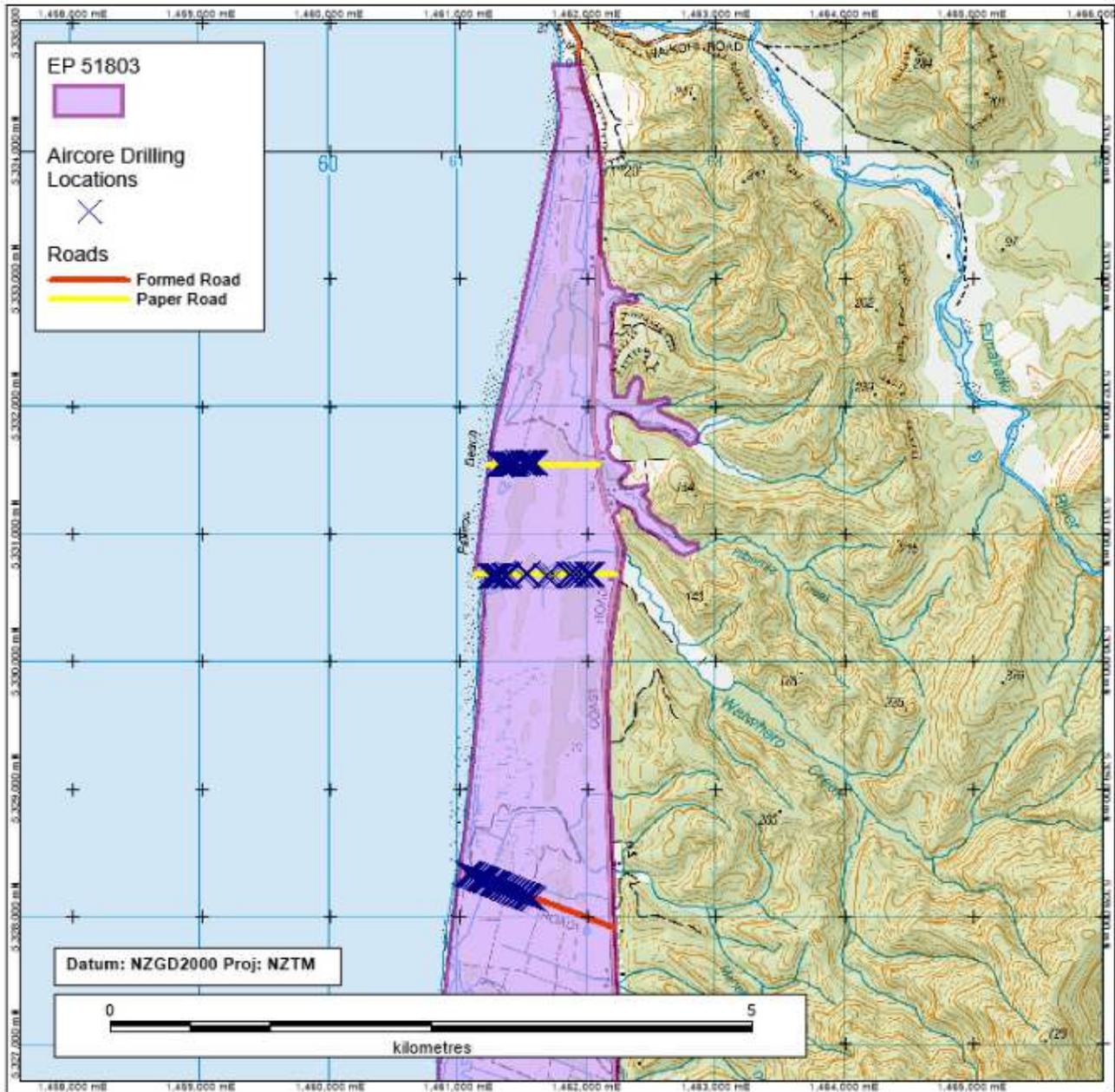


Figure 7: 2016 aircore drilling by Alloy Resources and TiGa at Barrytown Flats.

3.3 Production History

Early production records for mining across the Barrytown Flats area are incomplete. It is known that historical prospecting in the 1870s involved small sluice operations that worked the terraces along the Barrytown Flats for Au. Despite poor recoveries, McOnie & Bull (2007) estimated past production of Au from Barrytown at more than 62,000 oz Au from sands, at grades of 120–270 mg/m³. Most of the historical production records from Barrytown relate to areas south of Canoe Creek.

In the early 1900s, blow-up sluicing claims were worked in the vicinity of the mouths of Canoe Creek and Fagan Creek and near the fan of Bakers Creek, east of State Highway 6. No detailed information is available on these claims; however, Best

(1972) indicates that the approximate extent of these worked areas is around Canoe Creek, and in the area where Canoe Creek meets the beach. Most of this area is currently lagoon or tidal wetlands (Canoe Creek Lagoon, Figure 8).

Barrytown Gold Dredging Co Ltd mined at Barrytown Farms from April 1939 until 1945. The exact location of dredge tailings at Barrytowns Farms Block is not known (Figure 8); however, the company put down a total of 229 drill holes for an area of 317 ha, due west of Barrytown recovering an estimated 50,400 oz gold from 14,287,000 m³. Recovery of Au from the sands proved more difficult than anticipated, with annual average recovered grades of 85–164 mg/m³, compared to the expected 169–424 mg/m³. The percentage recovery achieved was 60% of the estimated value of the in-ground resource.

The initial operation of a pilot plant at Barrytown was by Carpentaria Exploration Company. As of March 1972, a total of 167 (British Imperial) tons of ilmenite had been produced, with all tailings combined and pumped to a settling pond (Best, 1972); however, there are no records of which area was mined, the quantity mined, the ilmenite abundance, or where the tailings were settled. Dredge tailings at Barrytown Farms Block (Figure 8) are related to workings by Barrytown Gold Dredging Co Ltd; Carpentaria considered the Barrytown Farms Block as low grade and probably did not mine this area. Carpentaria's pilot plant was located much further north than the Barrytown Farms Block, near Lyddys Creek.



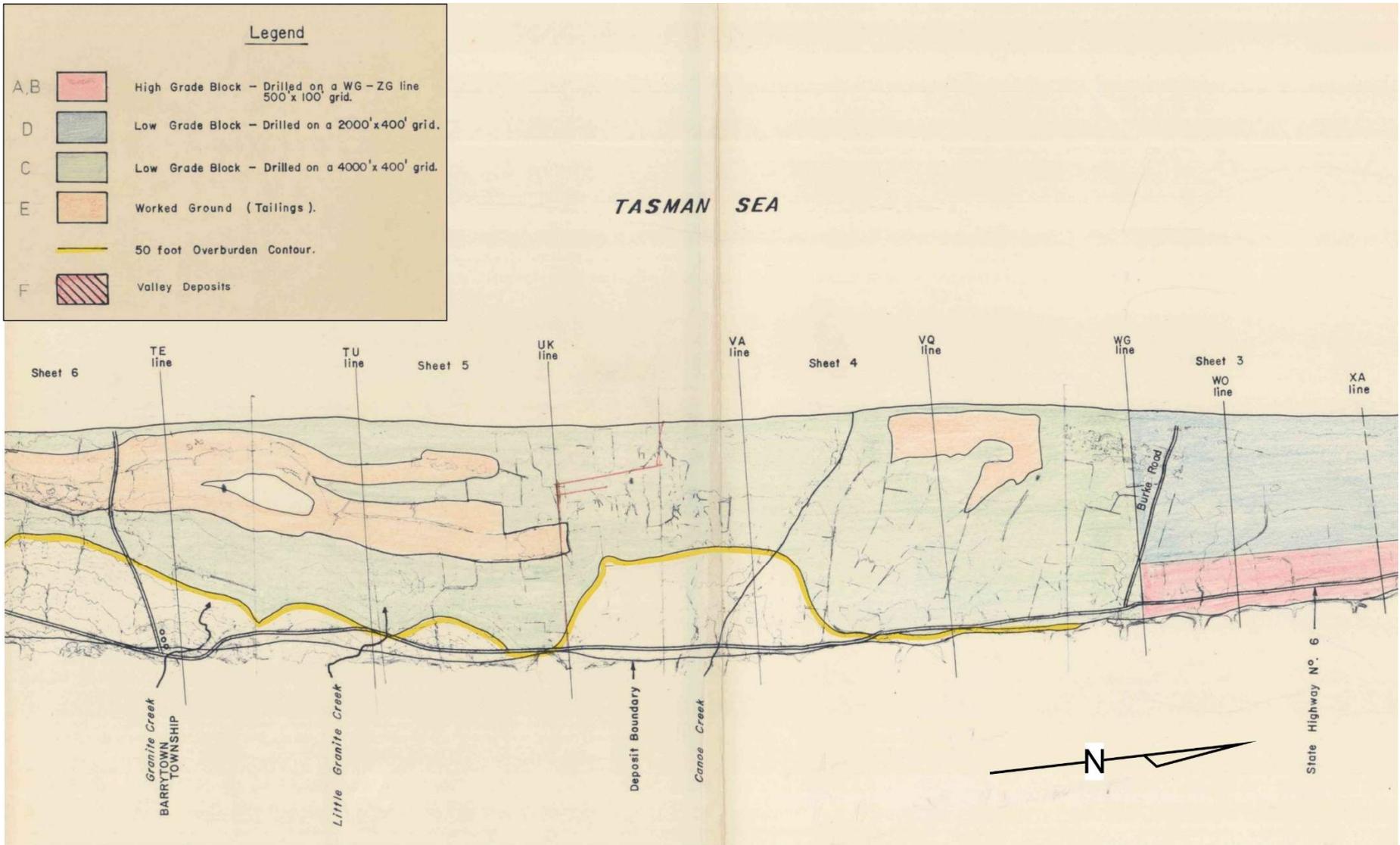


Figure 8: Modified from Carpentaria Exploration Company map of the Barrytown Flats, indicating worked ground (tailings) (Best, 1972)

3.4 Previous Studies

Various mineral resource estimation studies were undertaken before 2018 that were not reported or classified in accordance with the JORC Code (2012). Many of these estimates included volumes that are now considered sterilised material, such as those covered by State Highway 6, the Punakaiki Scenic Reserve, and the buildings on the deposit. These estimates represent the wider Barrytown Flats area and are not directly comparable to the MRE for the Barrytown Farms Block reported in section 8.

In 2018, TiGa commissioned Graham Lee & Associates Pty Ltd (GLA) and H&S Consultants Pty Ltd (H&SC) to undertake a resource estimate for the Barrytown Flats north of Canoe Creek, resulting in an Indicated and Inferred mineral resource for ilmenite classified and reported in accordance with the JORC Code (2012), and an exploration target for garnet, zircon and Au. Further details can be found in Lee et al. (2018).

An internal study was subsequently undertaken by TiGa to establish an indicative initial mine plan to support its permitting compliance and applications (Banaszak et al., 2018). This study was based on 69 Mt @ 11.56% ilmenite, 17.3% garnet, 0.4% zircon, and 0.07 g/t Au. This study was not reported in accordance with the JORC Code (2012) and no ore reserves were reported.

3.4.1 Ilmenite

Several historical ilmenite resource estimates for the Barrytown Flats have been completed (Table 7). Estimates prepared in the 1970s covered the entire deposit, while estimates since 1989 have been split to cover either the portion north, or the portion south, of Canoe Creek.

Table 7: Previous Barrytown Flats ilmenite mineral resource estimates.

Company	Year	Cut-Off (%)	In-Situ Resource	Ilmenite (Mt)	Ilmenite Abundance (%)	Reference	Comment
Carpentaria Exploration Company	1970	2	100 Mt	12.8	12.3	Caffyn (1976)	Total deposit.
Carpentaria Exploration Company	1971	5	92.8 Mt	11.0	13.0	Caffyn (1976)	Total deposit.
Mineral Resources NZ Ltd	1980	Not used	36.3 Mm3	7.1	10.0	Hancock & Associates (1980)	Total deposit.
Fletcher Challenge	1989	4	29.6 Mm3	6.3	12.3	Robbins (1989)	Feasibility study and resource estimates for the target area north of Canoe Creek.
Westland Ilmenite	1990	4	35 Mt	5.0	14.3	Lee (1990b, a)	Manual estimates North Canoe Creek.
Westland Ilmenite	1990	4	40 Mt	5.6	13.9	Lee (1990b, a)	Mine map modelled Estimate North Canoe Creek.
Westland Ilmenite	1990	4	15 Mt	1.9	12.8	Lee (1990b, a)	Manual estimates South Canoe Creek.
Westland Ilmenite	1990	4	19 Mt	2.3	11.7	Lee (1990b, a)	Mine map modelled estimate.
Alloy Resources/Westland Titanium	2014	2.5	59.1–70.3 Mt	4.7–6.4	6.5–10	Maynard & Jones (2014)	Total deposit.
TiGa (Barrytown JV Ltd)	2018	4	69 Mt	8.0	11.6	Lee & Bulet (2018)	North of Canoe Creek.

3.4.2 Zircon

In addition to the ilmenite estimates, Westland Ilmenite also estimated a zircon mineral resource of 66,000 t at 0.19%, contained within the 35 Mt of in-situ resources, north of Canoe Creek. There are no zircon test results for samples south of Canoe Creek (Lee, 1991b).

4 Geological Setting & Mineralisation

4.1 Regional Geology

Barrytown Flats is located in the West Coast region, South Island, which has been regionally mapped at 1:250,000 scale as part of the QMAP project (Nathan et al., 2002). The West Coast region of New Zealand has a complex geological history that is defined by multiple generations of rifting prior to and since the inception of Zealandia as a distinct landmass in the Late Cretaceous, and a shift to convergent tectonics in the Late Oligocene (Nathan et al., 1986).

Zealandia rifted away from the east coast of Gondwana throughout the Cretaceous from 125–83 Ma (Laird and Bradshaw, 2004). Extension and subsequent thinning of the continental crust were accommodated by the formation of several metamorphic core complexes (e.g. Tulloch and Kimbrough, 1989; Schulte et al., 2014). In the West Coast region, the resulting assemblage of Palaeozoic and Mesozoic basement rocks consists of an amalgamation of Ordovician metasediments (Greenland Group; Laird and Shelley, 1974), Devonian and Cretaceous intrusive plutons (Karamea Batholith; Nathan et al., 2002), and a suite of foliated granites, gneisses and mylonites (Kimbrough and Tulloch, 1989; Nathan et al., 2002) forming the exhumed footwall of the Paparoa Core Complex (Kimbrough and Tulloch, 1989).

A second stage of rifting in the palaeogene led to the formation and sedimentary infill of the Paparoa trough (Nathan et al., 1986) that extended from Greymouth to Westport. Rifting persisted into the Late Oligocene, shifting to convergent tectonics in the Late Oligocene (Furlong and Kamp, 2013). Development of the present oblique-compressional plate boundary in the Early Miocene led to a complex Late Cenozoic history. The switch from an extensional to a compressional regime prompted basin inversion throughout the Paparoa Trough, resulting in the uplift and erosion of most of the sedimentary rocks deposited in the deepest part of the trough (Figure 9). The preserved Oligocene strata are relatively thin packages of non-marine, shelf and platform facies that would have formed along the flanks of the axis of the Paparoa Trough. Following the deposition of Tertiary sediments there was a hiatus in deposition lasting about 1.5 Myr before the deposition of the oldest Quaternary sediments in the area.

Rapid uplift of the Southern Alps since the Early Quaternary has formed the present range-and-basin topography (e.g. Nicol et al., 2017). Glaciations during cool periods in the Quaternary have resulted in downstream aggradation from moraines and down-valley glacial outwash gravels (e.g. Barrows et al., 2013). During warmer, interglacial periods, there is evidence of higher sea levels near the coast from marine terraces that have been subsequently uplifted (Pillans, 1990).

Quaternary sand formations are the result of erosion of large volumes of heavy-mineral-bearing source rocks (Figure 9). These include the quartz vein and disseminated Au deposits in the Greenland Group (Palaeozoic orogenic shear zone Au deposits) and garnet schist of the Haast Schist east of the Alpine Fault (Mesozoic orogenic Au deposits and Cenozoic orogenic alpine Au deposits) (McPherson, 1978). Gold, along with ilmenite, magnetite, garnet, zircon and other heavy minerals (Hutton, 1950; McPherson, 1978; Minehan, 1989), was concentrated into lenticular beach placers known as black sand leads along 320 km of coastline from the Karamea River in the north to Bruce Bay in the south (Christie and Brathwaite, 2006; Tay et al., 2021). Narrow, elongate Holocene beach and dune deposits typically run parallel to, and at the back of, the modern storm beach (Suggate, 1989; Tay et al., 2021).

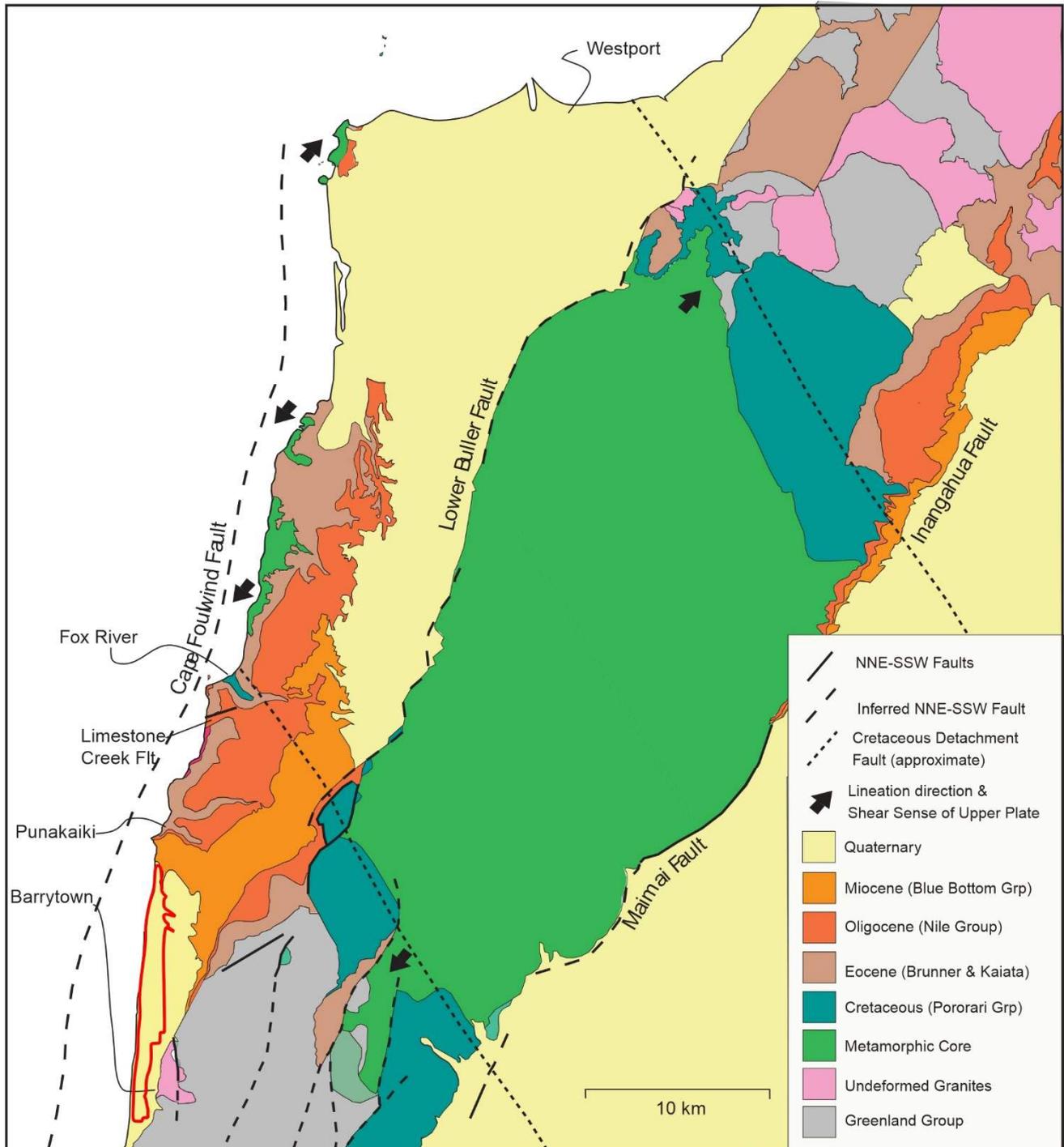


Figure 9: Simplified regional geological map of Greymouth–Westport area. Barrytown Flats indicated with a red outline (modified after Riordan et al., 2014).

4.2 Local Geology

The post-glacial coastal lowland of Barrytown (Barrytown Flats) is 17 km long and up to 1.5 km wide (Suggate, 1989). The lowland is backed by a well-marked cliff and comprises a succession of shorelines in the north, a series of fans from local creeks in the middle, and further shorelines in the south (Figure 10) (Suggate, 1989). Barrytown’s lowland flats are the result of costal progradation due to northward longshore drift (Furkert, 1947). Beach and low dune ridges, with intervening

swamps, form the northern third of the Barrytown lowland. In the central part and much of the south of the lowland, fans from creeks overtop the coastal deposits, with that from Canoe Creek reaching the present coast (Suggate, 1989). The fans resulted from large amounts of resistant material transported from high, steep, hard-rock catchments; in contrast, the lower gradient northern catchments are in easily eroded soft rocks that provide only fine material, easily carried to the sea (Suggate, 1989). The lowland is interpreted to be of postglacial age based on radiocarbon dated (4720 ± 70 years BP) shoreline deposits 15 km further south (Suggate, 1968, 1989). The inland post-glacial cliff defines the eastern limit of the Barrytown Project.

Using aerial photography, topographic maps, and ilmenite drilling results, Suggate (1989) identified 10 shorelines — plus a modern shoreline with its pattern of complementary erosion and deposition cutting off preceding shorelines — in a series of three sequences at Barrytown (Figure 10 and Figure 11). The three sequences include:

- an older series of four shorelines (numbered 1–4) that developed closely parallel to the post-glacial cliff along its entire length;
- a younger series of six shorelines (numbered 5–10) that formed after a major event changed the coastal regime and represent pauses in stages of coastal advances in the north of the Barrytown Project; and
- the modern shoreline 11 that is considered to have developed after a period of major erosion along the length of the beach after the formation of Shoreline 10.

Subsequent progradation of each shoreline resulted in the preservation of the various wave-cut platforms and burial of the beach facies beneath aeolian sands. South and inland of the Barrytown Project area lies the Canoe Fault. North of the Canoe Fault, elevations of the successive older shorelines 1–4 are about 8.5 m, 7 m, 4 m, and 3.5 m above sea level (m.a.s.l.), respectively, and may reflect continuous uplift, with separate shorelines resulting from the superposition of the effects of minor eustatic sea-level fluctuations, or from successive discrete uplifts (Suggate, 1989). Uplift and displacement at Canoe Fault likely took place between 1,000 and 6,500 years ago since the sea level stabilised (Suggate, 1989). The younger shorelines are not significantly different from present sea level (Suggate, 1989).

Both the wave and aeolian-deposited sands are locally overlain by younger alluvial fan deposits of gravel and/or silt, derived from the Paparoa Range to the east. These are particularly concentrated along the toe of the coastal escarpment where streams discharge onto, and cut through, the coastal plain. Typically, the alluvial and beach sand units overlie gravel and marine sand units (Laird, 1988). The Quaternary geology at Barrytown was mapped and summarised by Laird (1988) into four units (Table 8).

The local basement in the Barrytown Project area consists of Tertiary mudstones and siltstones of the Blue Bottom Group, Carboniferous granites of the Karamea Suite, and Late Palaeozoic metasediments of the Greenland Group (e.g. Nathan, 1974). These basement units are exposed to the east of the Barrytown Project (Figure 11). Blue Bottom Group sediments form the local topographic highs in the Barrytown Project area north of the Canoe Fault with elevations up to 120 m above sea level (e.g. Nathan et al., 1986). These soft sediments were partially eroded by high sea levels in the Pleistocene. South of the Canoe Fault, the inland portion of the Barrytown flats form higher, more undulating hills. This is due to the outwash

and talus materials of the more resistant granitic rocks of the Karamea intrusive suite and metasediments of the Greenland Group.

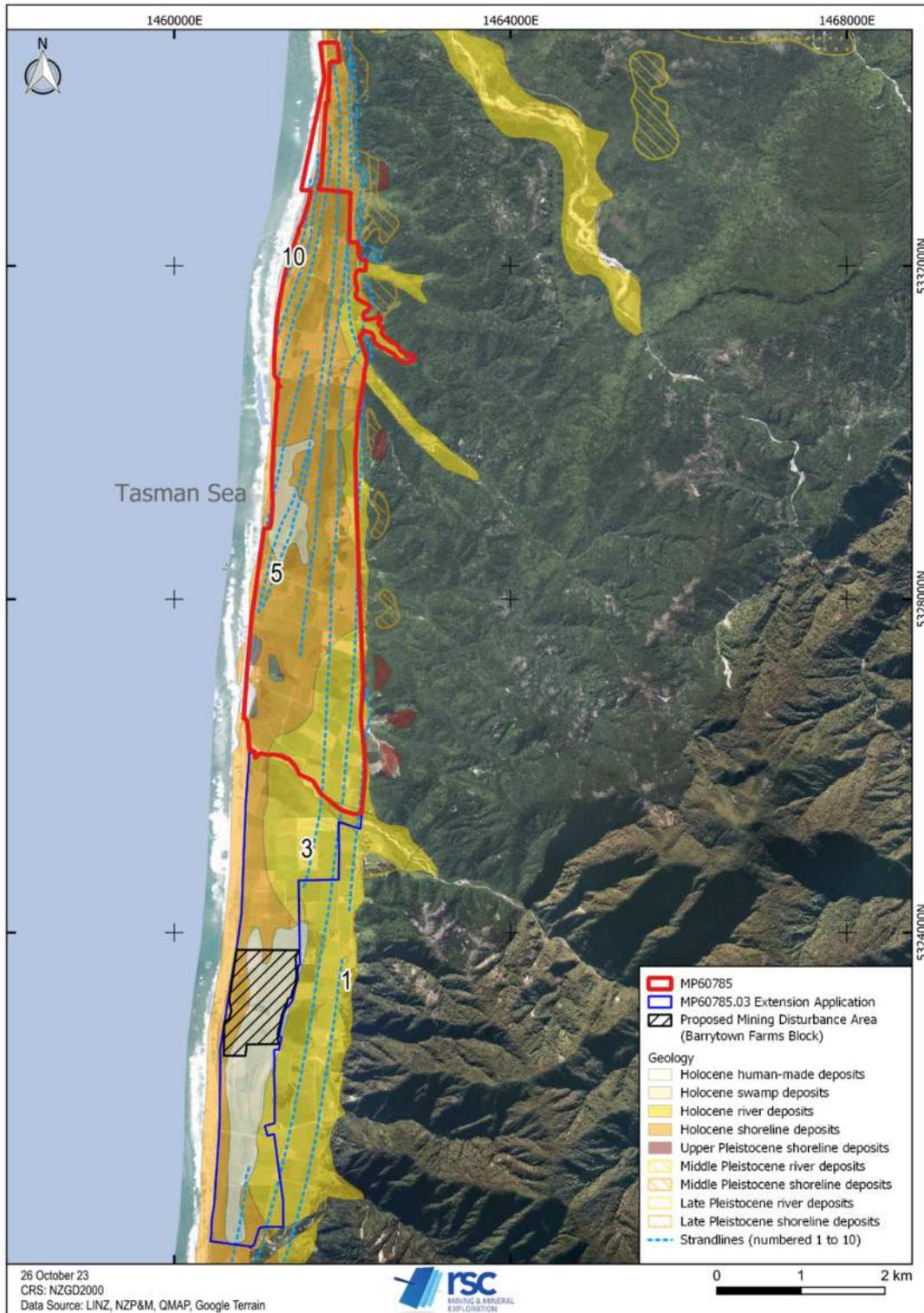


Figure 10: Sedimentary deposits and identified shorelines at the Barrytown Flats area (modified after Laird, 1988; Suggate, 1989).

Table 8: Quaternary geology at Barrytown (Laird, 1988).

Unit	Age	Description
Nine Mile Formation	Holocene	Deposits of the present-day beaches and rivers comprising unconsolidated ilmenite-rich beach sand and gravel, dredge and sluice tailings, river gravel and alluvial fans and swamp deposits.
Waites Formation	Upper Pleistocene	Gravel (mainly gneissic) forming lower-level inland river terraces and associated degradational terraces. Sand and fine gravel along the coast form a 34–36 m.a.s.l. terrace.
Addison Formation	Upper Pleistocene	Gravel (mainly gneissic) forming high-level terraces. Partly cemented, brown ilmenite-rich sand and fine gravel near the coast forming an 85–87 m.a.s.l. terrace
Caledonian Formation	Upper Pleistocene	Cemented marine sand and fine gravel near the coast form a 105–120 m.a.s.l. terrace.



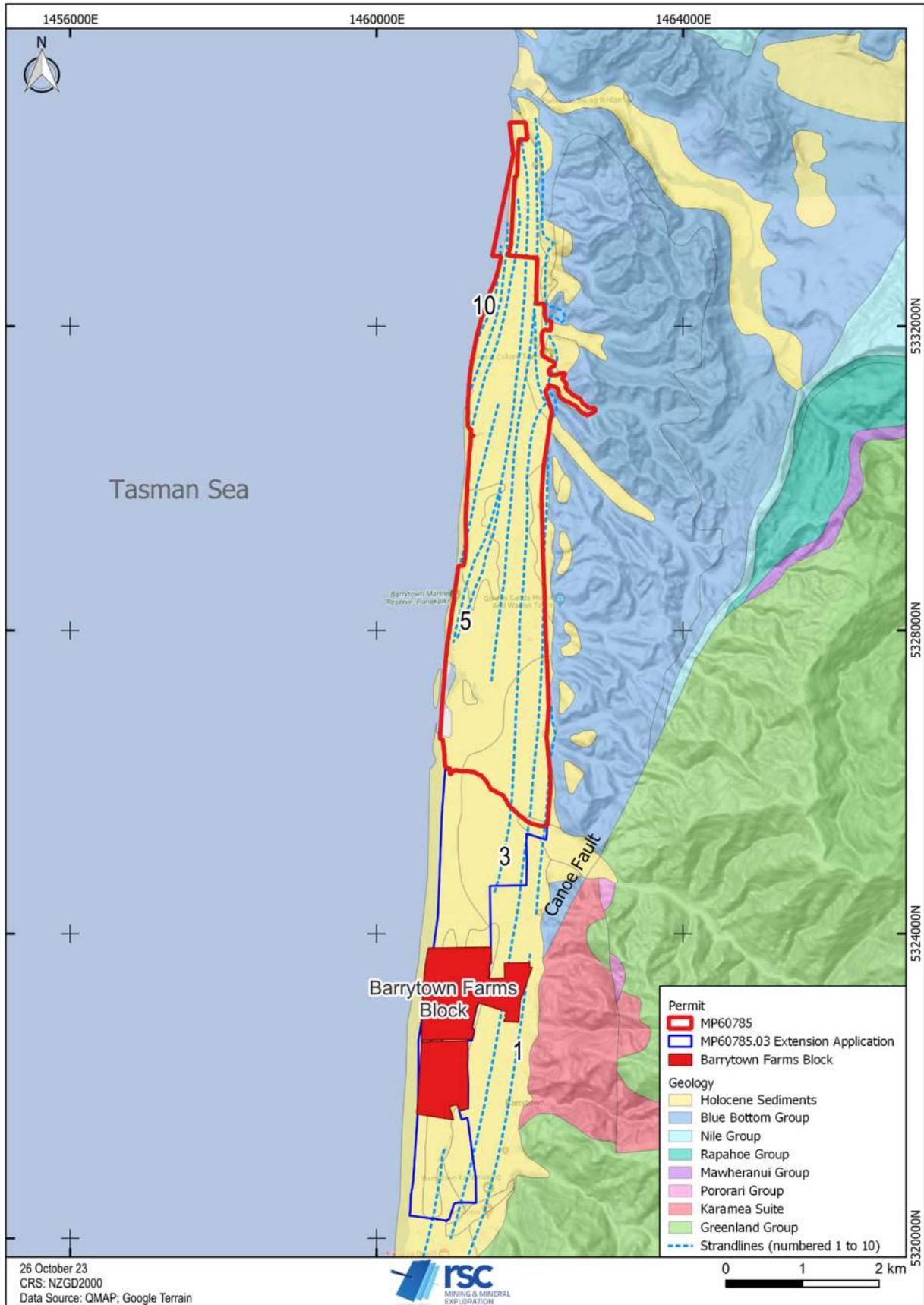


Figure 11: Geological map of the Barrytown Project area with Barrytown Farms Block.

4.3 Deposit Geology

The Barrytown Flats shoreline deposits are characterised by mineralogical and textural immaturity and a lack of chemical weathering. The shoreline beach deposits are quartz, feldspar and lithic (mostly grey schist fragments) sands that contain elevated heavy mineral abundances (Table 9), predominantly garnet and ilmenite with minor zircon and Au (Lee, 1991a; Wells and Haverkamp, 2020). These sands are immature, as demonstrated by many composite particles present and the presence of minerals with a low resistance to mechanical and chemical breakdown. The heavy minerals have been concentrated in the series of beach strandlines (shorelines 1 to 10) and are typically considered to have originated from the Alpine Schist of the Southern Alps, transported to the coast by rivers, mostly to the south of the Barrytown Project, and transported north by longshore drift (Bradley et al., 2002; Ritchie et al., 2019). The Au occurring in the Barrytown Project is essentially reworked detrital Au and typically occurs as very fine-grained thin flakes (Newman, 1989). Most Au grains are 50–150 µm in diameter with occasional larger fragments up to 600 µm, less than 20 µm thick and doubly or triply folded (e.g. Bulet and Lee, 2019; and references therein).

Table 9: Typical heavy mineral abundance in the Barrytown shoreline beach deposits (Newman, 1989; Haverkamp et al., 2016).

Heavy Mineral	Abundance
Ilmenite	10–15%
Garnet	10–15%
Magnetite	0.2–0.5%
Zircon	0.1–0.3%
Epidote	0.1–0.3%
Heavy silicates*	0.1–0.3%
Composite heavy particles	0.1–0.3%
Leucoxene	0.02–0.05%
Sphene	0.05–0.1%
Rutile	<0.1%
Monazite	<0.1%

*chlorite, biotite, amphiboles, pyroxenes and actinolite.

The 2022 drilling campaign at the Barrytown Farms Block covered an area of historical dredging. The strike of shoreline 3 (Figure 11) is interpreted to line up with the eastern end of dredge tailings within the Barrytown Farms Block, indicating that further shoreline deposits may have been obscured. Based on the interpretation of Suggate (1989), no other shorelines are developed within this area; thus, shoreline 3 may form a continuous deposit.

The shoreline deposits are interpreted to be part of the Holocene Nine Mile Formation (cf. Laird, 1988; Suggate, 1989). Shoreline 2 beach deposits are characterised by a top beach gravel layer that extends north from the postglacial cliff close to Bakers Creek up to Scotchman Creeks, in the northern part of the Barrytown Flats. Shorelines 3 and 4 are characterised by medium-grained beach sand deposits. The transition between shorelines 3 and 4 is evident further north of the Barrytown Farms Block, and is defined by a 0.5-m change in altitude due to regional uplift along the Canoe Fault (Suggate, 1989). The change in altitude between shorelines 3 and 4 is not evident at the Barrytown Farms Block nor further south of it. The

different shorelines might be separated by swales that contain unmineralised silt from alluvial fan deposits (e.g. schematic cross-section in Figure 12) (Lee, 1991a). At the eastern part of the Barrytown Farms Block, the shoreline deposits are covered by alluvium derived from the Little Granite Creek and Clarke Creek (cf. Suggate, 1989; Lee, 1991a). The thickness of the alluvial fan deposits ranges from <4 m up to 6 m at the eastern end and tapers off seaward. The shoreline and alluvial deposits are overlain by less mineralised, <1-m-thick aeolian sands and a ~0.5-m-thick top soil (Lee, 1991a); however, historical dredging in the Barrytown Farms Block may have removed any alluvial and aeolian cover as indicated by the radiometric data (Vidanovich, 2008).

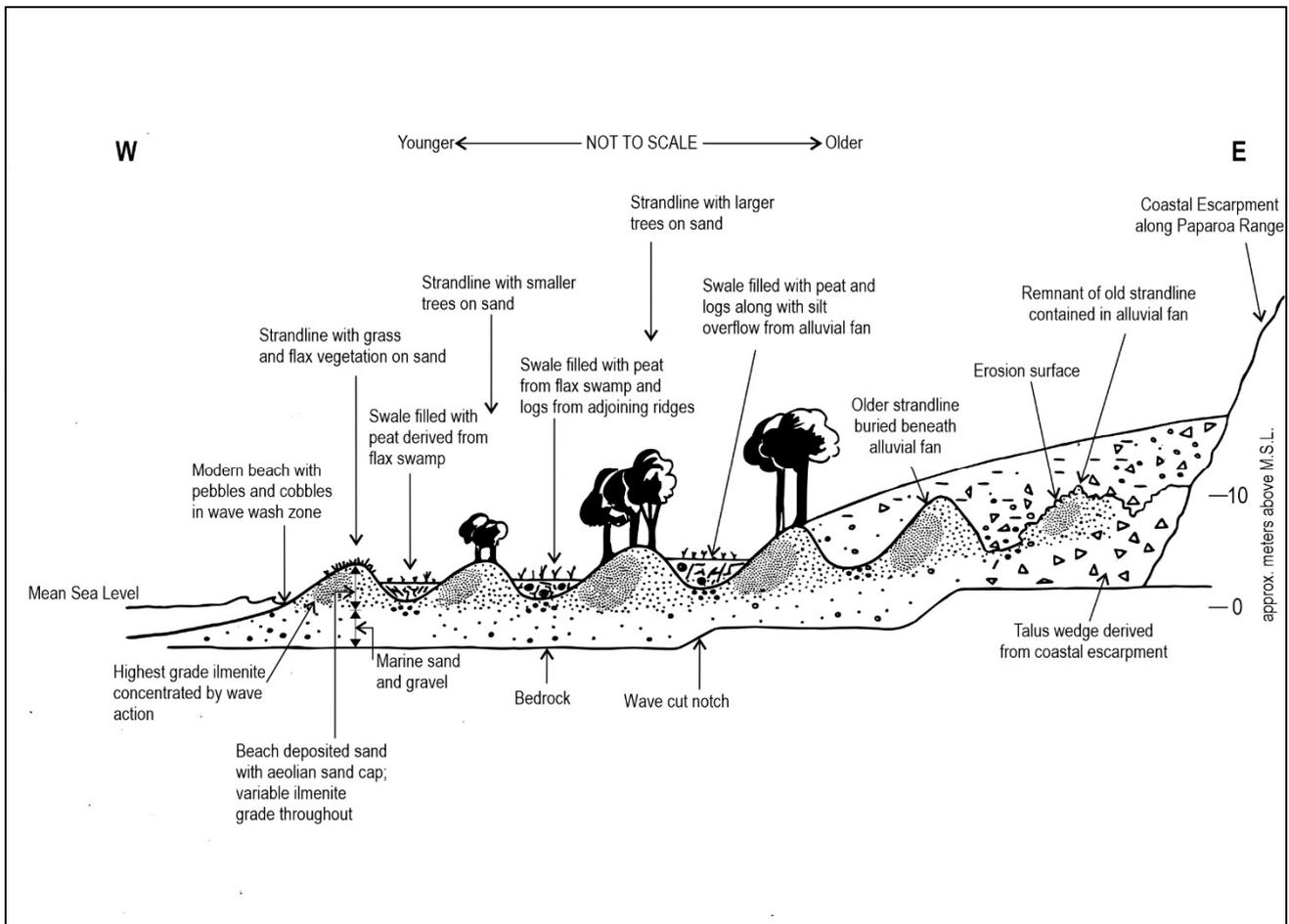


Figure 12: Generalised section of the Barrytown Flats (modified after Lee, 1991a; Westland Ilmenite Ltd.).

The local geology at the Barrytown Farms Block was modelled in 3-D using the logging from the 2022 drilling campaign. The cross-sections in Figure 13–Figure 15 present the geology of the coastal deposition across the project area. The base in the project area is defined by a flat-lying, sand- and gravel-dominated layer at ~3–10 m depth from the top surface and ~2 m below to ~2 m above current mean sea level — that is interpreted as equivalent to the ‘marine wave-cut platform’ from previous studies in this area (cf. Suggate, 1989; Lee, 1991a). Above this layer, the drilling campaign at Barrytown Farms defined a ~2–10 m thick continuous horizon of medium-grained, ilmenite-garnet-rich sand (green in Figure 13–Figure 15). This horizon of beach sand is interpreted as the shoreline deposits. The shoreline sand deposits are variably intercalated

with, 1–3 m thick inliers of silt (blue). The shoreline deposits are overlain by a thin layer of clay–silt (dark brown) and soil (light brown).

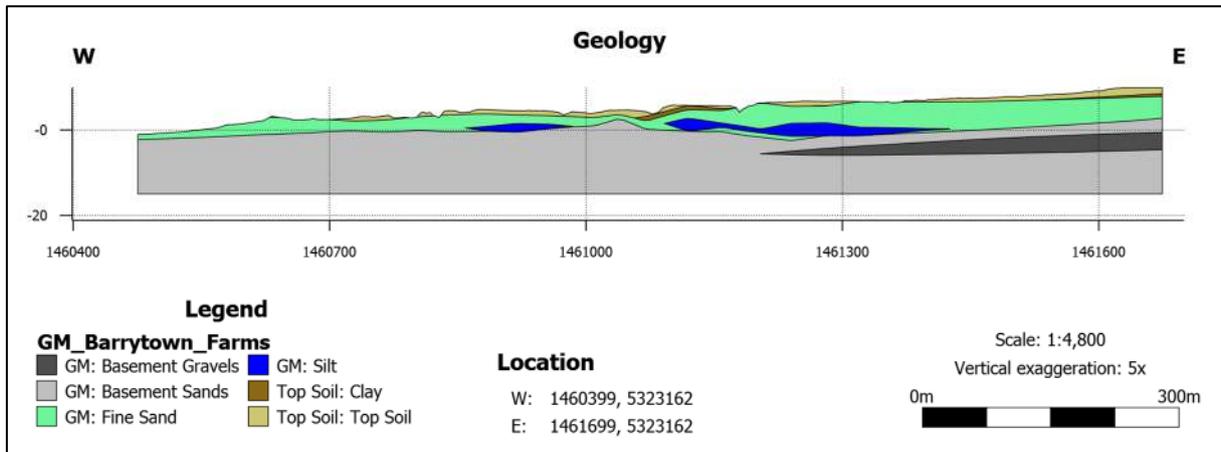


Figure 13: Cross-section of the southern part of the project, looking north along 5,323,162 N.

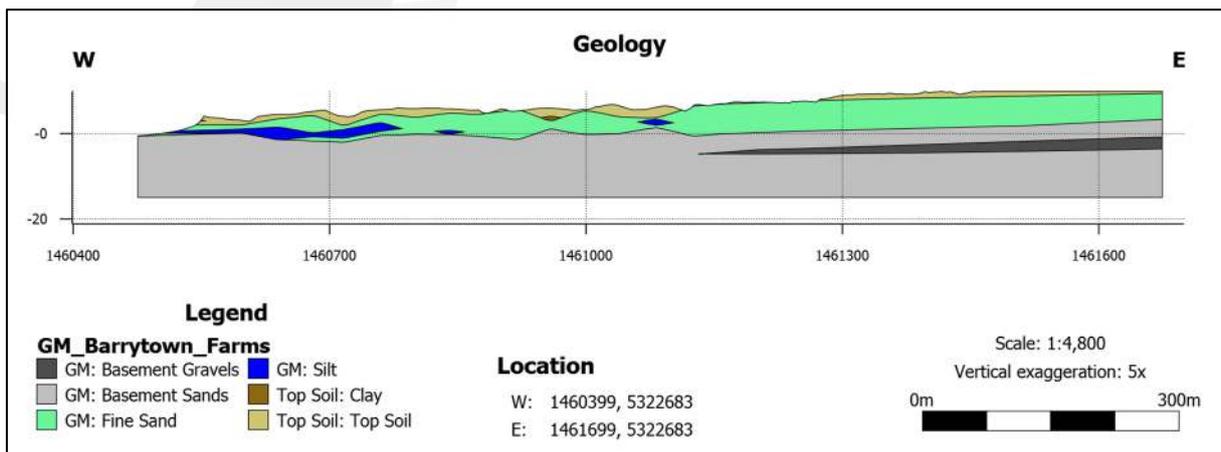


Figure 14: Cross-section of the southern part of the project, looking north along 5,322,683 N.

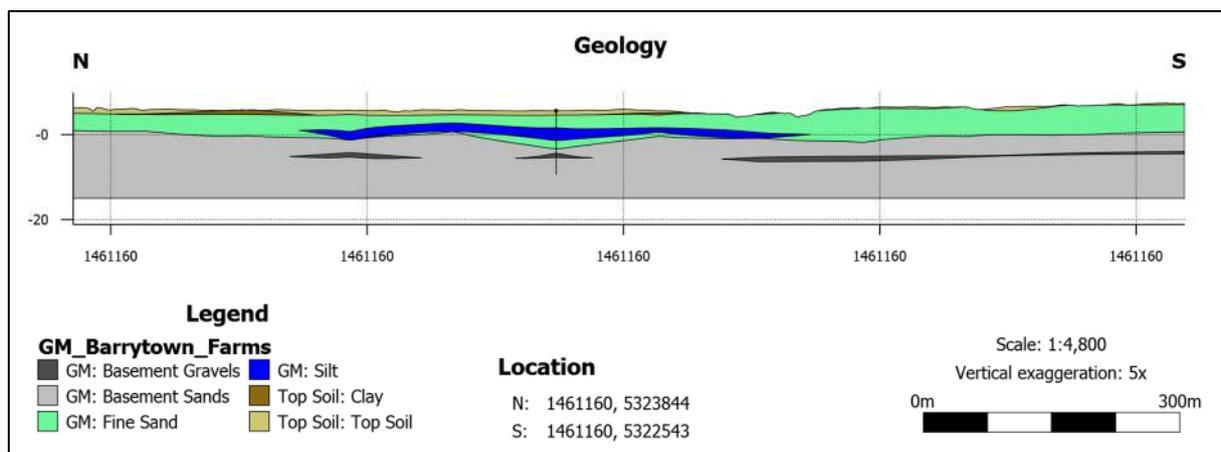


Figure 15: Long section, looking east along 1,461,160 E.

4.3.1 Controls on Mineralisation

Drilling has confirmed the presence of a broad, contiguous shoreline deposit (related to shoreline #3; cf. Suggate, 1988) within the Barrytown Farms Block. This shoreline deposit contains elevated abundances of ilmenite, garnet, zircon, Au, and associated HM deposited in a marine placer environment.

Several studies on the mechanics of deposition, distribution, and enrichment of HM sands deposits have been undertaken by Suggate (1989), Force (1991), Van Gosen et al. (2014), and Gallagher et al. (2016). They discuss that the key controls on HM distribution across the Barrytown Project area are:

- the supply of HM through physical weathering;
- the downstream persistence of the HM and their availability in the fluvial or marine environment; and
- a depositional sorting process to concentrate the HM.

The mineralisation process begins inland with the erosion of metamorphic and sedimentary rocks, which supplies sand, silt, clay, and HM to stream drainages. Streams and rivers carry the sediments to a coastal area, where they are deposited and redistributed in a variety of environments, such as deltas, the beach face (foreshore), the shoreface, barrier islands, dunes, and tidal lagoons (Van Gosen et al., 2014). Aeolian dunes, the foreshore, shoreface, and lagoonal environments have been identified as the most significant sites of heavy mineral sands deposition (Force, 1991). The upper part of the beach face, the foreshore (Figure 16), also referred to as the swash zone, is the principal zone of mineral separation (Force, 1991). Breaking waves carry a charge of turbulent sediment-laden water from the lower, submerged beach face onto the foreshore.

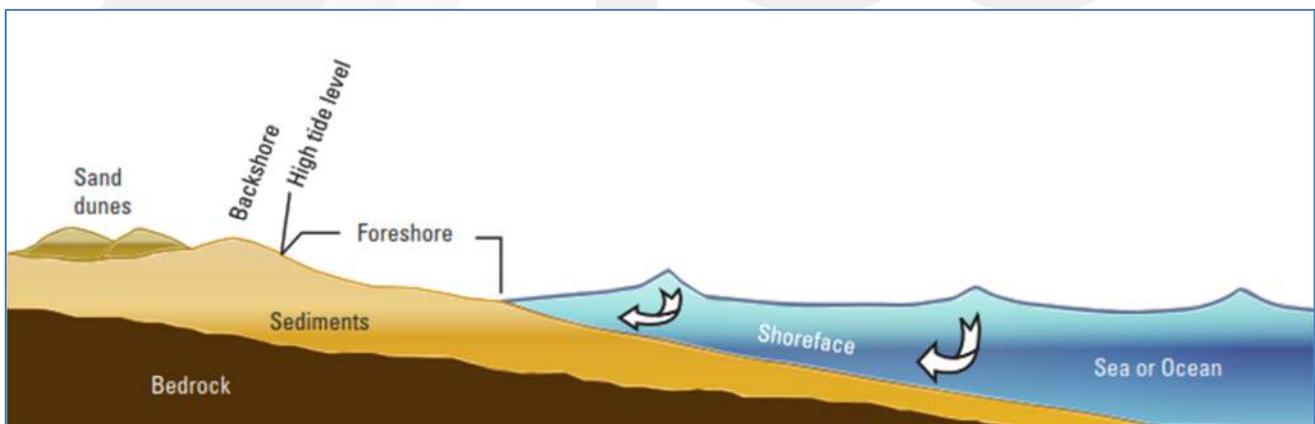


Figure 16: Idealised cross-section of a wave-dominated beach system (Van Gosen et al., 2014).

Grains with the highest settling velocities drop out first at the bottom of the foreshore, with settling velocity, a function of density and grain size. Coarser, light minerals are deposited with finer HM, resulting in a continuous spectrum of grain sizes for each mineral, with finer grains deposited toward the top of the foreshore. Subsequent backwash reworking of the grains results in 'lag enrichment' of HM in the upper portion of the foreshore (Force, 1991).

Traction flow in the lower part of the foreshore typically concentrates heavier elements into a thin, shallowly buried heavy mineral concentration occurring from backwash returning from the surf zone (Clifton, 1969). Typically, the zone of shore break reworking is about 10–40 cm deep (Gallagher et al., 2016) but thicker and more expansive layers of enrichment can

form due to episodic variations in the depth and extent of the shore-break zone. These variations are known to occur as climatic and tidal sea-level variations cause the shore break to move up and down the beachfront; this further controls the lateral extent of heavy mineral deposition (Figure 12).

The most effective mineral enrichment process occurs during storms or other periods of high wave energy where HM can be transported and preserved onto the upper foreshore and areas of aeolian dunes (Force, 1991). Storm periods are optimal for the storage of heavy mineral sands, as onshore winds transport sand from the beach and deposit it in aeolian landforms above the high tide (Force, 1991).

Heavy-mineral-bearing sands developed along, and behind, the present beachfront in sandy barriers transported by longshore drift and pushed up from the sea by wave action. These sandy barrier deposits have become stranded as the coastline prograded, allowing lagoonal deposits to accumulate in the swales along the eastern side of the barriers. This has had the effect of producing elongated zones of heavy mineral enrichment on the former beaches being surrounded by lower-grade finer sands and silty sediments in the swales.

Outcrops and excavations across the wider Barrytown Flats area, as demonstrated in Figure 17 and Figure 18, reveal a sequence of fine sand laminations of heavier and lighter minerals. Where strong storm concentrations occur, the dark heavy layers can coalesce with only minimal or no interbedded paler light mineral laminations, within the sediments deposited during that storm episode, and this can be observed in places along the high-grade eastern strandline. Finely laminated darker heavy mineral-rich layers are separated by paler quartz and feldspar light minerals laminations. The two pebbly layers represent periods of higher wave energy where the sand was largely scoured away leaving mainly pebbles. The photograph of Figure 17 was taken from a natural exposure on Barrytown Beach looking to the east with the dipping strata appearing as horizontal.



Figure 17: Wave-cut beach face demonstrating heavy mineral-rich layers.



Figure 18: View into Pit No 7 excavated at drillhole YC4400 (~8 km north of Barrytown Farms Block). The westerly (towards the coast) dip on the finely laminated strata is visible beneath the 0.2 m thickness of sandy soil.

4.4 Known Comparable Deposits

The West Coast of New Zealand hosts numerous heavy mineral-bearing shoreline placer deposits (Figure 19) that have been the subject of exploration by both government departments and private companies for decades. These deposits are known to contain a range of HM in variable concentrations, including ilmenite, garnet, magnetite, zircon, and rutile with trace amounts of Au, monazite, cassiterite, beryl, uranothorite, scheelite, and xenotime (Hutton, 1950; McPherson, 1978; Minehan, 1989; Ritchie et al., 2019).

In 2023, Westland Mineral Sands (WMS) brought the Nine Mile project into production to recover and concentrate ilmenite, for sale, on the international market.

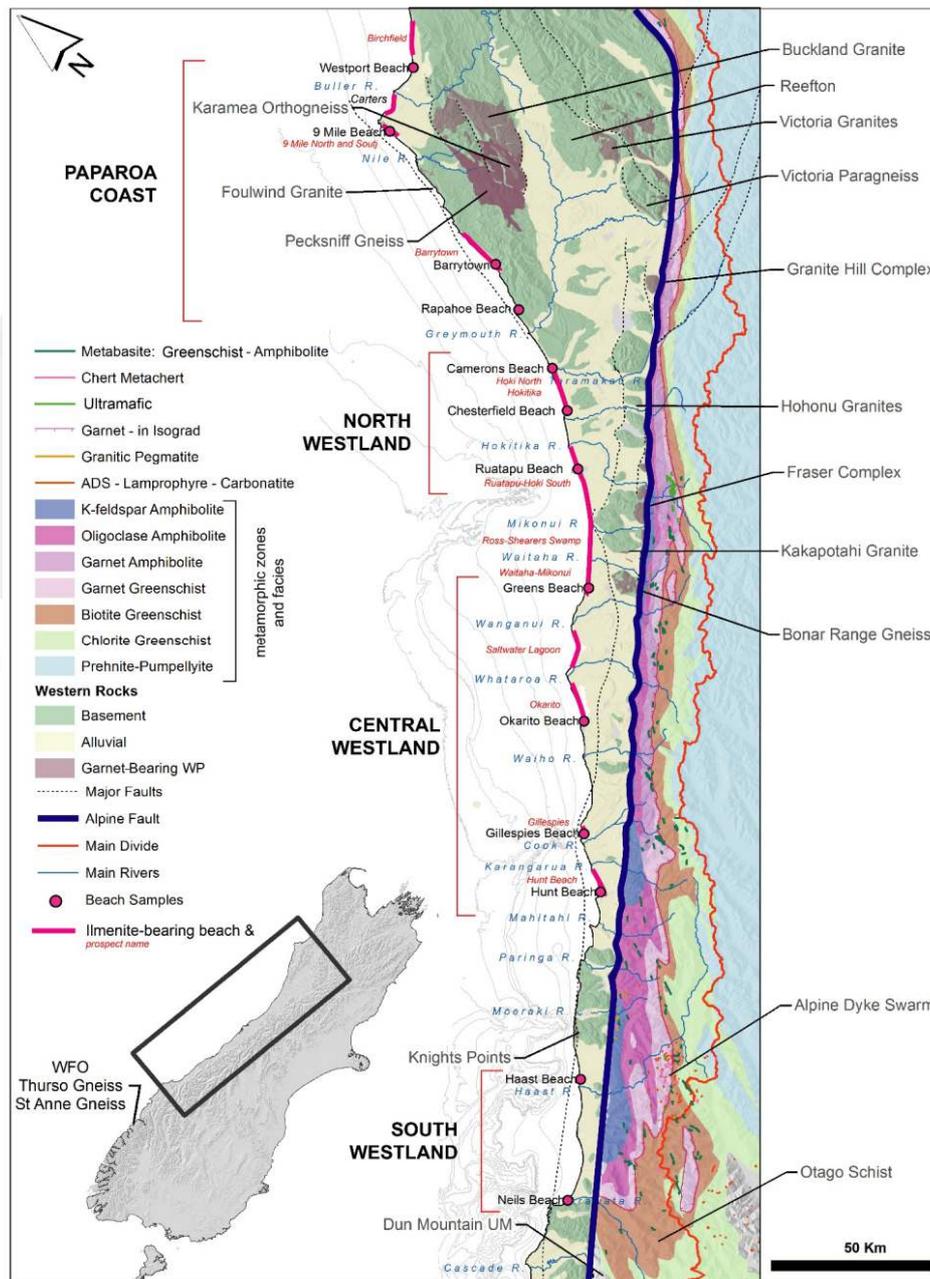


Figure 19: Geological map of Westland with heavy mineral sand prospect/deposit locations (from Ritchie et al., 2019).

Ritchie et al. (2019) assessed the heavy mineral content of samples from 13 West Coast beaches and concluded that:

- garnet is least abundant on the South Westland beaches, intermediate in abundance along the Paparoa Coast, and most abundant in Central and North Westland;
- magnetite and ilmenite abundances generally increase to the south; and
- REE HM abundance increases towards the north.

The mineralisation at Barrytown Flats bears the most similarities to other deposits along the Paparoa and North Westland Coast, including the producing mining operation at Nine Mile and the advanced garnet deposit at Ruatapu. Sands at Barrytown Flats and Nine Mile both contain a notable proportion of Otago Schist-derived garnet. In contrast to most other West Coast beaches, the garnet and ilmenite at Barrytown Flats and Nine Mile have similar, fine grain sizes and high circularity. The Nine Mile Beach deposit is held by Westland Mineral Sands Co which commenced full-scale production of a heavy mineral concentrate in January 2023. Westland Mineral Sands has reported that the North Nine Mile deposit contains over 2 Mt of heavy mineral concentrate.

Ruatapu and Barrytown Flats sands have similar garnet/ilmenite values of 2.0 and 1.7, respectively (Figure 21; Ritchie et al., 2019). The Ruatapu deposit, targeted mainly for its garnet content, was granted a government loan for its development in 2018; however, according to a public statement published in Stuff³, the development was cancelled by the permit holder due to changing global market conditions. The Ruatapu project (mineral mining permit MP60508) is now held by Westland Mineral Sands Co, which plans to develop the mine within the next 5–10 years⁴.

³ <https://www.stuff.co.nz/national/120249249/west-coast-garnet-mine-granted-10m-government-loan-scrapped>

⁴ <https://www.scoop.co.nz/stories/BU2301/S00023/critical-minerals-project-begins-full-scale-production-on-west-coast.htm>

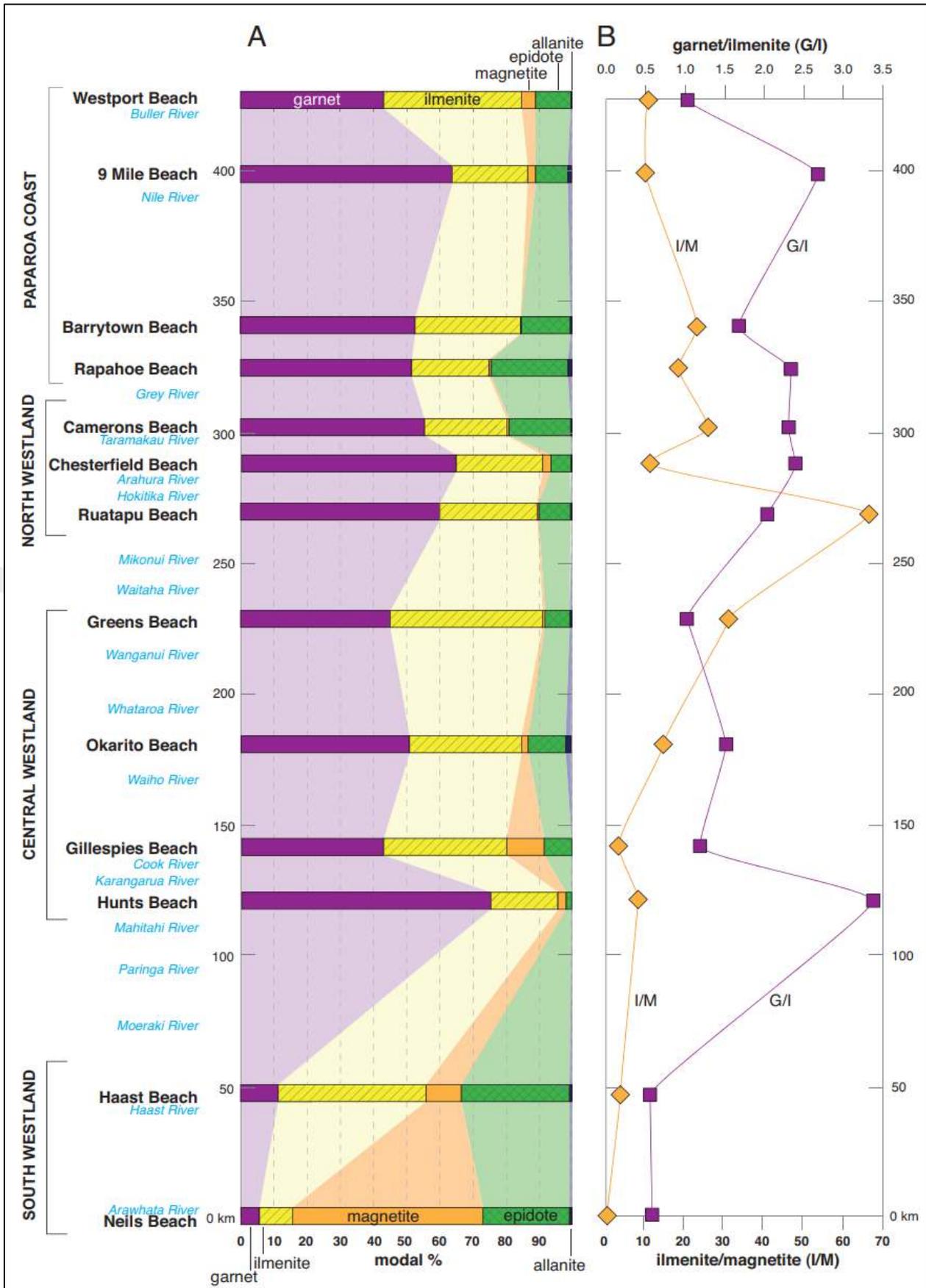


Figure 20: Summary of the lateral variation in modal abundances and ratios of garnet, ilmenite, magnetite, epidote and allanite (recalculated to 100%) along the Westland beaches (from Ritchie et al., 2019).

5 Exploration by TiGa

5.1 Drilling

In 2022, TiGa drilled 444 holes, across two landowner blocks within the Barrytown Project: Coates South and Barrytown Farms Blocks, respectively (Figure 21). Details of the Barrytown Farms Block and Coates South Block drilling are provided in sections 5.1.1 and 5.1.2.

5.1.1 Barrytown Farms Block

TiGa completed a programme of exploration drilling at Barrytown Farms Block, as part of exploration permit obligations for EP 51803 (now extension of land application MP 60785.03). RSC supervised the drilling which targeted shallow, heavy-mineral, placer mineralisation. A total of 1,988 metres were drilled in 176 holes from April–July 2022 (Table 10 and Figure 22). Holes were drilled on a grid with a line spacing of 120 m (N–S) and hole spacing of 20 m (E–W).

Alton Drilling conducted aircore drilling using an ADL multipurpose rig, mounted on an MST-600VD crawler, using a 3-inch hammer (~76 mm) and a 200-psi (400 cfm) compressor.

Aircore drilling was used to obtain 1-m samples, which were collected through a cyclone into plastic bags, packed into bulk bags, and sent to the sample preparation laboratory. All samples were dried and split using a rotary sample divider (RSD) to reduce sample size.

Data from these drillholes form the basis of the MRE presented in this report. In addition to resource definition drilling, five holes were drilled for water monitoring and six holes were drilled for Shelby Tube density sampling; however, the Shelby Tube density samples were not evaluated.

All holes were drilled vertically, approximately perpendicular to the sub-horizontal mineralised sands. All drillholes range in depth from 8–18 m, with an average depth of ~11 m. Five holes were drilled as dedicated water-monitoring holes, and were installed with piezometers for monitoring by Komanawa Solutions. No samples were collected from the water-monitoring holes.

Samples from the Barrytown Farms Block were logged and weighed on site.

Table 10: Summary of drilling at Barrytown Farms Block.

Drill Type	Barrytown Farms Block	
	No. Holes	Metres (m)
Aircore: Resource Definition	176	1,910
Aircore: Water Monitoring	5	55
Shelby Tube Density Drilling	6	23
Total	187	1,988

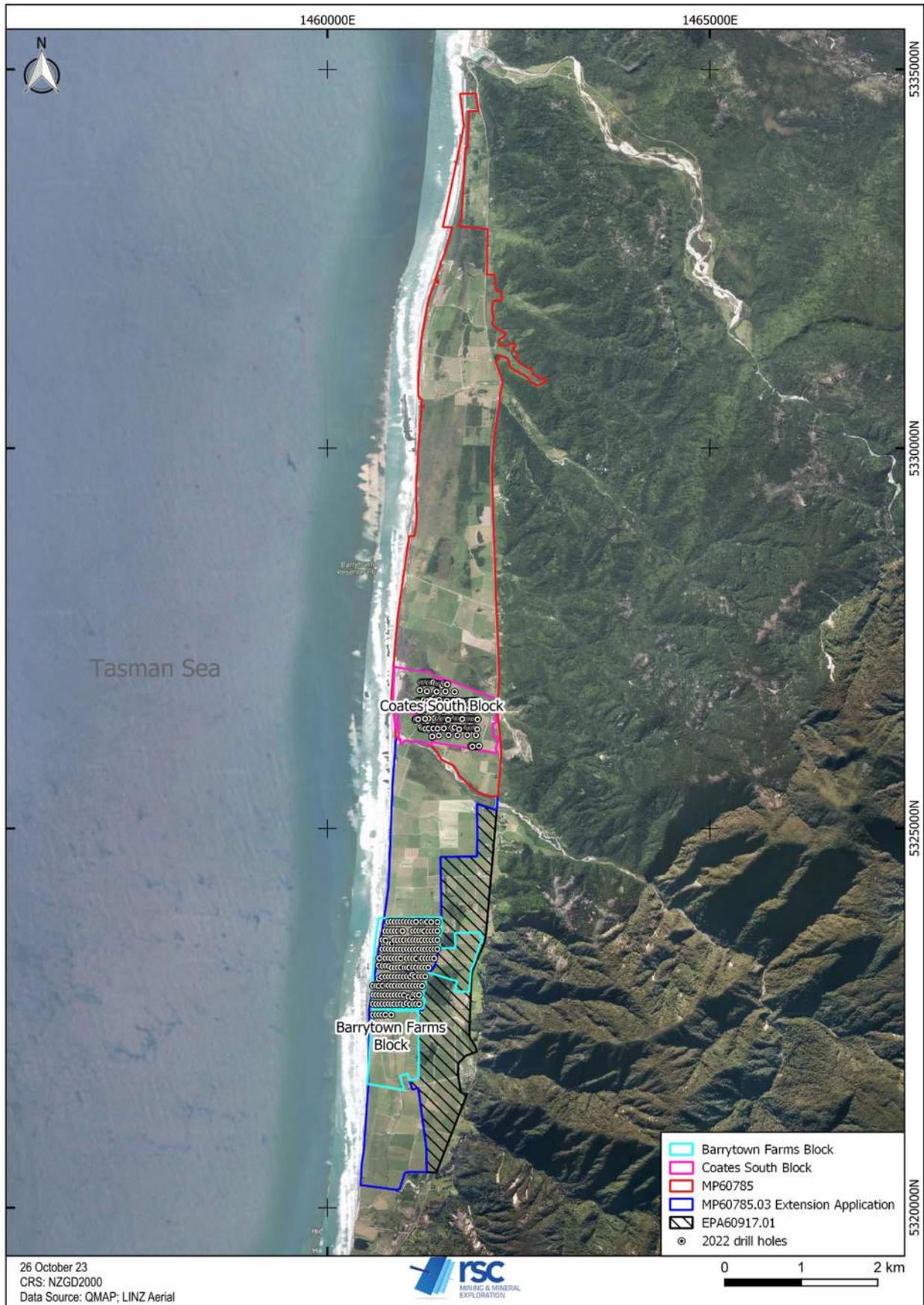


Figure 21: Overview map of the 2022 drilling programme at Barrytown Farms Block (within MP 60785.03) and Coates South Block (within MP 60785).

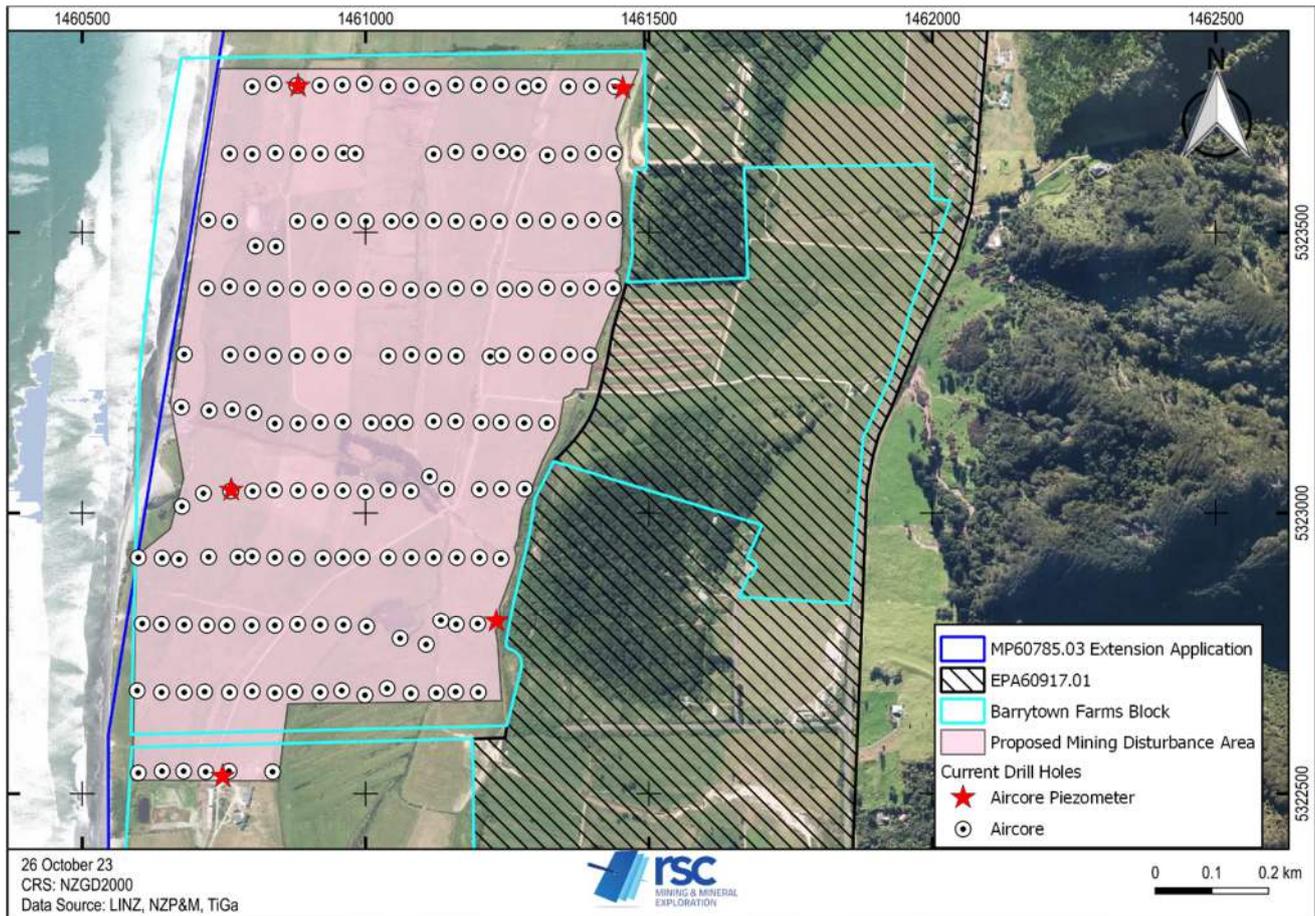


Figure 22: Distribution of 2022 drilling at Barrytown Farms Block.

5.1.2 Coates South

A total of 261 holes were drilled on the Coates South Block, from April–July 2022, for a total of 3,118 m (Table 11). The drilling programme comprised both exploration and hydrological drilling which was designed to infill the historical drill grid and, in general, followed a grid on a line spacing of 120 m in the north–south direction, and a hole spacing of 20 m in the east–west direction (Figure 22). Some holes were repositioned to allow for rig access in bogged areas. All holes were drilled vertically, approximately perpendicular to the sub-horizontal mineralisation.

No data from the Coates South Block were used in the resource estimate reported in this report. Details of the Coates South drilling programme are therefore not discussed further in this report, but can be found in Roux et al.(2023).

Table 11: Summary of 2022 drilling on Coates South Block.

Drill Type	Coates South Block	
	No. Holes	Metres (m)
Aircore: Resource Definition	192	2,408
Aircore: Twin	8	106
Aircore: Redrills	37	260
Sonic: Twin	4	51
Resource Definition Total	241	2,825
Aircore: Water Monitoring	20	293
Total	261	3,118

5.2 Geophysics

In 2016, TiGa (then Barrytown JV Ltd) commissioned Southern Geoscience Consultants (SGC) to reprocess and interpret the airborne geophysical (magnetic and radiometric) data obtained in 2008, by NZ Gold Ltd, for heavy mineral sands (HMS) targets. The data cover the entire Barrytown Flats deposit. The original data processing in 2008 was also completed by SGC, but it was used to establish Au targets.

The magnetic data were processed to enhance shallow magnetic features associated with HMS strandline targets. Radiometric data identified zones of elevated Th response from heavy minerals at, or very close to, surface. The processed magnetic/radiometric data, topographic cadastral GIS files and satellite imagery, were used to generate a 1:20,000-scale interpretation focussed on HM sands (HMS) targets.

The interpretations were primarily based on the delineation of strandline HMS targets, using magnetic images and profiles and supported by radiometric and satellite imagery. Approximately 140 magnetic strandlines and 35 associated Th anomalies were identified over the entire deposit (Wallace and Peters, 2016). Strong radiometric Th and U anomalies were identified within the Barrytown Farms Block, as well as weakly magnetic strandline targets.

The 2022 drilling and MRE completed for this report confirm the presence of a contiguous shoreline deposit with elevated concentrations of HM. In addition, there is evidence of second-order strandlines running in a southwest direction (Figure 23), as suggested by both magnetic interpretation and variogram continuity analyses outlined in section 8.4.

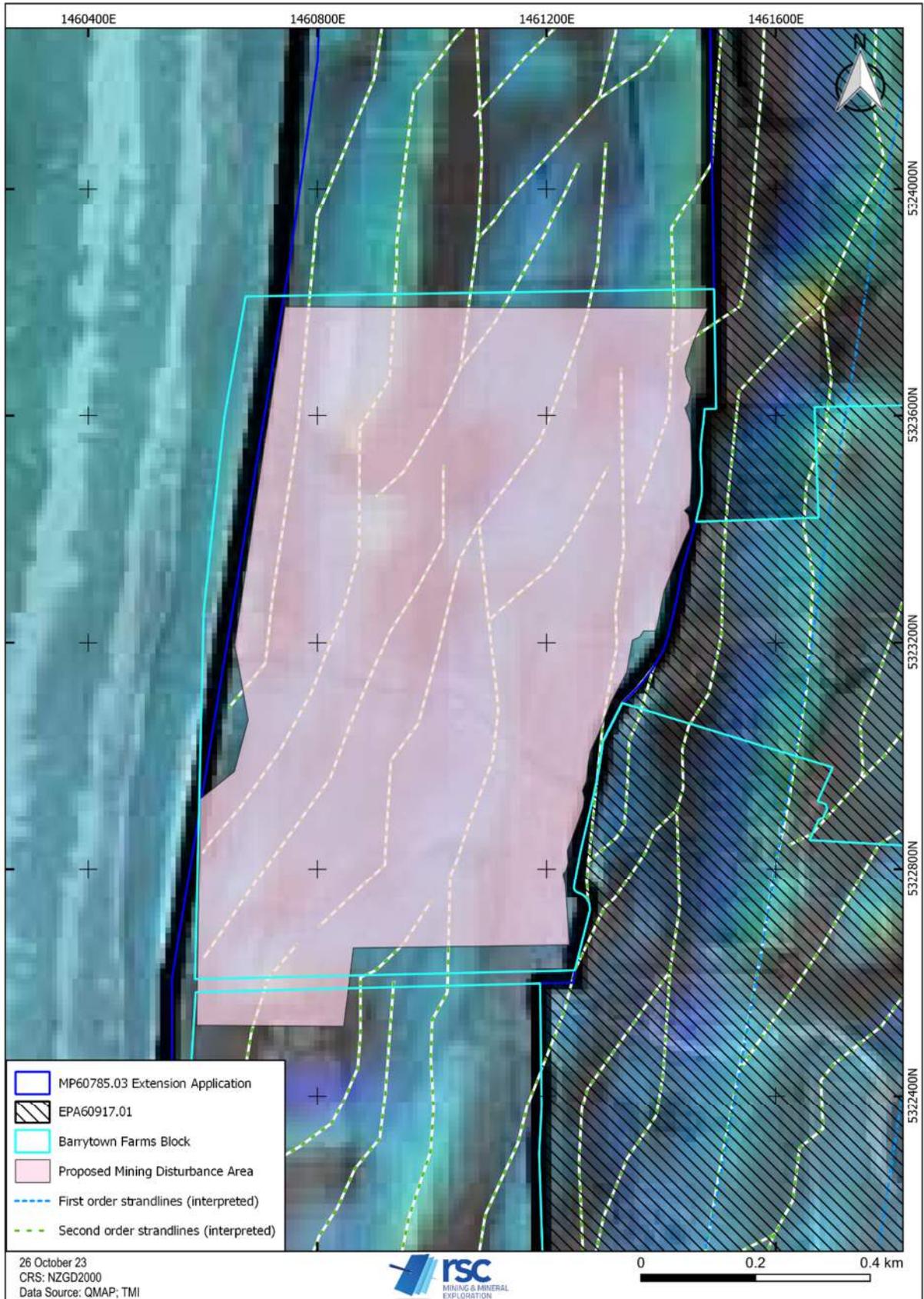


Figure 23: Interpretation of strandlines across Barrytown Farms Block from geophysical data (Vidanovich, 2008).

5.3 Petrography & Metallurgy

5.3.1 Metallurgy & Bulk Sampling

In 2017, TiGa (then Barrytown JV Ltd/Alloy Resources) completed metallurgical test work on 14 composite bulk samples collected from the 2016/2017 drillholes, north of the Barrytown Farms Block (RSC, 2017).

Samples were analysed by Shandong Huate Magnet Technology Co Ltd (HUATE) and Allied Mineral Laboratories (AML). AML established a process flowsheet, incorporating stages of screening, gravity, electrostatic and magnetic separation. The AML work demonstrated that ilmenite and garnet products could be produced through a simple processing circuit using electrostatic and magnet separators. Garnet products were described as visually similar but with varying yields across the composited samples.

IHC Robbins is currently completing a metallurgical test work programme, focussing on process development, to produce an ilmenite product, a garnet product and a non-magnetic (zircon-bearing) concentrate from material derived from the Barrytown Project. London (2023) reports that the process developed for the mineral separation and recovery is well advanced and is providing typical results for material of this nature. Test work and analyses are ongoing at the effective date of this report.

5.4 Mineral Composition

Mineral inclusion data provide important information for product specification. Product specification is an important principle in the estimation of industrial minerals and must be addressed by the Competent Person under clause 49 of the JORC Code (2012). This means that, in addition to determining the abundances of HM (i.e. the 'products'), an assessment of any impurities and any other deleterious compositional qualities of these products must be made.

5.4.1 Garnet

Quantitative Energy Dispersive Spectroscopy (EDS) analyses were undertaken on a representative selection of 120 garnet grains from the Coates South Block area 3 km to the north of the Barrytown Farms Block. RSC has no reason to believe that there will be any significant difference between the garnet at Coates South Block and Barrytown Farms Block because Coates South Block is in effect a depositionally along-strike equivalent of Barrytown Farms Block. The EDS analyses demonstrate that the chemistry of the garnets from Coates South Block fall within the expected range previously published in literature (e.g. Ritchie et al., 2019; Figure 24). The garnet population is dominated by almandine, along with a more spessartine-like composition, and a population intermediate between the two (Table 12). The garnet grains are largely free of mineral inclusions.

The median grain size for garnet, as observed by SEM automated mineralogy, is ~100 µm. Figure 25 presents particle size distributions for each of the samples analysed by SEM, with the mean of 58 samples indicated in black.

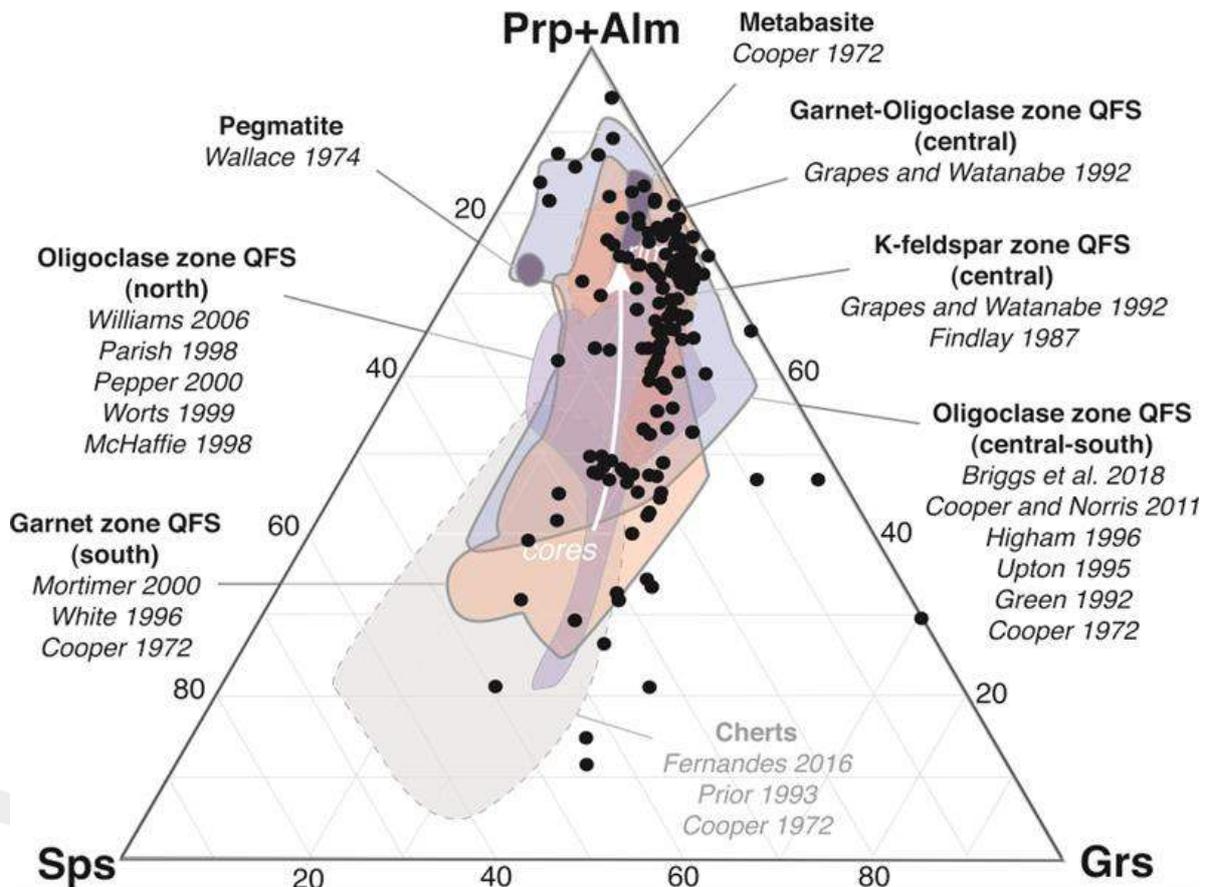


Figure 24: Garnet compositions from Barrytown samples (black circles) plotted over garnet compositions in the literature (e.g. Ritchie et al., 2019).

Table 12: Average compositions, by an average of measurements, on twelve grains of almandine, spessartine and intermediate compositions.

	MgO (wt%)	Al ₂ O ₃ (wt%)	SiO ₂ (wt%)	CaO (wt%)	TiO ₂ (wt%)	MnO (wt%)	FeO (wt%)	Total (wt%)
Almandine	1.81	22.41	29.17	8.48	0.12	1.56	36.02	99.57
Spessartine	0.74	22.00	28.74	11.36	0.32	12.28	23.84	99.28
Intermediate	1.11	22.11	28.81	10.73	0.17	6.37	29.74	99.03

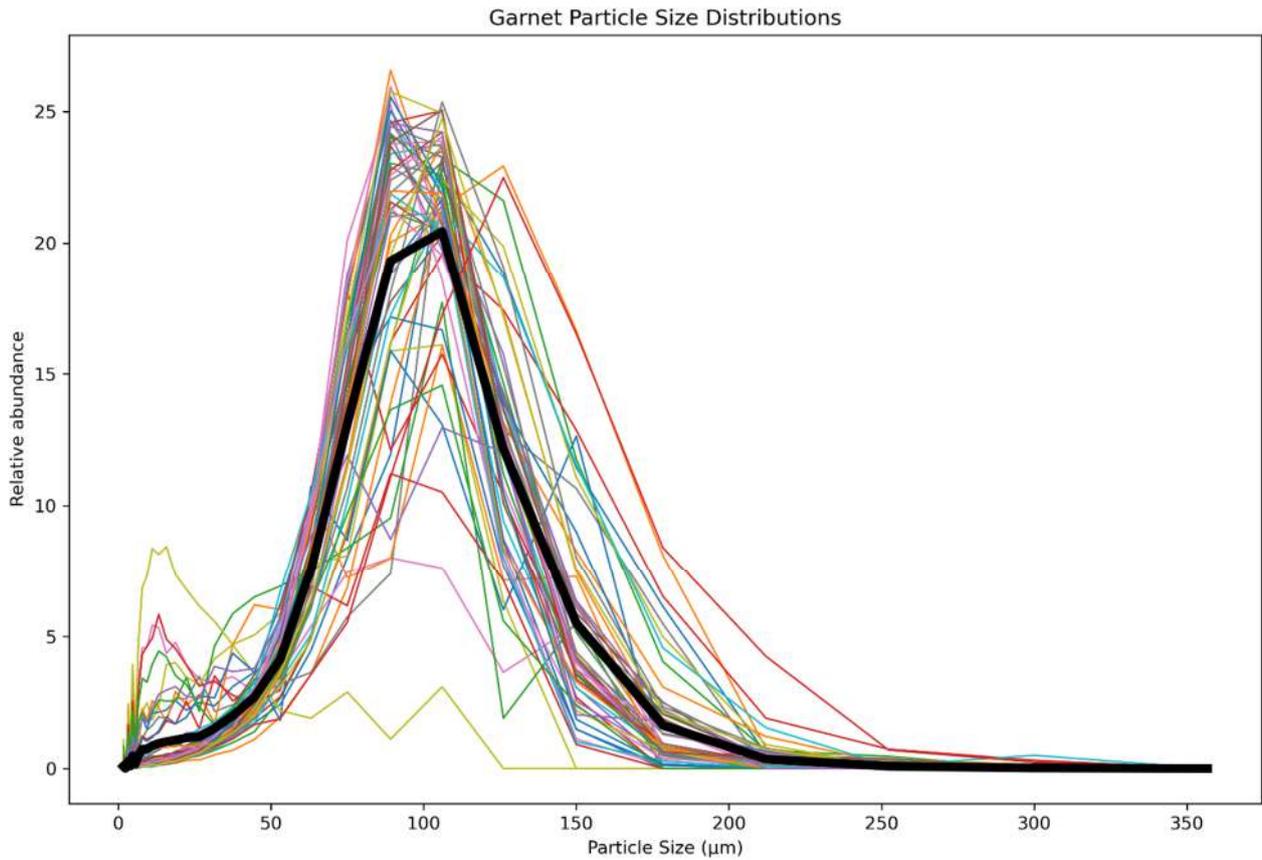


Figure 25: Particle size distributions of garnet grains from SEM analysis. The mean of the measured samples is indicated by the bold black line.

5.4.2 Ilmenite

Ilmenite grains from the Barrytown Flats area contain multiple large inclusions of other minerals; an example of the inclusions within ilmenite, as mapped by SEM, is presented in Figure 26. The median grain size for ilmenite, as measured by SEM automated mineralogy, is ~75 µm. Figure 27 presents particle size distributions for each of the SEM samples, with the mean of the 58 samples indicated in black.

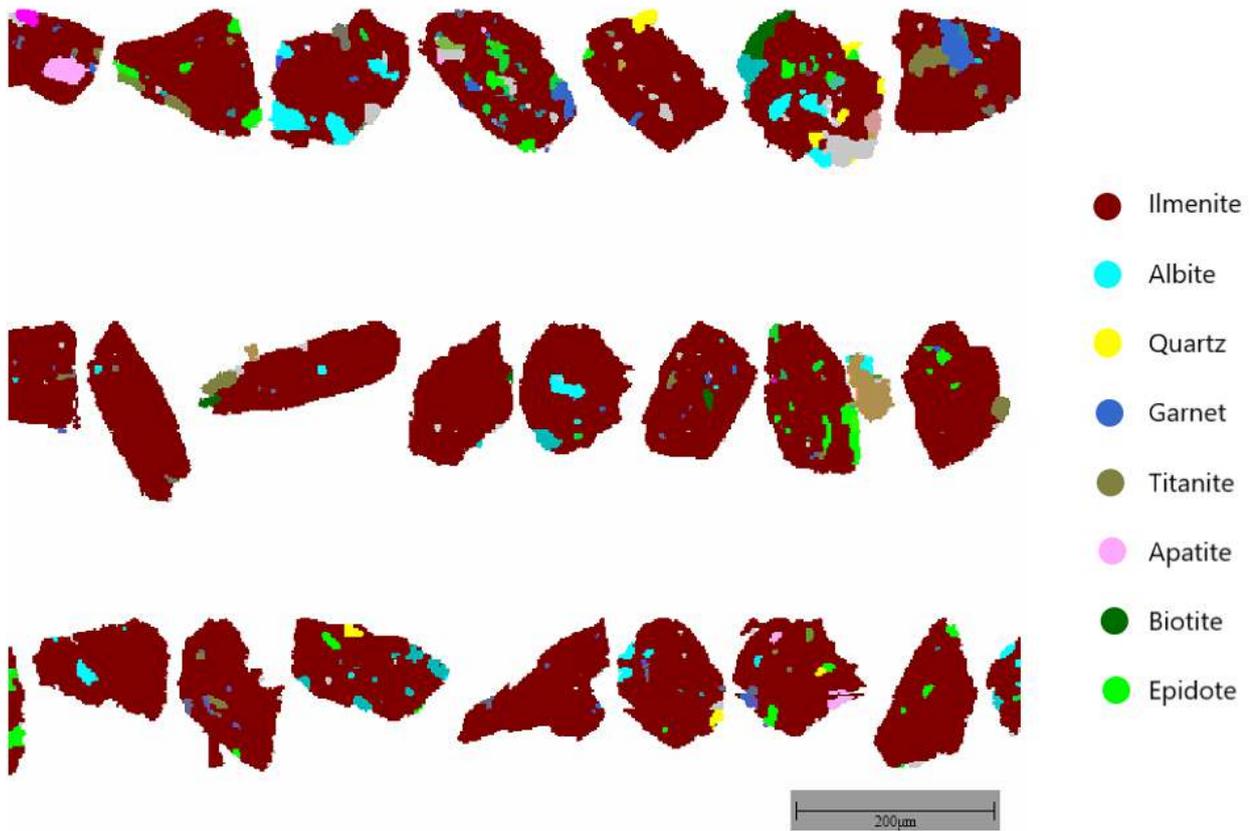


Figure 26: Example image of inclusions within ilmenite as observed by SEM automated mineralogy. These grains are from sample 202910, and are typical of the size, abundance and diversity of mineral inclusions seen across the entire Barrytown Flats.

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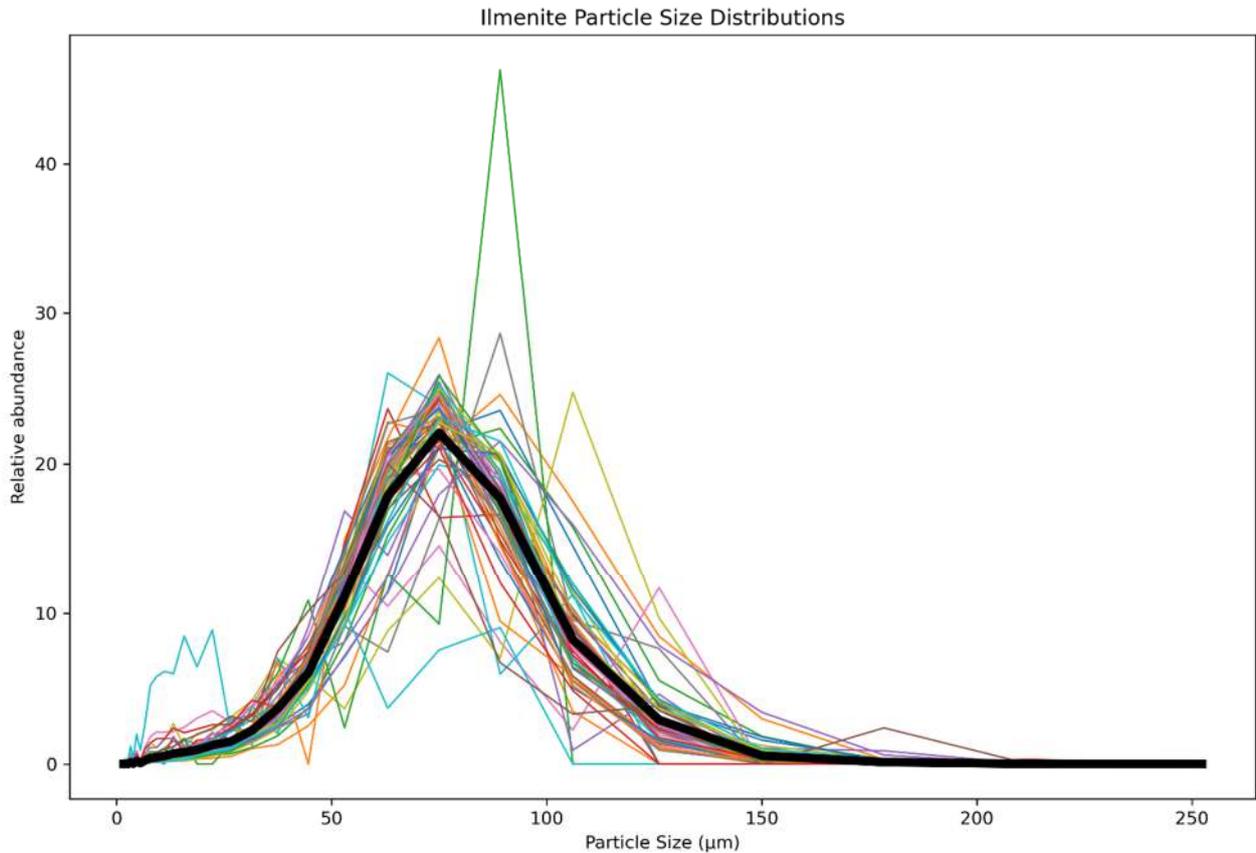


Figure 27: Particle size distributions of ilmenite grains from SEM analysis. The mean of measured samples is indicated by the bold black line.

5.4.3 Zircon

Zircon grains in the Barrytown Flats deposit contain only a few (if any) inclusions of other minerals. The median grain size for zircon, as measured by SEM automated mineralogy is ~75 µm.

5.5 **Surveying, Topography, & DTM**

LiDAR data for the project were collected in 2020 and 2021. The LiDAR survey was flown by Aerial Surveys Ltd. Aerial Surveys provided TiGa the associated 1-m-resolution digital elevation model (DEM) in NZTM2000 horizontal and NZVD2016 vertical datums, with accuracy specifications of ± 1.0 m (95%) horizontal and ± 0.2 m (95%) vertical. This DEM was used in the geological and estimation domain modelling described in section 8.

6 Sample Collection, Preparation & Analysis

6.1 Drilling

The 2022 drilling programme comprised of aircore drilling for resource definition and hydrological purposes. All drillhole collar locations were surveyed in place, in advance of drilling, by Mike Robbins of Davis Ogilvy & Partners Ltd using a Trimble RTK GNSS with R10 rover and base units. To establish local control, two survey reference marks were used: LINZ geodetic code EV77 (OITI DP3017) for the Coates South Block and ADQ1 (Barrytown) for the Barrytown Farms Block. As a check, all collars were also resurveyed at the end of the programme by RSC using handheld Garmin GPS Map60.

All aircore drilling was undertaken by Alton Drilling, using an ADL Manufactured Multipurpose Rig mounted on an MST-600VD crawler, using a 3-inch hammer (~76 mm) and a 200 psi (400 cfm) compressor (Figure 28). The primary aircore samples were collected at 1-m intervals from the cyclone into labelled plastic bags by drill assistants.



Figure 28: Aircore drilling on Coates South Block.

Due to the vertical and shallow (<19 m) nature of the drillholes, no downhole surveys were conducted.

All primary samples were weighed in the field, by field assistants, using spring scales. RSC geologists then logged each sample using a logging board for visual representation, and a small portion was placed into chip trays. Groups of ~40–60 samples were packed into large polyweave bulk bags prior to transportation to the sample preparation facility at NZIMMR.

6.2 Sample Preparation

RSC developed a laboratory sample preparation process prior to the 2022 drilling programme, and it was adapted during the drilling programme, following consultation with TiGa, Palaris, IHC Robbins, and NZIMMR. The adaptations were made to improve sample processing times and minimise transportation costs due to sample weights (Roux et al., 2023). These adaptations affected the Coates South samples but not the Barrytown Farms Block samples. The flow chart presented in Figure 29 and Figure 30 illustrates the sample preparation procedure used for the Barrytown Farms Block samples. The Competent Person considers the sample sizes appropriate for the grain size of the material sampled.

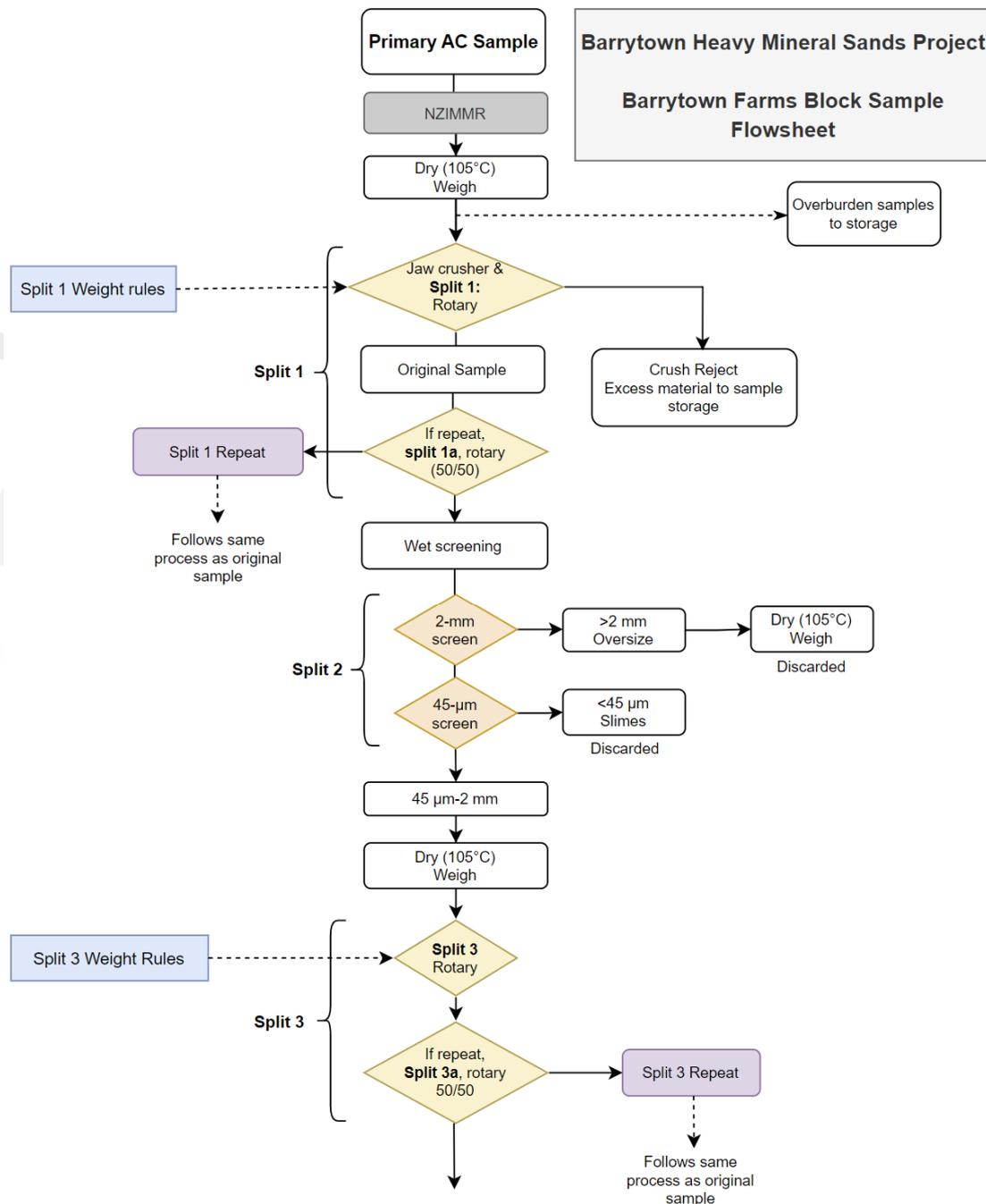


Figure 29: 2022 TiGa drill sample processing flow chart (continues in Figure 30).

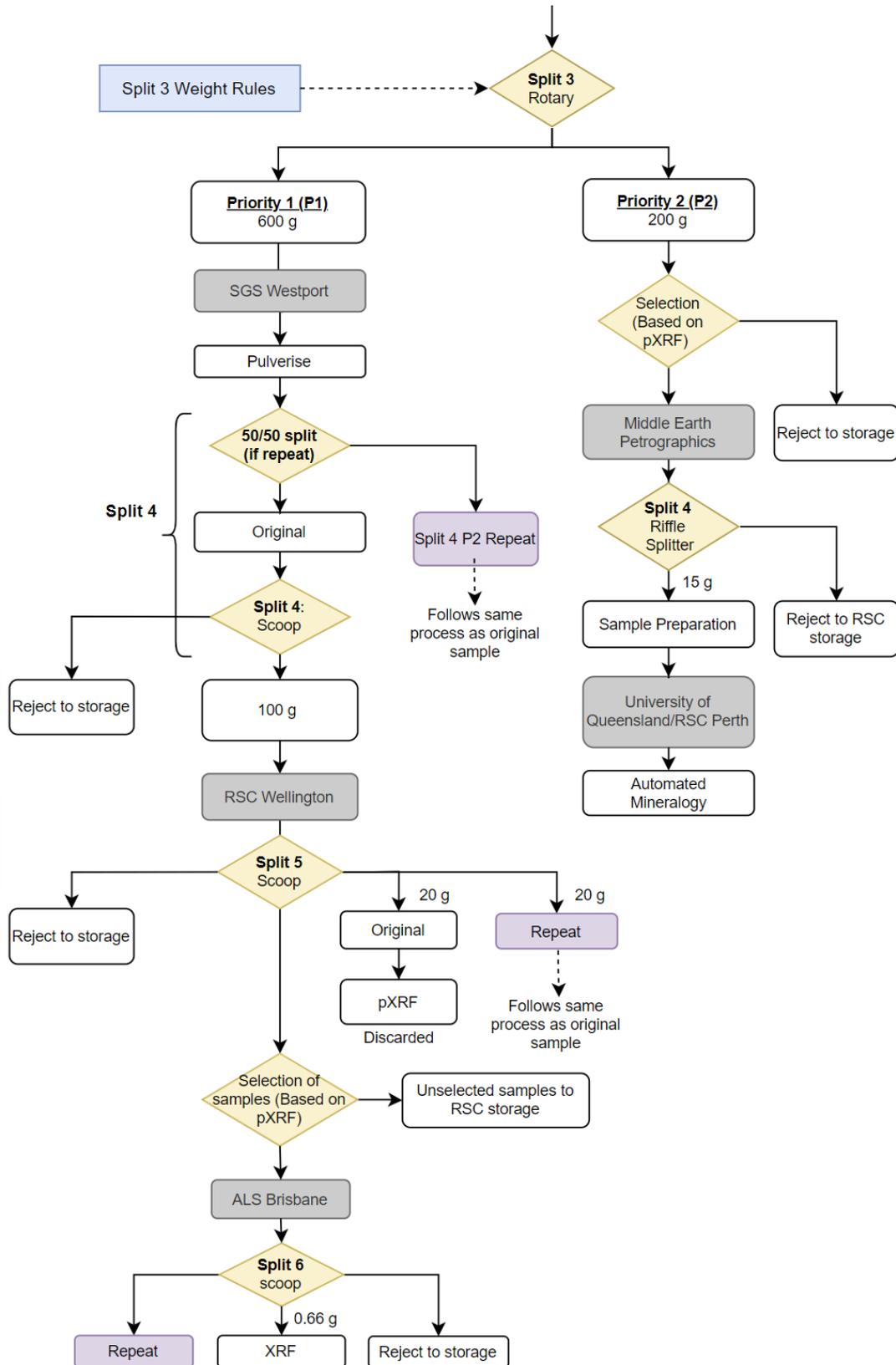


Figure 30: 2022 TiGa drill sample processing flow chart (continues from Figure 29).

NZIMMR processed samples in order of field batch number, according to the sample preparation flowsheet and associated splitting and weight guidance.

Prior to wet screening, the primary samples were dried to obtain a dry sample weight of the entire sample. This eliminated the need to dry the slimes' fraction. As a result of the drying, many samples solidified and required deagglomerating using a jaw crusher. Samples were therefore crushed and split (Split 1) in a Rocklabs Boyd Elite jaw crusher and rotary sample divider (RSD) combo (Figure 31). Fluctuating sample recoveries, in combination with variable water content, caused high variability in sample weights (0–30 kg). NZIMMR developed weight guidance rules to achieve targeted split weights (Table 13).

Split 1 repeat samples were collected approximately once every 20 regular samples. In the case of repeat samples, the first-split stage consisted of two separate steps. First, the primary sample was passed through the crusher-RSD combo to create a sub-sample, with a weight approximately twice that of a regular sample (~8 kg, Split step 1). Next, this sub-sample was passed through the crusher-RSD combo, again, to create two sub-samples with equal weights (~4 kg each, Split step 1a).



Figure 31: The RockLabs crusher-splitter at NZIMMR.

Table 13: NZIMMR Split 1 weight rules for regular and repeat samples.

Regular Sample		
Dry Weight	% Split to Sample	% Split to Reject
<3.75 kg	100	0
>3.751–<5.0 kg	80	20
>5.01–7.5 kg	60	40
>7.51–15.0 kg	40	60
>15.01 kg	20	80
If Repeat Required		
Dry Weight	% Split to Sample	% Split to Reject
<7.5 kg	100	0
>7.51–10 kg	80	20
>10.01–15 kg	60	40
15.01–30 kg	40	60

After Split 1, the samples were wet-screened (Split 2) using a 2-mm screen, followed by a 45- μ m screen. The >2-mm (oversize/coarse) fraction was dried, weighed and discarded. The 45- μ m to 2-mm (silt/sand) fraction was dried at 105°C and weighed and retained; the <45- μ m (slimes) fraction was discarded with the wastewater. The slimes' weights were determined by subtracting the weights of the dried reject, and the weights of the dried 45 μ m to 2 mm, and >2-mm fractions from the dry weight of the primary sample.

The dried 45- μ m to 2-mm (silt/sand) fraction was split (Split 3) into equal splits, with a Rocklabs RSD, producing two sub-samples.

- Priority 1 (P1) samples were sent to SGS Westport for pulverisation to 85% passing -75 μ m, and then split (P1 fourth split) using a scoop to create a 100-g sub-sample. The sub-sample was sent to RSC Wellington for pXRF analysis, where 20 g was extracted using a spoon (P1 fifth split, 'many increments' approach) and poured into a 40-mm sample cup, with one end covered by 4- μ m polypropylene film. Based on the pXRF results, additional samples (~3 tablespoons) were scooped from the pulp at RSC and sent to ALS Brisbane, where a 0.66-g aliquot was scooped (P1 sixth split) for XRF analysis.
- Priority 2 (P2) samples were sent to Middle Earth Petrographics, split (15 g) using a Humboldt micro riffle splitter (P2 fourth split), and set in a 25-mm epoxy round. The hardened epoxy was cut in half, remounted in a 30-mm epoxy round, to expose the two cut faces, and polished with water-soluble, polycrystalline diamond suspension (from 3 μ m down to 1 μ m). The polished surface was coated with a conductive carbon film before SEM analysis.

NZIMMR developed a set of splitting rules for Split 3, to prioritise sample preparation where samples were under weight (Table 14). Split 3 repeat samples were collected approximately once every 20 regular samples, but only from samples with a silt/sand fraction weighing >2 kg. In the case of repeat samples, the third-split stage consisted of two separate steps. First, the sand/silt fraction sample was passed through the crusher-RSD combo to create two sub-samples with equal weights (Split step 3). Next, each sub-sample was passed through the crusher-RSD combo, again, to create the P1 and P2 sub-samples (Split step 3a). The P2 samples were prepared for SEM analysis by the methods outlined in section 6.3.3.

Table 14: NZIMMR Split 3 weight and prioritisation rules for samples for which no repeat sample was collected.

Sample Weight	Tray 1	Tray 2	Reject %
<0.350	P1 only		0
>0.35–<1.0 kg	Small tray to P2, rest to P1		0
>1.01–<1.5 kg	P1	P2	0
1.501–2.0 kg	P1	P2	25
2.001–4.0 kg	P1	P2	50

6.3 Analysis

6.3.1 Portable X-Ray Fluorescence

RSC analysed a total of 1,988 samples from the Barrytown Farms Block, by pXRF, to produce a multi-element geochemical dataset. All pXRF samples were derived from a pulverised split of the P1 split, of the 45- μ m to 2-mm screened fraction (see section 6.2). The samples were analysed with an Olympus Vanta VMR instrument, with a 4-W, 50-kV rhodium anode and a large-area silicon-drift detector. The instrument was operated using a field test stand and a laptop with the Vanta PC Software (software version 3.40.76). RSC's approach followed industry best practice as outlined in Fisher et al. (2014) and Gazley and Fisher (2014).

To prepare the sample for analysis, about 20 g of sample material was collected from the plastic sample bag using a spoon and poured into a 40-mm sample cup, with one end covered by 4- μ m polypropylene film. The sample cup was put in the test stand and analysed using 3-beam Geochem mode. A beam — also referred to as a filter — is a combination of voltage and amperage that allows different elements to be detected. Analytical times were set to 15 s for each beam. To ensure the quality of the pXRF data, standard operating procedures were strictly adhered to, which included a solid quality control framework.

The pXRF data were corrected using calibration plots derived from seven certified reference materials (CRMs) inserted and analysed for each analytical session. The calibration plots are based on the expected values of the CRM plotted against the measured values of the CRM samples (Fisher et al., 2014). The gradient of the linear fit between the expected and the measured values defines the correction factor used to correct the elemental data (Figure 32).

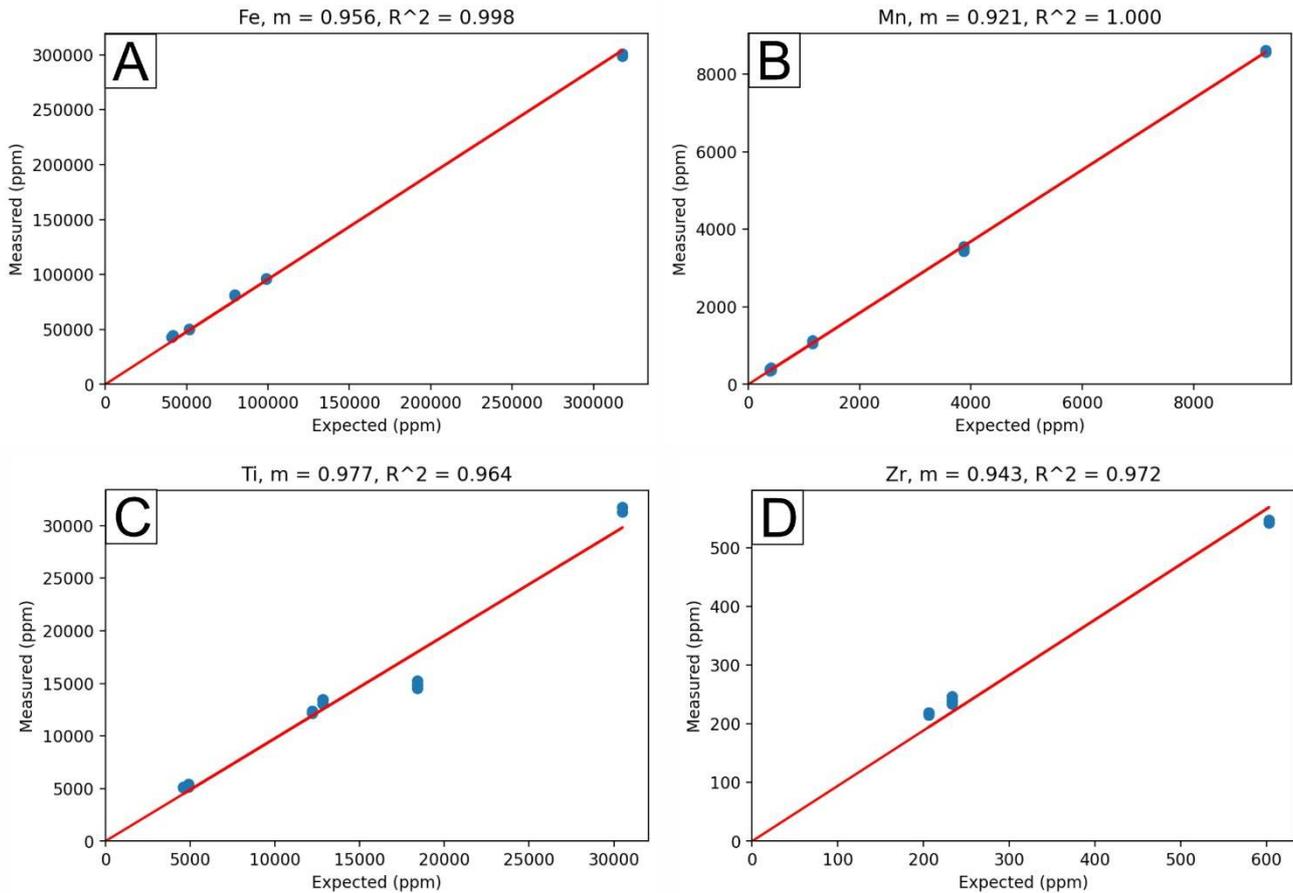


Figure 32: Example of calibration plots to correct geochemical data collected August 2023 for: A) Fe; B) Mn; C) Ti; and D) Zr.

6.3.2 Laboratory XRF

A total of 60 samples were selected from pXRF data and sent for laboratory XRF analysis at ALS Geochemistry, Brisbane. The samples were selected to cover the full range of variability of the geochemistry dataset. This means that the validation sample set includes samples with close to the highest and lowest measurements, as well as a range of intermediate measurements, in every element used in the mineral abundance models. Three tablespoons of material were scooped from each sample and poured into paper bags labelled with the sample ID. The sub-samples were analysed for whole-rock geochemistry using ME-XRF21u + ME-GRA05, with 24 analytes (plus total and LOI) as presented in Table 15. For laboratory XRF, a 0.66-g sample was scooped from the bag, fused with a Li-borate flux (including Li-nitrate) and poured into a platinum mould creating a disk. The disk was then analysed by X-ray spectrometry, directly by the instrument; a summary of analytes and reporting ranges is provided in Table 15. Lithium-borate fusion and XRF finish is the standard industry method for the analysis of oxide iron (Fe) ores. Loss-on-ignition was calculated from thermogravimetric analysis using a thermogravimetric analysis furnace. These laboratory XRF analyses also provided a quality check on the pXRF data (sections 6.3 and 7.3.4.5.3); the latter forms a key input to the MRE, via a linear regression model to convert pXRF chemistry to mineralogy.

Table 15: ALS Brisbane detection limits for XRF analysis.

Method Code	Analyte		Unit		Lower Limit	Upper Limit					
ME-GRA05	LOI		%		0.01	100					
ME-XRF21u Analytes and Reporting Ranges											
Analyte	Units	Lower Limit	Upper Limit	Analyte	Units	Lower Limit	Upper Limit	Analyte	Units	Lower Limit	Upper Limit
Al ₂ O ₃	%	0.01	100	As	%	0.001	1.5	Ba	%	0.001	10
CaO	%	0.01	40	Cl	%	0.001	6	Co	%	0.001	5
Cr ₂ O ₃	%	0.001	10	Cu	%	0.001	1.5	Fe	%	0.01	74.8
K ₂ O	%	0.001	6.3	MgO	%	0.01	40	Mn	%	0.001	25
Na ₂ O	%	0.005	8	Ni	%	0.001	8	P	%	0.001	10
Pb	%	0.001	2	S	%	0.001	5	SiO ₂	%	0.01	100
Sn	%	0.001	1.5	Sr	%	0.001	1.5	TiO ₂	%	0.01	30
Total	%	0.01	110	V	%	0.001	5	Zn	%	0.001	1.5
Zr	%	0.001	1								

6.3.3 SEM-Based Automated Mineralogy

The MRE presented in this report is based on the abundance of several minerals (ilmenite, garnet, and zircon), collectively labelled 'VHM', and collectively called 'the product' from a JORC Code (2012) reporting perspective (see comments in section 5.4). SEM-based automated mineralogy data were used to train linear regression models to derive quantitative mineralogy (abundances of ilmenite, garnet and zircon), from geochemical data, analysed by pXRF for each sample.

The geochemical data derived from pXRF, in combination with quantitative SEM-based automated mineralogy, were used to build a model to derive quantitative mineralogy for each sample, as inputs to the estimation process. Quantitative mineralogical data were obtained for each sample by automated mineralogy, and then by using regression algorithms applied to multi-element geochemistry, as discussed in section 6.2. The quantitative mineralogy data, either directly measured by SEM or derived from the geochemistry, provide the main input into the MRE.

The collection of quantitative mineralogical data by SEM-based energy-dispersive X-ray spectroscopy (EDS) is known as automated mineralogy. The sample surface is scanned by the SEM with a focussed beam of electrons. The electron beam interacts with the atoms in the sample, and the reflected signal is detected to produce a backscattered electron (BSE) image of the scanned surface. The brightness of a BSE image is proportional to the mean atomic number of the material, which means that different minerals can be distinguished from each other using this image. The BSE images are used to segment the sample based on back-scatter intensity. Each segment is allocated an EDS analysis point, which the SEM collects automatically. The EDS spectra for each point are compared to a library or database of minerals which allocates a mineral to each point analysis and thus each area of the sample. This allows an abundance of each mineral to be calculated for each sample.

RSC analysed a total of 58 samples by SEM in September 2023. Samples were selected to represent the full chemical variability of the dataset (Figure 33).

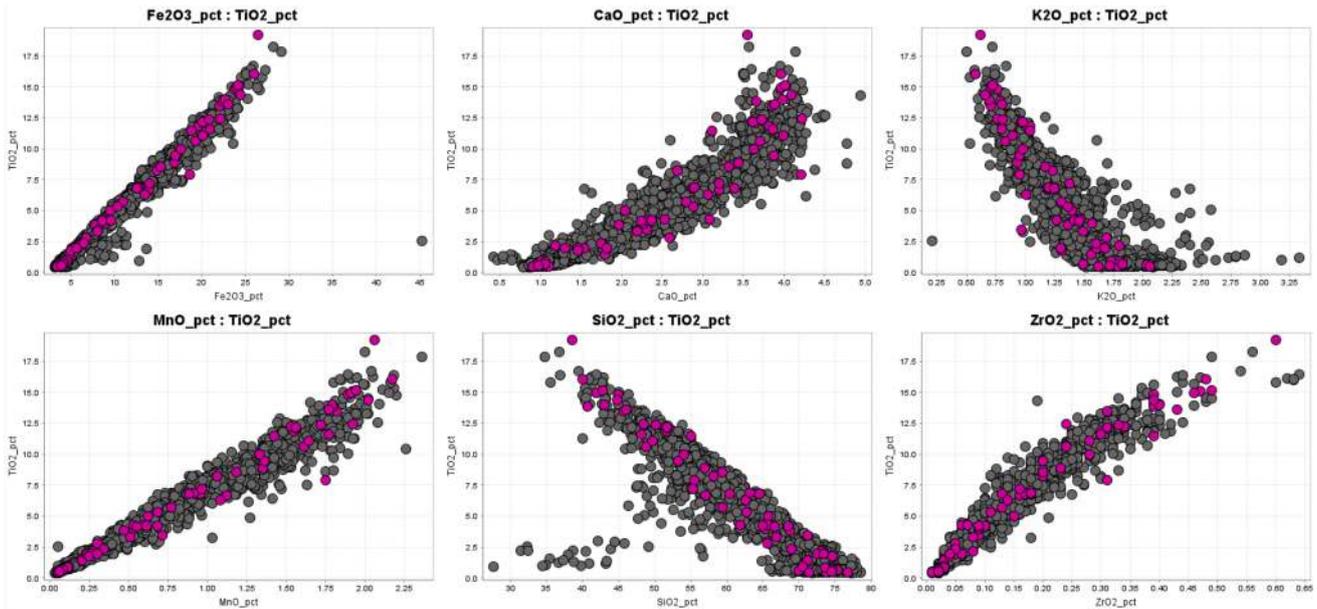


Figure 33: TiO₂ versus other oxides plots, with samples selected for SEM analysis (purple dots).

Sample material used for the SEM analyses was derived from 57 P2 samples (200-g splits of the screened ~45- μ m to 2-mm size fraction material), and was prepared by Middle Earth Petrographics. Samples were split to ~15 g using a Humboldt Micro and Precision Riffle Splitter, and then set in a 25-mm epoxy round. Repeat samples were created at this stage. The hardened epoxy round was then cut in half vertically and remounted in a 30-mm epoxy round to expose the two cut faces for SEM analysis (Figure 34). Cutting the 25-mm round reduces the impact of any differential settling of the sample, in the epoxy round, by grain size and density. The sample face of the epoxy mount was then polished with water-soluble, polycrystalline diamond suspension (from 3 μ m down to 1 μ m) to produce a highly smoothed surface. The polished surface was coated with a 15–20 nm conductive carbon film before SEM analysis.



Figure 34: Prepared Barrytown Farms Block samples loaded for SEM analysis.

Samples were analysed in a Hitachi SU-3900 SEM, with Quantax Q655-60-129 xFlash® EDS silicon-drift detectors, using Bruker's AMICS software, to control the SEM and process the data. Analysis was undertaken in particle mode — backscatter intensity was used to segment the sample into individual grains — for EDS spot analyses, for each grain to quantify the mineralogy of the sample in a fast and efficient manner. The EDS spectra for each point are compared to a library or database of minerals, that was updated from the generic database to be specific to the Barrytown Flats area. This library allocates a mineral to each point analysis and thus each area of the sample. Therefore, mineral abundances can be calculated for each sample.

As part of processing the AMICS data, a geochemical composition for each sample was calculated from the measured mineral abundances in the samples, and this was used as an internal check on the chemistry of the minerals (Figure 35 and Figure 36). This step provides information to optimise the choice of chemistry for each mineral in the library, and allows for a project-specific library to be generated, where the composition of each mineral matches those present in the samples.

Quality issues and/or anomalies in previous samples from the Coates South Block (reported in Roux et al., 2023) were related to organic material and slime (<45 µm), due to incomplete washing and screening by NZIMMR. No slime material

was identified in the Barrytown Farms Block samples. There is a minor high-bias (5–10%) which indicates that the chemistry of the minerals in the library is acceptably close to the actual chemistry of these minerals but that the match is not perfect.

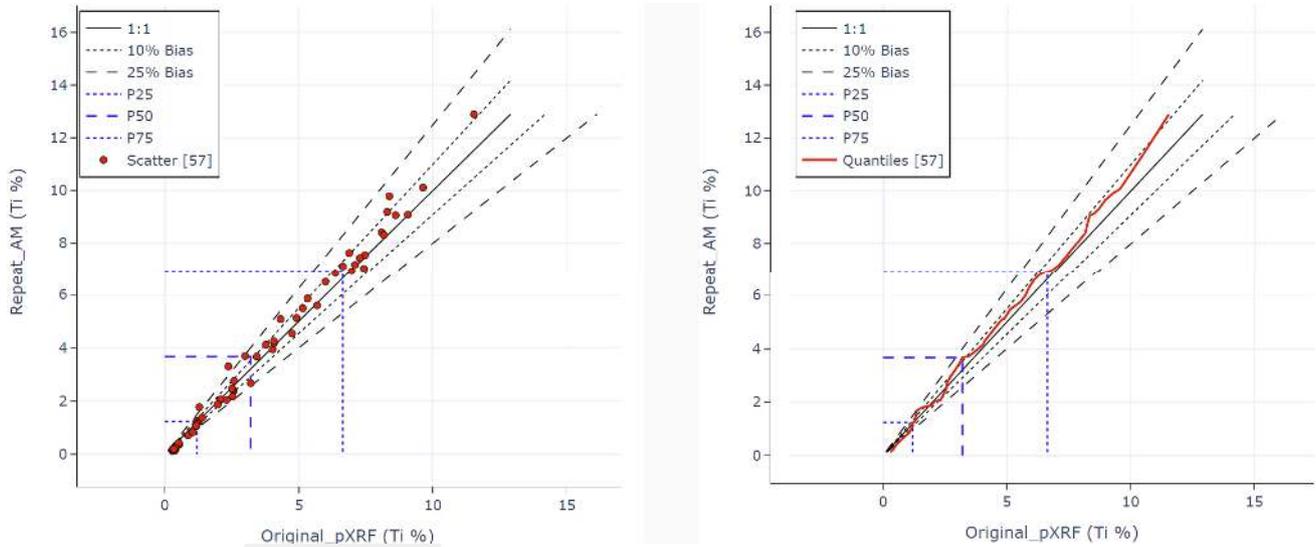


Figure 35: pXRF geochemistry compared with SEM-derived geochemistry for Ti. Left panel: point scatter; right panel: QQ plot.

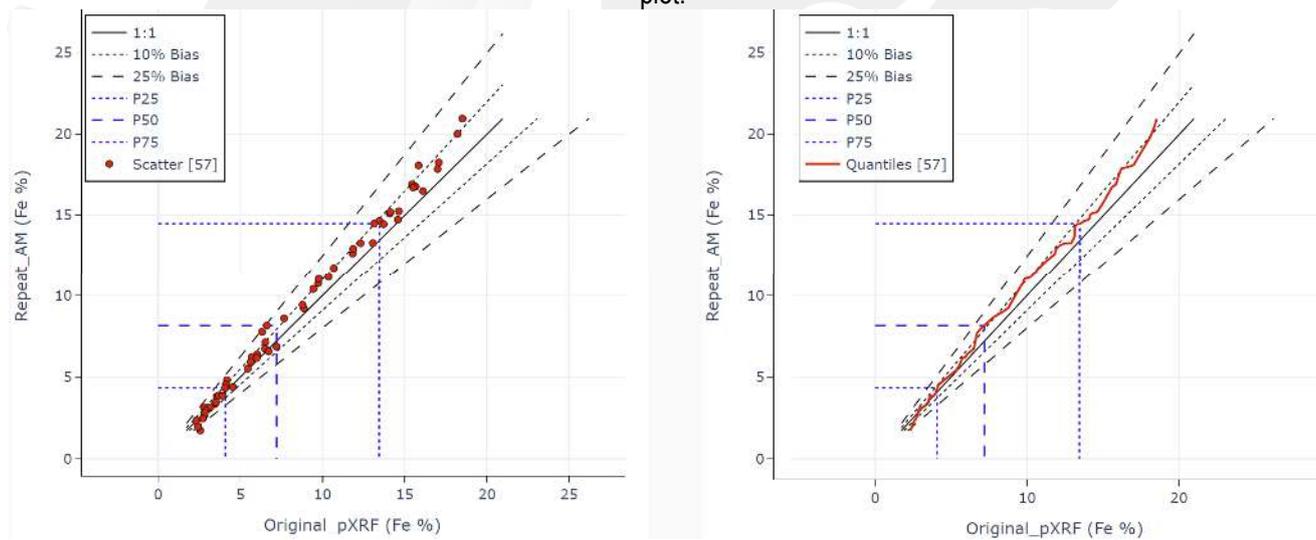


Figure 36: pXRF geochemistry compared with SEM-derived geochemistry for Fe. Left panel: point scatter; right panel: QQ plot.

Linear regression models were built using the linear regression algorithm, in the scikit learn package in Python (`sklearn.linear_model.LinearRegression`), to model abundances of ilmenite, garnet, and zircon from pXRF data based on seven elements: Ca, Fe, K, Mn, Si, Ti and Zr. The mineral abundances, measured by SEM automated mineralogy from the 58 samples, were used as the training data.

The performance of the models in estimating mineral abundances, for samples unseen⁵ in the training dataset, was estimated using test-and-train datasets with bootstrap sampling. RSC used Python’s scikit-learn machine-learning library for the bootstrap sampling. The models used to calculate the mineral abundances were trained on the full set of available automated mineralogy data; however, the performance metrics reported in Table 16 were calculated using data previously unseen by models, that were trained on a same-sized sample of the data, created with bootstrap resampling. Modelled garnet and ilmenite abundances are presented relative to SEM-measured abundances for the entire training dataset in Figure 37. Lastly, calculated mineral abundances, based on the laboratory-derived XRF geochemistry data, were compared with SEM-derived mineral abundances as a check of model performance.

Table 16: Model performance metric mean-absolute error (MAE) expressed as percentages of measured mineral abundance. The relative errors are consistent throughout the grade samples. The performance metrics are calculated below for test samples above 1%, 2%, and 4% ilmenite cut-off abundances.

Model	MAE 1% Cut-Off	MAE 2% Cut-Off	MAE 4% Cut-Off	R ²
Ilmenite	3%	3%	3%	0.98
Garnet	4%	4%	4%	0.99

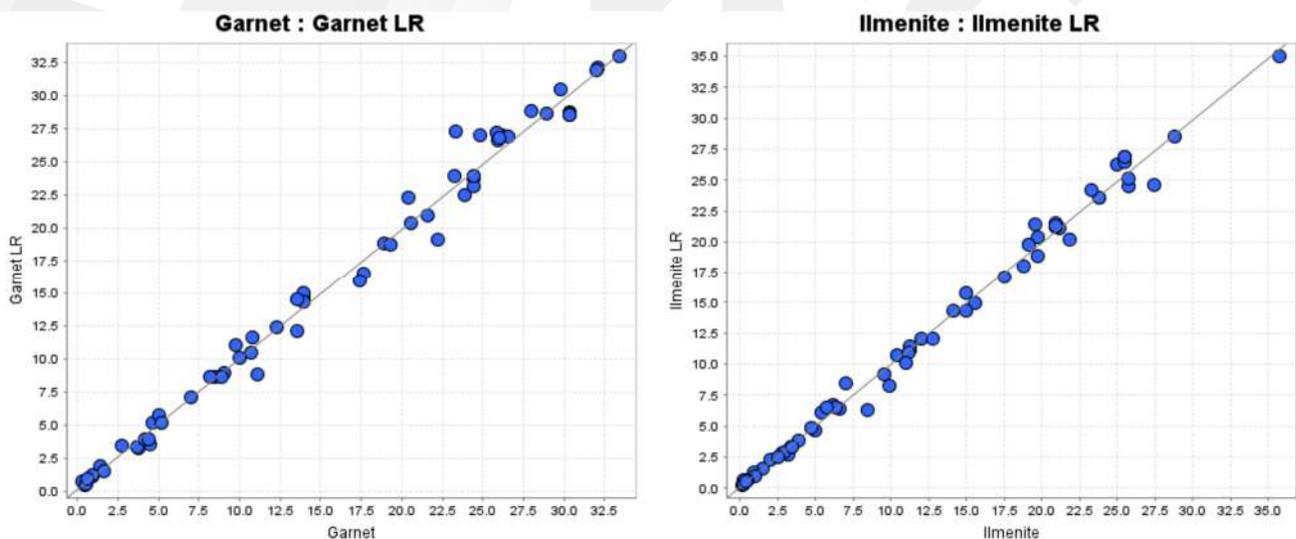


Figure 37: Measured vs modelled garnet and ilmenite. SEM-measured values on the x axes; linear regression modelled values on the y axes.

6.4 Bulk Density

Dry bulk density data are not available for the Barrytown Farms Block; hence, dry bulk density was approximated by considering the block’s HM content and the densities of the heavy minerals (section 8.9).

⁵ ‘Unseen’ refers to a blind dataset, that has not been involved in training the algorithms; its sole purpose is to define the performance of the classification/regression.

7 Data Quality

7.1 Data Quality & Quality Objectives

Every data collection process implicitly comes with expectations for the accuracy and precision of the data being collected. Data quality can only be discussed in the context of the objective for which the data are being collected. In the minerals industry the term 'fit for purpose' is commonly used to convey the principle that data should suit the objective. In the context of data quality objectives (DQO), fit for purpose could be translated as 'meeting the DQO'.

For the Barrytown Farms Block, data from the 2022 drilling programme should be of a quality that is fit for the purpose of classifying at least an Indicated mineral resource for ilmenite, garnet and zircon in accordance with the JORC Code (2012). These mineral resource classification objectives set a requirement for the level of quality of the data and determine the DQO.

7.2 Quality Assurance

Quality assurance (QA) is about error prevention and establishing processes that are repeatable and self-checking. The simpler the process and the fewer steps required the better, as this reduces the potential for errors to be introduced into the sampling process. This goal can be achieved using technically sound, simple prescriptive standard operating procedures (SOPs) and management systems.

In discussing the suitability of QA systems for the data collection that underpin the MRE reported here, and the potential impact of these processes on the resource classification, RSC applied the process summarised in Figure 38. This summary discusses whether:

- processes are clearly documented in an SOP, and they represent good practice;
- the SOP includes statements on clear data quality objectives;
- the SOP includes clear details on quality control (QC) measures; and
- the site visit confirmed adherence to the SOPs.

For each part of the sample collection, preparation and analytical process, a comment on the expected associated risk with respect to resource classification is provided.

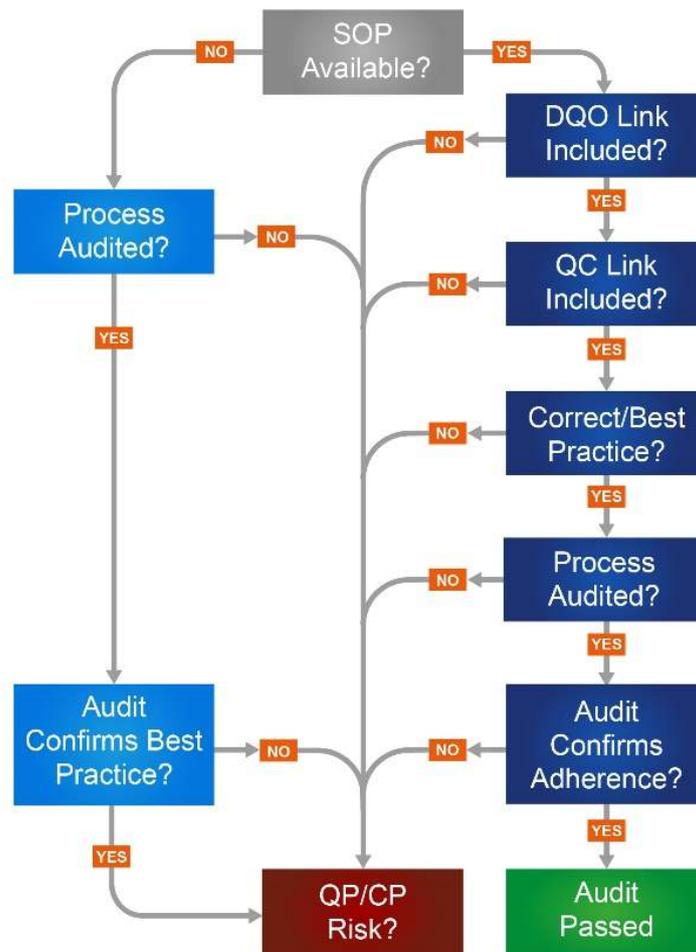


Figure 38: Flow chart of RSC's QA review process.

7.2.1 Location

7.2.1.1 Collar Location

The drillhole collars were pegged by a professional surveyor using a Trimble RTK GNSS with R10 rover and base units. The measurement accuracy of this survey is reported at better than $\pm 2-3$ cm, both horizontally and vertically. Local control was established with temporary survey marks. Survey field checks were made on the establishment of each day's fieldwork to ensure the survey equipment was reliably operating in terms of the established network. The third-party surveyor SOPs were not available for review and this process was not audited.

Due to logistical issues with working on an active dairy farm, and the surveyor's limited availability, the final drillhole collar locations were captured each day using a hand-held GPS with ~ 3 -m accuracy. Drillhole collar elevations were draped to the DTM with accuracy specifications of ± 0.2 m (95%) vertical. While the use of hand-held GPS may have resulted in lower horizontal accuracy, given the flat, open areas of Barrytown Farms Block, and relatively strong grade and geological continuity in the deposit, the Competent Person considers that there is low risk of using hand-held GPS with respect to the classification of the MRE.

7.2.1.2 Downhole Survey

No downhole surveys were conducted for any of the 2022 drillholes. The Competent Person considers that this is appropriate, given the vertical orientation and shallow nature of the drilling, and considers that there is low risk with respect to the location of the samples on the quality of the estimate.

7.2.2 Dry Bulk Density

No dry bulk density data were collected at Barrytown Farms Block; instead, the bulk density was approximated on a block-by-block basis, by considering the block's HM content and the densities of the component minerals. The Competent Person considers that there is some risk with respect to the objectives given that the dry bulk densities are approximations. However, the approximated dry bulk densities are in line with known dry bulk densities of similar deposits and lithologies, and are therefore unlikely to differ significantly from the true dry bulk density values.

7.2.3 Geological Logging

An SOP was in place for the process of collecting geological data from the aircore samples, which included appropriate sections on QC. For each metre, a handful of sample material was placed on a logging board and logged. The geological data captured include lithology, grain size, colour, rounding, clay content, garnet content, and dark HM content. Other details logged include sample weight, sample moisture and depth to the water table. Logging details were entered in dropdown-validated MS Excel spreadsheets. Digital photos of the logging board and the chip trays were taken to provide a permanent photographic record of the drillhole intervals.

This process was audited internally during a site visit by Mr Aldrich. The Competent Person considers the aircore logging procedures to be carried out well. The Competent Person considers that there is low risk with respect to the data quality objectives, and any minor logging inconsistencies have been taken into consideration when classifying the Resource.

7.2.4 Grade

7.2.4.1 Primary Sample

The primary sample was collected at the drill bit. Quality assurance of the primary sample for aircore drilling generally consists of:

- selecting the correct drill bit;
- applying the correct air pressure;
- ensuring correct placement of metre marks on the drill mast;
- maintaining adequate moisture content to minimise loss of fines;
- minimising sample loss by choosing the right tolerance between bit and shroud; and
- ensuring the sample system was clear to minimise cross-contamination between samples.

These decisions were continually adjusted based on encountered lithologies to make sure delimitation errors and extraction errors were prevented. A good SOP for the drilling process details how these decisions are made, by whom, and with a

particular focus on recovery management. However, in practice, such decisions and processes are typically not documented, and quality is dependent on the experience of the driller.

During the site visit, Mr Aldrich noted that drilling encountered challenges such as:

- high water tables creating wet samples;
- high rainfall and surface water creating wet samples;
- rising sand causing overweight samples;
- loss of pressure in the top 1–3 m resulting in low-weight samples, and
- areas with beach cobbles or wood debris that caused blockages in the drill string and resulted in low-weight samples and potential loss of fine material.

Mr Aldrich observed that the drilling was actively monitored by staff on site, and that instructions and training were provided to both drilling and field staff regarding the drilling procedures. Any issues affecting the quality of the primary sample were noted in drilling daily logs and on log sheets.

TiGa decided to use the aircore rig instead of a sonic rig for logistical, timing and cost reasons. Notwithstanding the assurance measures in place, the Competent Person considers that there is some risk associated with the aircore sampling that affects the quality of the resource estimation.

7.2.4.2 First Split

The first split (Split 1) of the primary sample occurred at the NZIMMR laboratory, where the primary sample was passed through a Rocklabs Boyd Elite jaw crusher and radial splitting device (RSD) combo. In the case of samples for which a repeat sample was to be collected, this first-split stage consisted of two separate steps. First, the primary sample was passed through the crusher-RSD combo to create a sub-sample with a weight approximately twice that of a regular sample (Split step 1). Next, this sub-sample was passed through the crusher-RSD combo again to create two sub-samples with equal weights (Split step 1a).

The first-split process was not audited, as the NZIMMR laboratory was not processing samples during the site visit. However, the first-split process was regularly observed by RSC field personnel, and it was undertaken in accordance with the established and well-communicated procedures. The Competent Person considers using an RSD to split the primary sample industry good practice. The Competent Person considers the risk associated with the first-split procedure to be low with respect to the data quality objectives.

7.2.4.3 Second Split

The second split (Split 2) occurred at the NZIMMR laboratory when the first split was wet-screened using a 2-mm and a 45- μm sieve. The second-split process was not audited, as the NZIMMR laboratory was not processing samples during the site visit. However, the second-split process was regularly observed by RSC field personnel, and it was generally undertaken in accordance with the established procedures. RSC notes that the trays used were not always cleaned between each

sample. In future, RSC recommends that NZIMMR completes sizing tests to ensure the quality of the wet-screening process, and ensures the sample trays are cleaned between each sample to reduce contamination.

The Competent Person considers that even though improvements to this process should have been made, the risk associated with the second-split procedure is low with respect to the data quality objectives.

7.2.4.4 Third Split

The third split (Split 3) occurred at the NZIMMR laboratory when the 2-mm to 45- μ m sub-sample was passed through a Rocklabs Boyd Elite jaw crusher and RSD combo to create P1 and P2 sub-samples (priority sub-samples). The process was governed by a sample process flowsheet and splitting rules developed between RSC, TiGa, and NZIMMR. Every 30th sample, a repeat sample pair was created, by passing the 2-mm to 45- μ m sub-sample through a Rocklabs Boyd Elite jaw crusher and RSD combo, to create two equal splits (Split step 3) before creating the P1 and P2 sub-samples. The repeat samples were collected to monitor the consistency of this split step. P1 and P2 sub-samples were subsequently created by passing the split 3 sub-samples through the RSC combo once more (Split 3a).

The third-split process was not audited, as the NZIMMR laboratory was not processing samples during the site visit. However, the third-split process was regularly observed by RSC field personnel, and it was generally undertaken in accordance with the established procedures.

The Competent Person considers using an RSD to create the third-split sub-samples industry good practice. The procedures outlined in the flowsheet and the splitting rules are considered industry standard practice. The Competent Person considers the risk associated with the third-split process to be low with respect to the resource classification target.

7.2.4.5 Priority 1 Sub-Sample (P1)

7.2.4.5.1 P1 Fourth Split

The P1 sub-samples were sent to SGS Westport for pulverisation and splitting. Following pulverisation, a 100-g sub-sample was created using a scoop (P1 fourth split). No SOP outlining the P1 fourth-split procedure was available for review, and the process was not audited.

SGS Westport is an ISO/IEC 17025 accredited laboratory. Although there is some residual risk with this part of the process not having been audited, the Competent Person has in-depth knowledge of SGS laboratories and its SOPs around the world, and considers the risk associated with the P1 fourth split to be low with respect to the quality of the resource estimation.

7.2.4.5.2 P1 Fifth Split A

At the RSC Wellington Office Laboratory, about 20 g of sample material was extracted from the P1 fourth-split sub-samples using a spoon, using the 'many increments' approach to obtain a fit-for-purpose split of the sample. Fifth-split repeat samples were created approximately once every 30 regular samples to check this. The Competent Person considers the risk associated with the P1 fifth split at RSC Wellington low with respect to the quality of the regression model, on which the abundance calculations are based, and, in turn, the quality of the resource estimation.

7.2.4.5.3 P1 Analytical (Portable XRF) Process

Multi-element analysis of the P1 samples was completed at RSC's office in Wellington using an Olympus Vanta VMR pXRF instrument and followed industry best practice and RSC's pXRF analysis SOP. A robust QC framework was in place to ensure that the instrument was working according to its specifications and that no special-cause variation was introduced. The process was not audited, but it was supervised by RSC's Principal Geochemist, and the Competent Person considers that the risk associated with the pXRF analysis at RSC Wellington is low with respect to the data quality objectives.

7.2.4.5.4 P1 Fifth Split B

Based on the pXRF results, a subset of samples reflecting the geochemical variety of the total sample population was selected for laboratory whole-rock XRF analysis. At RSC Wellington, three tablespoons were scooped from the sample bags of the selected samples and poured into labelled paper bags that were sent to the ALS laboratory in Brisbane. An SOP describing this process was not in place and the process was not audited. Because the samples are finely pulverised, and because the XRF analysis determines the concentrations of common rock-forming elements that have a very low natural inherent variability, the Competent Person considers the risk associated with the P1 sixth-split B process at RSC Wellington to be low with respect to the resource estimation quality.

7.2.4.5.5 P1 Sixth Split

At ALS Brisbane, a 0.66-g aliquot was extracted from the P1 sixth-split sub-samples using a scoop (P1 sixth split). Sixth-split repeat samples were created once every ~20 samples to control the consistency of this process. An SOP outlining the P1 sixth-split procedure at ALS Brisbane was not available for review and the process was not audited. As ALS Brisbane is an ISO/IEC 17025 accredited laboratory, the Competent Person considers the risk associated with the P1 sixth split at ALS Brisbane to be low with respect to the data quality objectives.

7.2.4.5.6 P1 Analytical (XRF) Process

At ALS Brisbane, the whole-rock geochemistry of the P1 sub-samples was determined using methods ME-XRF21u and ME-GRA05. The SOP describing this process was not available for review and the process was not audited. ALS Brisbane is an ISO/IEC 17025 accredited laboratory, and the Competent Person is familiar with its processes and standards, and the Competent Person considers the risk associated with the analysis of samples by ME-XRF21u and ME-GRA05 at ALS Brisbane to be low with respect to the resource classification objectives.

7.2.4.6 Priority 2 Sub-Sample (P2)

7.2.4.6.1 P2 Fourth Split

The P2 samples were shipped to Middle Earth Petrographics, where they were split to ~15 g using a Humboldt Micro and Precision Riffle Splitter and then set in a 25-mm epoxy round. The hardened epoxy round was cut in half, vertically, and remounted in a 30-mm epoxy round to expose the two cut faces for SEM analysis. Cutting the 25-mm round vertically reduces the impact of any differential settling of the sample, in the epoxy round, by grain size and density. An SOP was not available for review, but the process was reviewed by senior RSC staff. The Competent Person considers this sample

preparation method to be best practice and considers there is low risk of this process generating excessive inaccuracies or imprecision.

7.2.4.6.2 P2 Analytical (SEM) Process

SEM data, collected at RSC Perth, were collected in accordance with standard AMICS workflow as outlined in the manual (Bruker, 2020). The work was supervised by RSC's Principal Geochemist. The Competent Person considers the AMICS workflow industry good practice, and this process therefore presents minimal risk with respect to the quality of the resource estimate.

7.3 Quality Control

The purpose of quality control (QC) is to detect and correct errors while a measuring or sample-collection system is in operation. The outcome of a good QC programme is that it can be demonstrated that any errors were fixed during operation and that the system delivering the data was always in control. Together with good QA (section 7.2), QC ensures that the DQOs are met. Good QC is achieved by inserting and constantly evaluating checks and balances. These checks and balances can be incorporated at every stage of the sample process (location, primary sample collection, preparation and analytical phases) and, if in place, should be monitored during data collection, allowing the operator to identify and fix errors as they occur.

7.3.1 Sample Location

Quality control of the sample location data, usually derived from a combination of drillhole collar positions and downhole surveys, should occur on site as surveys are being conducted by conducting check measurements. Quality control of the collar location data should take place on site as measurements are being collected.

7.3.1.1 Collar Location

GPS survey field checks were made at the start of each day's fieldwork; with any accuracy checks or repeat readings for each collar used to check, correct and repeat the collar-recording process, if necessary. Even though the accuracy and repeat metadata were not recorded in the database, these QC measures are good practice. Final drillhole collar locations, captured each day by hand-held GPS, were compared against the pegged values from the professional surveyor as an additional check. The Competent Person considers the collar data to be well-controlled.

7.3.1.2 Downhole Survey Data

No downhole surveys were conducted for the 2022 drillholes.

7.3.2 Dry Bulk Density

No dry bulk density data were collected.

7.3.3 Geological Logging

Geological logging was completed by field geology staff, with some check logging completed by the cross-shift geologist, and senior RSC staff, during the drill campaign, and by Mr Aldrich during the site visit. No significant discrepancies were identified during this process, demonstrating consistent data capture.

7.3.4 Grade

7.3.4.1 Primary Sample

The quality of the primary sample was monitored by reviewing primary (wet) sample weights as the drilling was ongoing (Figure 39). If undesired trends in the sample weights were observed, these were communicated with the drillers to identify the cause and resolve any issues that were identified. The use of wet weights is suboptimal as variability in water saturation hinders the assessment of trends and patterns in sample weights, but was the best proxy available at the time of drilling to check the performance of the drilling rig.

The primary sample weights are an indicator of sample recovery and can thus, by proxy, be used to assess the quality of the primary sample. Considering that the samples were obtained by AC drilling, no major trends or steps were observed in the primary sample weight data (Figure 39). The average primary sample weight ranges between 6 kg and 9 kg, which is in line with expectations. Over the short term (on a hole-by-hole basis), a repetitive trend in primary sample weight was observed, with the primary sample weight increasing with depth (Figure 40). This variation is also in line with expectations, as the density of the material recovered increases in the top 10–15 metres of the subsurface. The short-term primary weight data do not indicate evidence of systematic sample delineation issues (e.g. repetitive within-rod sample weight increase), but do suggest that the recovery of the primary sample was not always well controlled. Implications of this are discussed in section 7.4.4.1.

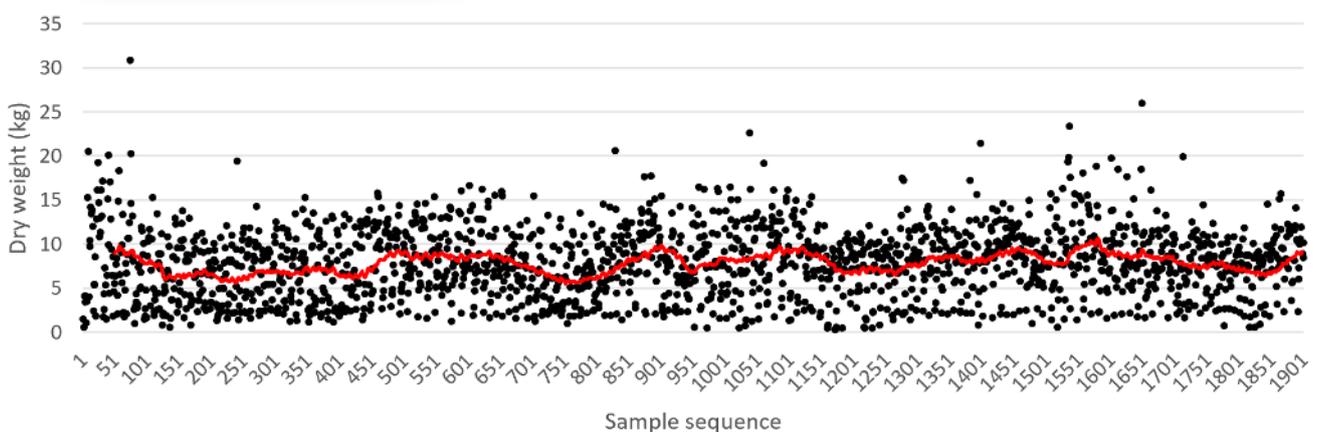


Figure 39: Sample weights against sample sequence (time); 50-period moving average trendline in red.

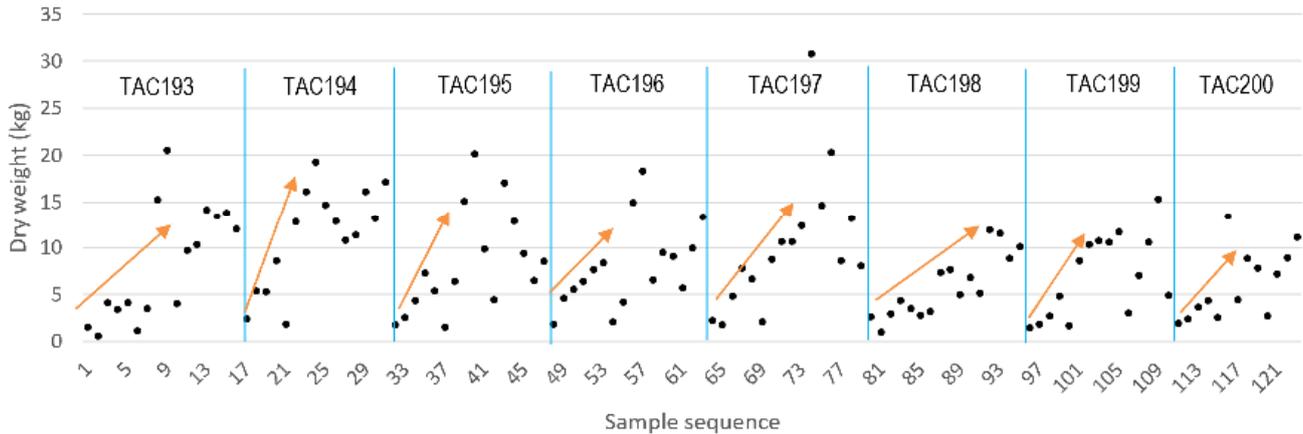


Figure 40: Short-term primary sample weight variation for holes TAC193 to TAC200.

7.3.4.2 First Split

The consistency of the splitting process was assessed by tracking the relative difference of the repeat pairs over time. The assessment of the repeat pair data revealed four instances of sample swaps (sample IDs 250137, 250138, 300365 and 301048). These samples were excluded from the final assessment of this and subsequent splits. The quality control data for the first split, by proxy of repeat elemental data for Ti, Fe and Zr (Figure 41, Figure 42 and Figure 43, respectively), demonstrated that the splitting process was in control, indicating no systematic (i.e. across multiple elements) trends, step-drops or threshold breaches. The Competent Person considers the splits generated here to be consistently executed and usable in downstream processes.

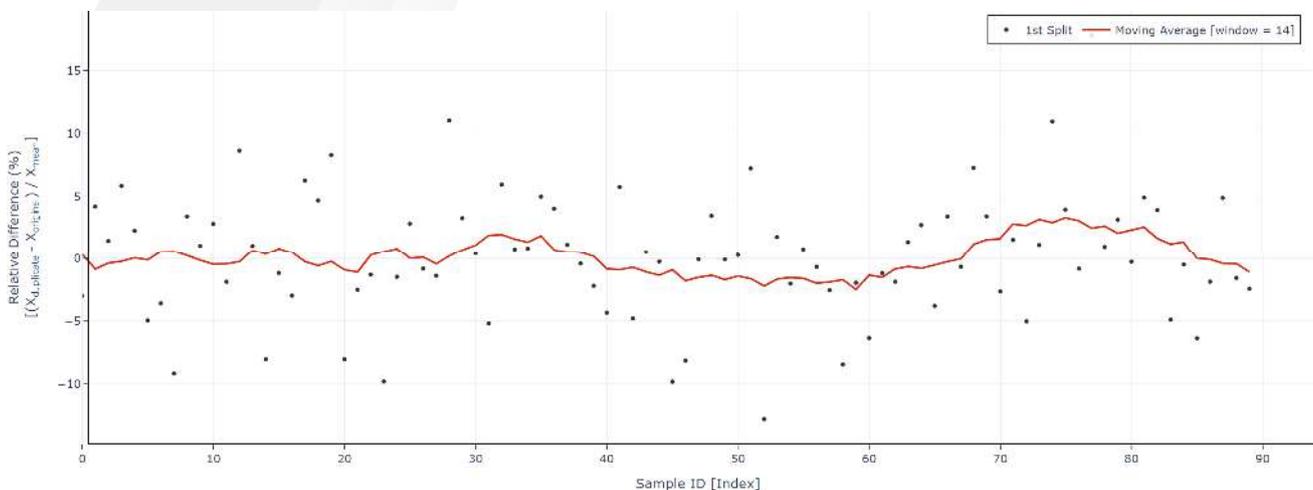


Figure 41: RD plot Ti pXRF first split, demonstrating the relative differences in grades between original and repeat samples against time, collected at the first-split stage.

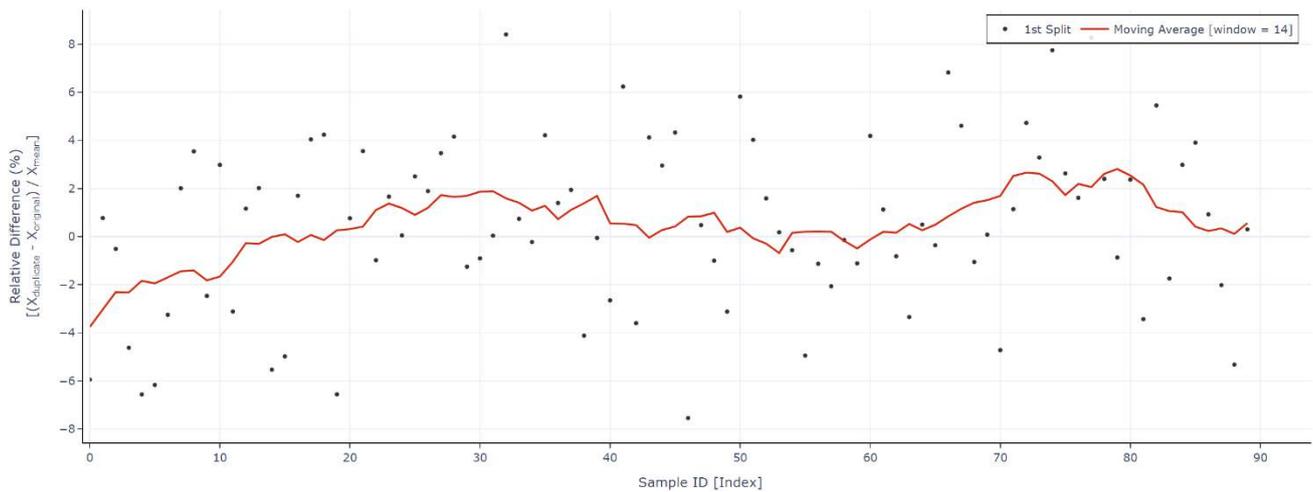


Figure 42: RD plot Fe pXRF first split, demonstrating the relative differences in grades between original and repeat samples against time, collected at the first-split stage.

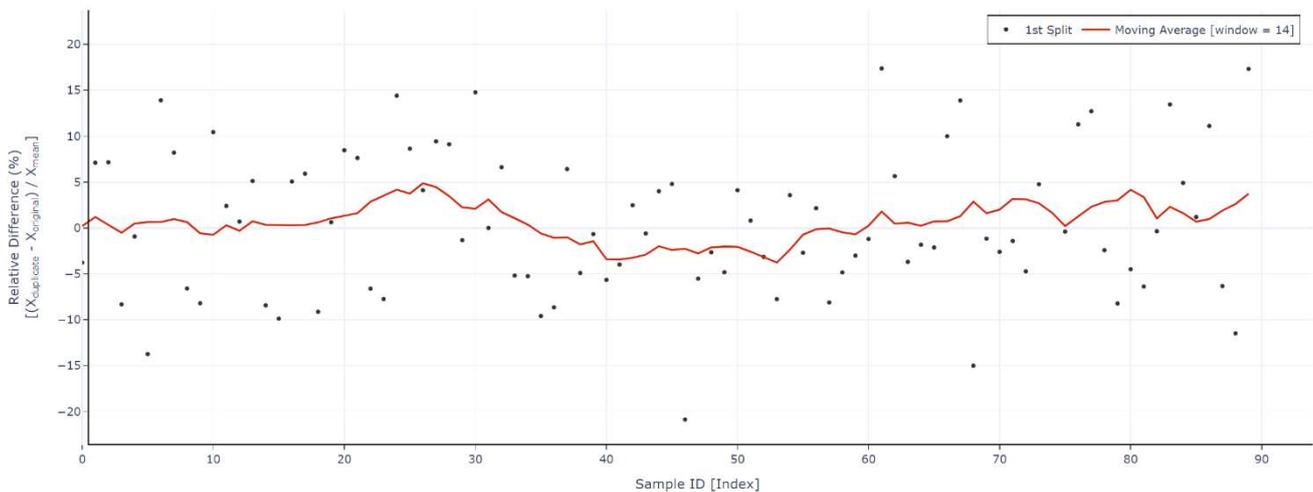


Figure 43: RD plot Zr pXRF first split, demonstrating the relative differences in grades between original and repeat samples against time, collected at the first-split stage.

7.3.4.3 Second Split

The second split occurred at the NZIMMR laboratory, when the first-split samples were wet-screened using a 2-mm and a 45- μ m sieve. Screen-size testing data were not available, so the consistency of the wet-screening process could not be assessed.

7.3.4.4 Third Split

The third split (Split 3) occurred at the NZIMMR laboratory, when the 2-mm to 45- μ m sub-sample was passed through a Rocklabs Boyd Elite jaw crusher and RSD combo to create P1 and P2 sub-samples (priority sub-samples). The quality control data for the third split, by proxy of repeat elemental data for Ti, Fe and Zr (Figure 44, Figure 45 and Figure 46, respectively), demonstrated that the splitting process was mostly in control, with no threshold breaches, and perhaps a few minor trends throughout the measuring cycle (e.g. a minor bias (~1%) towards the original sample in case of Fe (Figure 45)).

Overall, the Competent Person considers the splits generated here to be consistently executed and usable in downstream processes.

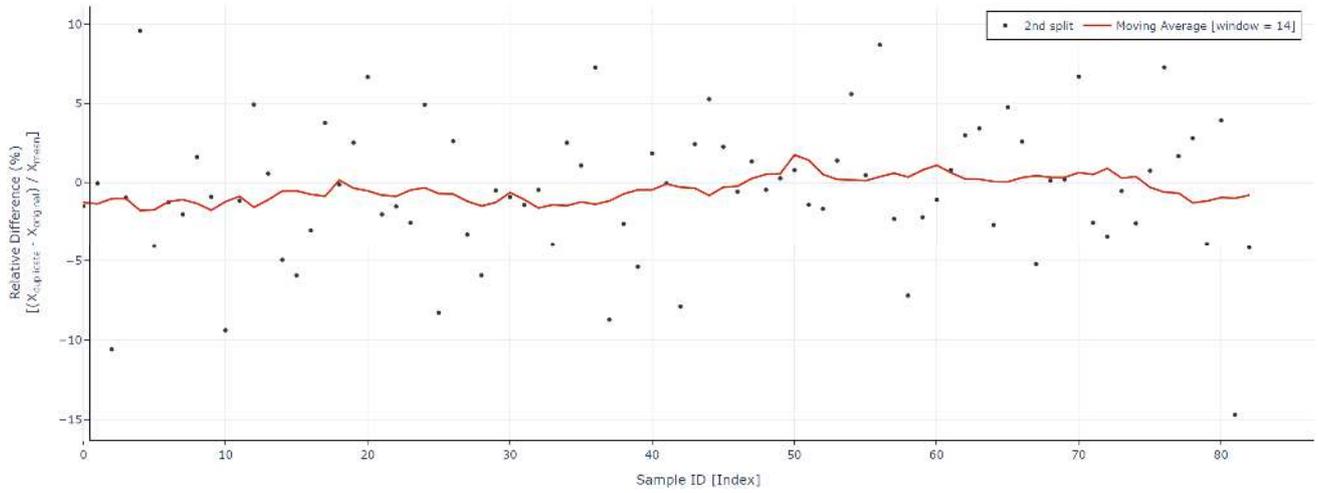


Figure 44: RD plot Ti pXRF third split, demonstrating the relative differences in grades between original and repeat samples against time.

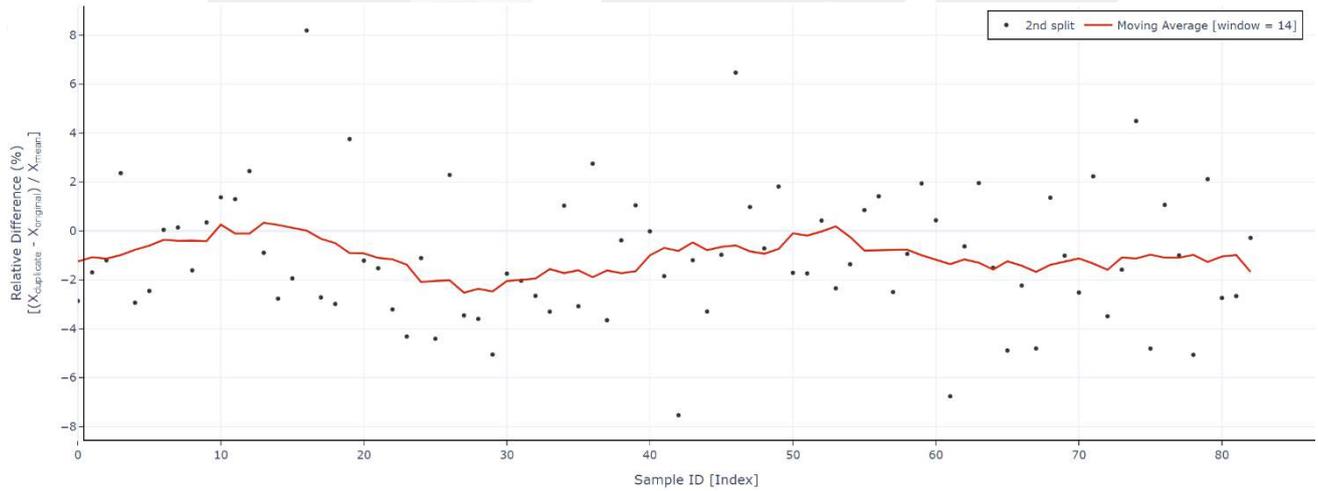


Figure 45: RD plot Fe pXRF third split, demonstrating the relative differences in grades between original and repeat samples against time.

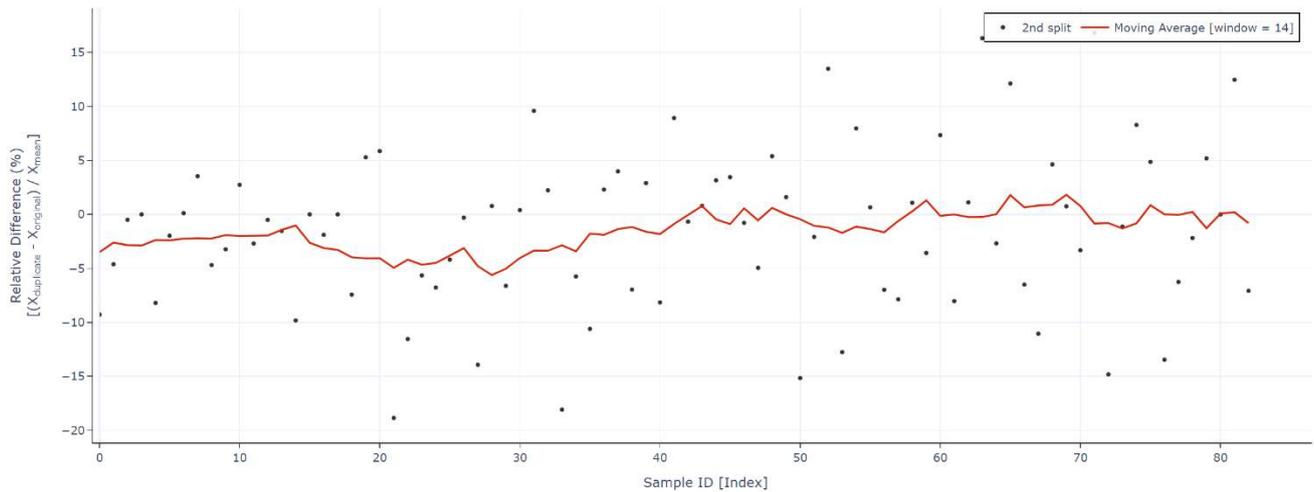


Figure 46: RD plot Zr pXRF third split, demonstrating the relative differences in grades between original and repeat samples against time.

7.3.4.5 Priority 1 Sub-Sample (P1)

7.3.4.5.1 P1 Fourth Split

The quality control data for the P1 fourth split, by proxy of repeat elemental data for Ti, Fe and Zr (Figure 47, Figure 48 and Figure 49, respectively), demonstrated that the splitting process was in control, indicating no systematic (i.e. across multiple elements) trends, step-drops or threshold breaches.

The Competent Person considers the splits generated here to be mostly consistently executed and usable in downstream processes.

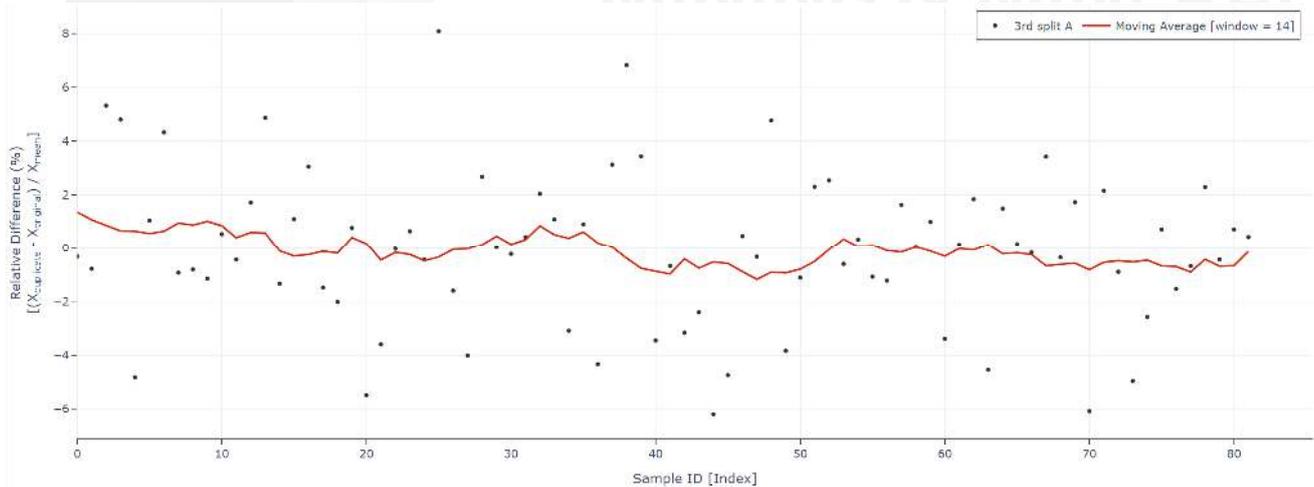


Figure 47: RD Ti pXRF P1 fourth split, demonstrating the relative differences in grades between original and repeat samples against time.

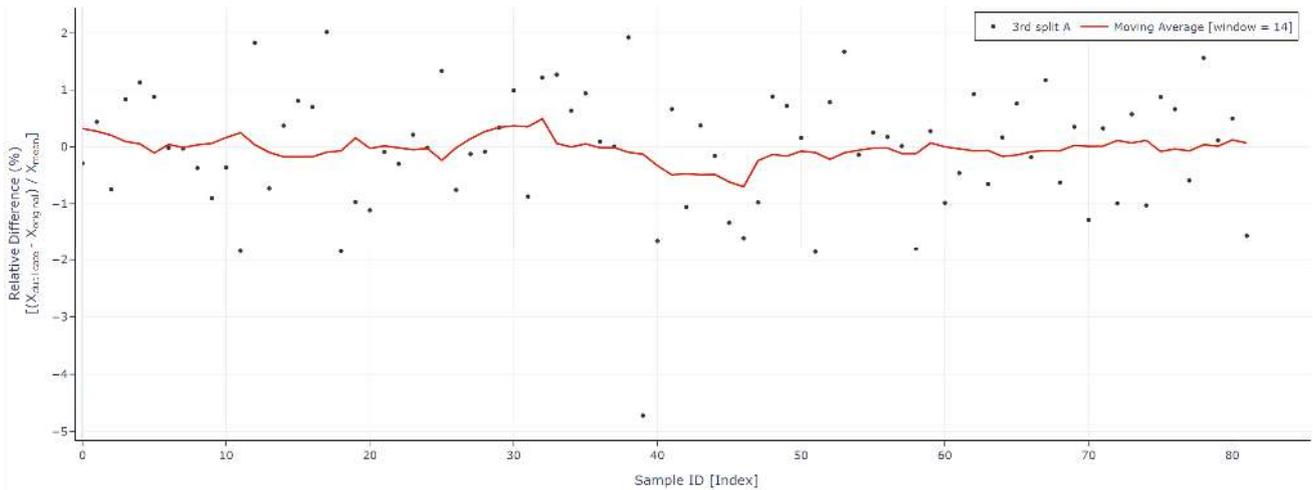


Figure 48: RD Fe pXRF P1 fourth split, demonstrating the relative differences in grades between original and repeat samples against time.

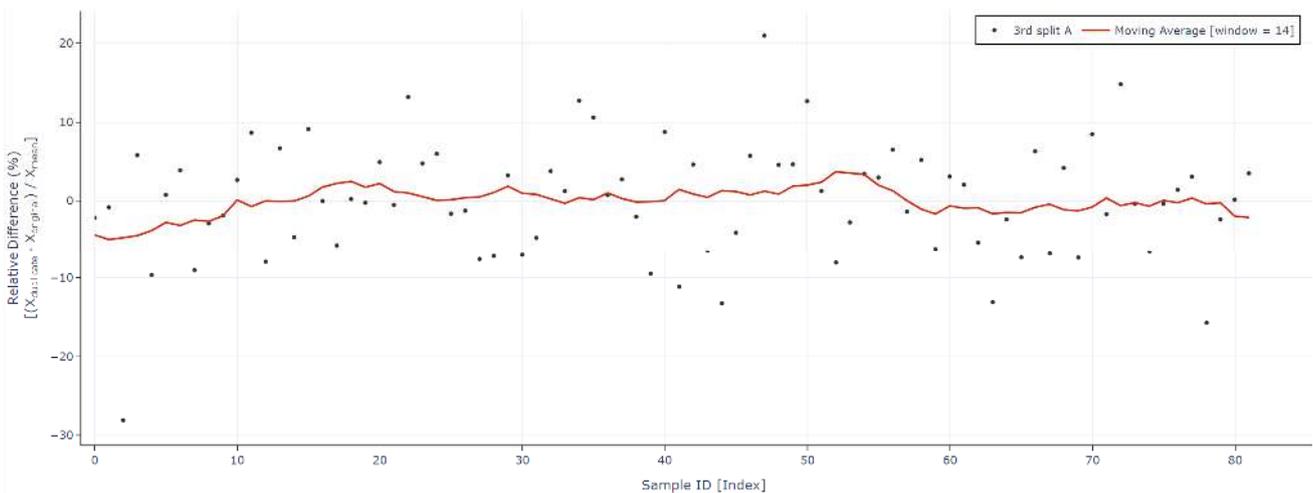


Figure 49: RD plot Zr pXRF P1 fourth split, demonstrating the relative differences in grades between original and repeat samples against time.

7.3.4.5.2 P1 Fifth Split

The quality control data for the P1 fifth split, by proxy of repeat elemental data for Ti, Fe and Zr (Figure 50, Figure 51 and Figure 52, respectively), demonstrated that the splitting process was in control, indicating no systematic (i.e. across multiple elements) trends, step-drops or threshold breaches.

The Competent Person considers the splits generated here to be mostly consistently executed and usable in downstream processes.

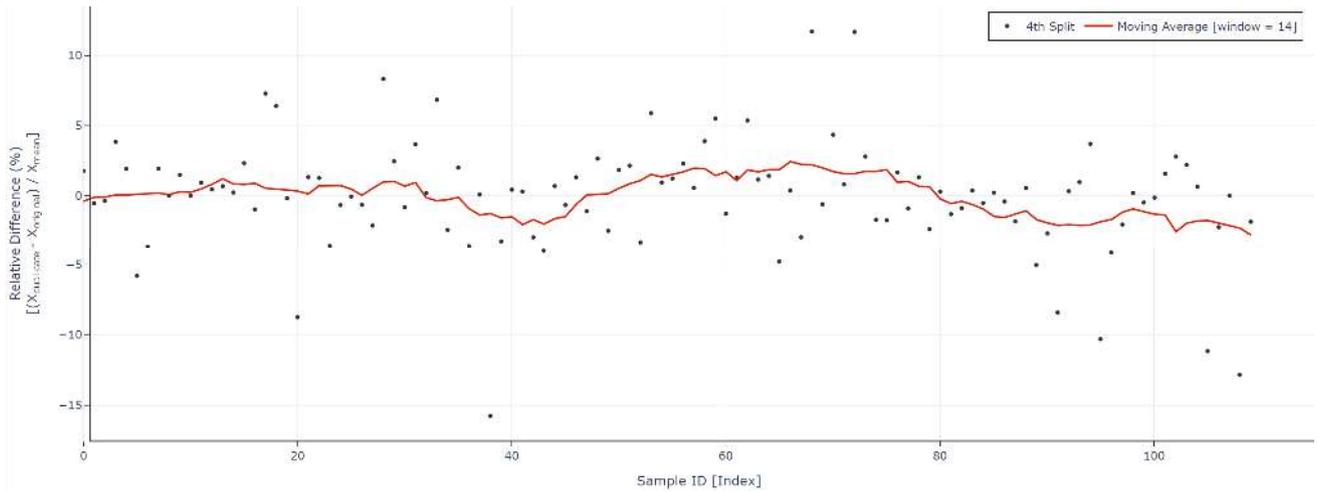


Figure 50: RD Ti pXRF P1 fifth split, demonstrating the relative differences in grades between original and repeat samples against time.

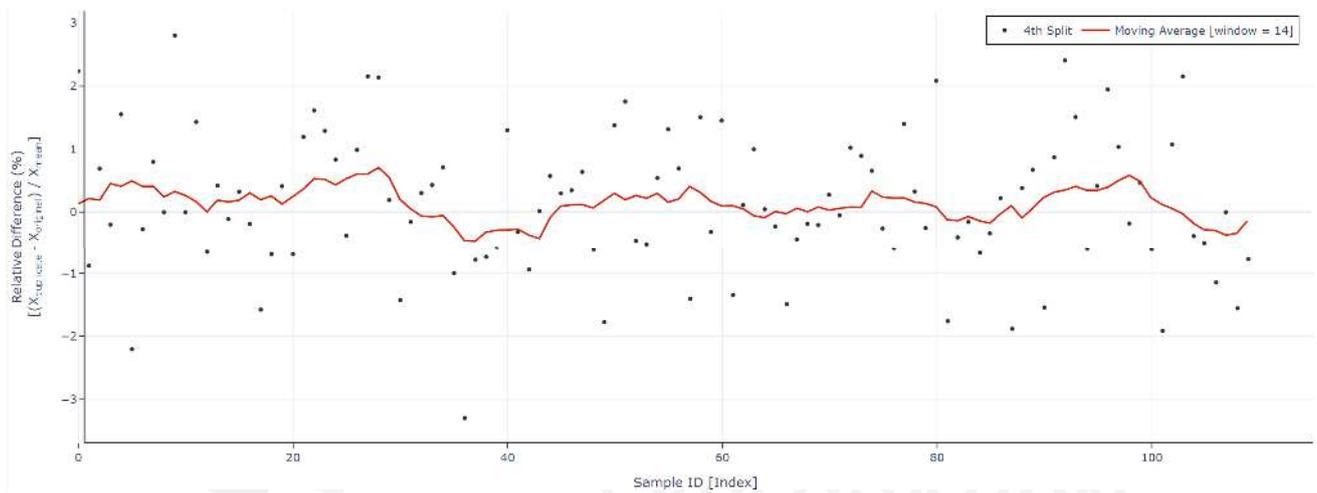


Figure 51: RD Fe pXRF P1 fifth split, demonstrating the relative differences in grades between original and repeat samples against time.

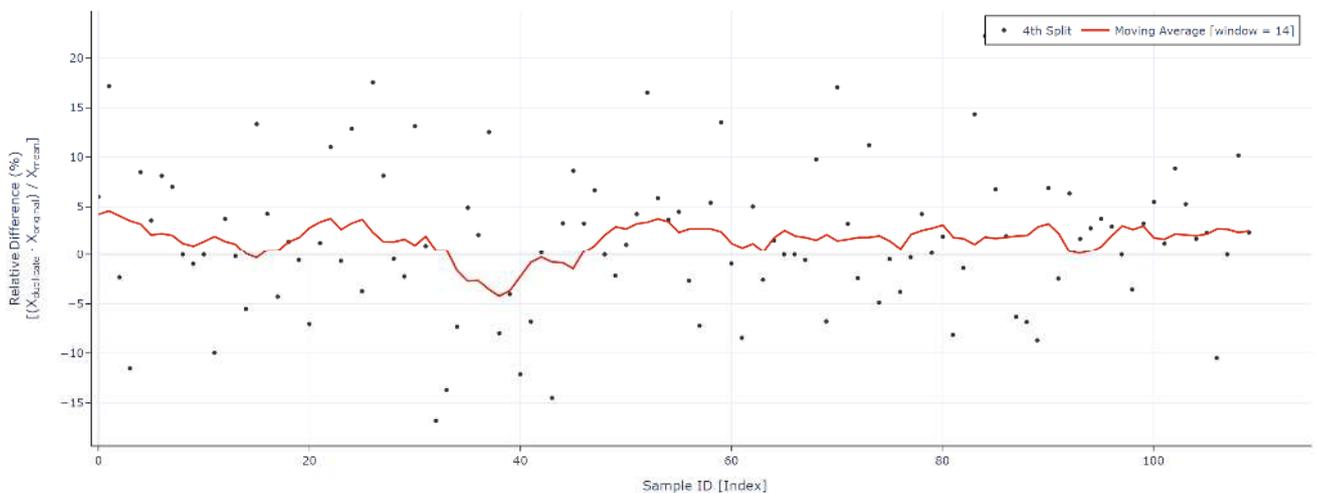


Figure 52: RD plot Zr pXRF P1 fifth split, demonstrating the relative differences in grades between original and repeat samples against time.

7.3.4.5.3 P1 Analytical (pXRF) Process

Certified reference materials (OREAS24C, OREAS232, OREAS235, OREAS239 and OREAS501B) were inserted in the sample stream for quality control during pXRF operation. Every pXRF operator started their shift with measuring the blank and five CRMs. After that, only one of the five CRMs was measured, at a frequency of 1 in 20 (the maximum frequency is 1 to 30) starting with OREAS24C. All five CRMs followed by the blank were measured again at the end of each shift. The CRM samples were inserted in the sample stream to allow post-processing correction of the data, as well as to monitor the consistency of the pXRF analytical process during the measuring process. Blanks were inserted to ensure that any contamination of the instrument was identified before samples were analysed. Replicate measurements were completed once every 20 regular samples.

The geochemical data collected with the pXRF were corrected using calibration plots after every shift (section 6.3; Figure 32). The calibration plots are based on the expected values of the CRMs plotted against the measured values of the CRMs. The gradient of the linear fit between the expected and the measured values defined the correction factor used to calibrate the collected geochemistry data. Replicate measurements were performed for 106 samples (Figure 53–Figure 55).

No step changes, trends or major deviations were observed in the replicate data, suggesting that the pXRF analytical process was in control and delivered consistent data.

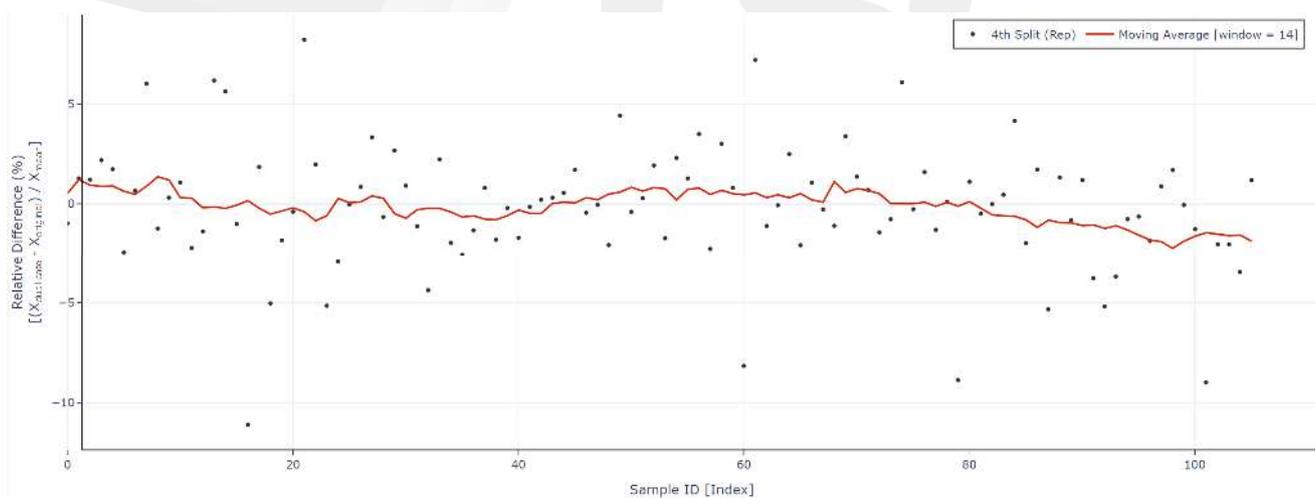


Figure 53: RD plot Ti pXRF P1 replicate data, demonstrating the relative differences in grades between original and P1 replicate analysis against time.

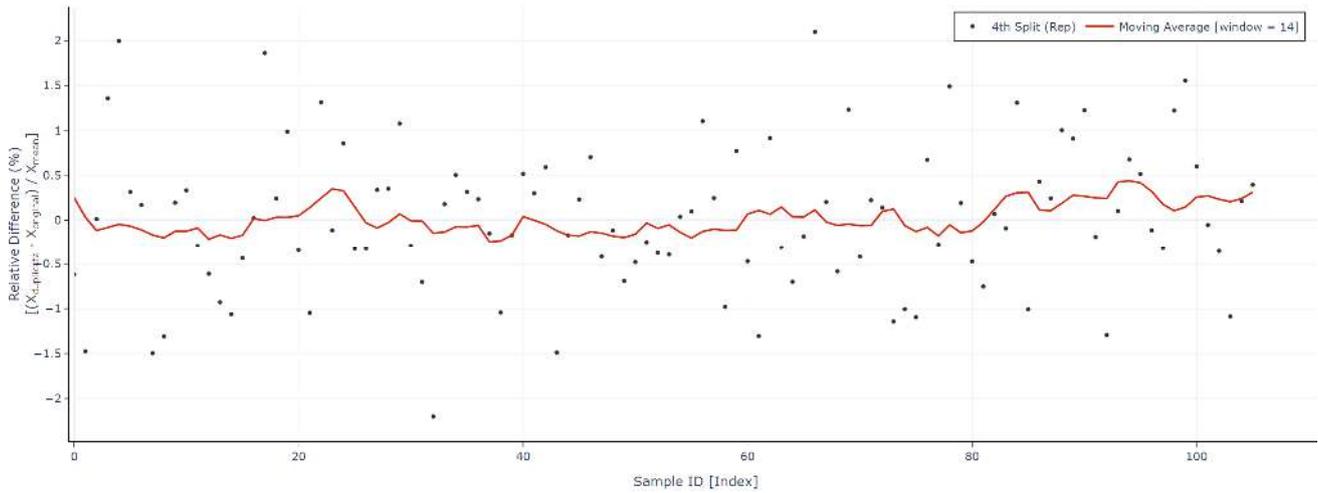


Figure 54: RD plot Fe pXRF P1 replicate data, demonstrating the relative differences in grades between original and P1 replicate analysis against time.

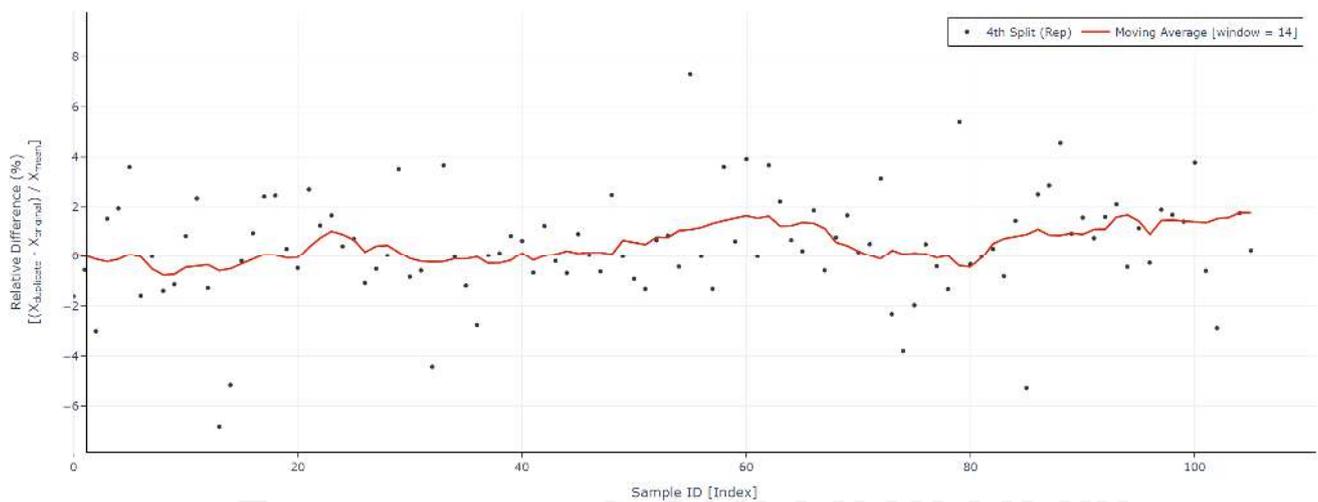


Figure 55: RD plot Zr pXRF P1 replicate data, demonstrating the relative differences in grades between original and P1 replicate analysis against time.

7.3.4.5.4 P1 Sixth Split

The ALS internal repeat data were briefly reviewed and indicated that the P1 sixth-split process provided consistent data.

7.3.4.5.5 P1 Analytical (XRF) Process

RSC did not insert CRMs into the XRF sample stream. The laboratory blank and CRM data were sighted in the laboratory reports and suggested that the XRF analytical process was in control.

7.3.4.6 Priority 2 Sub-Sample (P2)

7.3.4.6.1 P2 Fourth Split

Only five P2 fourth-split repeat samples were collected, hence there were not enough data points available to complete a statistically proper process-control analysis to determine the consistency of the splitting process.

7.3.4.6.2 P2 Analytical (SEM) Process

It was not possible to insert QC samples into the P2 analytical process. However, as part of processing the AMICS data, a geochemical composition for each sample was calculated from the measured mineral abundances in the samples, and this was used as an internal check on the chemistry of the minerals (section 6.3.3; Figure 35 and Figure 36).

7.4 Quality Acceptance Testing

7.4.1 Location

7.4.1.1 Collar Location

There were no quantitative quality data for the collar location collection process; hence, accepting the quality (accuracy and precision) of the collar location data based on statistically defined thresholds was not possible. Based on the review of processes, systems, and tools available to determine collar locations (section 7.2.1.1), including the quality control process to monitor any inconsistencies in GPS readings (section 7.3.1.1), the collar location data are considered fit for the purpose of estimation and high-confidence resource classification.

7.4.1.2 Downhole Survey Data

No downhole surveys were conducted for any of the 2022 drillholes. The Competent Person deems this appropriate given the vertical orientation of the drillholes and shallow nature of the drilling, and considers there is low risk with respect to the data quality objectives.

7.4.2 Dry Bulk Density

No dry bulk density data were collected.

7.4.3 Geological Logging

Based on the review of processes, systems, and tools available to collect geological data from the drill core (section 7.2.3), including the quality control process to monitor any inconsistencies in logging (section 7.3.3), the logging data are considered fit for the purpose of supporting high-confidence estimation domains for use in resource estimation.

7.4.4 Grade

7.4.4.1 Primary Sample

A practical way to check and verify the quality of a primary sample is to validate it against, or compare it with, a sample of a known grade. In simple terms, the difference between the measured value and the 'known' value is then defined as the bias, a measure of sample quality. Precision can be benchmarked by comparing the variance in the measurements of samples with the variance in the check samples. This is the principle, for instance, behind the utility of laboratory CRMs.

For the *primary* sample, i.e. the sample collected at the drill bit, such options do not readily exist. The next practical way to determine the quality of the primary sample is to compare it with a sample of better quality, taken at the same location.

Practically, in unconsolidated ground conditions, sonic drill core is regarded as providing the highest-quality sample and is often used to check the quality of lower-quality drilling or sampling methods, usually AC or reverse circulation (RC) drilling. This process is often called 'twin drilling', but it can be used anywhere where a sample from drill type A is close enough to a sample from drill/sample type B. At the Barrytown Farms Block, no twin drilling took place.

As a back-door check for primary sample quality, the primary sample weight can be used as a proxy to investigate impact on the grade distribution. Noting that some trends were visible in the quality control data (section 7.3.4.1), and that the site visit had indicated some challenges with wet ground (section 7.2.4.1), it is important to review the impact of variations in primary dry sample weight on grade. RSC assessed recovery of the primary sample and its relation to grade by reviewing dry sample weights obtained at NZIMMR. An approximate sample recovery was calculated by using dry weights, derived HM content, and assuming a 28% sample porosity that was constrained by review of in-situ density data from four holes at TiGa's Coates South Block. Based on this calculation, ~73% of the samples had >50% recovery. Samples with a low recovery were typically topsoil. Average recovery was 20% for the first metre, 37% for the second metre, 51% for the third metre, 60% for the fourth metre, and 70% for the fifth metre, illustrating increasing recoveries with depth.

RSC reviewed the relationship between dry sample weight and HM content. A relationship between sample weight and concentrations of Ti, Zr, Fe, garnet, ilmenite, and zircon was not evident, providing reinforcement for aircore drilling to support the high-confidence classification categories (Figure 56–Figure 58). Based on reviewing sample weights and grade data, there appears to be no direct correlation between sample weight and grade, suggesting that while recoveries were likely poor overall, grades seemed to be relatively unaffected. The Competent Person is of the opinion that the quality of the primary aircore samples is fit for purpose with respect to the data quality objective. The very poor recoveries in the first couple of metres of drilling were considered in the classification of the MRE.

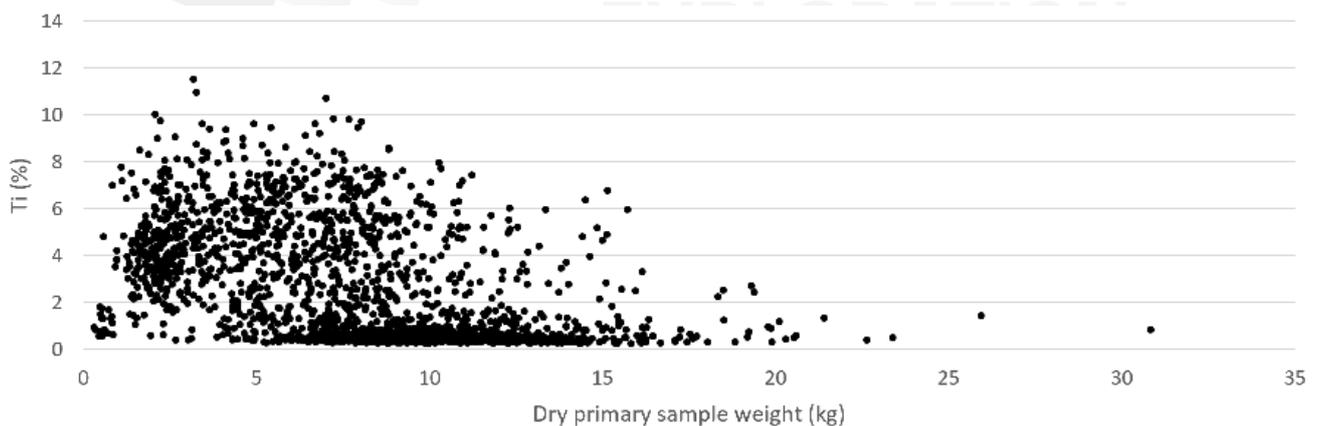


Figure 56: Ti grade (pXRF) vs dry primary sample weight plot.

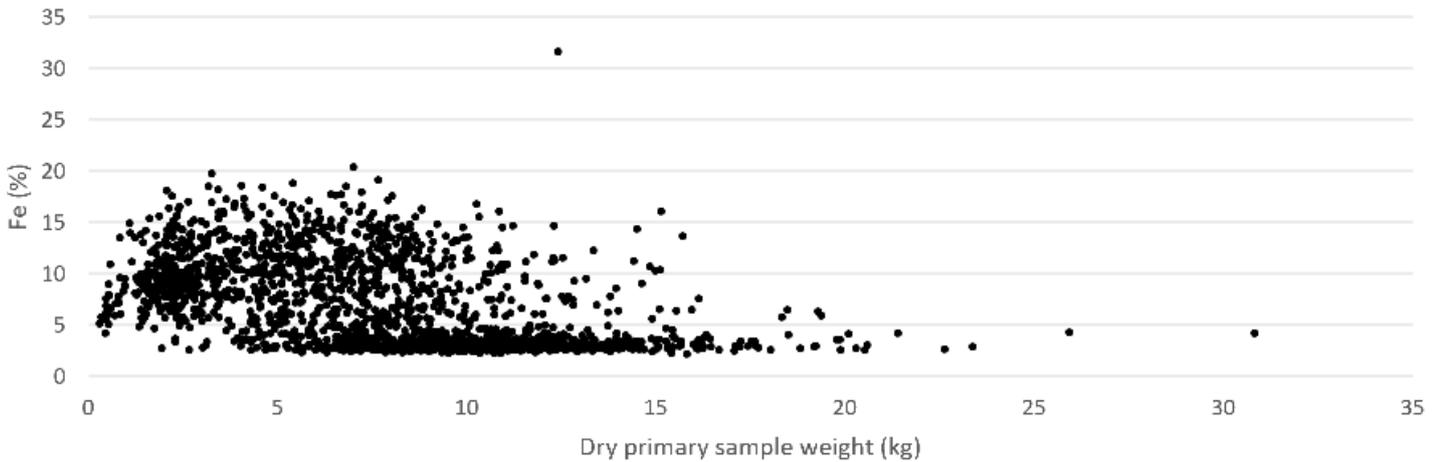


Figure 57: Fe grade (pXRF) vs dry primary sample weight plot.

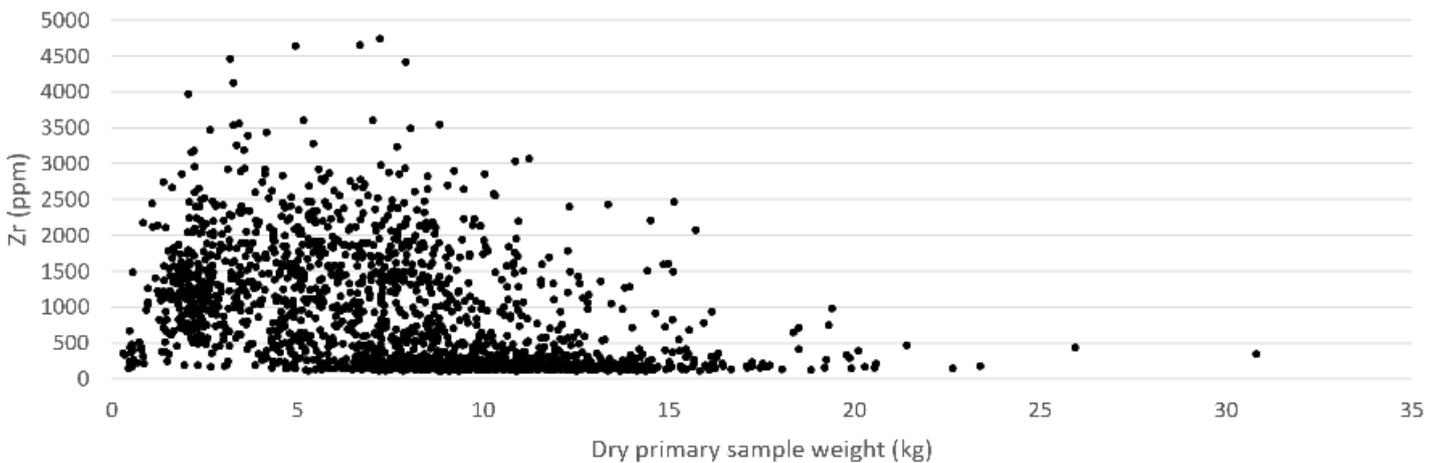


Figure 58: Zr grade (pXRF) vs dry primary sample weight plot.

7.4.4.2 First Split

The data quality of the first (rotary) splitting stage was determined following the determination that these processes were appropriately controlled and provided consistent data (section 7.3.4.2).

Scatter and QQ plots of the first-split repeats (n=90) are presented in Figure 59, Figure 60 and Figure 61 for pXRF Ti, Fe and Zr data, respectively. The scatterplots indicate very low scatter. This is also reflected in the precisions (measured by the coefficient of variation⁶) of ~4.4%, ~3.2% and ~7.1% for Ti, Fe, and Zr, respectively. A coefficient of variation (CV) of 5–10% is similar to the expected range for field duplicates from detrital ilmenite sand deposits, as calculated by Abzalov (2008). The QQ plots do not indicate significant bias, and ranked Wilcoxon tests confirm that there are no statistically significant biases at 95% confidence.

The data resulting from the first split are accurate and highly precise, and therefore fit for the purpose of resource estimation in high-confidence classification categories.

⁶ Root mean square CV Stanley, C. R., and Lawie, D., 2007, Average relative error in geochemical determinations: Clarification, calculation, and a plea for consistency. *Exploration and Mining Geology*, 16, 267–275; Abzalov, M., 2008, Quality control of assay data: a review of procedures for measuring and monitoring precision and accuracy. *Ibid.*, 17, 131–144.

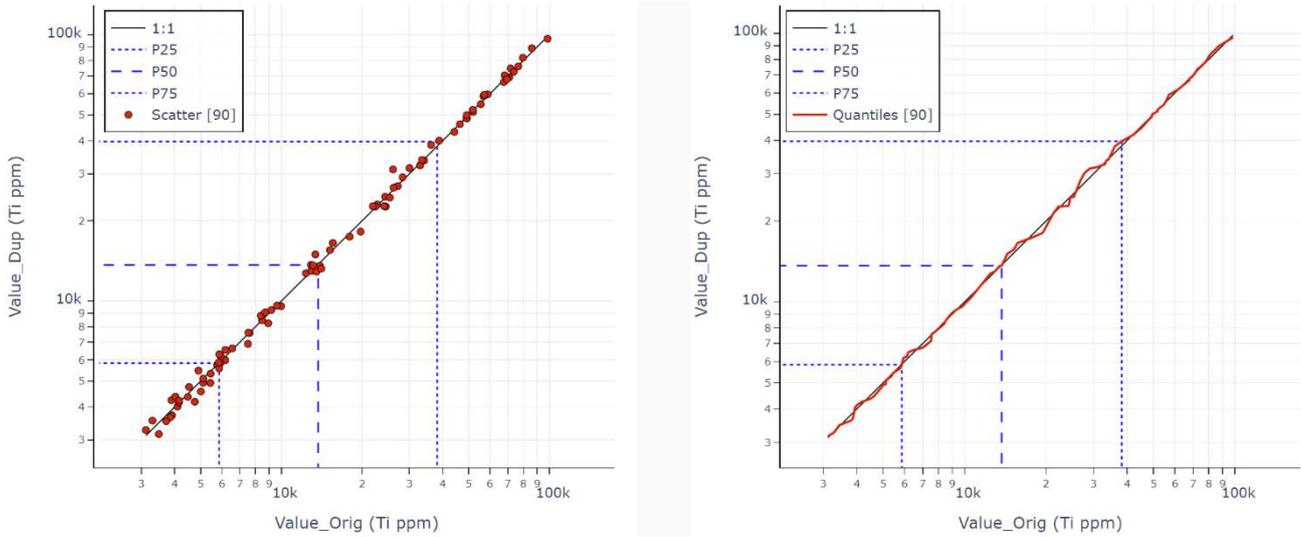


Figure 59: Scatter and QQ plot Ti pXRF first-split repeats.

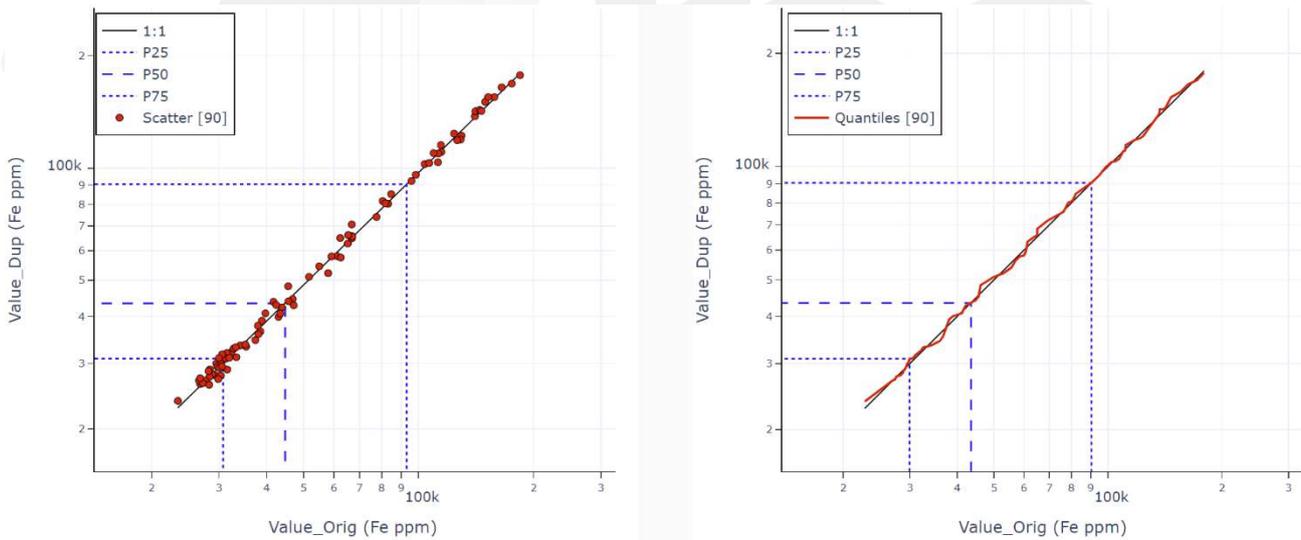


Figure 60: Scatter and QQ plot Fe pXRF first-split repeats.

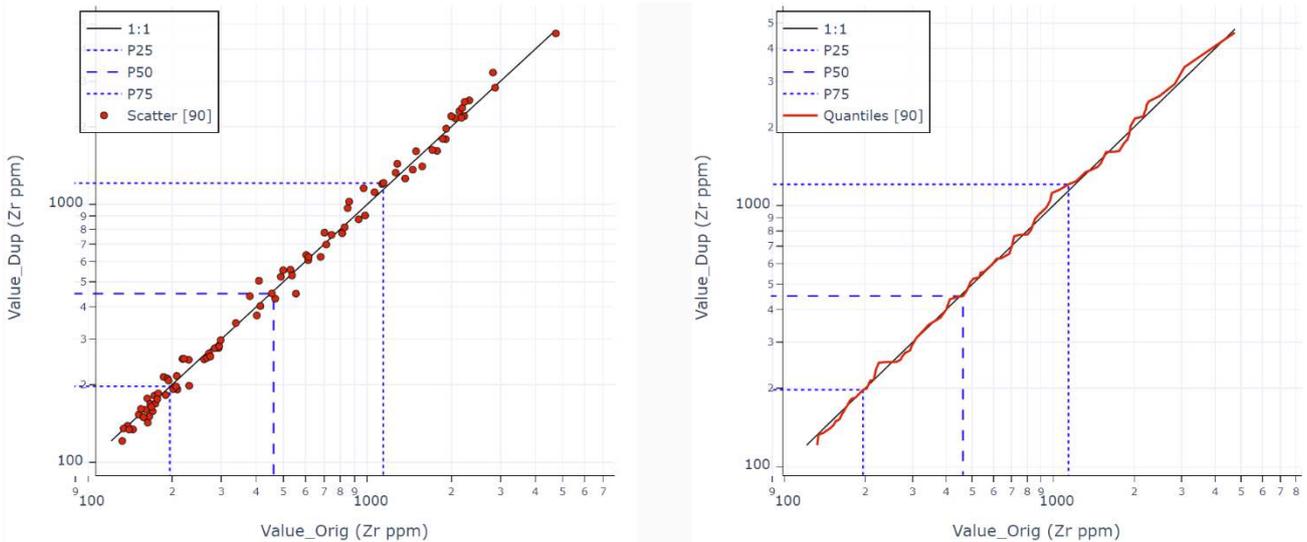


Figure 61: Scatter and QQ plot Zr pXRF first-split repeats.

7.4.4.3 Second Split

Quality control data were not available for the second split; hence, the quality of the second split cannot be quantitatively determined. Since wet screening is an uncomplicated, straightforward process that was carried out at a commercial laboratory, the Competent Person considers the risk associated with the second-split process to be low and the data fit for purpose.

7.4.4.4 Third Split

The data quality of the third splitting stage was assessed following the determination that these processes provided consistent data (section 7.3.4.4).

Scatter and QQ plots of the third-split repeat data (n=83) are presented in Figure 62, Figure 63 and Figure 64 for pXRF Ti, Fe and Zr data, respectively. The scatterplots indicate very low scatter. This is also reflected in the precisions (CV⁶) of ~3.9%, ~2.6% and ~6.7% for Ti, Fe and Zr, respectively. These are in range with expectations for the mineralisation style and comminution stage. The QQ plots do not indicate significant bias, and ranked Wilcoxon tests confirm that there are no statistically significant biases at 95% confidence.

The data resulting from the third split are accurate and highly precise, and therefore fit for the purpose of resource estimation in high-confidence classification categories.

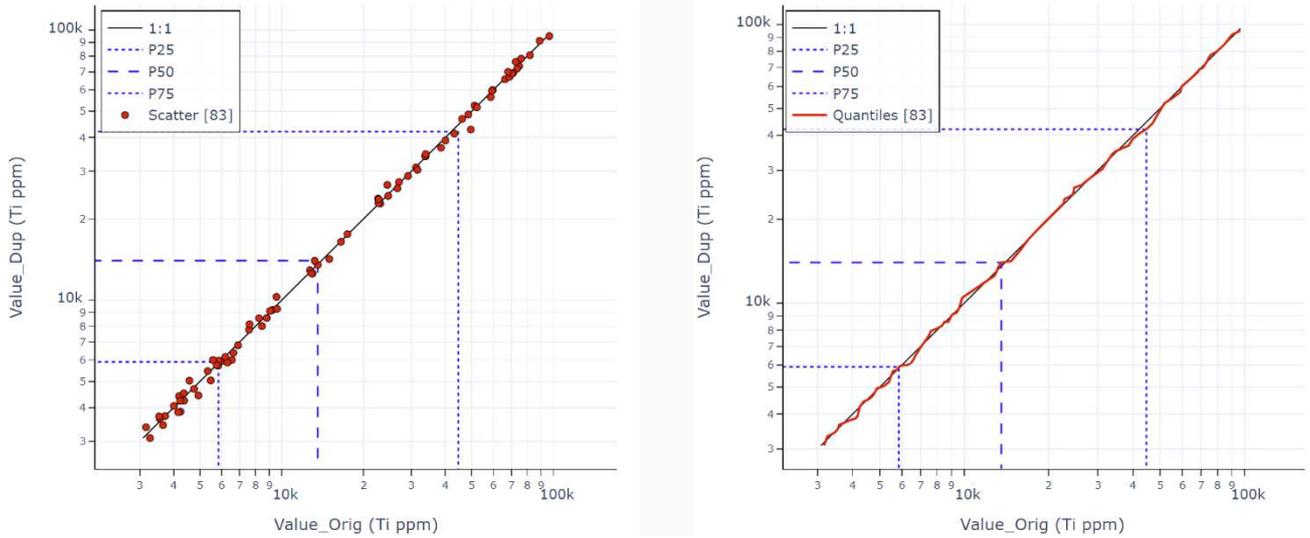


Figure 62: Scatter and QQ plot Ti pXRF third-split repeats.

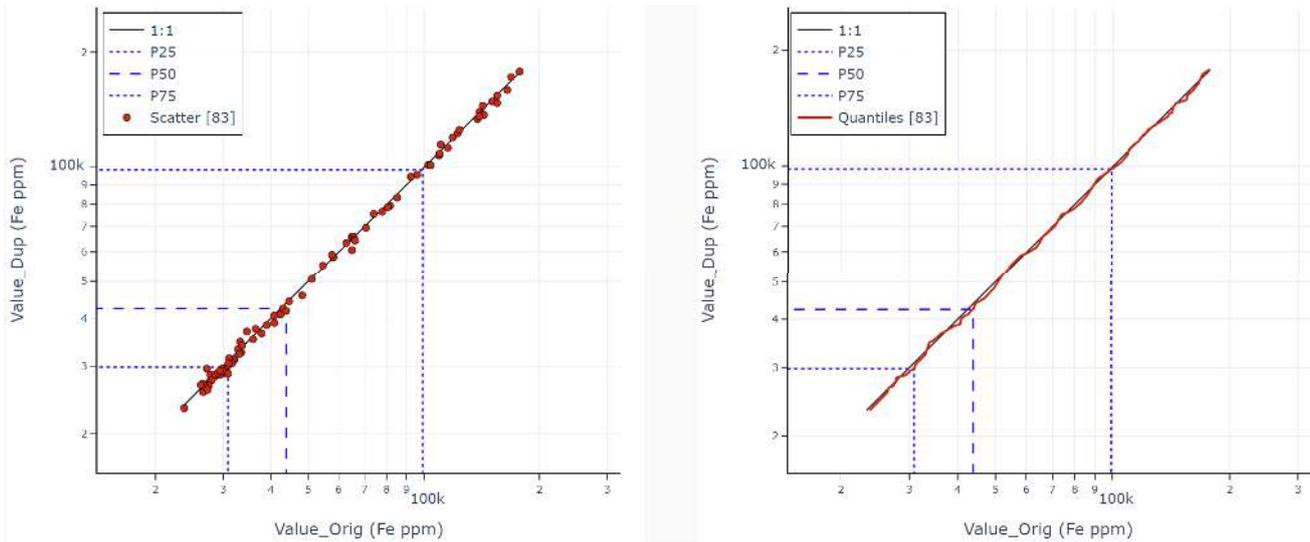


Figure 63: Scatter and QQ plot Fe pXRF third-split repeats.

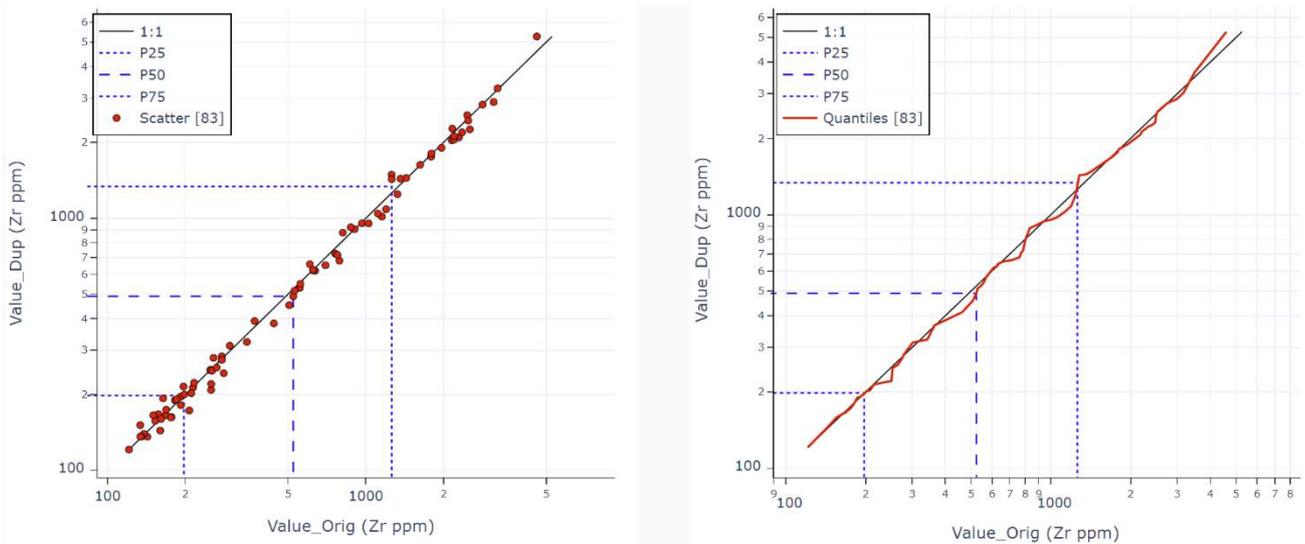


Figure 64: Scatter and QQ plot Zr pXRF third-split repeats.

7.4.4.5 Priority 1 Sub-Sample (P1)

7.4.4.5.1 P1 Fourth Split

The data quality of the fourth splitting stage was assessed following the determination that these processes provided consistent data (section 7.3.4.5.1).

Scatter and QQ plots of the fourth-split repeat data (n=82) are presented in Figure 65, Figure 66 and Figure 67 for pXRF Ti, Fe and Zr data, respectively. The scatterplots indicate very low scatter. This is also reflected in the precisions (CV⁶) of ~2.5%, ~1.0% and ~6.6% for Ti, Fe and Zr, respectively. These are in range with expectations for the mineralisation style and comminution stage. The QQ plots do not indicate significant bias, and ranked Wilcoxon tests confirm that there are no statistically significant biases at 95% confidence.

The data resulting from the P1 fourth split are accurate and highly precise, and therefore fit for the purpose of resource estimation in high-confidence classification categories.

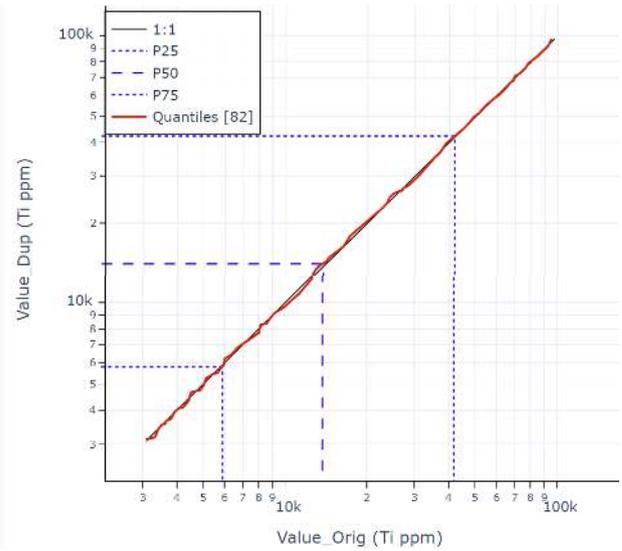
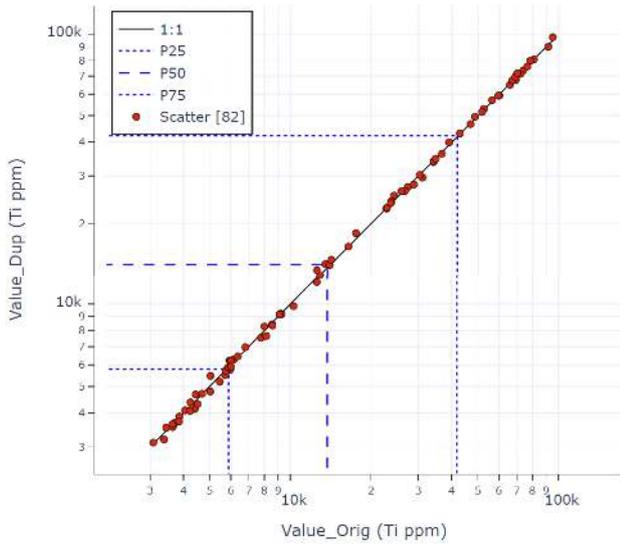


Figure 65: Scatter and QQ plot Ti pXRF P1 fourth-split repeats.

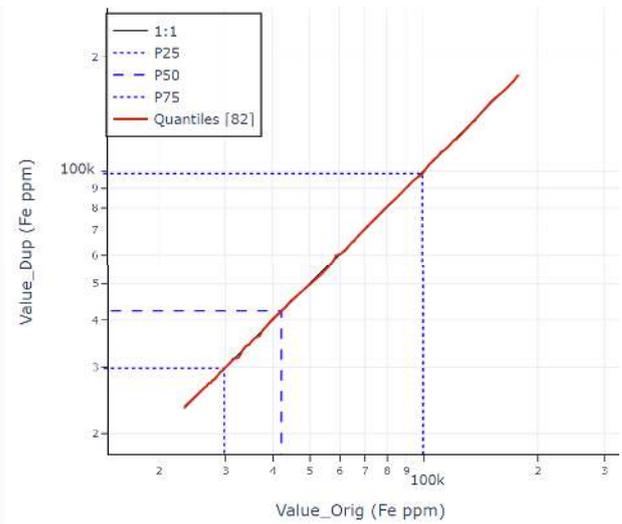
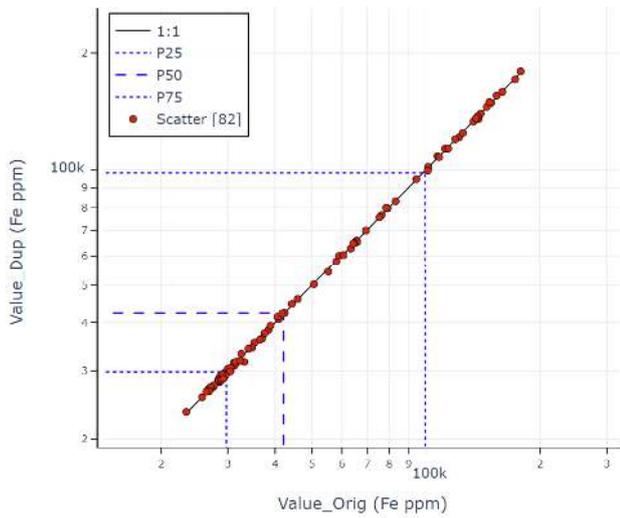


Figure 66: Scatter and QQ plot Fe pXRF P1 fourth-split repeats.

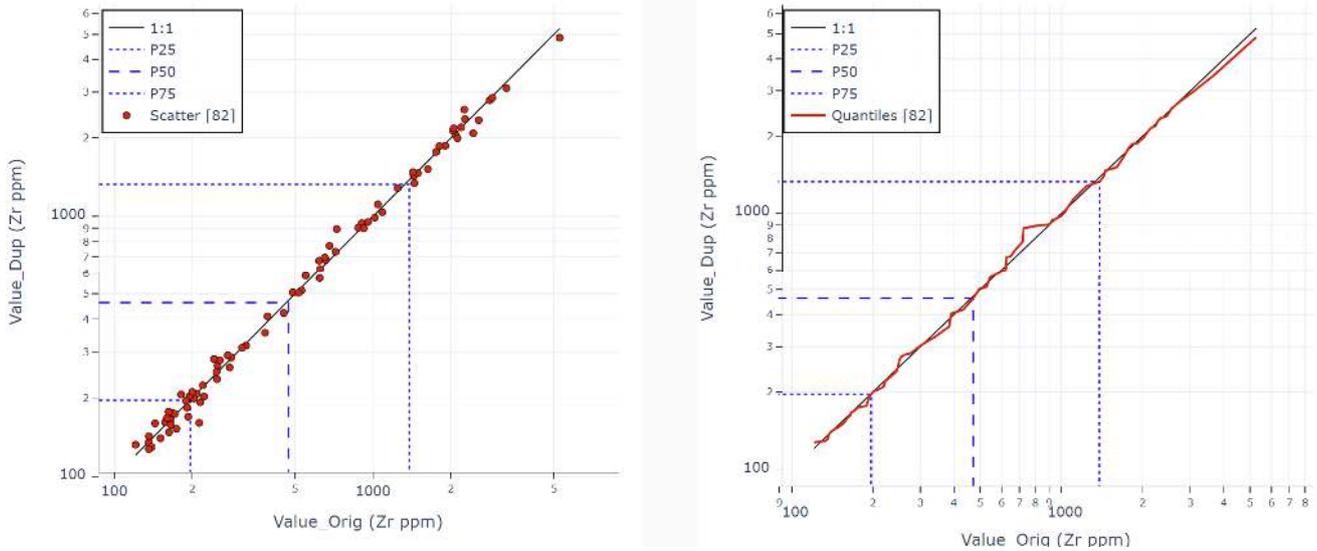


Figure 67: Scatter and QQ plot Zr pXRF P1 fourth-split repeats.

7.4.4.5.2 P1 Fifth Split

The data quality of the P1 fifth splitting stage was assessed following the determination that the process provided consistent data (section 7.3.4.5.2).

Scatter and QQ plots of the P1 fifth-split repeat data (n=110) from pXRF Ti, Fe and Zr data are presented in Figure 68, Figure 69 and Figure 70. The scatterplots indicate very low scatter. This is also reflected in the precisions (RMS CV⁶) of ~3.6%, 1.0% and ~6.6% for Fe and Ti respectively. These are in range with expectations for the mineralisation style and comminution stage. The QQ plots do not indicate significant relative bias, and ranked Wilcoxon tests confirm no statistically significant bias at 95% confidence.

The data resulting from the P1 fifth split are accurate and highly precise, and therefore fit for the purpose of resource estimation in high-confidence classification categories.

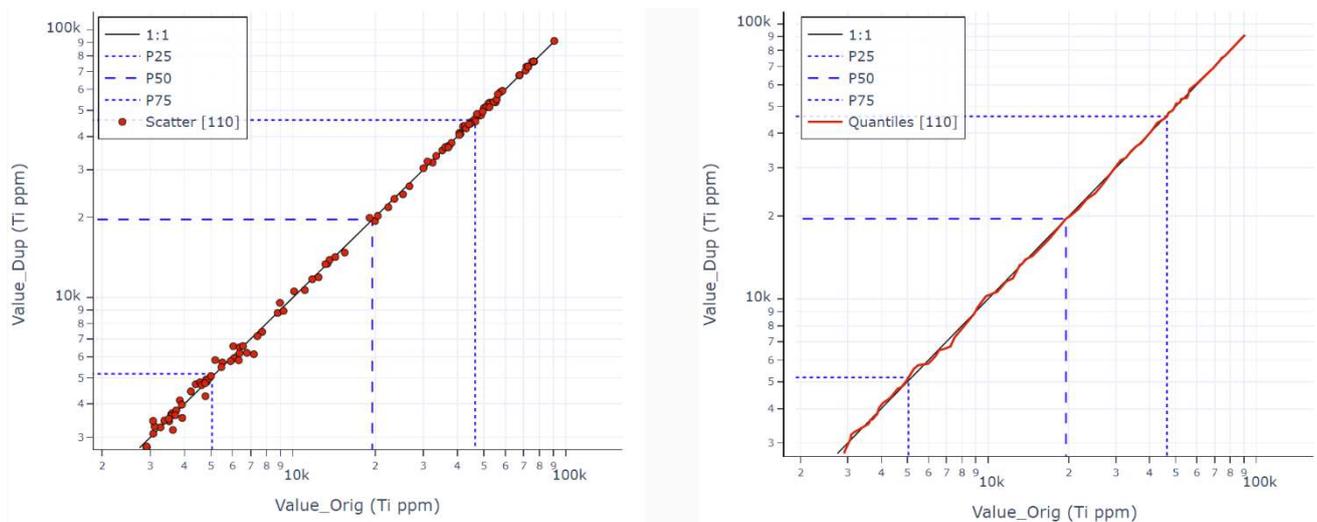


Figure 68: Scatter and QQ plot Ti pXRF P1 fifth-split repeats.

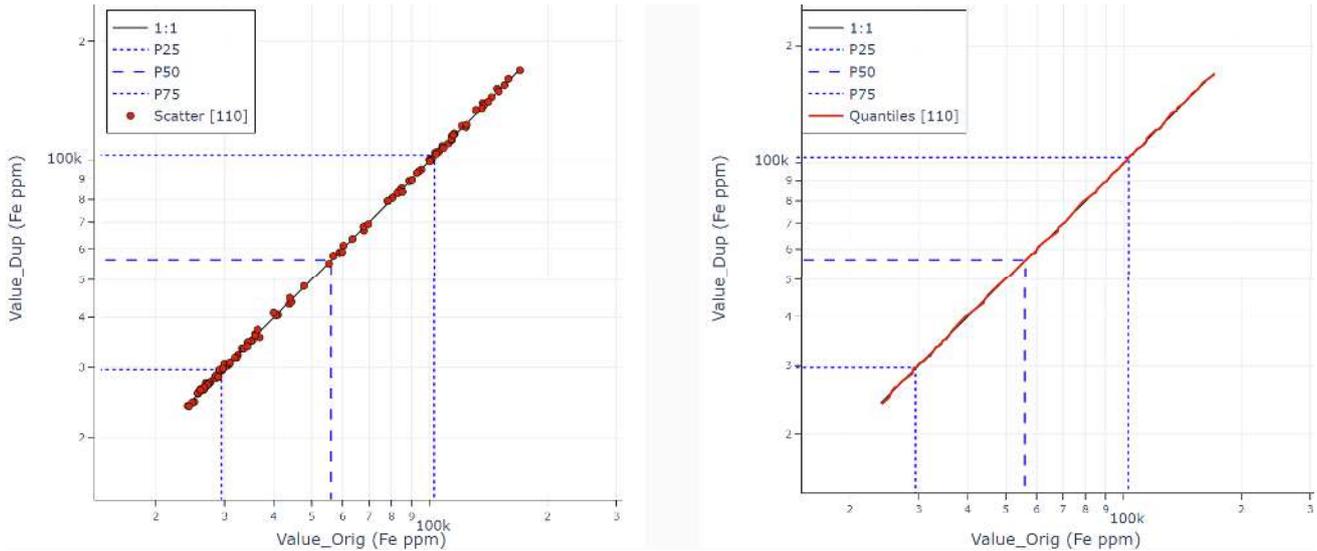


Figure 69: Scatter and QQ plot Fe pXRF P1 fifth-split repeats.

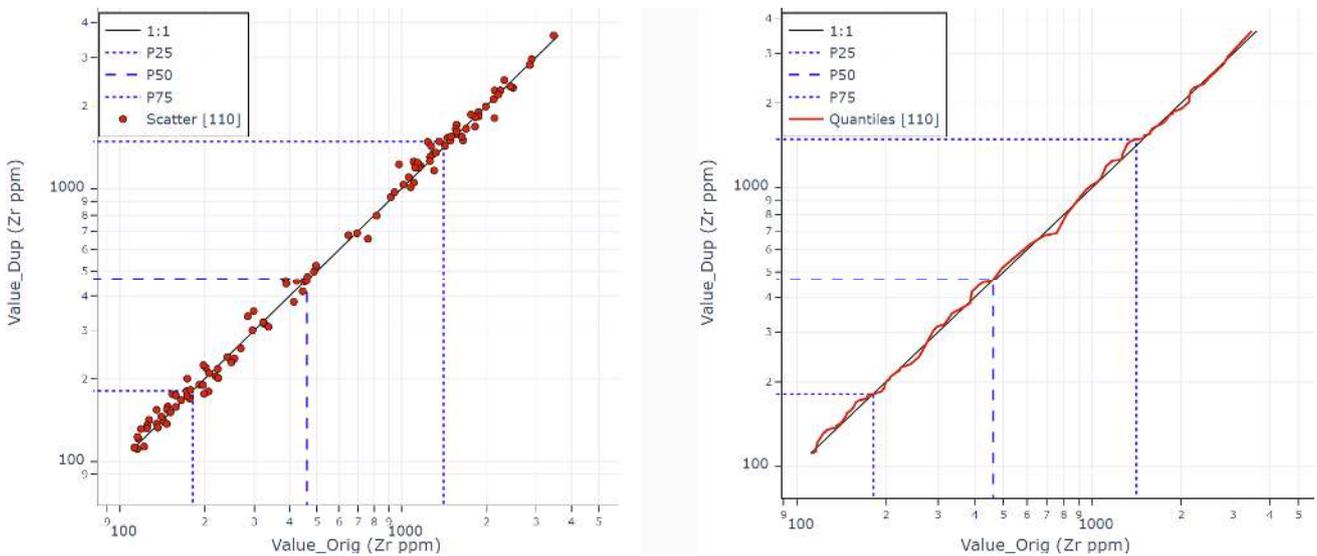


Figure 70: Scatter and QQ plot Zr pXRF P1 fifth-split repeats.

7.4.4.5.3 P1 Analytical Process (pXRF)

The data quality of the P1 analytical process was assessed following the determination that the analytical process provided consistent data (section 7.3.4.5.3).

Scatter and QQ plots of the pXRF P1 replicate data (n=106) for Ti, Fe and Zr are presented in Figure 71, Figure 72 and Figure 73, respectively. The scatterplots indicate very low scatter. This is also reflected in the precisions (RMS CV⁶) of ~2.8%, 0.7% and ~2.1% for Ti, Fe and Zr, respectively. These are in range with expectations for the mineralisation style and comminution stage. The QQ plots do not indicate significant relative bias, and ranked Wilcoxon tests confirm no statistically significant bias at 95% confidence.

The data resulting from the P1 pXRF analytical procedure are accurate and highly precise, and therefore fit for the purpose of resource estimation in high-confidence classification categories.

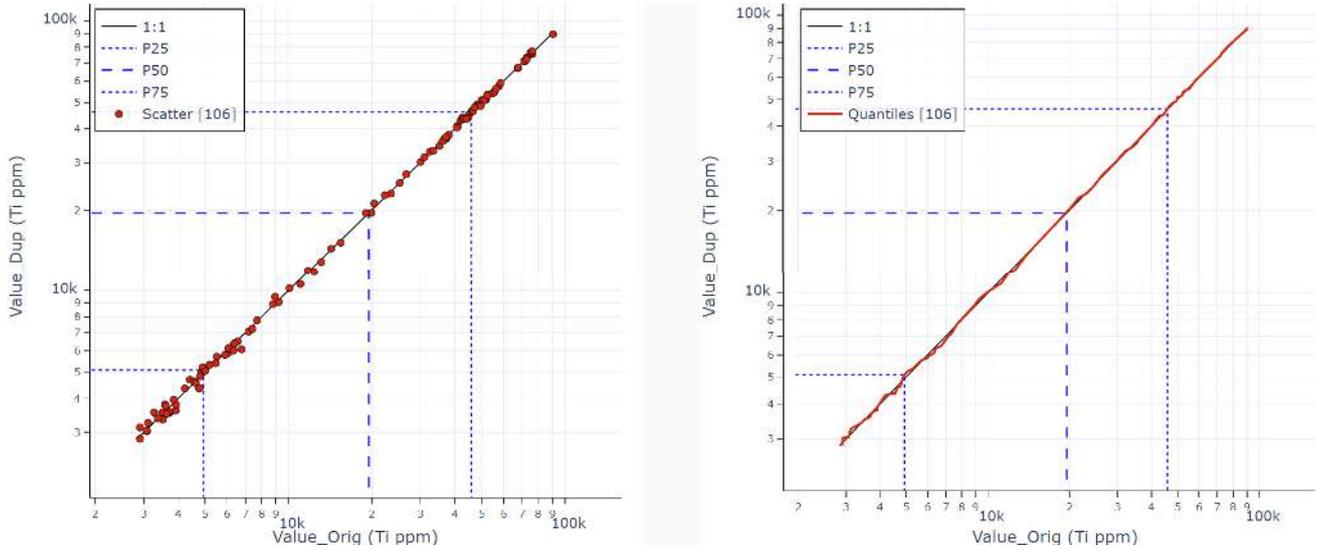


Figure 71: Scatter and QQ plot Ti pXRF P1 replicate analyses.

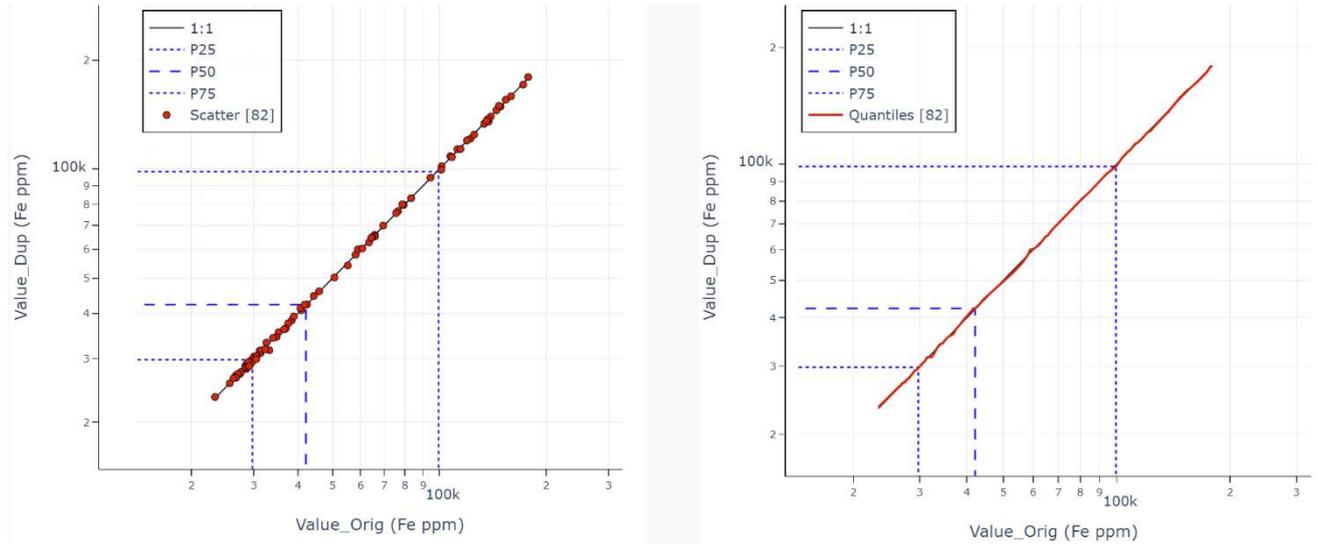


Figure 72: Scatter and QQ plot Fe pXRF P1 replicate analyses.

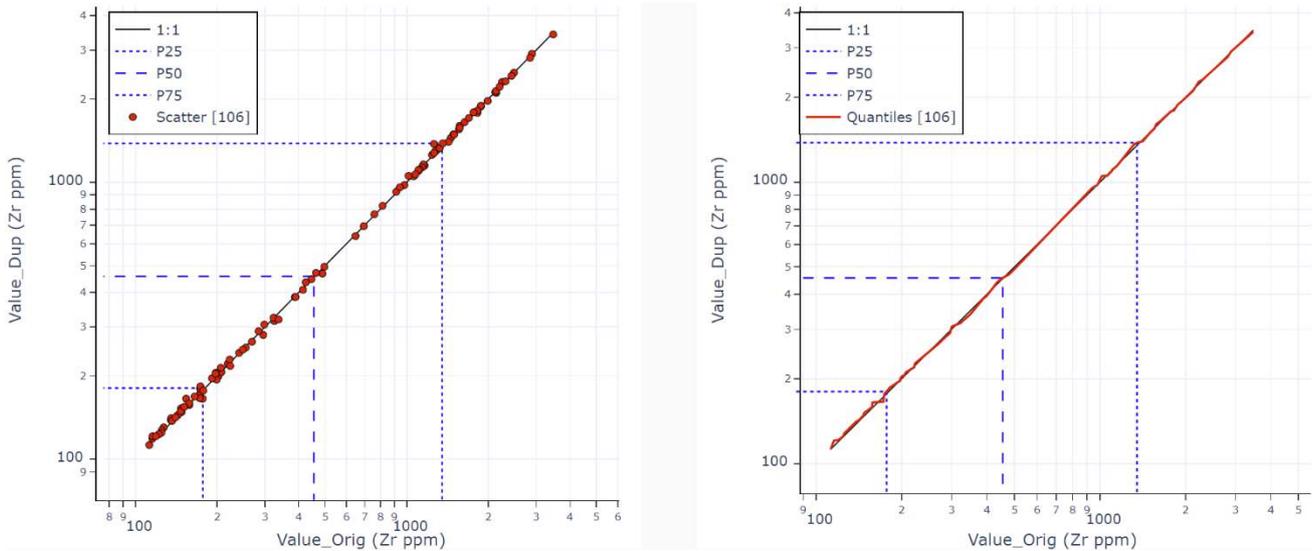


Figure 73: Scatter and QQ plot Zr pXRF P1 replicate analyses.

To validate the pXRF results, a total of 60 samples were sent to ALS Brisbane for XRF analysis. Scatter and QQ plots of the pXRF-XRF check data for Ti, Fe and Zr are presented in Figure 74, Figure 75 and Figure 76, respectively. The scatter plots indicate low (for Ti and Fe) and moderate (for Zr) scatter. This is also reflected in the precisions (RMS CV⁶) of ~5.3%, 4.8% and ~16% for Ti, Fe and Zr, respectively. These precisions are in range with expectations for the mineralisation style, comminution stage and analytical methods used.

The QQ plots for Fe and Zr demonstrate a pXRF high bias at low concentrations (<0.35% Fe and <500 ppm Zr). In the case of Fe, a ranked Wilcoxon test confirms that this bias is statistically significant at 95% confidence. The QQ plot for Ti demonstrates a more systematic (i.e. across the entire grade range) pXRF high bias averaging ~4%. A ranked Wilcoxon test confirms that this bias is statistically significant at 95% confidence.

For most elements, the pXRF geochemical data slightly over-estimate the laboratory-derived geochemistry data; however, the precision is very good — appropriate sample preparation and calibration against standards have produced a high-quality pXRF dataset with a minor (~4%) high bias. Furthermore, the linear regression model to derive mineralogy from geochemistry is trained on the entire geochemical dataset and the absolute values do not impact the model performance. The Competent Person therefore considers the calibrated pXRF geochemical data fit for the purpose of resource estimation in high-confidence classification categories.

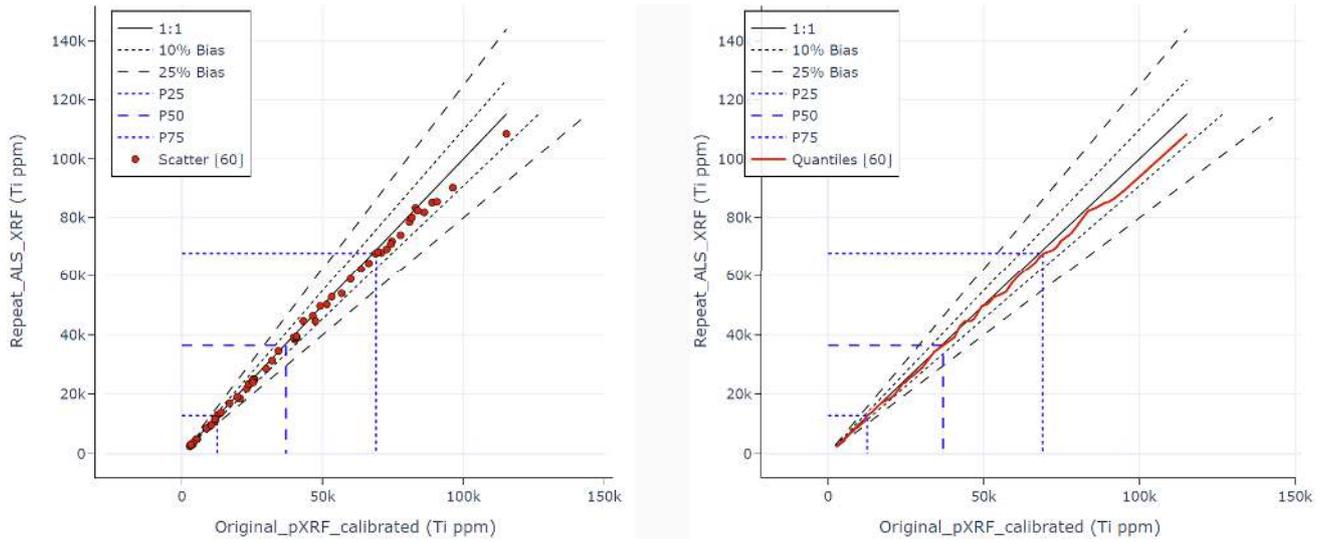


Figure 74: Scatter and QQ plot Ti pXRF and ALS XRF repeat analyses.

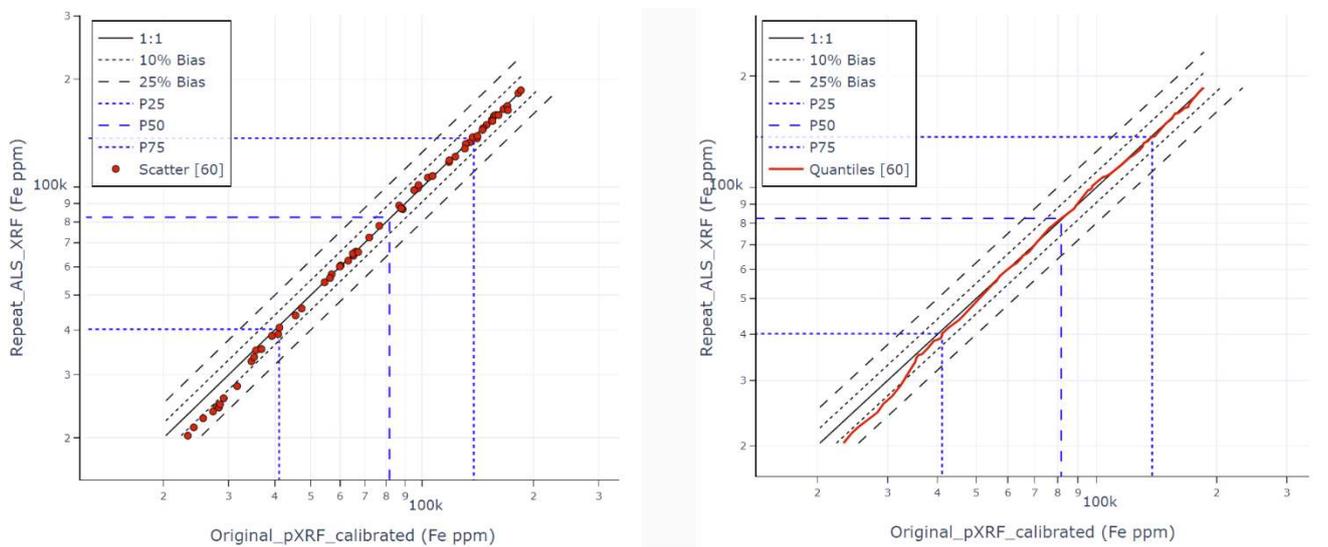


Figure 75: Scatter and QQ plot Fe pXRF and ALS XRF repeat analyses.

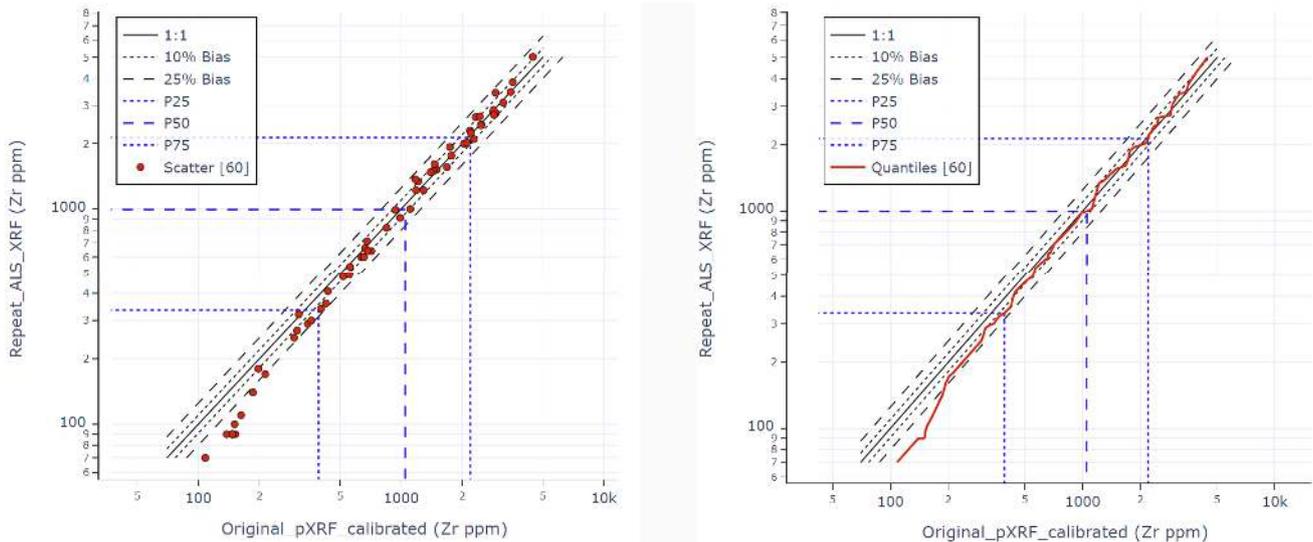


Figure 76: Scatter and QQ plot Zr pXRF and ALS XRF repeat analyses.

7.4.4.5.4 P1 Sixth Split

The accuracy and precision of the scooping process at ALS Brisbane were not determined. Based on the accreditation of the laboratory, the use of industry-standard processes, systems, and tools (section 7.2.4.5.5), including the laboratory's quality control processes to monitor inconsistencies in the splitting (section 7.3.4.5.3), the P1 sixth split data are considered fit for the purpose of estimation and high-confidence resource classification.

7.4.4.5.5 P2 Analytical Process (XRF)

The accuracy and precision of the XRF analytical process at ALS Brisbane were not determined. However, the laboratory's quality data suggested that the analytical process was fit for purpose, and delivered accurate and precise data appropriate for estimation and high-confidence resource classification.

7.4.4.6 Priority 2 Sub-Sample (P2)

7.4.4.6.1 P2 Fourth Split

Insufficient quality data were available for the P2 fourth split; hence, the quality of the P2 fourth split cannot be quantitatively determined. Based on the highly trained personnel and quality operating procedures (7.2.4.6.1), the Competent Person considers the P2 fourth-split data fit for the purpose of estimation and high-confidence resource classification.

7.4.4.6.2 P2 Analytical Process (SEM)

RSC analysed 70 samples for SEM-based automated mineralogy. The data, collected via automated mineralogy with the SEM, were used to guide mineral abundance modelling from the calibrated pXRF data.

Scatter and QQ plots of the paired pXRF and automated mineralogy data (n=57) are presented in Figure 35 and Figure 36. The scatterplots indicate very low scatter. The QQ plot suggests bias (~10%) towards the automated mineralogy data; however, the pXRF data were in general found to only have a minor bias (section 7.4.4.5.5) when compared with the XRF data. Based on the overall model performance results (sections 6.3.3), RSC considers the SEM-derived mineral abundances

in the untrained data to be highly precise and sufficiently accurate for the purpose of estimation and high-confidence resource classification.

7.5 Data Verification

Data verification is the process of checking and verifying hard-copy logs and digital records for accuracy, ensuring the data on which MREs are based can be linked from digital databases or records to log sheets and drilling or sampling intervals. It is an additional verification process to determine that QA and QC processes have been effectively applied, and that these were working to assure and control the quality of the data. Data verification is carried out after samples have been collected, assays have been returned, and data have been stored in the database. Where relevant, data verification may also include check sampling carried out by the Competent Person, especially if SOPs are not available or difficult to audit, and QC data are limited to demonstrate processes were in control.

7.5.1 Site Visit

Mr Sean Aldrich completed a site visit to the Barrytown Flats area from 12–13 May 2022 and reviewed the project geology, drilling and sampling procedures, samples, drill sites, and processing facilities. Mr Aldrich was granted full access to samples, certificates, and databases. At the time of Mr Aldrich's visit, only data and samples collected at Coates South Block were available. Since the Barrytown Farms Block drilling, sampling and logging procedures were completed by the same operators and staff directly following the Coates South Block drilling, the outcomes of the site visit are considered to also apply to the Barrytown Farms Block drilling.

The objectives of the site visit included: auditing drilling, handling and sampling procedures, examination of sampling and observation of mineralised intercepts, and a brief audit of the NZIMMR preparation laboratory in Greymouth (section 7.2). However, the NZIMMR laboratory was not processing samples during the site visit. No verification samples were collected during the site visit. The locations of the points of interest visited during the site visit are presented in Table 17.

7.5.1.1 Collar Locations

During the site visit, the location data of a selection of collars were checked using a handheld GPS. The locations captured generally match with what is recorded in the database (Table 17).

Table 17: Verification of collar locations.

Drillhole ID	Database Easting	Database Northing	Check Easting	Check Northing	Difference Easting (m)	Difference Northing (m)
TAC142	1461386.3	5326731.5	1461385	5326731	1.3	0.5
TAC143	1461401.0	5326724.1	1461401	5326719	0	5.1
TAC144	1461438.5	5326691.7	1461440	5326692	-1.5	-0.3
TAC145	1461467.0	5326681.3	1461465	5326685	2	-3.7
TAC146	1461482.6	5326676.9	1461484	5326680	-1.4	-3.1
TAC147	1461504.5	5326679.0	1461506	5326680	-1.5	-1
TAC148	1461524.6	5326679.6	1461525	5326681	-0.4	-1.4
TAC149	1461541.0	5326680.3	1461545	5326681	-4	-0.7
TAC150	1461564.1	5326681.8	1461564	5326681	0.1	0.8

7.5.1.2 Geological Logging

During the site visit, several aircore drillholes were relogged by Mr Aldrich; the logs were found to be comparable with the logs recorded in the database. Mr Aldrich observed that the overburden was easily recognisable and separated from the mineralised domain by a distinct boundary. The mineralised domain consisted of grey to dark-grey fine sand. The HM assemblage of the mineralised domain was difficult to assess with accuracy. The base of the mineralised domain was also distinct and marked by a decrease in HM and an increase in particle size. The overburden, the mineralised domain and their boundaries could easily be interpreted from photographs taken of the sample board and chip trays.

7.6 Security & Chain of Custody

7.6.1 Sample Storage, Security & Chain of Custody

Following logging, samples were batched into polyweave bulka bags in groups of 40–60 samples. For the 2022 drilling, aircore samples were briefly stored on site before transportation to the sample preparation lab at NZIMMR. A locked gate restricts access to the site. Alton Drilling staff transferred samples from the rig to the storage area multiple times a day.

In the sample storage area, samples were unloaded and laid out for logging. Following logging, samples were recorded and then closed with a zip tie with a metal tag labelled with the sample number. An additional metal tag was placed inside the sample bag. The polyweave sample bags were placed in batches into large polyweave bulka bags which were then closed, ready for transportation. The site was securely locked overnight to prevent third-party access.

NZIMMR laboratory staff picked the samples up from site and transported them directly to their facility. Samples were stored according to batch at the facility, both indoors and outdoors, awaiting sample preparation. Samples stored outdoors were covered in tarpaulins for protection from rainfall. Digital sample submission forms, including sample processing instructions,

were sent directly to NZIMMR. NZIMMR used a spreadsheet to record sample processing data, and processed samples in batch order. The spreadsheet was maintained by the lead process engineer and periodically emailed to RSC.

7.6.2 Priority Sub-Split Samples

P1 sub-split samples were sent in groups of batches to SGS Westport, where they were logged into SGS's sample tracking system throughout the subsequent processing. SGS Westport prepared P1 pulps for analysis by pXRF. Samples were sent by registered courier to RSC Wellington and sample submission lists accompanied these samples in hard copy format.

P2 sub-split samples were stored securely at NZIMMR, and then transported by NZIMMR staff to TiGa's secure storage facility in Greymouth awaiting selection for analysis. NZIMMR staff selected samples to send by registered courier to the Middle Earth Petrographics preparation facility in Christchurch. Prior to analysis, RSC staff hand-couriered the prepared SEM samples to the SEM facility in Perth.

P1 pulp samples were retained in RSC Wellington in a secure locked office following pXRF analysis. Samples selected for XRF analysis were sent by registered courier, with accompanying sample submission forms, to ALS, Brisbane for analysis.

7.7 **Summary Data Quality**

A summary of the QA, QC, and overall quality of the data informing the MRE is presented in Table 18.



Table 18: Summary of informing data quality for the purpose of resource estimation and classification.

Data Type	Technique	QA	QC	Accuracy	Precision	Accepted/Fit for Purpose	Comment
Location Data	Collar	Pass	Pass	Not available	Not available	Yes	Quality data not recorded, but collar location data is fit for purpose based on process review.
	Downhole	Not available	Not available	Not available	Not available	Yes	No downhole surveys. Low risk as short vertical holes.
Density	Density data calculated	Not available	Not available	Not available	Not available	Yes	Fit for purpose, based on process review.
Grade	Primary sample	Pass with minor issues	Pass with minor issues	Not available	Not available	Yes	Limited control over recovery due to nature of AC drilling.
	First split	Pass	Pass	Pass	Pass	Yes	
	Second Split	Pass	Pass	Not available	Not available	Yes	Fit for purpose, based on process review.
	Third Split	Pass	Pass	Pass	Pass	Yes	
	P1 Fourth Split	Pass	Pass	Pass	Pass	Yes	
	P1 Fifth Split	Pass	Pass	Pass	Pass	Yes	Fit for purpose, based on laboratory accreditation and QC processes.
	P1 Analytical (pXRF)	Pass	Pass	Pass	Pass	Yes	
	P1 Sixth Split	Pass	Pass	Not available	Not available	Yes	Fit for purpose, based on laboratory accreditation and QC processes.
	P1 Analytical (XRF)	Not available	Not available	Not available	Not available	Yes	Fit for purpose, based on laboratory accreditation and industry-standard processes.
	P2 Fourth Split	Not available	Not available	Not available	Not available	Yes	Fit for purpose, based on industry-standard processes.
P2 Analytical (SEM)	Not available	Not available	Not available	Not available	Yes	Fit for purpose, based on highly-trained personnel, process review and model performance.	

8 Mineral Resource Estimate for Barrytown Farms

8.1 Informing Data

8.1.1 Heavy Minerals

Abundance⁷ data for the heavy minerals — ilmenite, garnet, and zircon — were used in the mineral resource estimation. These data were derived from the 45- μ m to 2-mm screened fraction of 1-m intervals from 1,901 m of aircore drilling, completed by TiGa during 2022. The process of determining heavy mineral abundances is described in section 6.3.3.

8.2 Interpretation & Model Definition

8.2.1 Geological Domains

The interpretation of geological domains is important for providing a first-pass constraint on grade populations, and ensuring the geological controls on mineralisation guide the modelling of estimation domains.

Six geological domains were interpreted, based on downhole, lithological logging data from the 2022 drilling campaign. The following geological domains were modelled using implicit techniques (Figure 77):

- Topsoil
- Clay
- Fine Sand
- Silt
- Basement Sand
- Basement Gravel

The basal contact of the Topsoil and Clay units (top) and the contact between the Fine Sand and Basement Sand (bottom) provide a first-order constraint on mineralisation.

In the Competent Person's opinion, given the strong geological continuity, high data density, and relatively simple geology, alternative interpretations of the geology are not likely to deviate much from the current model and are unlikely to significantly impact the mineral resource.

⁷ The term abundance is used here to refer to the weight percentage of a mineral (e.g. ilmenite, garnet, or zircon). The term is used instead of grade, which is typically used to denote the concentration of a chemical element.

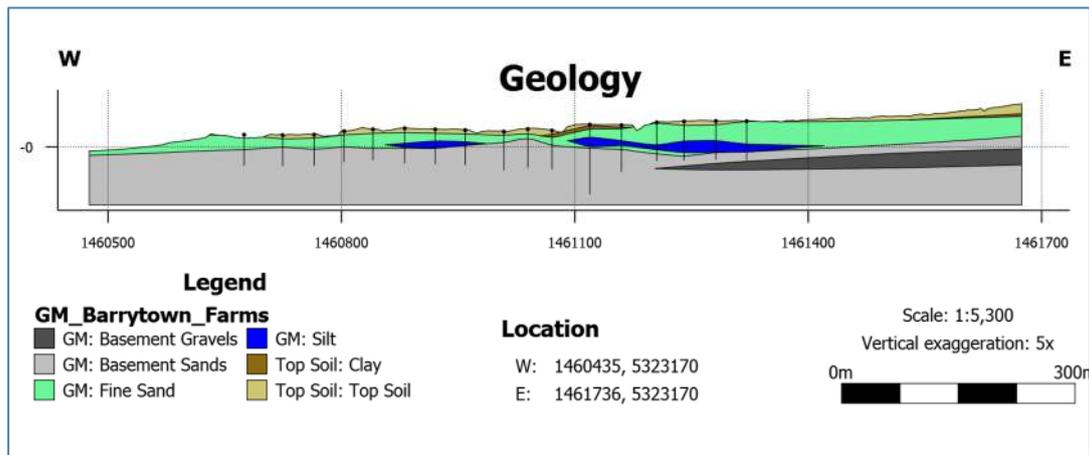


Figure 77: East–West cross-section (5,323,170N), looking north of the modelled and logged geological domains.

8.2.2 Estimation Domains

8.2.2.1 Heavy Minerals

RSC assessed the continuity of the ilmenite, garnet, and zircon abundance, within the modelled geological domains, to ascertain whether populations could be combined or further subdivided for estimation.

Heavy mineral mineralisation is hosted in the Top Soil, Clay, Fine Sand, Silt and Basement Sands Geological Domains. Geological domains form a good first-order approximation of the mineralised domains, but do not constitute robust domains for estimation. For instance, the mineralisation boundary straddles the interface between the Fine Sands domain and the Basement Sands; parts of the Fine Sands domain are unmineralised while parts of the Basement Sands domain are mineralised. Therefore, the estimation domains were constrained by first defining a contiguous mineralised volume, based on the heavy mineral abundance using an 'inclusive or' approach; flagging an interval as mineralised if either ilmenite, garnet or zircon is substantially elevated compared to background values (Figure 78). Mineralisation thresholds were set based on a review of grade statistics as: $\geq 5\%$ Ilmenite, $\geq 6\%$ Garnet and $\geq 0.1\%$ Zircon.

The contiguous mineralised volume was subdivided based on a simplified geological model to preserve the primary geological domains, which are associated with subtle grade differences. The intersection of the mineralisation and geological domain results in five, in-situ estimation domains (Figure 79): Mineralised Sand, Mineralised Silt, Mineralised Topsoil, Background Sand and Background Gravel. The Topsoil and Clay geological domains were combined in the Mineralised Topsoil estimation domains to retain sufficient samples for estimation. The Fine Sands and Basement Sands were combined in the creation of the Mineralised Sands and Background Sands domains.

Two additional estimation domains were created enclosing an area that was historically dredged for placer Au. The dredged zone, which can be recognised from aerial imagery and from grade and logging data, was modelled separately, as indicated in Figure 79, as assumptions of geological and grade continuity do not apply in this area. The depth of the historical workings is unknown, and the base was left undefined in the model. The dredged zone was modelled to extend from surface to the base of the model. The dredged zone still exhibits a moderately sharp mineralisation boundary and was split into two

estimation domains: Dredged Mineralised and Dredged Background, using an 'inclusive or' approach, identical to the one used to constrain the in-situ mineralised domain.

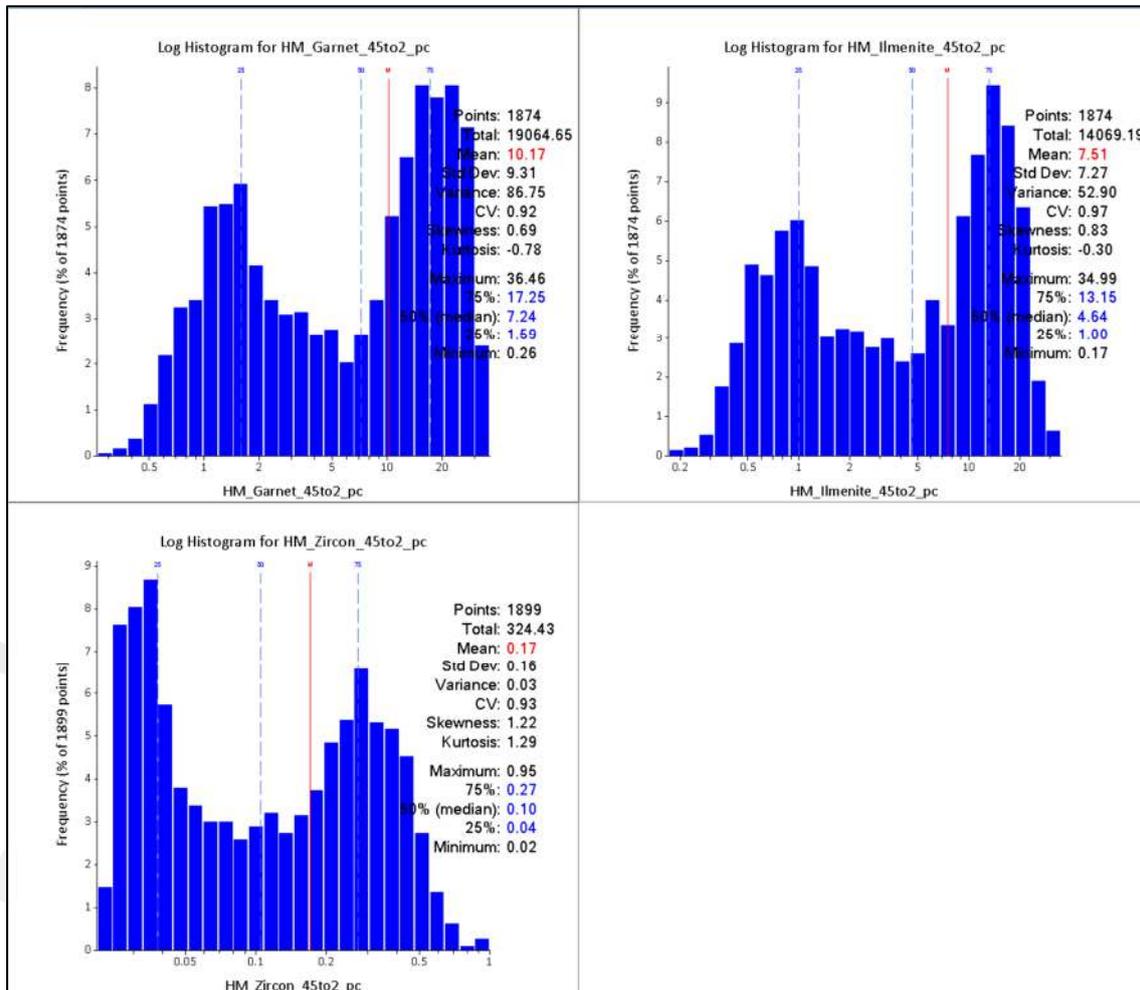


Figure 78: Log histograms for garnet, ilmenite and zircon abundance (unconstrained).

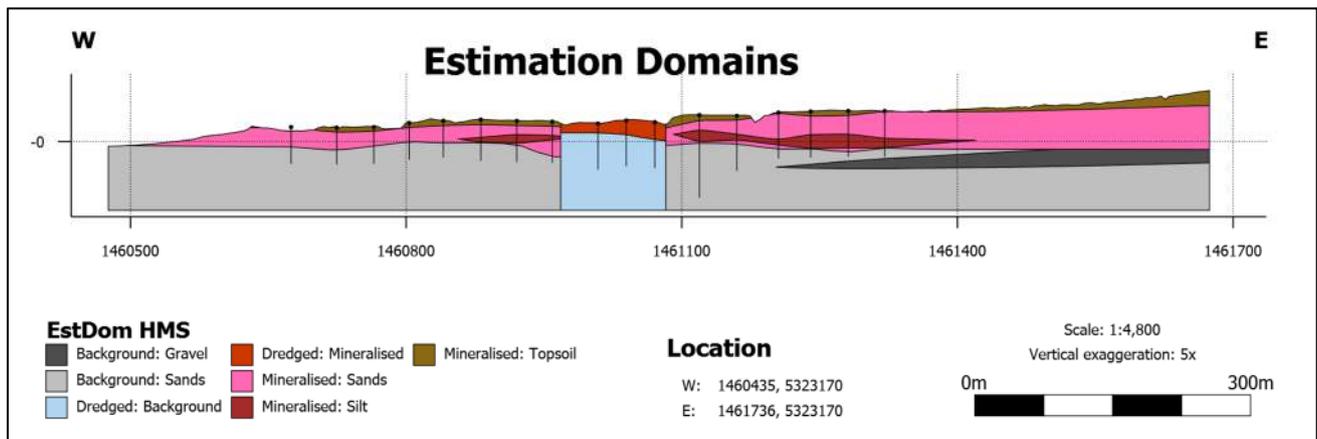


Figure 79: East-West cross-section (5,323,170N), looking north of the modelled estimation domains.

8.2.2.2 Size Fractions

Three estimation domains (Sand, Topsoil and Gravel) were created to estimate the grainsize fractions, as indicated on Figure 80, by simplifying the Geological Model based on a review of grainsize proportions in each domain. The dredged zone constitutes the fourth estimation domain, as geological continuity does not hold in this part of the deposit.

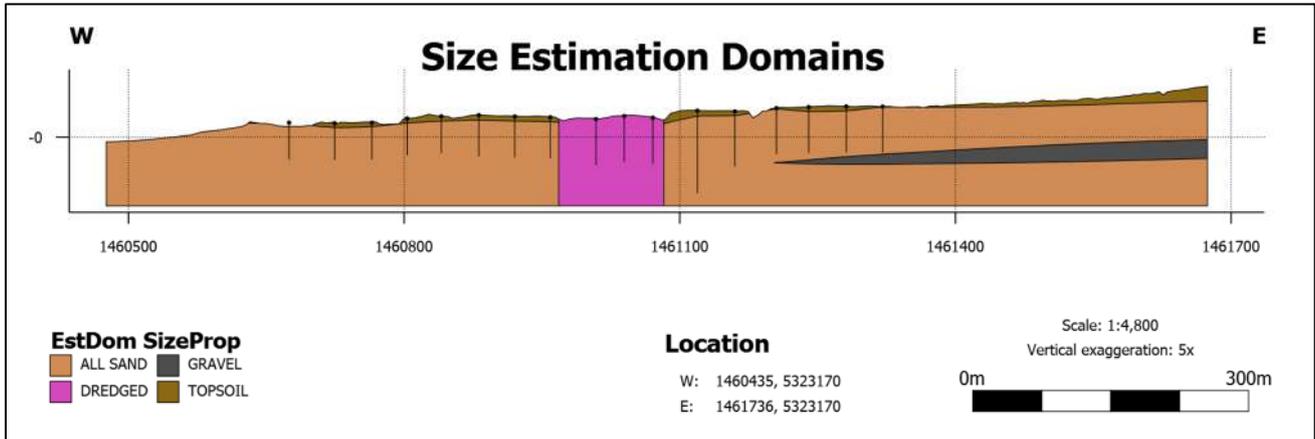


Figure 80: East–West cross-section (5,323,170N), looking north of the modelled size fraction estimation domains.

8.2.3 Extrapolation

Mineralisation is closed at depth but remains open to the north, south and east. Estimation wireframes were not constrained laterally, rather a lateral constraint was applied during classification of the resource estimate. The Competent Person considers the risk of uncertainty due to excessive extrapolation to be low.

8.2.4 Topography

A 1-m resolution DEM, with accuracy specifications of ± 1.0 m (95%) horizontal and ± 0.2 m (95%) vertical, was derived from LiDAR data collected in 2020 and 2021. This is considered high quality and adequate for a Measured classification.

8.3 **Summary Statistics & Data Preparation**

8.3.1 Heavy Minerals

All analyses and calculated abundances represent the 45- μ m to 2-mm screened fraction of 1-m intervals. The primary mineralised estimation domain (Mineralised Sand, Mineralised Silt) are characterised by monomodal distributions, minimal skewness and low CVs (0.3–0.5, Table 19, Figure 81, Figure 82 and Figure 83). The Mineralised Topsoil domain is characterised by low CVs (0.3–0.4) for all variables, but histograms suggest the existence of a secondary mode around the 95th percentile. Due to the low number of samples affected (~15), overall low CVs, and visual confirmation that these samples are spatially clustered within a small area, RSC considers the existence of this sub population a low risk and no additional sub-domaining was required. Background domains are characterised by moderate skewness and CVs (0.6–0.8) due to transitional material at the boundary of the mineralised domains.

Table 19: Summary statistics for the heavy mineral abundances inside the estimation domains (1-m composites, not declustered and no top cut applied).

Variable	Domain	Count	Length	Mean	Median	StDev	CV	VAR	Min	Max
Garnet	Background: Gravel	53	53	1.38	1.06	0.99	0.72	0.99	0.37	5.20
	Background: Sands	668	668	1.95	1.52	1.32	0.68	1.74	0.26	11.44
	Dredged: Background	145	145	2.12	1.61	1.50	0.71	2.25	0.33	9.65
	Dredged: Mineralised	103	103	13.04	13.01	5.31	0.41	28.14	4.50	30.24
	Mineralised: Sands	666	665	17.59	17.02	7.43	0.42	55.20	2.32	36.46
	Mineralised: Silt	137	137	20.01	20.54	6.84	0.34	46.78	3.25	33.39
	Mineralised: Topsoil	102	102	15.57	14.50	5.20	0.33	27.08	6.45	33.32
Ilmenite	Background: Gravel	53	53	1.02	0.73	0.85	0.84	0.73	0.17	4.75
	Background: Sands	668	668	1.28	0.97	0.89	0.70	0.79	0.19	6.62
	Dredged: Background	145	145	1.20	0.92	0.93	0.78	0.87	0.25	6.40
	Dredged: Mineralised	103	103	9.88	9.01	5.08	0.51	25.82	2.36	29.98
	Mineralised: Sands	666	665	12.95	12.62	6.06	0.47	36.70	1.25	34.09
	Mineralised: Silt	137	137	15.11	15.06	5.69	0.38	32.35	2.22	28.90
	Mineralised: Topsoil	102	102	12.60	11.69	4.74	0.38	22.47	5.08	34.99
Zircon	Background: Gravel	53	53	0.04	0.04	0.02	0.49	0.00	0.02	0.13
	Background: Sands	669	669	0.04	0.04	0.02	0.47	0.00	0.02	0.20
	Dredged: Background	145	145	0.04	0.03	0.02	0.41	0.00	0.02	0.12
	Dredged: Mineralised	124	124	0.16	0.14	0.11	0.66	0.01	0.03	0.80
	Mineralised: Sands	667	666	0.29	0.27	0.14	0.50	0.02	0.04	0.95
	Mineralised: Silt	137	137	0.34	0.34	0.14	0.41	0.02	0.05	0.71
	Mineralised: Topsoil	104	104	0.27	0.24	0.12	0.44	0.01	0.08	0.89

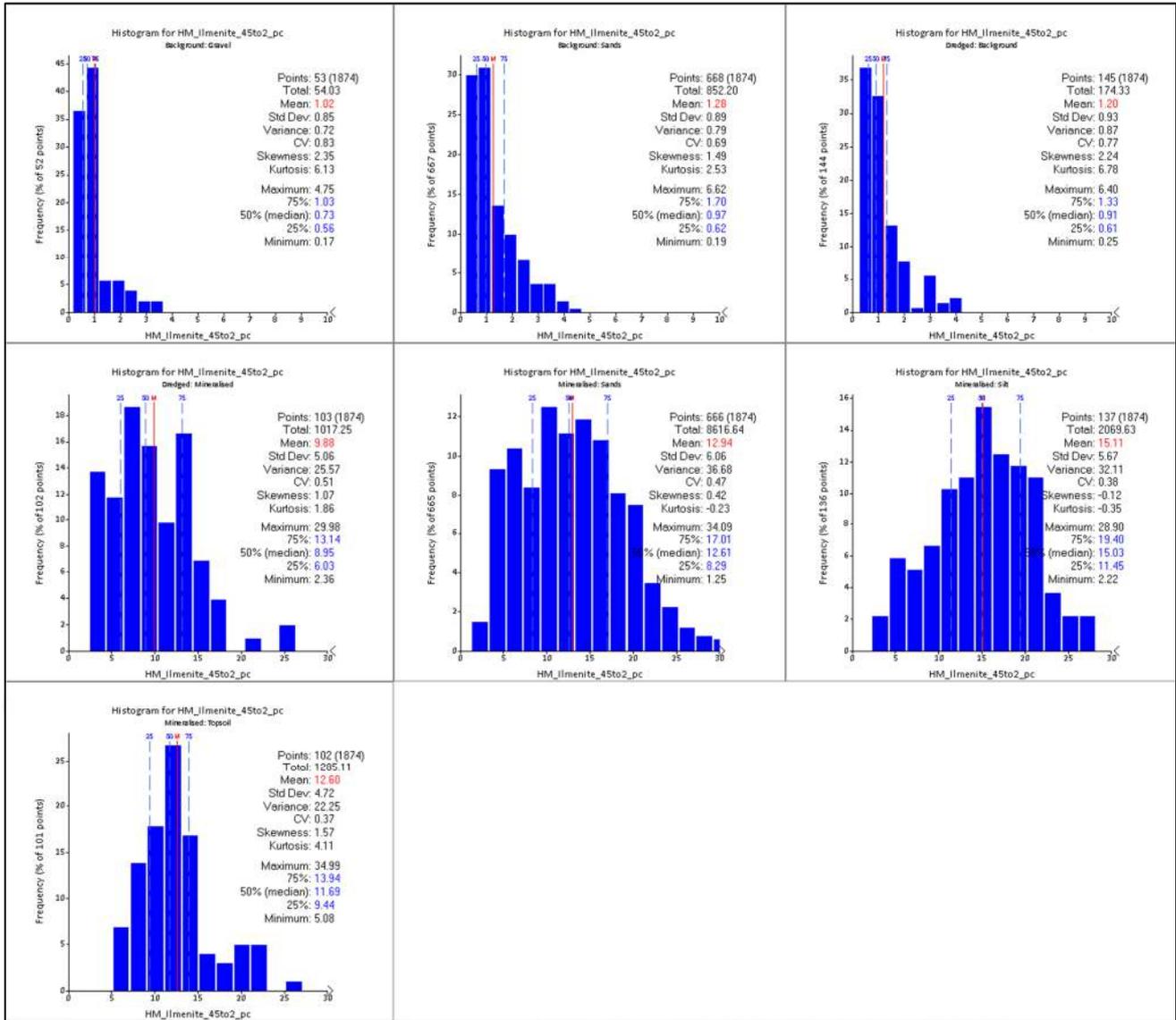


Figure 81: Histograms of ilmenite abundance (%) inside the estimation domains.

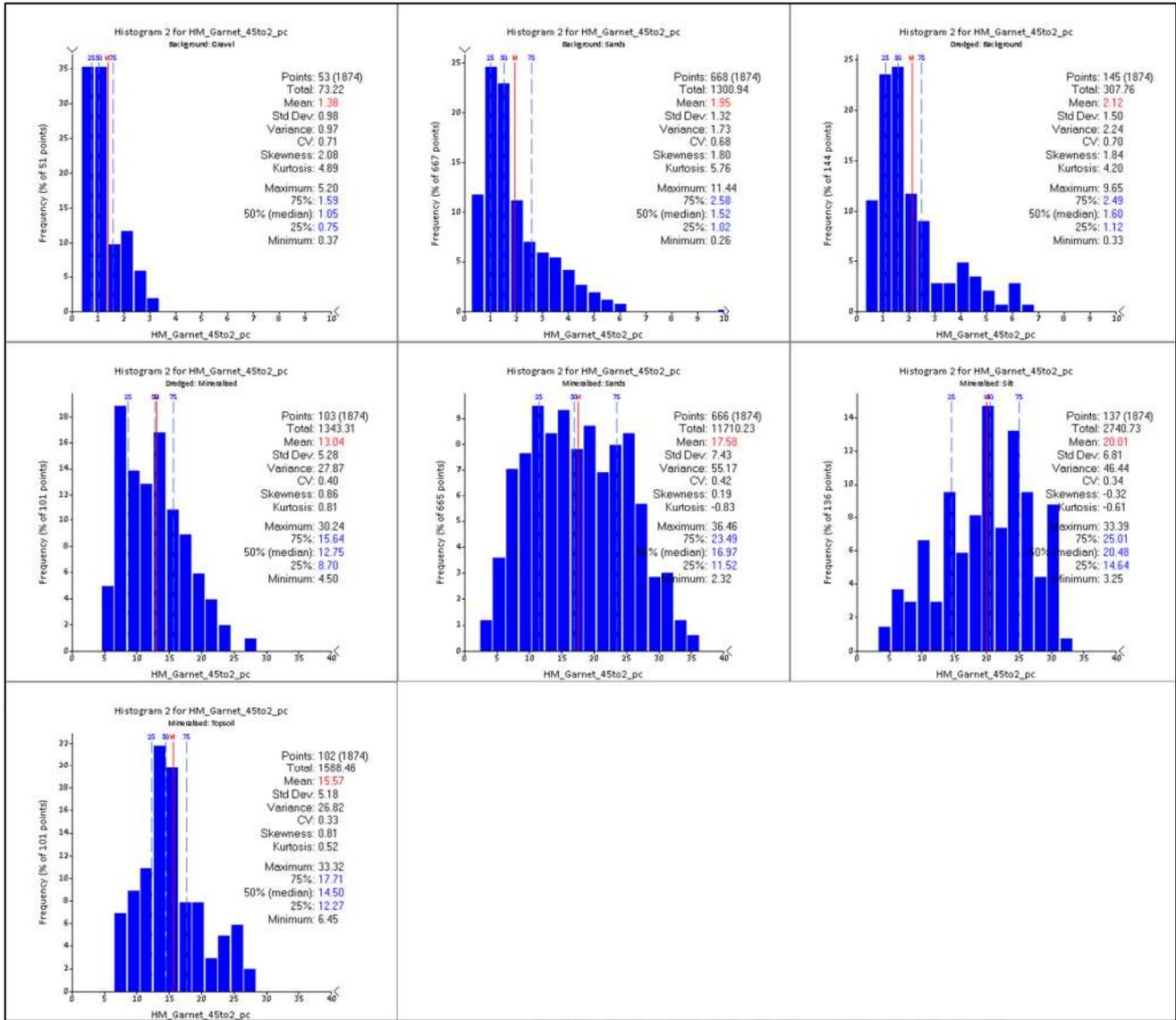


Figure 82: Histograms of garnet abundance (%) inside the estimation domains.

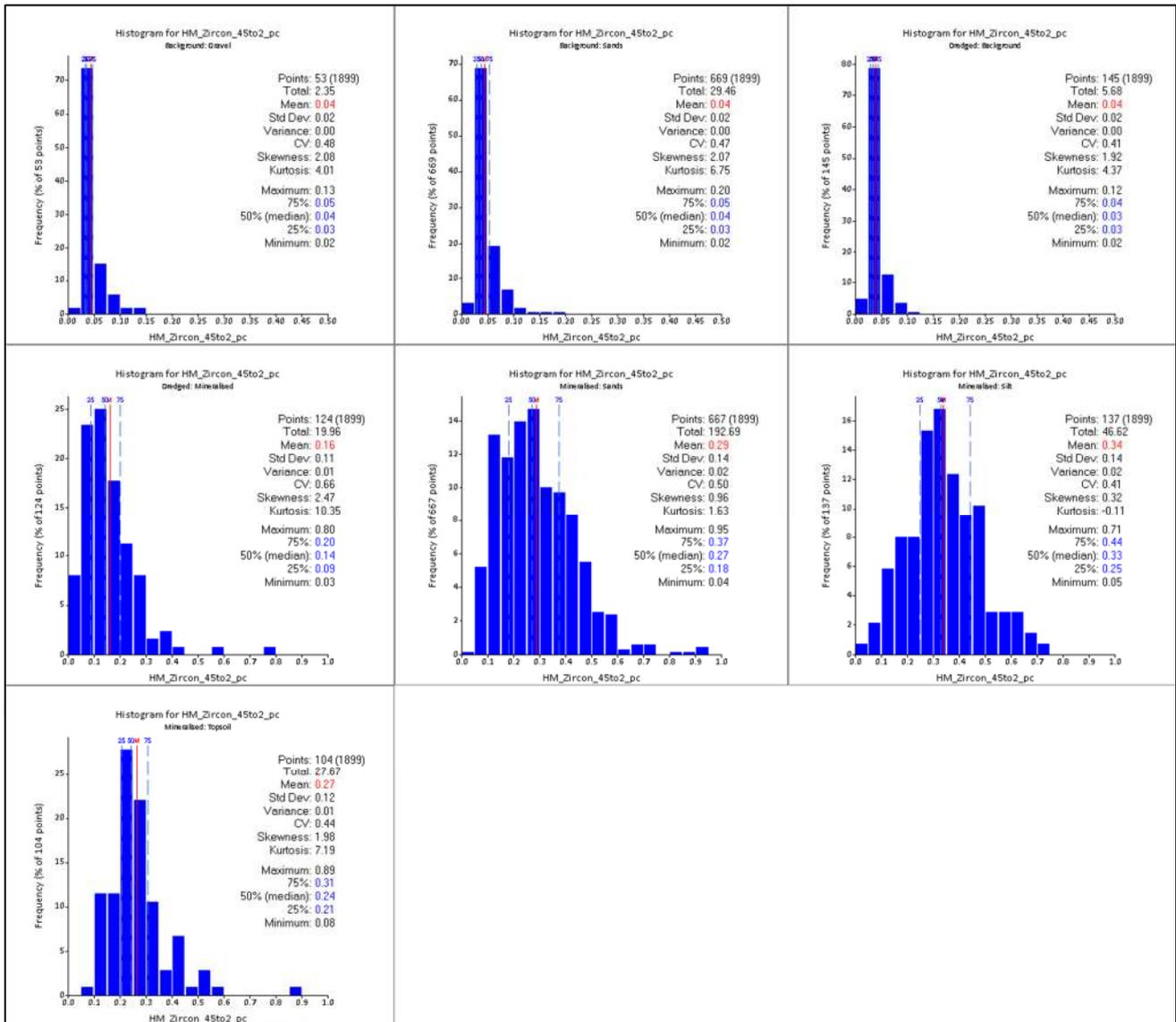


Figure 83: Histograms of zircon abundance (%) inside the estimation domains.

8.3.2 Size Fractions

The three, size fraction proportions (0–45 µm, 45 µm–2 mm and >2 mm) of each sample were evaluated within each of the size-fraction estimation domains (Table 20, Figure 84, Figure 85 and Figure 86). The initial data review revealed a negative correlation between recoveries and the proportion of oversize in the sample. RSC interprets this to reflect the preferential loss of fines in samples with poor recoveries. For the Sands, Gravel and Dredged domains, samples with recoveries <50% were omitted to avoid biasing the size fractions to coarser grain sizes. For the Topsoil domain, all samples have recoveries <50% and hence, no filter was applied. The poor recoveries in the Topsoil domain are expected to negatively impact the quality of the estimate for this domain, and RSC considered this in the classification of the MRE.

The distributions of the product fraction (45 µm–2 mm) are typically characterised by monomodal distributions, with low skewness and low CVs (0.2–0.4). The Topsoil domain indicates relatively high variance in the proportion of the product fraction, which is likely associated with the poor recoveries in this domain.

The distributions of the oversize fraction are characterised by moderate CVs (0.5–1.4). The Gravel domain is characterised by a monomodal distribution and low CV (0.5), while the Sand and Dredged domains demonstrate relatively high skewness, with long tails, towards high proportions of oversize, possibly suggesting some gravel contributions in these domains. RSC notes that size fraction domains, which are based on visual logging, may not be optimised for estimation of the oversize fraction. Some improvements could be made to the size fraction estimation domains by considering the proportion of oversize in the domain definition. Since the estimate of the oversize fraction does not impact the tonnes or grade of the Mineral Resource, RSC considers this a low risk.

The distributions of the undersize fraction are characterised by monomodal distributions with low (Sands, Gravel, Dredged) to moderate (Topsoil) CVs (0.5–0.8) and moderate skewness.

Table 20: Summary statistics of size fraction proportions within estimation domains, excluding intervals with <50% recovery from the Sand, Dredged and Gravel domains (all intervals in Topsoil domain have <50% recovery).

Variable	Domain	Filter	Count	Length	Mean	Median	StDev	CV	VAR	Min	Max
45 µm–2 mm	All Sand	>50% Recovery	1,105	1105	0.77	0.80	0.12	0.15	0.01	0.06	0.99
	Dredged	>50% Recovery	188	188	0.76	0.78	0.12	0.15	0.01	0.32	0.99
	Gravel	>50% Recovery	49	49	0.55	0.52	0.12	0.23	0.02	0.32	0.83
	Topsoil	None (all <50%)	105	105	0.57	0.61	0.25	0.44	0.06	0.11	0.96
>2 mm	All Sand	>50% Recovery	1,105	1105	0.05	0.02	0.07	1.53	0.01	0.00	0.59
	Dredged	>50% Recovery	188	188	0.05	0.02	0.06	1.37	0.00	0.00	0.37
	Gravel	>50% Recovery	49	49	0.26	0.26	0.12	0.47	0.01	0.04	0.46
	Topsoil	None (all <50%)	105	105	0.33	0.29	0.27	0.81	0.07	0.00	0.84
<45 µm	All Sand	>50% Recovery	1,105	1105	0.18	0.16	0.10	0.55	0.01	0.00	0.93
	Dredged	>50% Recovery	188	188	0.19	0.18	0.10	0.51	0.01	0.01	0.64
	Gravel	>50% Recovery	49	49	0.19	0.16	0.09	0.46	0.01	0.10	0.50
	Topsoil	None (all <50%)	105	105	0.10	0.08	0.08	0.78	0.01	0.01	0.38

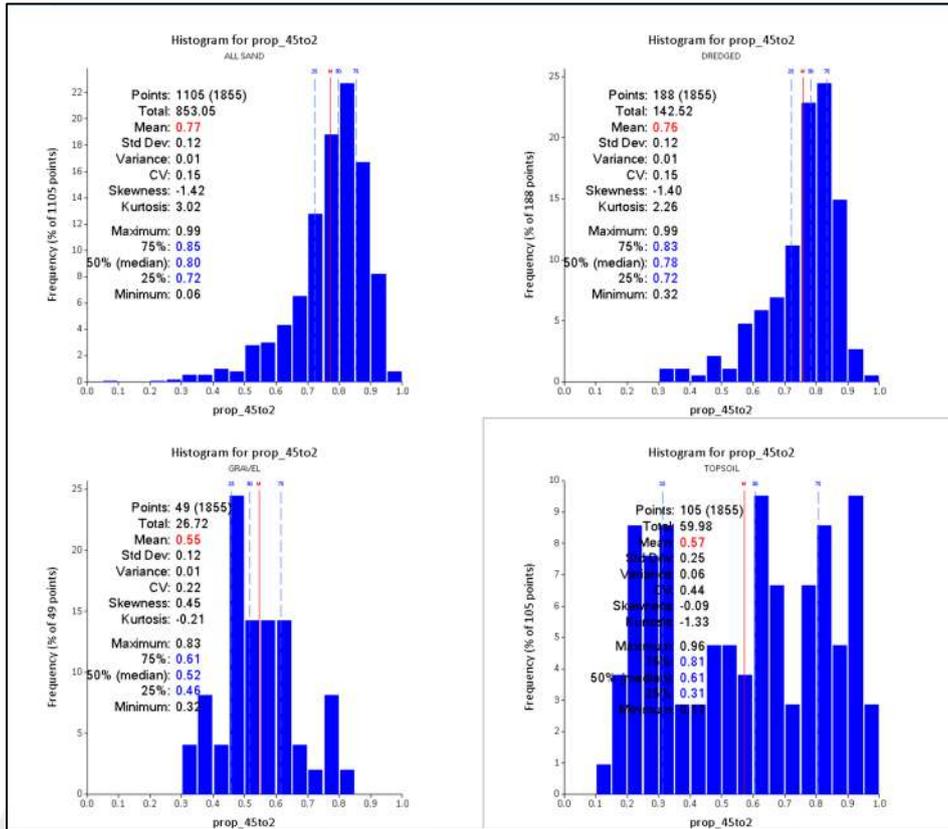


Figure 84: Histograms of the product-size fraction inside the size-fraction estimation domains.

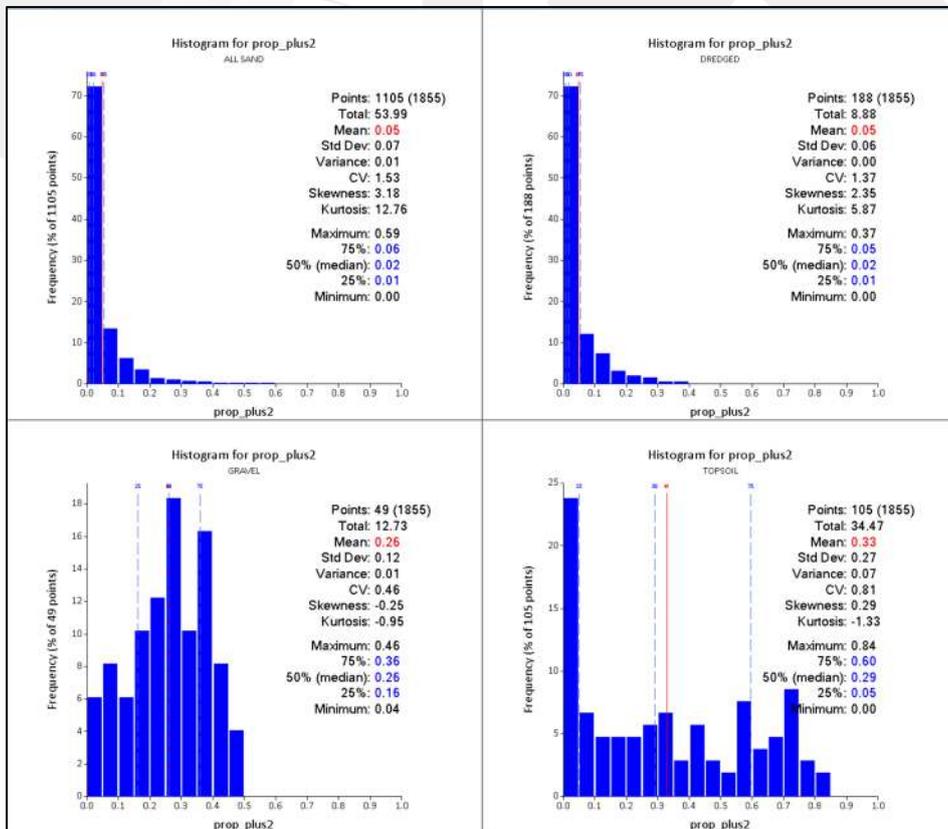


Figure 85: Histograms of the oversize fraction inside the size fraction-estimation domains.

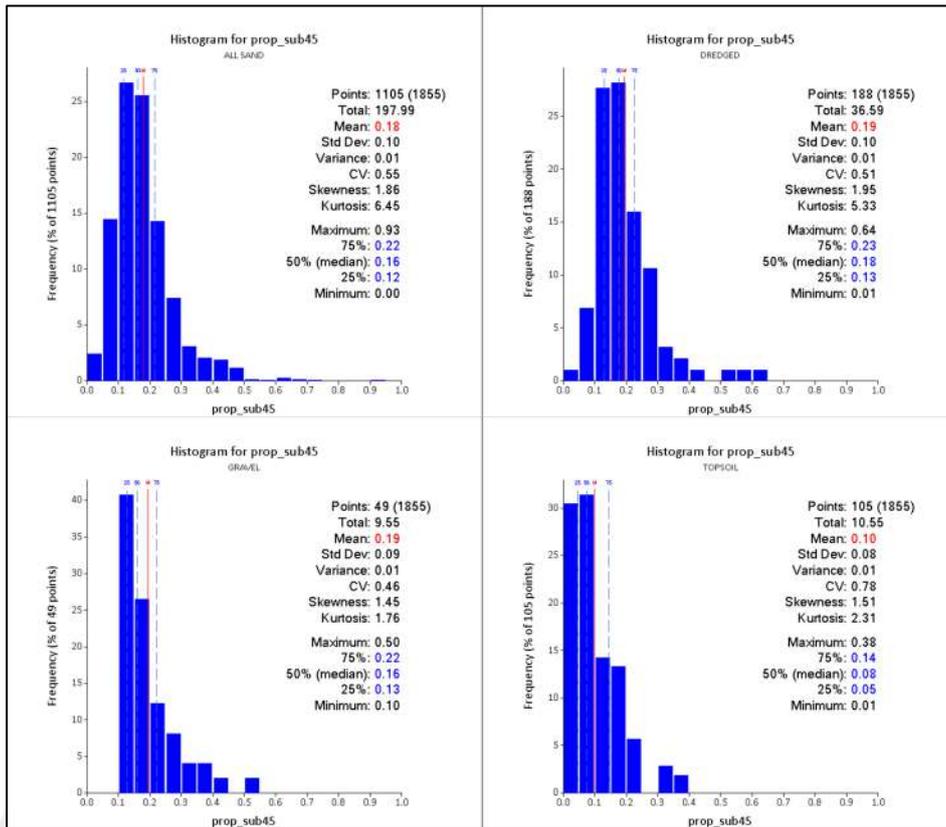


Figure 86: Histograms of the fines fraction inside the size-fraction estimation domains.

8.4 Spatial Analysis & Variography

8.4.1 Heavy Minerals

The spatial continuity of heavy mineral abundance was modelled for each estimation domain on raw composites. The composites indicated reasonable structure, and experimental semi-variograms were modelled with relatively low γ_0 values (0.1–0.2, estimated from downhole variograms) and two spherical structures (Table 21, Figure 87, Appendix A.1).

Table 21: Modelled Ilmenite variogram parameters.

Domain	Variance	Nugget (Relative)	Structure	Sill	Normalised Sill	Major	Semi-Major	Minor	Dip	Dip Azi.	Pitch
Background: Gravel	0.7	0.21	1	0.5	0.71	139	31	2.2	0.0	0.0	93.0
			2	0.1	0.08	444	100	3.0	0.0	0.0	93.0
Background: Sands	0.8	0.21	1	0.5	0.66	139	31	2.4	0.0	0.0	93.0
			2	0.1	0.12	444	100	3.7	0.0	0.0	93.0
Dredged: Background	0.9	0.26	1	0.3	0.38	128	36	1.3	0.0	0.0	93.0
			2	0.3	0.36	192	51	3.7	0.0	0.0	93.0
Dredged: Mineralised	25.8	0.1	1	13.3	0.51	128	36	3.7	0.0	0.0	93.0
			2	10.0	0.39	151	81	2.3	0.0	0.0	93.0
Mineralised: Sand	36.7	0.05	1	20.2	0.55	161	41	3.7	0.0	0.0	93.0
			2	14.6	0.40	607	212	4.9	0.0	0.0	93.0
Mineralised: Silt	32.3	0.09	1	18.8	0.58	177	44	3.3	0.0	0.0	93.0
			2	10.6	0.33	456	205	3.7	0.0	0.0	93.0
Mineralised: Topsoil	22.5	0.05	1	12.0	0.53	366	52	3.7	0.0	0.0	93.0
			2	9.4	0.42	366	175	5.3	0.0	0.0	93.0

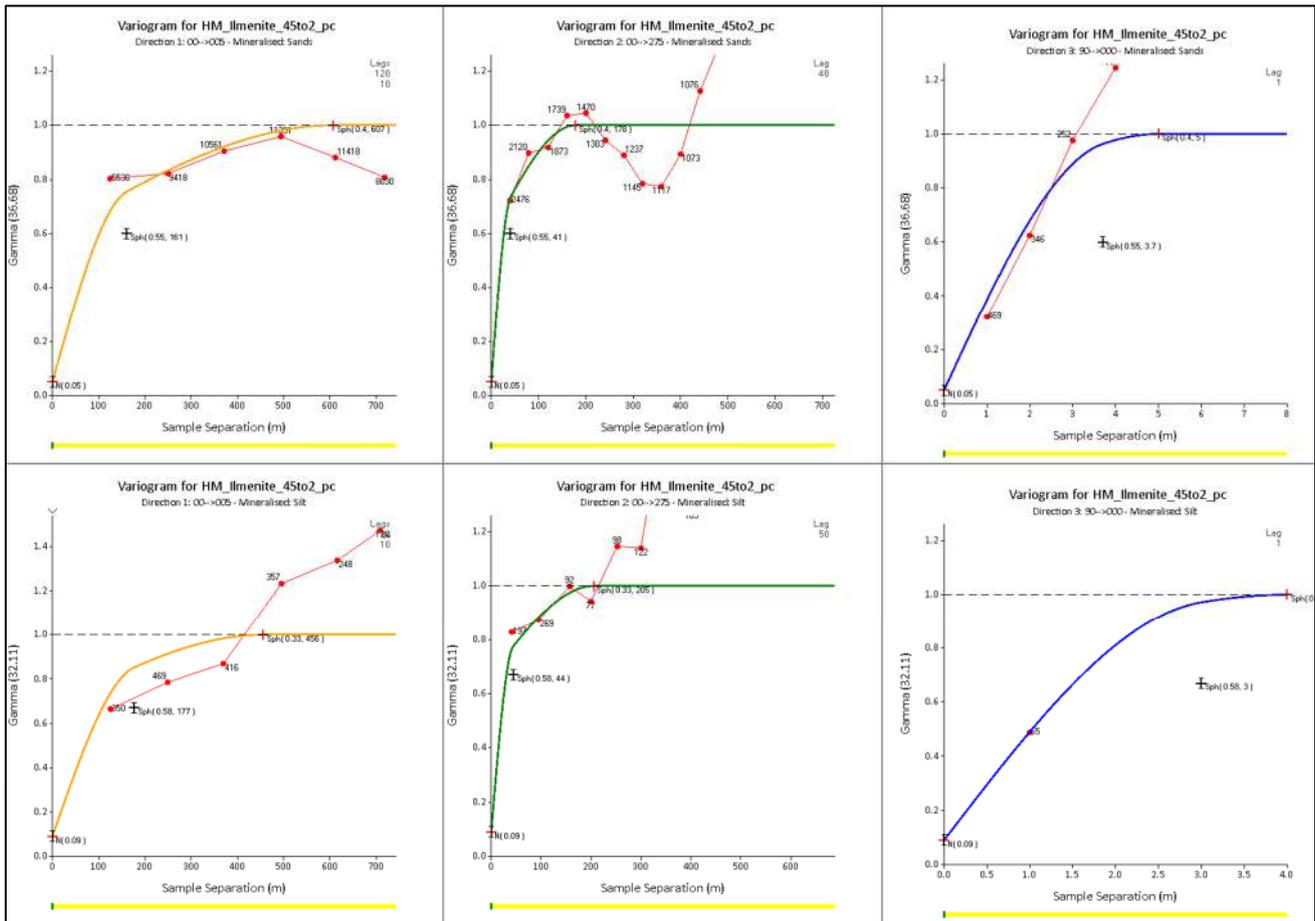


Figure 87: Experimental semi-variogram models for ilmenite in the Mineralised Sands (top) and Mineralised Silt (bottom) estimation domains.

8.4.2 Size Fractions

The spatial continuity of the three size-fraction proportions (0–45 μm , 45 μm to 2 mm and >2 mm) was modelled using the same variogram model for each domain to preserve the interdependent nature of the variables (i.e. all proportions summing up to 100%). By applying the same variogram for each variable, the conditions of a full co-kriging of the proportions are reproduced, ensuring that the consistency of the individual estimates is preserved with all proportions summing to 100%.

For each estimation domain, experimental semi-variograms were modelled based on the product size fraction (45 μm to 2 mm) with a moderate γ_0 value (0.4, estimated from downhole variograms) and two spherical structures (Table 22, Figure 88).

Table 22: Modelled size-fraction variogram parameters.

Domain	Variance	Normalised Nugget	Sill	Normalised Sill	Structure	Major	Semi-Major	Minor	Dip	Dip Azi.	Pitch
Topsoil	0.063	0.38	0.03	0.46	Spherical	215	62	5.9	0	0	93
			0.01	0.16	Spherical	455	235	6.7	0	0	93
Dredged	0.013	0.38	0.01	0.48	Spherical	150	40	6	0	0	93
			0.00	0.14	Spherical	359	93	6.7	0	0	93
Gravel	0.015	0.38	0.00	0.33	Spherical	280	44	1.6	0	0	93
			0.00	0.29	Spherical	487	102	3.3	0	0	93
Sand	0.014	0.38	0.01	0.48	Spherical	150	40	6	0	0	93
			0.00	0.14	Spherical	490	169	6.7	0	0	93

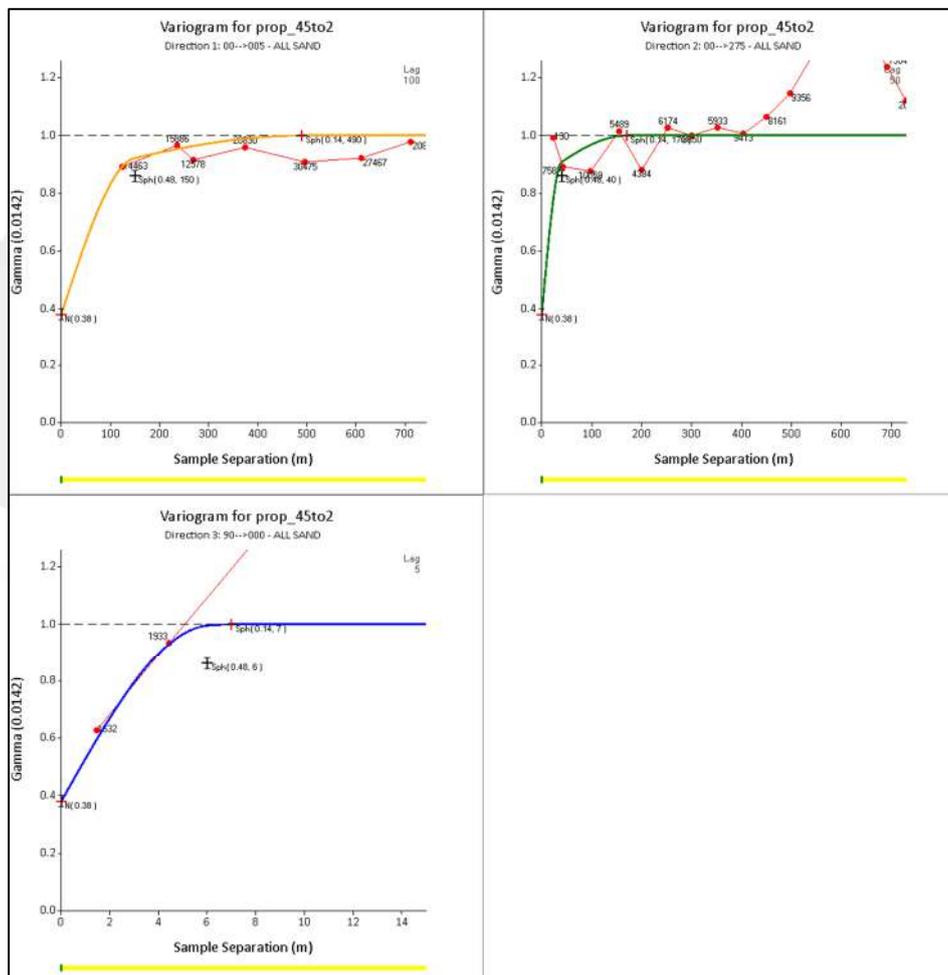


Figure 88: Variogram model for the Sand domain, based on the product size fraction.

8.5 Block Model

A parent block size of 20 m x 60 m x 1 m (x-y-z), sub-blocked to 15 m x 5 m x 0.5 m, was selected for estimation, based on a consistent regular drill spacing of 40 m x 120 m (x-y). Block model prototype definitions are outlined in Table 23. A discretisation of 5 x 5 x 1 (x-y-z) was applied.

Table 23: Block model definitions.

Axis	Origin	Parent Block Size	Smallest Sub Block Size	Number of Blocks	Length (m)
x	1,460,455	20	5	56	1,120
y	5,322,380	60	15	26	1,560
z	20	1	0.5	40	40

8.6 Search Neighbourhood Parameters

8.6.1 Heavy Minerals

The interpolation of heavy mineral abundance into blocks was completed using a two-pass search strategy. The search pass was optimised based on the drill spacing, and available samples, to find sufficient samples for estimation. First search ellipsoids were ~250 m x 70 m x 3 m, and second search ellipsoids were typically twice the size. Some domains with few samples, specifically the basement gravel, required wider second pass ellipsoids to find sufficient samples for estimation. The blocks requiring a second pass constitute less than 0.5% of the mineral resource, by volume, and are located near the model margins.

Numbers of samples were optimised using kriging neighbourhood analysis (KNA), in Supervisor, to optimise kriging statistics, minimise conditional bias, and minimise the negative weights (Figure 89). All domain boundaries were implemented as hard boundaries. For the HM abundance, a minimum of 4 and a maximum of 24 samples were used. The variogram models for ilmenite, zircon, and garnet abundance provide good conditions for precise local estimation (modelled γ_0 of 5–10 %; ranges exceeding the sample spacing), and the maximum number of samples, at 24, ensure conditional unbiasedness, while limiting the occurrence of negative weights in the kriging scheme.

Analysis of the grade distributions of the respective HM fractions indicated top cuts were not required for the key mineralised domain (Mineralised Sand, Mineralised Silt). For the background domains and the dredged domain, moderate top cuts were used to prevent the influence of extreme grades in these domains.

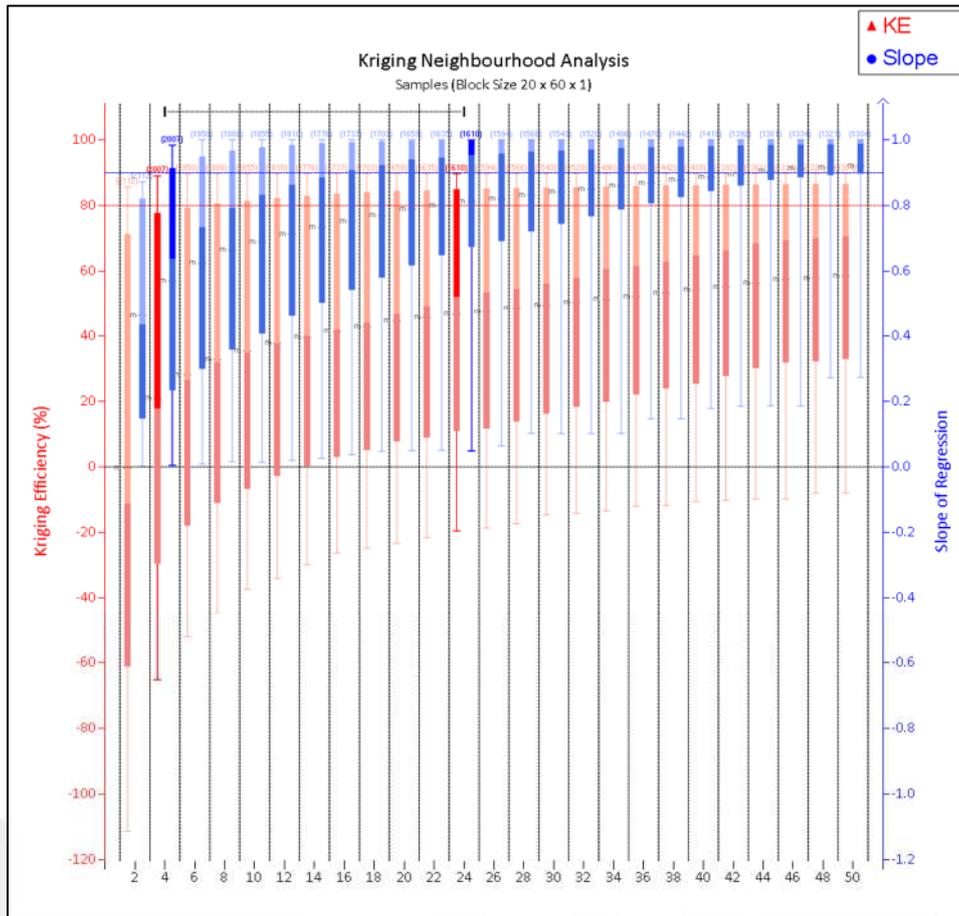


Figure 89: KNA result for number of samples for Ilmenite inside the Mineralised Sand domain.

8.6.2 Size Fractions

The interpolation of size fractions into blocks was completed using a two-pass search strategy. The search pass was optimised based on the drill spacing and available samples to find sufficient samples for estimation. First search ellipsoids were ~400 m x 120 m x 6 m and second search ellipsoids were typically twice the size. The Gravel domain, which has few samples, required wider second-pass ellipsoids (1200 m x 400 x 12) to find sufficient samples for estimation. The blocks requiring a second pass constitute less than 0.1% of the mineral resource by volume and are located near the model margins.

Numbers of samples were optimised using KNA, in Supervisor, to optimise kriging statistics, minimise conditional bias and minimise the negative weights (Figure 90). For the size fractions, a minimum of 4 and a maximum of 32 samples were used to increase stability of the estimate given the relatively higher γ_0 . All domain boundaries were implemented as hard boundaries. No top cuts were applied to estimate the size fractions to preserve the interdependent nature of the variables.

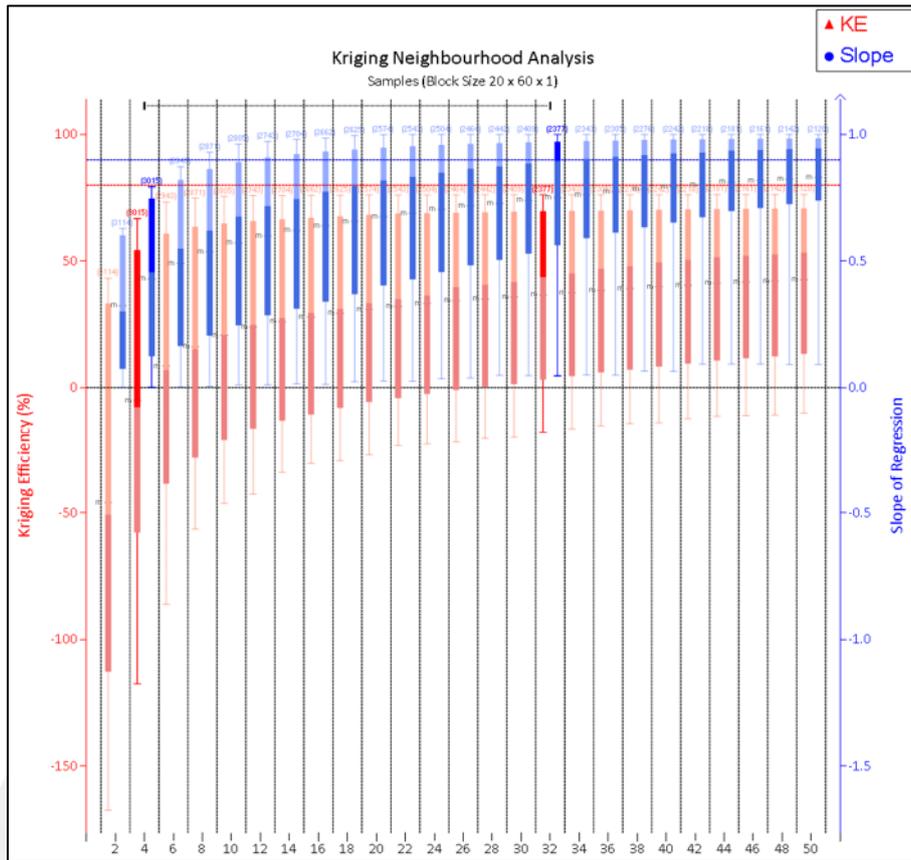


Figure 90: KNA result for number of samples for the size fractions inside the Sand domain.

8.7 Estimation

8.7.1 Heavy Minerals

The estimate of the heavy mineral abundance was completed using ordinary kriging. Hard domain boundaries were set for estimation, supported by a domain contact analysis in Snowden Supervisor (Figure 91).

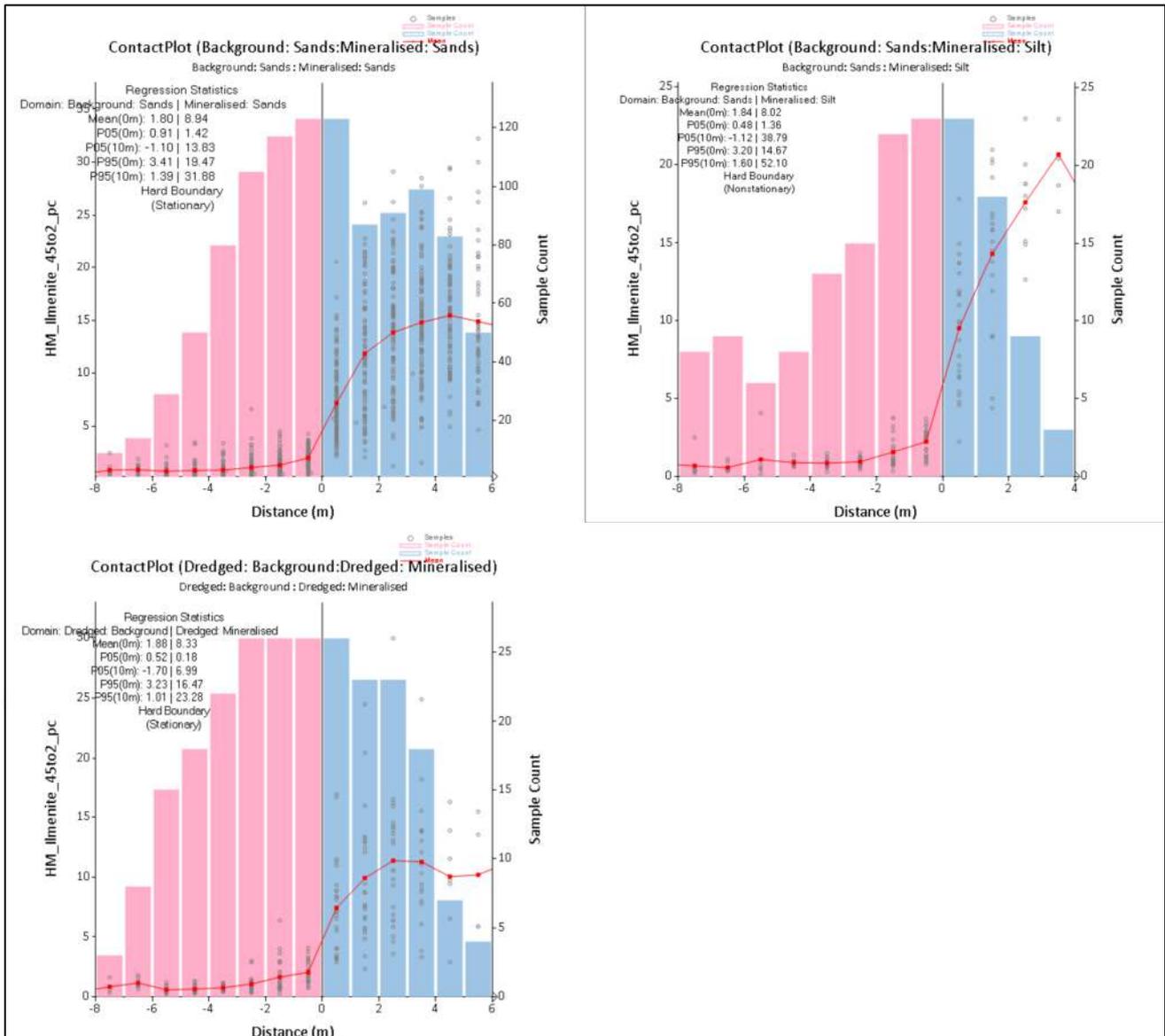


Figure 91: Downhole contact analysis plots for Ilmenite abundance, across the contact between background and mineralised domains.

8.7.2 Size Fractions

The estimate of the size fractions was completed using ordinary kriging. Hard domain boundaries were set for estimation, supported by a domain contact analysis in Snowden Supervisor (Figure 92).

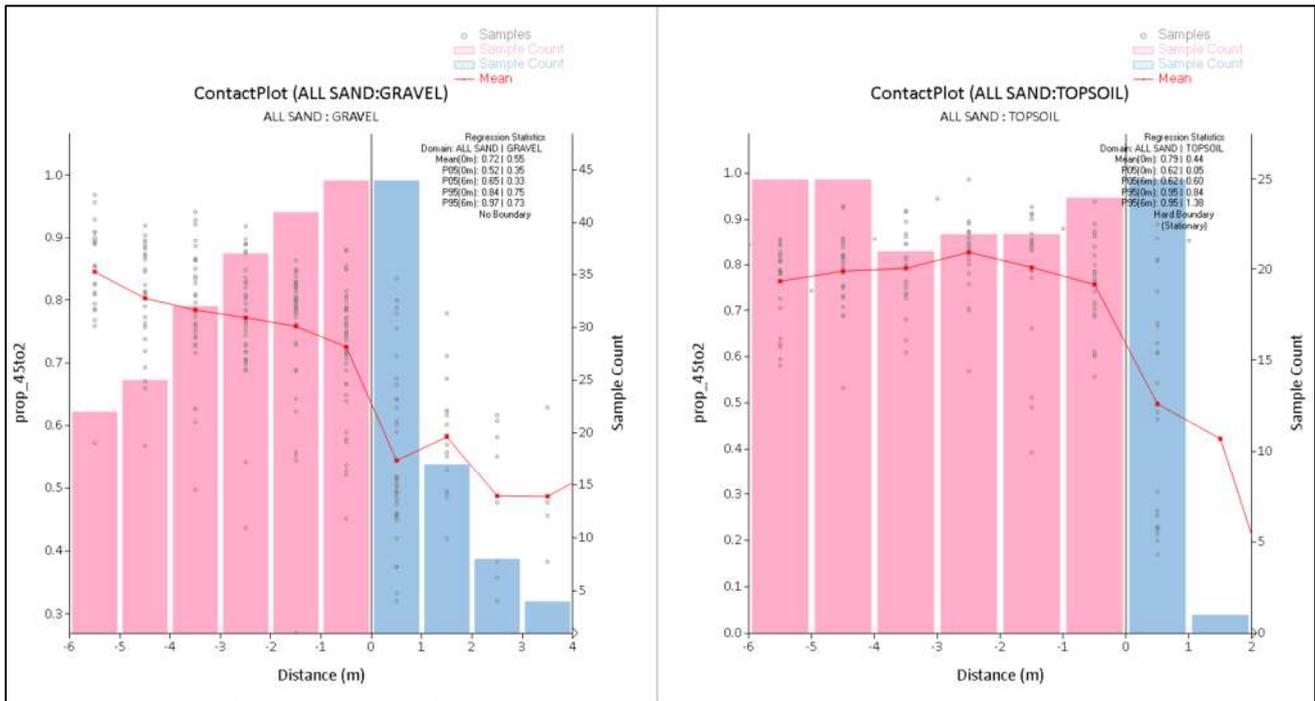


Figure 92: Downhole contact analysis plots for the product fraction, across the Sand:Gravel and Sand:Topsoil domain boundaries.

8.8 Validation

8.8.1 Heavy Minerals

Block model abundances were validated by comparing the input mean abundances with the block model mean abundance, using swath plots, and visually, on cross-section including:

- the comparison of input mean abundance and estimated block means, by estimation domain, demonstrating good correlation within the key mineralised domains (mean grade differences up to 3% Table 24);
- the comparison of input mean abundance, and estimated block means, demonstrating that the gravel domain is relatively poorly estimated due to the low number of samples (53) in this domain;
- visual validation along cross-section, comparing input and estimated block abundance, indicating that the estimates reasonably reflect the abundances of the input data (Figure 93); and
- swath plots (x-y-z) display good correlation between input and estimated abundance, within the key estimation domains and appropriate levels of smoothing (Figure 94, Figure 95, Figure 96) — swath plots (x and y) for background domains suggest underestimation in these domains; z-swath plots illustrate that this is due to a decrease of grade with depth.

Table 24: Model mean and median validation.

Variable	Domain	Data			Model			Difference	
		Mean	Median	CV	Mean	Median	CV	Mean	Median
Garnet	Background: Gravel	1.38	1.06	0.72	1.13	1.11	0.25	-18%	4%
	Background: Sands	1.95	1.52	0.68	1.80	1.64	0.41	-8%	8%
	Dredged: Background	2.12	1.61	0.71	2.05	1.98	0.32	-3%	23%
	Dredged: Mineralised	13.04	13.01	0.41	12.98	12.67	0.18	0%	-3%
	Mineralised: Sands	17.59	17.02	0.42	17.72	17.71	0.31	1%	4%
	Mineralised: Silt	20.01	20.54	0.34	19.59	19.43	0.23	-2%	-5%
	Mineralised: Topsoil	15.57	14.50	0.33	15.43	14.25	0.28	-1%	-2%
Ilmenite	Background: Gravel	1.02	0.73	0.84	0.79	0.75	0.27	-23%	3%
	Background: Sands	1.28	0.97	0.70	1.18	1.06	0.41	-8%	10%
	Dredged: Background	1.20	0.92	0.78	1.15	1.09	0.31	-4%	18%
	Dredged: Mineralised	9.88	9.01	0.51	9.67	9.64	0.20	-2%	7%
	Mineralised: Sands	12.95	12.62	0.47	12.96	12.69	0.36	0%	1%
	Mineralised: Silt	15.11	15.06	0.38	14.77	14.53	0.26	-2%	-4%
	Mineralised: Topsoil	12.60	11.69	0.38	12.34	11.45	0.32	-2%	-2%
Zircon	Background: Gravel	0.04	0.04	0.49	0.04	0.04	0.19	-9%	7%
	Background: Sands	0.04	0.04	0.47	0.04	0.04	0.28	-5%	4%
	Dredged: Background	0.04	0.03	0.41	0.04	0.04	0.16	-2%	11%
	Dredged: Mineralised	0.16	0.14	0.66	0.16	0.15	0.25	-3%	9%
	Mineralised: Sands	0.29	0.27	0.50	0.29	0.28	0.36	0%	4%
	Mineralised: Silt	0.34	0.34	0.41	0.33	0.32	0.29	-2%	-3%
	Mineralised: Topsoil	0.27	0.24	0.44	0.26	0.25	0.28	-2%	3%

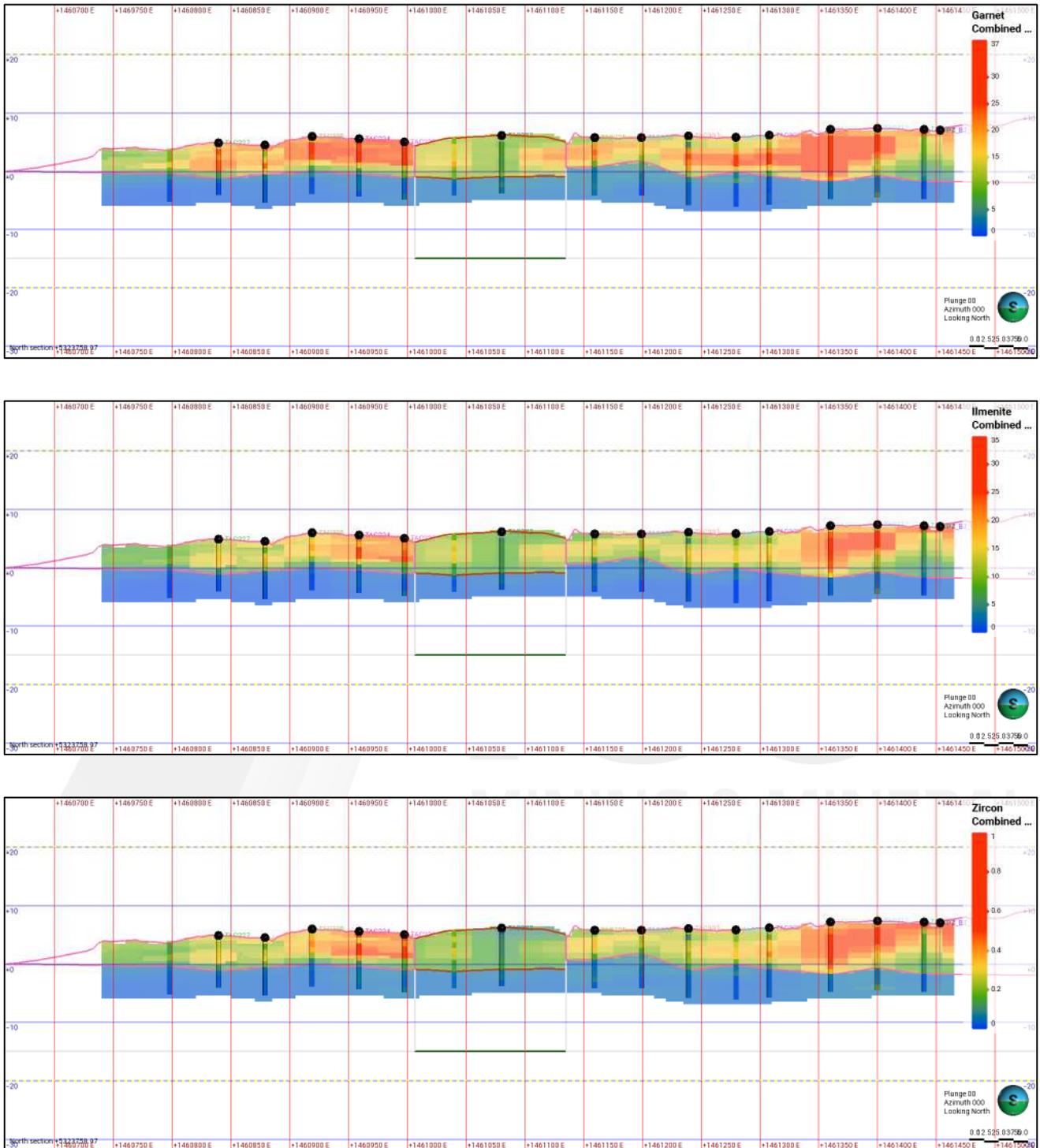


Figure 93: Visual comparison of drillholes and blocks for garnet (top), ilmenite (middle) and zircon (bottom) . The rectangular domain in the centre of view is the dredged zone.

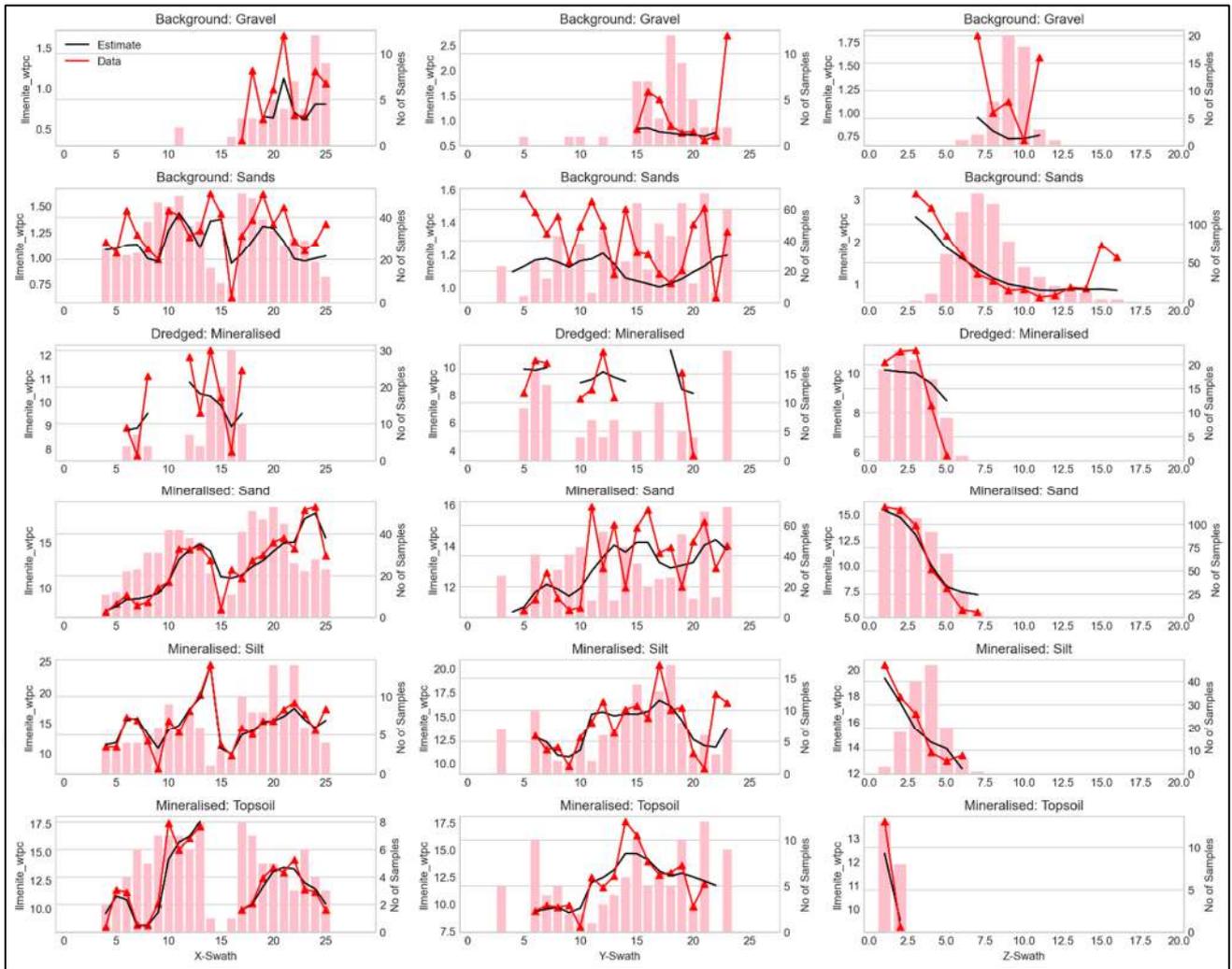


Figure 94: Swath plots for ilmenite inside estimation domains.

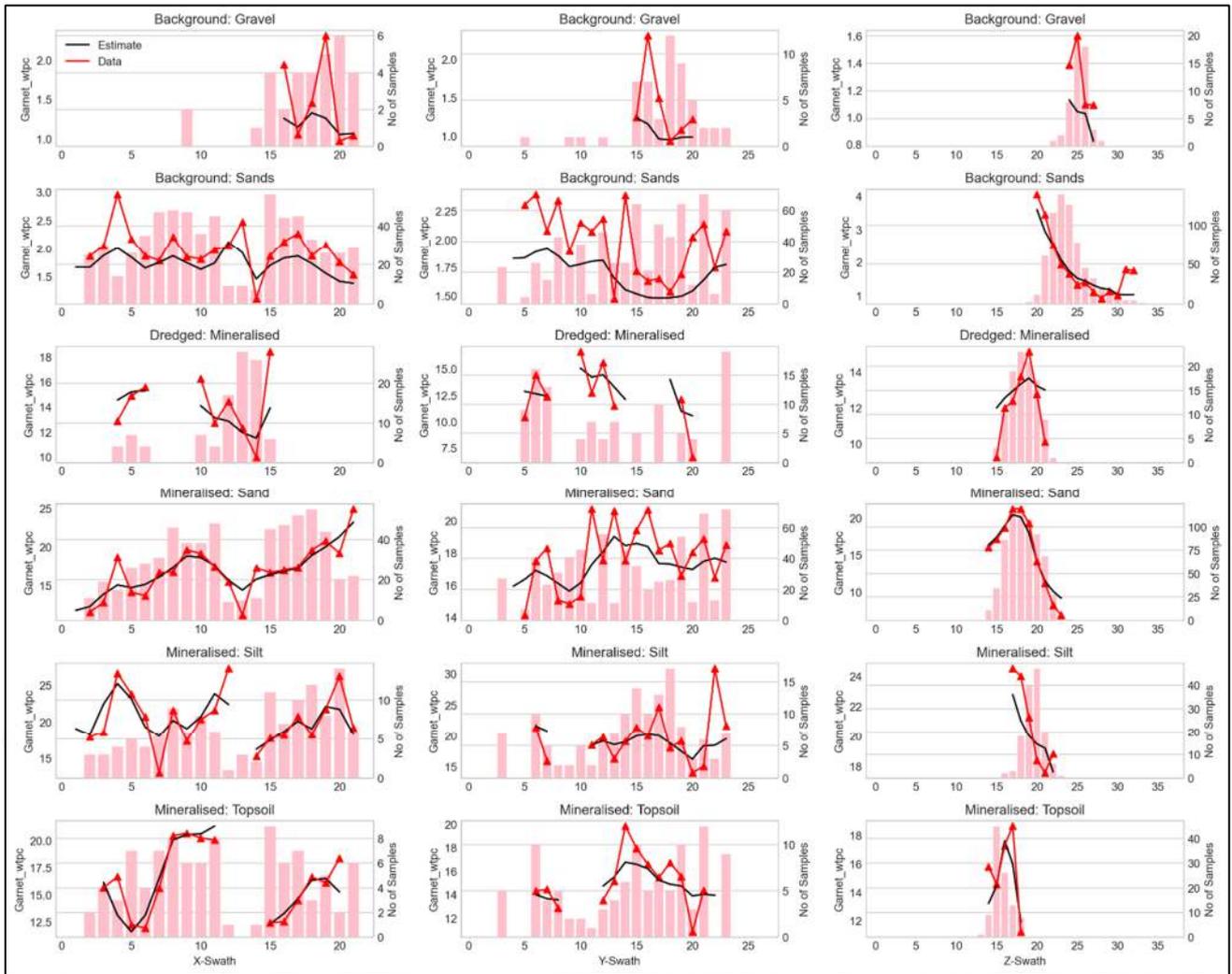


Figure 95: Swath plots for garnet inside estimation domains.

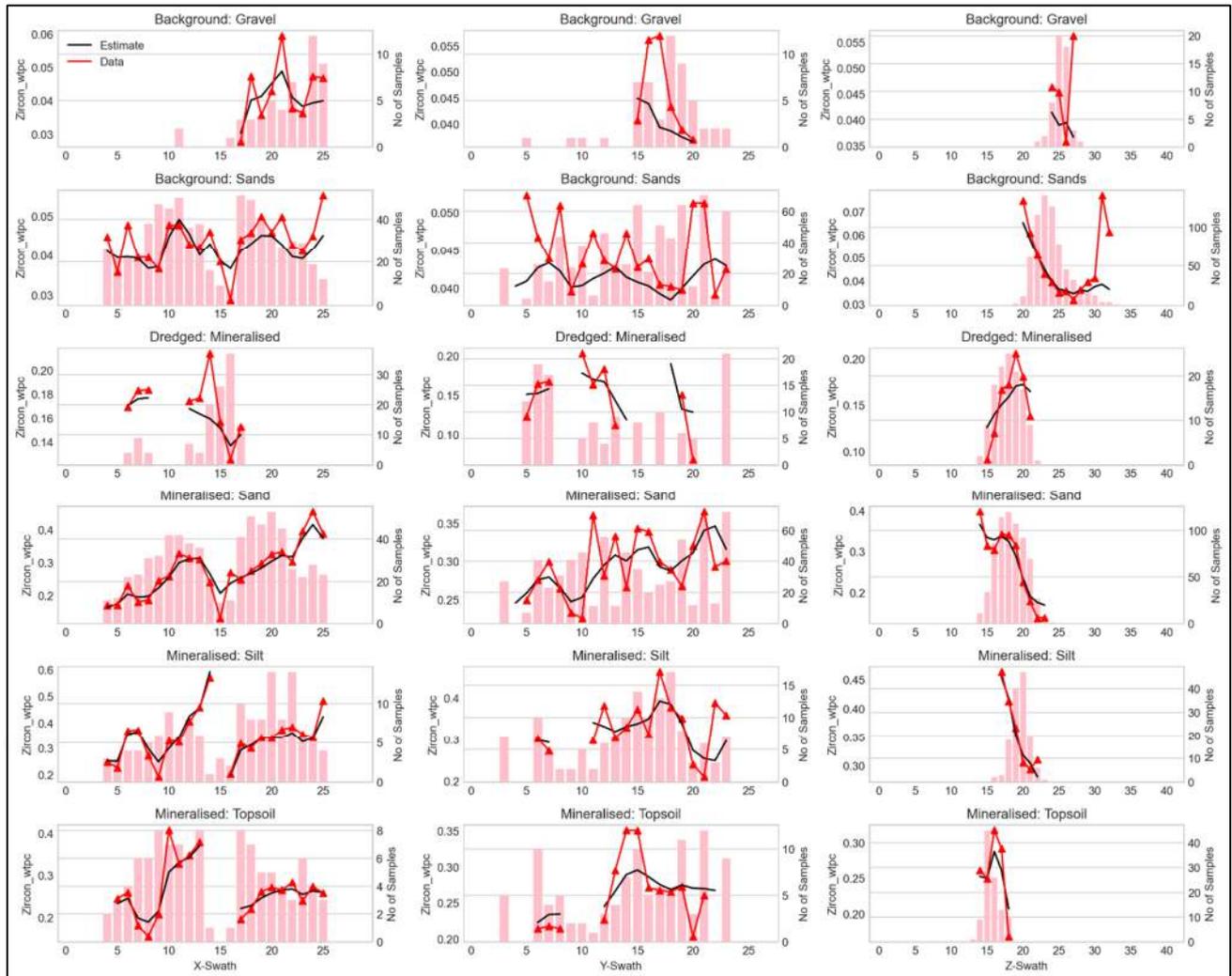


Figure 96: Swath plots for zircon inside estimation domains.

8.8.2 Size Fractions

Block model abundances were validated by comparing the input mean abundances with the block model mean abundance, using swath plots, and visually, on cross-section including:

- the comparison of input mean and estimated block means, by estimation domain, demonstrating good correlation for the product fraction (mean grade differences up to 1%, Table 25);
- comparison of input mean and estimated block means, by estimation domain, demonstrating that the oversize fraction (>2 mm) is relatively poorly estimated compared to the product fraction (especially inside the dredged domain) due to high CVs of the input data — this is considered a low risk given that the oversize fraction does not impact the tonnes and grades of the MRE;
- visual validation along cross-section, comparing input and estimated values, indicating that the estimates of the product fraction reasonably reflect the input data (Figure 97) and revealing the relatively more variable character of the size fraction data, compared to the heavy mineral abundance; and
- swath plots (x-y-z) of the product fraction displaying reasonable correlation between input and estimated abundance, and appropriate levels of smoothing (Figure 98).

Table 25: Model mean and median validation.

Variable	Domain	Data			Model			Diff	
		Mean %	Median %	CV	Mean %	Median %	CV	Mean %	Median %
Proportion 45 µm – 2 mm	All Sand	77.2	79.7	0.15	78.1	78.7	0.09	1	-1
	Dredged	75.8	78.2	0.15	75.5	76.4	0.07	0	-2
	Gravel	54.5	51.8	0.23	54.3	53.5	0.10	0	3
	Topsoil	57.1	60.7	0.44	56.4	56.5	0.25	-1	-7
Proportion > 2 mm	All Sand	4.9	2.1	1.53	5.1	3.6	0.84	4	71
	Dredged	4.7	1.9	1.37	5.4	4.6	0.56	14	140
	Gravel	26.0	26.2	0.47	26.4	27.1	0.19	2	3
	Topsoil	32.8	29.1	0.81	33.7	31.9	0.46	3	10
Proportion < 45 µm	All Sand	17.9	16.1	0.55	16.9	16.5	0.31	-6	2
	Dredged	19.5	17.6	0.51	19.2	18.0	0.24	-2	2
	Gravel	19.5	16.0	0.46	19.3	18.2	0.21	-1	14
	Topsoil	10.0	7.5	0.78	9.9	9.7	0.38	-2	30

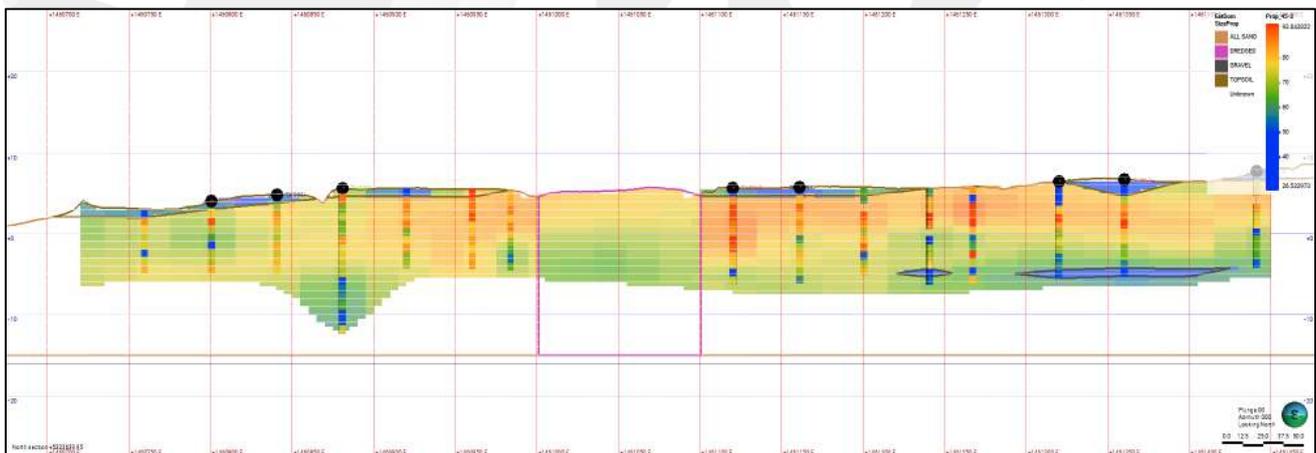


Figure 97: Visual comparison of drillholes and blocks for the product size fraction. The rectangular domain in the centre of view is the dredged zone.

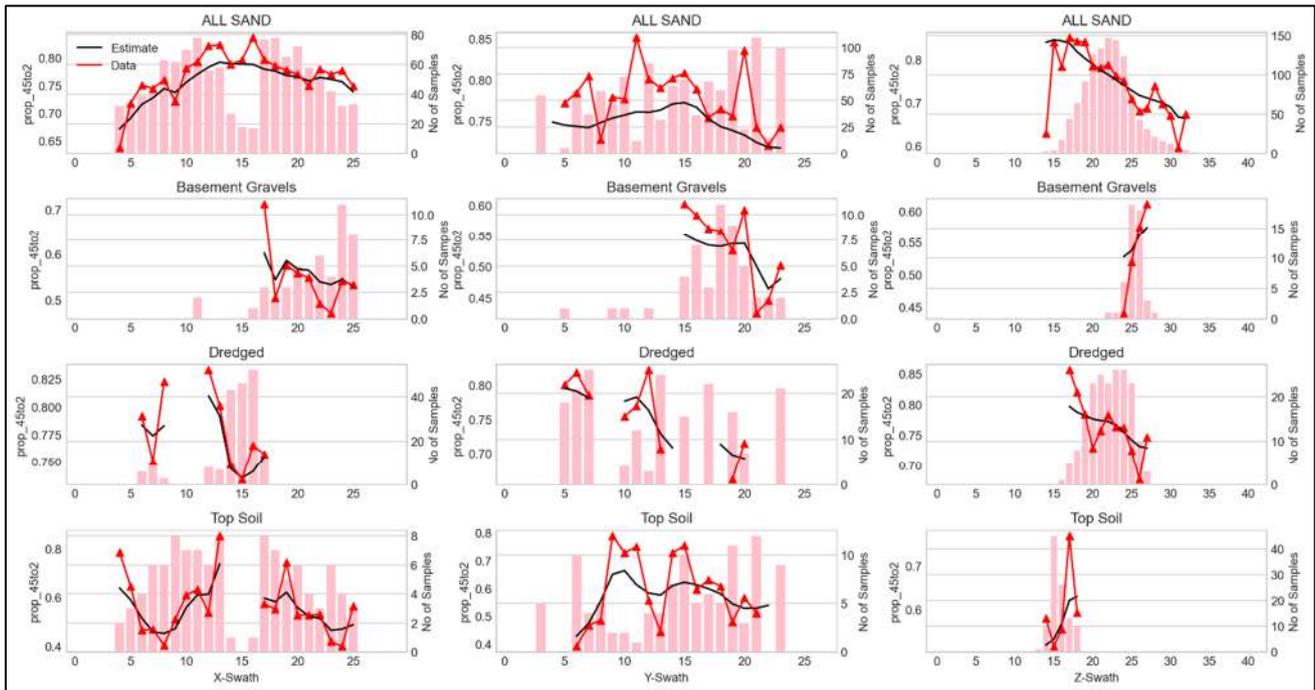


Figure 98: Swath plots for product fraction inside estimation domains.

8.9 Density

TiGa did not collect bulk density data for the Barrytown Farms Block and, hence, bulk density could not be estimated from sample data. RSC inferred an in-situ dry bulk density for each block by considering the estimated abundance of heavy minerals. RSC considered adopting the bulk density values from Coates South and using the same values for Barrytown Farms Block; however, the total number of bulk density analyses for Coates South (52) is low, and available results have relatively high variance. Geological domains at Coates South are also slightly different from Barrytown Farms Block, hindering a direct 1:1 translation of the experimental data. Given that heavy mineral abundance is the primary control on bulk density, and to honour the resulting spatial variability in density throughout the deposit, RSC opted to infer bulk density *of the product size fraction* on a block-by-block basis from estimated heavy mineral abundances.

The parameters used to infer the bulk density are summarised in Table 26. The density of the non-valuable heavy minerals was determined based on the average composition, of the non-valuable heavy mineral fraction, by taking a weighted average of the densities, of the gangue heavy minerals (GHM), listed in Table 27.

The total (valuable + non-valuable) heavy mineral abundance (THM) was determined as a function of the valuable heavy mineral abundance (VHM), based on a linear regression on the quantitative mineralogy data (Figure 99). This relationship differs slightly from the linear relationship based on sink-float data (Roux et al., 2023) and reflects the relatively larger contribution of VHM to THM at higher grades. This increasing contribution of VHM can be understood by considering that the valuable HM have the highest mineral densities and the depositional process concentrates minerals of similar density.

The bulk density (BD) of the product fraction, based on heavy minerals (HM), was then approximated using the following equation:

$$BD_{HM} = \left((\rho_{garnet} * \alpha_{garnet}) + (\rho_{ilmenite} * \alpha_{ilmenite}) + (\rho_{zircon} * \alpha_{zircon}) + (\rho_{GHM} * \alpha_{GHM}) \right. \\ \left. + (\rho_{quartz} * (1 - THM)) \right) * (1 - P)$$

Where ρ is the density of each constituent (Table 26), α is the abundance of each constituent and P is the porosity. The porosity was inferred by comparing bulk density data obtained from four sonic drillholes, at TiGa's Coates South deposit, against theoretical densities from four twin aircore holes, calculated using the formula above. Based on this comparison, a porosity of 28% was found to provide the best fit between theoretical and experimental bulk densities. The porosity of 28% is slightly lower than the theoretical porosity of pure sand (Curry et al., 2004) which is interpreted as reflecting the presence of fines in the interstitial space. Obtained BD_{HM} values (2.0–2.4 g/cm³) are consistent with bulk densities used at Coates South (Table 28). For the Topsoil domain (density = 2.3 g/cm³), BD_{HM} is higher than experimental densities for the equivalent domain at Coates South (mean = 1.4, based on 11 experimental results ranging from 0.23–2.26 g/cm³). Given the prevalence of recovery issues at shallow depths and the wide range of experimental bulk densities for the Topsoil domain, the Competent Person considers the density of the Topsoil poorly constrained. The Competent Person notes that there is a risk that BD_{HM} overstates the density for the Topsoil domain, and recommends collecting additional bulk density data to validate the previous experimental work and derived BD_{HM} values.

For reporting the MRE, the over- and undersize were assumed to be devoid of heavy minerals, and in-situ bulk densities were determined by diluting BD_{HM} with the density of quartz sand (1.94 g/cm³, Table 28):

$$BD_{HM_insitu} = BD_{HM} * p_{product} + 1.94 * (p_{undersize} + p_{oversize})$$

Where p is the proportion (between 0 and 1) of each size fraction. The assumption that the over- and undersize are barren is an oversimplification and may result in the underestimation of overall resource tonnes. However, in absence of HM abundance data for the over and undersize fraction, the Competent Person considers this approach conservative and appropriate, and the associated risk low.

The Competent Person notes there is a risk in the assignment of a global porosity for the deposit, and recommends collection of additional bulk density data for the Barrytown Farms block to validate the theoretical bulk density values. Sensitivity of contained heavy minerals to the porosity parameter scales at about 1:40; that is: a one-percentage-point understatement of the global porosity relates to a ~40 kt overstatement on contained VHM. In the Competent Person's opinion, modelled bulk density values (Table 28) are consistent with expectations for this type of deposit and in line with densities obtained at TiGa's Coates South Block, and the associated risk is considered moderate. Sensitivity of the MRE to the density parameter was tested as part of the sensitivity analysis (Section 8.10).

Table 26: Parameters used to determine in-situ bulk density.

Parameter	Value	Unit
Density Garnet	4.19	g/cm ³
Density Ilmenite	4.72	g/cm ³
Density Zircon	4.65	g/cm ³
Density Quartz	2.70	g/cm ³
Density Gangue Heavy Minerals (GHM) (average)	3.45	g/cm ³
Valuable Heavy Minerals (VHM)	Garnet + Ilmenite + Zircon	%
Total Heavy Minerals (THM)	$-0.0043 * VHM^2 + 1.38 * VHM + 2.22$	%
Porosity	28	%
Density Quartz Sand (Density Quartz * 100 – Porosity)	1.94	g/cm ³

Table 27: Average abundances and densities of non-valuable heavy minerals.

Mineral	Average Abundance %	Average Abundance % (Normalised)	Density
Epidote	3.59	55	3.45
Titanite	1.42	22	3.47
Hornblende	0.82	13	3.15
Allanite	0.19	3	3.75
Apatite	0.18	3	3.19
Rutile	0.15	2	4.23
Augite	0.09	1	3.4
Ti-magnetite_Ti>10	0.05	1	5.15
Average			3.45

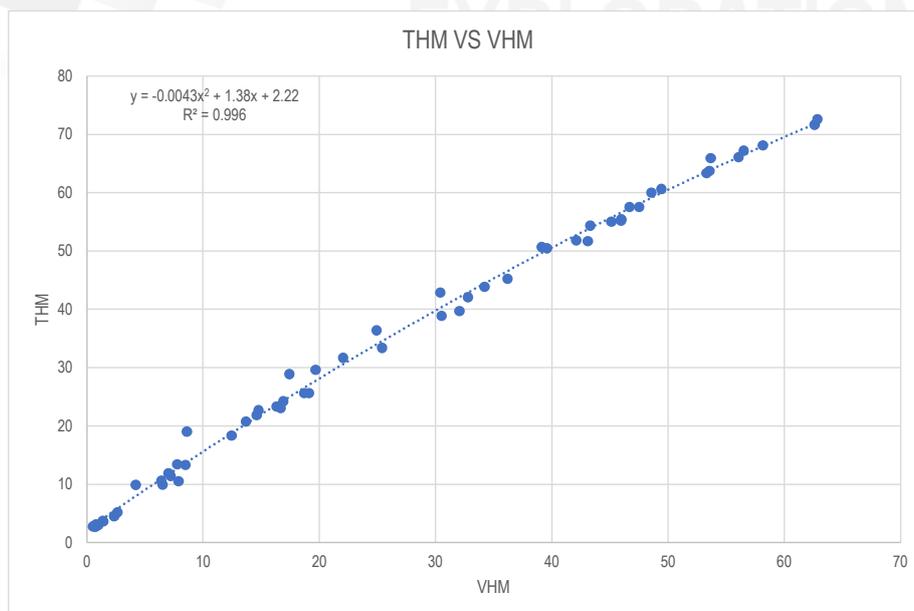


Figure 99: Relationship of THM and VHM based on automated mineralogy data.

Table 28: Average block model bulk densities for all estimation domains. In-situ bulk densities were determined by assuming the density of quartz sand (1.94 g/cm³) for the over- and undersize domains.

Domain	BDHM (g/cm ³)	BDHM_in situ (g/cm ³)
Background: Gravel	1.98	1.97
Background: Sands	2.00	1.99
Dredged: Background	2.00	1.99
Dredged: Mineralised	2.27	2.20
Mineralised: Sands	2.38	2.30
Mineralised: Silt	2.43	2.35
Mineralised: Topsoil	2.34	2.18

8.10 Sensitivity Testing

Sensitivity testing was performed by comparing ilmenite block model estimates of the two largest domains (75% of the mass of the classified resource, ~66% of contained heavy minerals) by:

- using an alternative block size which still fits the drill spacing (20 m x 20 m x 1 m, x-y-z);
- doubling the maximum number of samples (48);
- reducing the maximum number of samples (16);
- estimating with a larger search ellipsoid;
- limiting the number of samples per hole to 2 (to combat string effects);
- excluding samples with poor recoveries (threshold set at 50%); and
- assigning a global density value for the topsoil domain.

The comparison of ilmenite abundance for each sensitivity test demonstrates that the estimation settings testing (Table 29) have a minimal impact on estimated ilmenite abundance ($\leq 1\%$ relative difference). Moreover, estimation parameters have minimal impact ($\leq 1\%$ relative difference) on contained ilmenite for the key estimation domains.

A test to compare mineral abundances within the Measured portion of the resource model, using only those samples with an estimated recovery of $\geq 50\%$, was carried out. This comparison (Table 30) demonstrates that the relatively poor sample recoveries observed had no material impact on the estimated mineral abundances ($\leq 2\%$ relative difference for ilmenite and garnet, and $< 1\%$ for zircon).

RSC tested the assignment of a global density for the topsoil domain on the basis of 11 bulk density measurements taken at Coates South. The test demonstrates minimal sensitivity on mean grade for ilmenite in the topsoil domain but a 38% reduction in contained ilmenite. Given the size of the domain (~5% of the classified volume), the overall impact on the global Mineral Resource is small: -3% on contained ilmenite and -3% on contained VHM. The Competent Person considers the potential overstatement of densities in the topsoil domain a low-to-moderate risk.

The Competent Person considers the block model to be robustly estimated for the key estimation domains. Background domains and size fractions are not always robustly estimated, but the Competent Person considers the associated risk low.

Table 29: Global comparison of ilmenite abundance estimates using alternative estimation parameters (inside classification volume, reported at 0.0% ilmenite cut-off).

Estimation Domain	Parameter Tested	Setting	Sensitivity Test Ilmenite Mean (% , mass weighted)	Original Model Ilmenite Mean (% , mass weighted)	Relative Difference Abundance (%)	Relative Difference Contained HM (%)
Mineralised Sand	Block Size	20 m x 20 m x 1 m	10.96	10.95	<1	<1
	Reduced Max Samples	16	10.96	10.95	<1	<1
	Increased Max Samples	48	10.95	10.95	<1	<1
	Double Search Ellipsoid	500 m x 140 m x 6 m	10.93	10.95	<1	<1
	Max. Samples/Hole	2	10.97	10.95	<1	<1
	Sample Quality	Exclude <50% Recovered	11.10	10.95	1	1
	Domaining	Single Mineralised Dom.	11.07	10.95	1	1
Basement Sand	Block Size	20 m x 20 m x 1 m	0.90	0.90	<1	<1
	Reduced Max Samples	16	0.89	0.90	1	<1
	Increased Max Samples	48	0.90	0.90	<1	<1
	Double Search Ellipsoid	500 m x 120 m x 8 m	0.90	0.90	<1	<1
	Max. Samples/Hole	2	0.89	0.90	1	<1
	Sample Quality	Exclude <50% Recovered	0.89	0.90	1	1
	Domaining	Single Mineralised Domain	0.87	0.90	1	3
Topsoil	Density	Global Assignment of 1.4 g/cm ³	7.27(50)	7.46	3	38

Table 30: Global comparison of mineral abundance estimates within the Measured portion of the resource model using only those samples with ≥50 % recovery (reported at 1.0% ilmenite cut-off).

Mineral	Original Model Mean (%)	Sensitivity Test Mean (%)	Relative Difference %
Ilmenite	7.8	7.7	-1.9%
Garnet	10.6	10.5	-0.9%
Zircon	0.2	0.2	0.3%

8.11 Depletion

Minor historical mining for gold, ilmenite, and other minerals had occurred within the Barrytown Project, as discussed in section 3.3. Detail on historical production is scarce, and RSC modelled the area affected by historical dredging based on visual interpretation of aerial imagery, in combination with drillhole observations (Figure 100). The area, interpreted to be affected by historical dredging, was modelled and estimated separately as this material is not considered to be in situ, and assumptions of geological and grade continuity do not hold. The dredged area was included in the Mineral Resource but classified separately to reflect the lower confidence in grade continuity in this zone.

A small zone surrounding a water pond has been excluded from the mineral resource, on the basis that this material is no longer in situ, and no drilling data are available to estimate heavy mineral abundance.

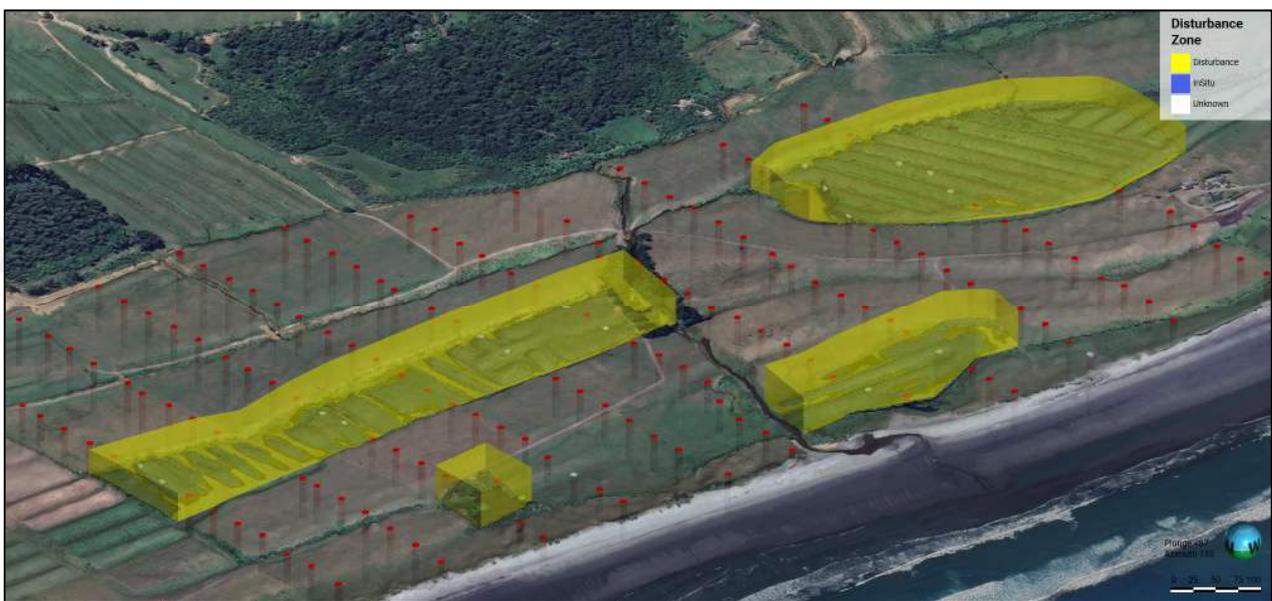


Figure 100: Areas where aerial imagery and grade data suggest historical mining activity were modelled and estimated separately.

8.12 Classification

8.12.1 Classification Statement

In accordance with Clause 49 of the JORC Code (2012), the likely product and its specifications have been considered by the Competent Person. The product is a 45- μm to 2-mm magnetic concentrate rich in ilmenite, garnet and a non-magnetic concentrate rich in zircon. The Mineral Resource is reported in terms of the minerals on which the project is based and includes the specification of these minerals.

The Competent Person has classified a Measured Mineral Resource of 7.7 Mt at 7.8% ilmenite, 10.6% garnet and 0.2% zircon, and an Indicated Mineral Resource of 5.8 Mt at 9.2% ilmenite, 12.2% garnet and 0.2% zircon, reported at a cut-off abundance of 1% ilmenite and within a particle size range of 45 μm to 2 mm (Table 31, Table 32). The Mineral Resource has been classified in accordance with the JORC Code (2012), and is outlined in Figure 101. Table 31 summarises tonnes

and in-situ grades, determined on the basis of the grade of the product fraction and the proportion of the product size fraction to the whole. Table 32 details the proportion of the product size fraction for each resource category and the HM abundance inside the product size fractions, which is higher than the in-situ HM abundance.

The Measured portion of the Mineral Resource has been determined from an assessment of kriging statistics (kriging efficiency and slope of regression), drill spacing and assessment of geological and grade continuity. Geological evidence is derived from adequately detailed and reliable exploration, sampling and testing gathered through appropriate techniques from drillholes including SEM-based automated mineralogy, and is sufficient to confirm geological and grade continuity between points of observation where data and samples are gathered.

The Competent Person has used sample recovery as an indicator of sample quality, and has classified material informed mostly by samples with less than 50% recovery in the Indicated category. Additionally, the areas of historical mining, in which material has been displaced from its geological context, were also classified in the Indicated category. For these areas, evidence is sufficient to assume but not confirm geological and grade continuity.

The part of the deposit underlying a road parcel in the southern end of the property was not classified. For this parcel, non-statute minerals are privately owned and do not have reasonable prospects for economic extraction.

The Mineral Resource is a global estimate. The confidence in the Mineral Resource is reflected in the Measured and Indicated classifications, which have been assigned based on the drill spacing, an assessment of kriging statistics (kriging efficiency and slope of regression), and an assessment of geological and grade continuity.

An internal peer review of the MRE has been completed and no issues were found. No production data are available to reconcile the HM abundances of the MRE. No check estimates are available.

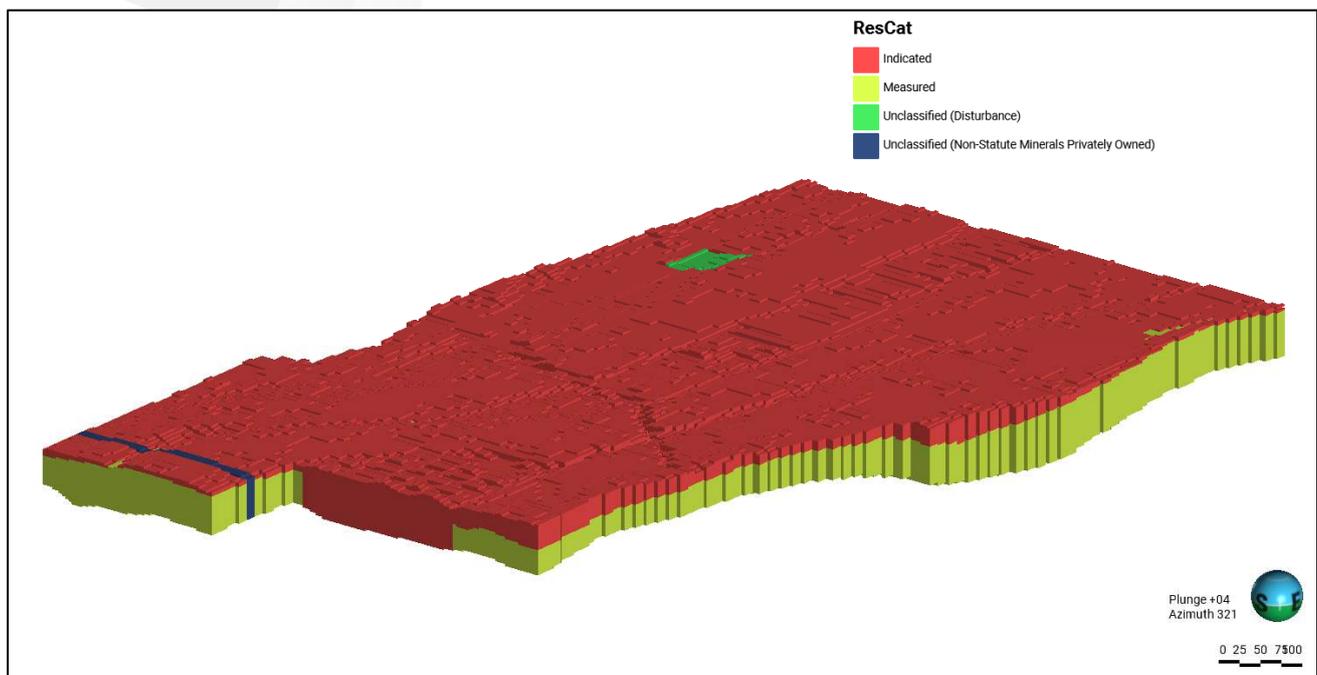


Figure 101: Barrytown Farms Block Measured and Indicated Mineral Resource and unclassified blocks.

Table 31: Barrytown Farms Block in-situ Mineral Resource, reported at a 1% ilmenite (in-situ) cut-off.

Category	Density (g/cm ³)	In-Situ Mass (Mt)	In-Situ Grade (%)				Material Content (Kt)			
			Ilmenite	Garnet	Zircon	VHM	Ilmenite	Garnet	Zircon	VHM
Indicated	2.2	5.8	9.2	12.2	0.2	21.6	530	710	10	1,250
Measured	2.2	7.7	7.8	10.6	0.2	18.7	610	820	15	1,440
Total	2.2	13.5	8.4	11.3	0.2	19.9	1,140	1,530	25	2,690

Notes:

1. The Mineral Resource is classified in accordance with the JORC Code (2012).
2. The Mineral Resource is reported at a 1% ilmenite abundance cut-off.
3. Zircon is the tonnes of zircon within particle size range 45 µm to 2 mm.
4. Garnet is the tonnes of garnet within particle size range 45 µm to 2 mm.
5. Ilmenite is the tonnes of ilmenite within particle size range 45 µm to 2 mm.
6. VHM % is the abundance of ilmenite, garnet and zircon within a particle size range 45 µm to 2 mm.
7. The Mineral Resource is reported on a dry basis.
8. The effective date of the Mineral Resource is 6 October 2023.
9. The Mineral Resource is contained within the proposed mining disturbance area.
10. The Mineral Resource is rounded to reflect the level of confidence in the estimate at the time of reporting.

Table 32: Barrytown Farms Block Mineral Resource products.

Category	Density	In-Situ Mass	Proportion of Product	Contained Product	Product Grade				Material Content			
					Ilm.	Gar.	Zir.	VHM	Ilm.	Gar.	Zir.	VHM
	g/cm ³	Mt	%	Mt	%	%	%	%	kt	kt	kt	kt
Indicated	2.2	5.8	76	4.4	12.1	16.1	0.3	28.4	530	710	10	1,250
Measured	2.2	7.7	80	6.2	9.8	13.2	0.2	23.2	610	820	15	1,440
Total	2.2	13.5	78	10.6	10.7	14.4	0.2	25.4	1,140	1,530	25	2,690

Notes:

1. The Mineral Resource is classified in accordance with the JORC Code (2012).
2. The Mineral Resource is reported at a 1% ilmenite abundance cut-off.
3. Zircon is the tonnes of zircon within particle size range 45 µm to 2 mm.
4. Garnet is the tonnes of garnet within particle size range 45 µm to 2 mm.
5. Ilmenite is the tonnes of ilmenite within particle size range 45 µm to 2 mm.
6. VHM % is the abundance of ilmenite, garnet and zircon within a particle size range 45 µm to 2 mm.
7. The Mineral Resource is reported on a dry basis.
8. The effective date of the Mineral Resource is 6 October 2023.
9. The Mineral Resource is contained within the proposed mining disturbance area.
10. The Mineral Resource estimate is rounded to reflect the level of confidence in the estimate at the time of reporting.

8.12.2 Cut-Off Grade

The abundance cut-off of 1% ilmenite was determined through an interim feasibility study (London, 2023) for TiGa's nearby Coates South Block deposit. The cut-off is based on assumed operating costs of a conventional open-pit mining operation and HM recoveries. The ilmenite abundance–tonnage relationship for the Mineral Resource is illustrated in Table 33.

Table 33: Total Barrytown Farms Block Mineral Resource at various ilmenite cut-off abundances.

Cut-Off (Ilmenite %)	In-Situ Mass (Mt)	In-Situ Grade (%)				Material Content (Kt)			
		Ilmenite	Garnet	Zircon	VHM	Ilmenite	Garnet	Zircon	VHM
1	13.5	8.4	11.3	0.2	19.9	1,140	1,530	25	2,700
2	10.7	10.3	13.8	0.2	24.3	1,100	1,480	25	2,600
4	10.1	10.7	14.2	0.2	25.2	1,080	1,440	25	2,550
6	8.9	11.4	15.1	0.2	26.8	1,020	1,350	20	2,400
8	7.1	12.5	16.5	0.3	29.3	890	1,180	20	2,090
10	5.2	13.8	17.9	0.3	32.0	720	940	15	1,680

8.12.3 Reasonable Prospects

In assessing the reasonable prospects of economic extraction, the Competent Person has evaluated preliminary mining, metallurgical, economic, environmental, social (section 9) and geotechnical parameters established in preliminary or internal, pre-feasibility and feasibility studies (Banaszak et al., 2018; London, 2022) that have investigated various mining and processing methods for extracting and concentrating the ilmenite, garnet, and zircon. The interim feasibility study (London, 2022) focussed on the Coates South Block, with engineering and design completed to a 20–30% level of precision, assumes a high level of mining recovery of the Sand unit (>95%), based on a bulk mining method (dredge or excavator) with relatively low mining selectivity. It is reasonably assumed that the same, or similar methodology could apply to mining at Barrytown Farms and that similar sand recovery could be achieved.

The metallurgical assumptions considered for the Barrytown Farms Block MRE are based on the metallurgical assumptions applied to the Coates Block South Block, which is located ~2.5 km north of Barrytown Farms Block. The Competent Person considers the two deposits to be geologically very similar. London (2023) includes the outcomes of metallurgical testing of a bulk sample collected from Coates South. The Coates South, and previous metallurgical testing (section 5.3.1) results, demonstrate reasonable pathways to produce marketable concentrates from Barrytown heavy mineral sands that contain ilmenite, garnet, and zircon.

The Competent Person considers that TiGa is working towards an outcome where it is more likely than not that resource consents will be issued under the Resource Management Act. Therefore, RSC considers that the Mineral Resource reported here is a realistic inventory of mineralisation which, under assumed and justifiable technical, economic and developmental conditions, might, in whole or in part, become economically extractable. Portions of the deposit that do not have reasonable prospects for economic extraction are not included in the Mineral Resource.

8.12.4 Product Specification, Deleterious Elements & Marketability

The heavy minerals product is a magnetic concentrate rich in ilmenite and garnet, and a non-magnetic concentrate rich in zircon with grains that range from 45 µm to 2 mm.

In the Competent Person's experience with similar projects and product types, from nearby locations in New Zealand and elsewhere, there are reasonable markets for these concentrate products. These will most likely be China, North America

and/or Europe. Purchasers would separate the ilmenite, garnet, and zircon from the concentrates for further processing and/or marketing.

Globally, the primary market for ilmenite is the supply of titanium raw materials for the manufacture of TiO_2 pigments and titanium metal. The Barrytown Flats ilmenite product, recovered from the concentrate by downstream customers, would likely be used either for direct use in anatase production or as a blend feedstock for wider use in TiO_2 pigment production. The garnet product would likely be used for abrasive blasting and waterjet cutting. The zircon product may be suitable as an opacifier, whitening agent, or pigment for ceramic applications. Other zircon product markets include abrasives and machinery, due to its hardness and resistance to corrosion and heat, respectively.

Key quality characteristics of the product containing ilmenite and garnet are the garnet composition and the proportion of impurities within the ilmenite and garnet grains (section 5.4). RSC notes that Barrytown Flats ilmenite grains typically contain large inclusions of other deleterious minerals; however, using conventional processing techniques, the presence of other mineral inclusions in ilmenite is unlikely to be deleterious to the production of TiO_2 (pers. comm. Chris Bumby, Chief Scientist/Engineer – Materials, Robinson Institute). The Barrytown Flats garnet grains are relatively fine ($\sim 100 \mu m$; Figure 25), dominated by almandine, and are typically free of inclusions (section 5.4); hence, the Barrytown Flats garnets are suitable for the water-jet cutting market.

9 Environmental & Social Factors

The drilling at Barrytown Farms was undertaken within a planned mining disturbance area. This area was defined using boundaries and exclusion zones of the surrounding environmentally sensitive areas as discussed in section 2.4 and outlined in Figure 3.

The Barrytown Project lies within an area of high average annual rainfall. Groundwater levels are high and landowners describe the area as very wet for large parts of the year. As such, effective groundwater management will be key to successful mining of HM deposits in this area, in particular, the management of run-off with relation to the surrounding areas of environmental sensitivity. One of the conditions requested by the West Coast Regional Council, for gaining resource consent to mine at Coates South Block, concerned obtaining a detailed understanding of the hydrological conditions and groundwater for effective water management. As a result, TiGa commissioned Komanawa Solutions Ltd to undertake a detailed hydrogeological study across the Coates South Block in 2022. As part of this study, RSC supervised the drilling of water monitoring holes during the 2022 drilling campaign. It is assumed that there would be a similar condition for resource consent to mine the Barrytown Farms Block.

TiGa submitted its updated publicly notified resource-consent applications (see section 2.4 for background) for the Coates South Block in April 2023, with public submissions due by 13 October 2023. The Competent Person considers that the company is working towards an outcome where it is more likely than not that resource consents will be granted, given that resource consents have been issued for a similar style of project (Nine Mile) to the north. The Competent Person notes that if resource consents are not granted, it could negatively affect the Mineral Resource's prospects of economic extraction.

Mining in New Zealand is a sensitive subject, and like many other Western Countries, there are active anti-mining groups. In 2019, Plaman Resources lost its social licence to operate at Foulden Hills, Diatomite Mine, Otago⁸. A negative Facebook social media campaign resulted in the project losing funding and therefore being unable to proceed. A local community group (Coast Road/Barrytown Resilience Group) positioned against TiGa's proposed mine operation at Coates South has raised NZD 20,000 and planned to protest at TiGa's public meeting on 10 October 2023^{9,10}. If TiGa was to lose its social licence to operate, it could negatively affect the Mineral Resource's prospects of economic extraction. The Competent Person notes that while there is some risk of social licence issues, the West Coast region has stronger support for mining than the rest of New Zealand. A similar heavy mineral sands project is consented and operating on private land, ~50 km north of Barrytown at Nine Mile Beach, with support from West Coast locals (section 4.4).

The Competent Person notes that TiGa and its consultants regularly engage with iwi (indigenous Māori tribes) and hapū (Māori sub-tribes), whose rohe (territory) includes some or all of the Barrytown Project area, or who may be directly affected by the Barrytown Project, namely Ngāti Waewae. Ngāti Waewae has indicated its support of TiGa's Coates South resource consent applications, subject to sufficient mitigating measures. It is therefore considered likely that the same expectations would apply to any future mining of the Barrytown Farms Block.

⁸ <https://www.newsroom.co.nz/southern-discomfort-at-fossil-mining-plans>

⁹ <https://community.scoop.co.nz/2023/09/submissions-urgent-to-save-barrytown-flats/>

¹⁰ <https://www.newsroom.co.nz/barging-into-an-ore-some-future>

On balance, the Competent Person considers that the environmental, social and governance factors are sufficiently well-understood, and proactively managed, to support the Mineral Resource's reasonable prospects of economic extraction at the effective date of this report.



10 Risks

The risks involved in the modelling and estimation for the Project are summarised in Table 34. The most pertinent risks have also been noted throughout this report.



Table 34: Overview of risk factors impacting the MRE.

Category	Availability Data/Info	Score (1–10)	Impact Factor (1–5)	Risk Factor	Comment
Database Format	Good	9	1	Low	Data are stored in a Microsoft Access database maintained by RSC.
Drilling & Primary Sampling Techniques	Good	6	3	Low–Moderate	The Competent Person (CP) considers aircore drilling an acceptable sampling method for HM sand deposits if sampling is well controlled.
Drilling & Primary Sampling Recovery	Good	7	3	Low–Moderate	Recovery estimates indicate that first rods averaged less than 50% (~37%) recovery, indicating that the quality of the primary sample was not always controlled. This presents a risk to the sample quality for these intervals (mainly inside the Topsoil domain). The CP has considered sample quality in the classification of the MRE.
Logging	Good	8	1	Low	Logging was completed to a good standard. It is consistent and provided a solid foundation for robust geological interpretations.
Sub-Sampling Techniques & Sample Preparation	Good	7	2	Low	Subsampling procedures and quality control checks were acceptable. In general, Ti, Fe and Zr indicate low variation at all splitting stages.
Quality of Assay Data & Analytical Techniques	Good	8	2	Low	The analytical procedures (pXRF, SEM) delivered data that were accurate and precise and fit for purpose of estimation in high-confidence categories.
Verification of Sampling and Assaying	Good	8	1	Low	During the site visit, RSC carried out spot checks on collar locations and re-logged several aircore holes; no issues were identified. RSC did not collect verification samples.
Location of Data Points	Good	7	2	Low	Drill collars were picked up by hand held GPS which has x-y error of ± 5 m. These drill collar elevations were draped to the DTM with accuracy specifications of ± 0.2 m (95%) vertical. Considering the horizontal nature of the deposit, lack of cover, combined with the strong grade and geological continuity, the CP considers the accuracy of the collar locations acceptable, and the potential error present will not materially impact the MRE.
Data Spacing & Distribution	Good	8	2	Low	With drill fences 120 m apart and hole spacing of ~40 m, the CP considers the data spacing sufficient to confirm geological and grade continuity for the estimation of HM abundance.
Bulk Density	Poor	3	3	Moderate	No bulk density data are available for the Barrytown Farms Block, and the CP considers this a moderate risk. Some experimental bulk density data are available from four sonic holes at TiGa's nearby Coates South deposit, minimising the risk.
Orientation of Data/Drilling	Good	9	1	Low	All drilling used in the estimate was appropriately oriented, and perpendicular to the flat-lying deposit.

Database Integrity	Good	9	1	Low	All data are maintained in a database and verified by RSC.
Geological Interpretation	Good	8	2	Low	The geological interpretation is based on downhole lithological logging, which provides acceptable correlation between drillholes.
Estimation & Modelling: Domaining	Good	8	2	Low	Estimation domains are constrained by the geological interpretation and produced populations with low-to-moderate internal grade variation, as expressed by the CV.
Estimation & Modelling: Compositing	Good	9	1	Low	All samples were collected in 1-m intervals and compositing to 1 m did not affect the input data.
Estimation & Modelling: Grade Capping	Good	8	1	Low	The HM estimation domains exhibit low to moderate CVs. Top cutting was applied only in domains with relatively high CVs, i.e. background domains and the dredged domain, which no longer retain geological integrity. The use of top cuts in these domains is considered conservative and low risk. No top cuts were applied to size fraction data to preserve the interdependent properties of the dataset.
Estimation & Modelling: Variography	Good	8	1	Low	Variogram structures are typically well defined and extend beyond drill spacing. Nugget values inferred from the downhole variograms are relatively low (≤ 0.1 for HM in mineralised domains, ≤ 0.3 for HM in background domains). For size fractions, a relatively higher nugget was modelled (~ 0.4).
Estimation & Modelling: Interpolation and Extrapolation	Good	9	1	Low	Extrapolation was constrained to within 50% of the drillhole spacing, which is considered reasonable by the CP. Sensitivity analysis indicates the MRE is not particularly sensitive to search distances.
Estimation & Modelling: Checks and Validation	Good	8	2	Low	The model was validated through visual validation, mean comparison checks, and review of swath plots. RSC considers the HM abundances to be robustly estimated, with block grades representative of the input data. The product size fraction is reasonably well estimated, despite indicating relatively more variability than HM abundance.
Estimation & Modelling: Cut-off	Good	8	2	Low	The abundance cut-off of 1% ilmenite was determined through a pre-feasibility study (London, 2023) and is based on assumed operating costs and heavy mineral recoveries.
Estimation & Modelling: Density	Acceptable	6	4	Low-Moderate	Due to the lack of bulk density data at Barrytown Farms, the density estimate is reliant on data from TiGa's nearby Coates South Block. The CP considers a HM-abundance-based density approximation that honours variability throughout the deposit preferable to a nominal domain-based bulk density assignment, on the basis of limited measurements from Coates South. However, the abundance-based method relies on various assumptions, such as the porosity of the material and the grade of the over- and undersize fractions, both of which are poorly constrained and should be supported by additional experimental bulk density data. For the topsoil domain, there are only few and highly variable experimental data at Coates South. Porosity may vary throughout the deposit (e.g. in the topsoil), and this is not currently accounted for due to the lack of density data at Barrytown Farms. Sensitivity of contained heavy minerals to the porosity parameter scales inversely with HM

					content; that is, a one-percentage-point understatement of the global porosity is associated with a 40 kt overstatement contained VHM. There is a risk that HM-based densities overstate true in-situ densities for domains with higher porosity, such as the topsoil, and this may have resulted in an overstatement of contained HM for these domains.
Estimation & Modelling: Classification	Good	7	4	Low–Moderate	The Mineral Resource is classified as Measured and Indicated based on sample spacing, sample quality, geological understanding, and kriging statistics. The Measured classification was applied to blocks of in-situ mineralisation, informed by good quality samples. Blocks informed by poor-quality samples or in areas that are affected by historical mining have been classified as Indicated.



11 Exploration Potential

The MRE presented in this report is based on drilling undertaken within a planned mining area on the Barrytown Farms Block. The Barrytown Farms Block is bounded to the north and south by land ownership boundaries, to the west by the coastline and neighbouring hobby beach mining permits, and to the eastern extent by an ~200-m buffer zone from State Highway 6.

Previous operators have attempted to estimate the global resources across the Barrytown Flats as listed in Table 7; however, they did not lead to further or more advanced technical evaluations or mining proposals in the southern half of the Barrytown Project.

Since 2016, TiGa's exploration has confirmed the presence of a contiguous shoreline deposit across the Barrytown Project, with ~140 magnetic strandlines identified in the reprocessing and interpretation of the airborne magnetic and radiometric data (see section 5.2; Wallace and Peters, 2016). These results demonstrate potential for further exploration in the Barrytown Flats. TiGa is in the process of planning further exploration activities on the wider Barrytown Project area.



12 Conclusions

The ilmenite, garnet, and zircon Mineral Resource presented in this report is a realistic inventory of mineralisation which, under assumed and justifiable technical, economic, and developmental conditions, might, in whole or in part, become economically extractable. The heavy mineral product is a 45- μm to 2-mm magnetic concentrate rich in ilmenite, garnet, and a non-magnetic concentrate rich in zircon. Geological evidence is derived from adequately detailed and reliable exploration, sampling and testing, gathered through appropriate techniques from drillholes including SEM-based automated mineralogy, and is sufficient to confirm geological and grade continuity between drillholes for a significant part of the deposit.

The machine learning approach to quantify the ilmenite, garnet, and zircon abundance from XRF-derived elemental concentrations in drill samples has performed well, and is supported through robust, repeatable and demonstrable quality control processes.



13 Recommendations

The method of using aircore drilling is suitable for sampling soft sediments, but struggles to obtain high-quality samples where large-diameter gravel, beach pebbles, or other clasts are present; whereby the material is either rejected by the bit, or causes a blockage to either the bit, casing or sample hose. As a result of this, and/or efforts to clear this material, the resulting samples can be unrepresentative of the mineralisation domain. There is a potential for the under-estimation of coarse/over-size material, or the over-estimation of finer material, which would introduce bias towards subsequent estimation of HM within size fractions. RSC recommends excavating a series of test pits to further evaluate the true size fraction proportions and abundances across key areas. RSC also recommends drilling a close-spaced (~5-m-spaced) sonic drill programme to further resolve any abundance bias and better understand short-range variability in the deposit.

Water saturation was high owing to high groundwater levels and run-off from heavy rainfall during the autumn-to-winter period. Sample quality in future drilling programmes could be improved by drilling during the drier summer months.

The lack of bulk density data for the Barrytown Farms block presents a low-to-moderate risk to the MRE, in particular for the soil domain. The Competent Person prefers the HM abundance-based density approach to a global density assignment, based on limited data, but this approach relies on various assumptions, which should be tested with additional bulk density data. In the Competent Person's opinion there is a low-to-moderate risk that an understatement of the porosity of the topsoil domain may have resulted in an overestimation of contained HM.

RSC understands that geotechnical studies have been carried out at Coates South Block and recommends that more density data are collected, across the Barrytown Farms deposit, to get more confidence in tonnages and variation, in densities across the project area, and validate the parameters used to infer bulk densities from heavy mineral content.

Amendments and adjustments were made to sample processing during the programme as a result of budget constraints and tight timelines. This created complicated sampling protocols, which, in itself, is a common source of errors in data. Limitations with equipment, experience, personnel, size, and capacity at NZIMMR all contributed to small but cumulative errors in handling of samples, or errors in digital data reporting. RSC recommends that future samples are processed at a single accredited facility, and that all sample processing is defined before the programme starts.

14 References

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APPENDIX A: Variogram Parameters and Models

A.1 Heavy Minerals Variogram Parameters

General		Structure 1													Structure 2								
Variable	Variogram Name	Model space	Variance	Nugget	Normalised Nugget	Sill	Normalised sill	Structure	Major	Semi-Major	Minor	Dip	Dip Azi.	Pitch	Sill	Normalised Sill	Structure	Major	Semi-Major	Minor	Dip	Dip Azi.	Pitch
Garnet	Background: Gravel	Data	0.99	0.27	0.28	0.49	0.49	Spherical	124	31	3	0	0	93	0.23	0.23	Spherical	328	95	3	0	0	93
	Background: Sands	Data	1.74	0.48	0.28	0.85	0.49	Spherical	124	31	3	0	0	93	0.4	0.23	Spherical	328	95	3	0	0	93
	Dredged: Background	Data	2.25	0.59	0.26	0.64	0.29	Spherical	128	36	2	0	0	93	1.02	0.45	Spherical	192	51	3	0	0	93
	Dredged: Mineralised	Data	28.14	2.81	0.1	14.45	0.51	Spherical	128	36	4	0	0	93	10.87	0.39	Spherical	151	81	2	0	0	93
	Mineralised: Sand	Data	55.25	3.21	0.06	37.2	0.67	Spherical	140	43	4	0	0	93	14.74	0.27	Spherical	461	156	3	0	0	93
	Mineralised: Silt	Data	46.78	1.68	0.04	35.2	0.75	Spherical	135	43	2	0	0	93	9.85	0.21	Spherical	461	113	2	0	0	93
	Mineralised: Topsoil	Data	27.08	1.35	0.05	13.6	0.5	Spherical	334	73	4	0	0	93	12.09	0.45	Spherical	597	205	5	0	0	93
Ilmenite	Background: Gravel	Data	0.73	0.15	0.21	0.52	0.71	Spherical	139	31	2	0	0	93	0.06	0.08	Spherical	444	100	3	0	0	93
	Background: Sands	Data	0.79	0.17	0.21	0.52	0.66	Spherical	139	31	2	0	0	93	0.1	0.12	Spherical	444	100	4	0	0	93
	Dredged: Background	Data	0.87	0.23	0.26	0.33	0.38	Spherical	128	36	1	0	0	93	0.31	0.36	Spherical	192	51	4	0	0	93
	Dredged: Mineralised	Data	25.82	2.58	0.1	13.3	0.51	Spherical	128	36	4	0	0	93	9.97	0.39	Spherical	151	81	2	0	0	93
	Mineralised: Sand	Data	36.73	1.92	0.05	20.2	0.55	Spherical	161	41	4	0	0	93	14.64	0.4	Spherical	607	212	5	0	0	93
	Mineralised: Silt	Data	32.35	2.91	0.09	18.8	0.58	Spherical	177	44	3	0	0	93	10.6	0.33	Spherical	456	205	4	0	0	93
	Mineralised: Topsoil	Data	22.47	1.12	0.05	12.0	0.53	Spherical	366	52	4	0	0	93	9.36	0.42	Spherical	366	175	5	0	0	93
Zircon	Background: Gravel	Data	0	0	0.27	0	0.3	Spherical	137	55	2	0	0	93	0	0.43	Spherical	299	109	3	0	0	93
	Background: Sands	Data	0	0	0.27	0	0.3	Spherical	137	55	2	0	0	93	0	0.43	Spherical	299	109	3	0	0	93
	Dredged: Background	Data	0	0	0.26	0	0.38	Spherical	128	36	1	0	0	93	0	0.36	Spherical	192	51	4	0	0	93

General		Structure 1											Structure 2									
Dredged: Mineralised	Data	0.01	0	0.1	0.01	0.51	Spherical	128	36	4	0	0	93	0	0.39	Spherical	151	81	2	0	0	93
Mineralised: Sand	Data	0.02	0	0.04	0.01	0.68	Spherical	140	43	4	0	0	93	0.01	0.28	Spherical	461	185	5	0	0	93
Mineralised: Silt	Data	0.02	0	0.07	0.01	0.53	Spherical	190	43	4	0	0	93	0.01	0.4	Spherical	461	219	3	0	0	93
Mineralised: Topsoil	Data	0.01	0	0.05	0.01	0.51	Spherical	334	29	4	0	0	93	0.01	0.44	Spherical	360	104	5	0	0	93



