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PRELIMINARY ECONOMIC ASSESSMENT

Goondicum 2016

Prepared for Melior Resources Inc.

IMPORTANT NOTICE

This notice is an integral component of the Goondicum Project Preliminary Economic Assessment (Goondicum 2016 PEA) and should be read in its entirety and must accompany every copy made of the Technical Report. The Technical Report has been prepared using the Canadian National Instrument 43-101 Standards of Disclosure for Mineral Projects.

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This report is a Preliminary Economic Assessment (PEA) and includes an economic analysis that is based, in part, on Inferred Mineral Resources. Inferred Mineral Resources are considered too speculative geologically to have the economic considerations applied to them that would allow them to be categorised as Mineral Reserves, and there is no certainty that the results will be realised. Mineral Resources are not Mineral Reserves as they do not have demonstrated economic viability. The results of the PEA represent forward-looking information. The forward-looking information includes mineral price assumptions, cash flow forecasts, projected capital and operating costs, mineral recoveries, mine life and production rates, and other assumptions used in the PEA. Readers are cautioned that actual results may vary from those presented. The factors and assumptions used to develop the forward-looking information, and the risks that could cause the actual results to differ materially are presented in the body of this report under each relevant section. The conclusions and estimates stated in the Technical Report are to the accuracy stated in the Technical Report only and rely on assumptions stated in the Technical Report. The results of further work may indicate that the conclusions, estimates and assumptions in the Technical Report need to be revised or reviewed.

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TITLE PAGE

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Title:	Goondicum 2016 Preliminary Economic Assessment
Location:	Monto, South East Queensland, Australia
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1.0 Summary

1.1 Introduction

TZ Minerals International Pty Ltd (TZMI) was commissioned by Melior Resources Ltd (Melior) to undertake a Preliminary Economic Assessment (PEA) of the Goondicum ilmenite and apatite project in Queensland, Australia. The purpose of this assessment is to determine the economic viability of Goondicum in accordance with the guidelines of Canadian National Instrument (CNI) 43-101.

This independent NI 43-101 Technical Report (the Report) has been generated to support the results of the PEA.

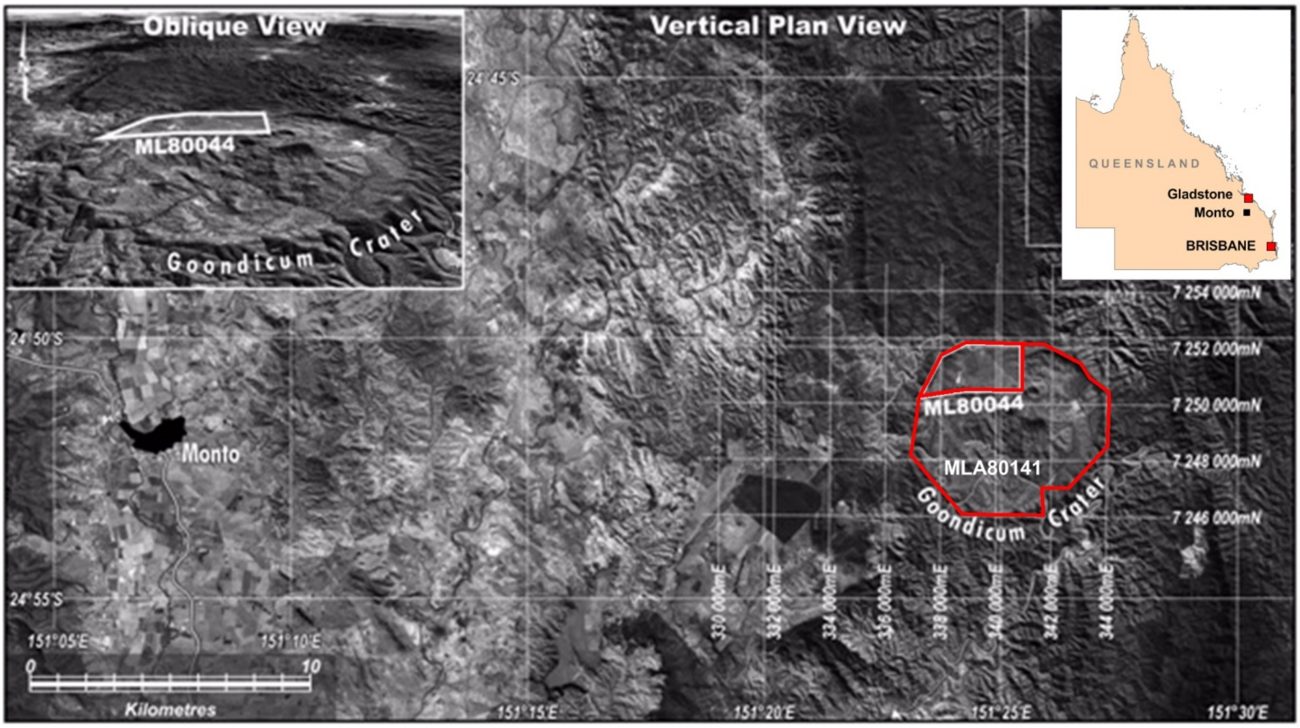
1.2 Project description and location

The Goondicum project is located 30km due east of the town of Monto, or about 50km by bitumen and dirt road, in Central Queensland, Australia. Monto itself is approximately 150km southwest of the port city of Gladstone.

Melior Resources is a company focused exclusively on the mining sector. In 2014 Melior purchased the Goondicum property from Belridge Enterprises ("Belridge") and completed a refurbishment and upgrade exercise on the existing plant.

The property comprises a Mining Lease ML80044 ("ML") and an abutting Mining Lease Application ML80141 ("MLA") that are both owned 100% by Melior.

Figure 1.1: Goondicum Project location map



1.3 Accessibility, climate, local resources, infrastructure and physiography

The Goondicum Project is well located with respect to infrastructure and services. The region is a developed rural area with a network of highways, roads, rail lines and electricity transmission corridors.

The climate is classified as sub-tropical with mean maximum temperatures ranging between 20-35ºC. Rainfall averages 740mm per year generally as heavy storms in the summer months.

The Goondicum deposit lies in a rural area of SE Queensland within 30km of the small town and major population centre of Monto. Approximately 2,500 people reside in the Monto area, half of those in the town itself, and the remainder being spread throughout the smaller communities of Mulgildie, Kalpowar and Mungungo and the rural area.

In terms of infrastructure, the area has power supply from the national grid. A series of sealed roads service the area including access to the port cities of Gladstone and Bundaberg. Gladstone is a major port with facilities for the export of mineral products. Melior has previously shipped ilmenite from Gladstone. Bundaberg also has a port facility that is a second option to export Goondicum products.

The terrain at Goondicum is typical cattle grazing country and the area consists of small rolling hills with moderately broad watercourses. Vegetation is typically grassland with Eucalyptus trees. The elevation for the area is around 400metres above sea level with a local range in elevation of approximately 50metres.

1.4 History

In 1992 the Monto Minerals Group commenced exploration of the surface of the Goondicum Complex and the Burnett River, which drains the complex.

Initial work by the company concentrated mostly on the alluvial deposits contained within the Burnett River channel. However, during this initial work period limited sampling and testing of eluvial mineralisation was carried out within the crater, which forms the surface of the gabbro complex. The area covered by this work exceeded 10km^2 and showed significant ilmenite concentrations to occur. The company then undertook a number of investigations, of which the eluvial deposits occurring on the surface of the gabbro became the focus. Several phases of drilling and other development studies culminated in the completion of a feasibility study in 2005. This work lead to the first operating phase at Goondicum which started in August 2007.

There have been several historical resource estimates for the Goondicum project which are outlined in detail in the body of this report. These estimates were reported in the years 2000, 2005 and 2009.

The Goondicum project has had three operating phases:

- 2007/2008 – Monto Minerals operated Goondicum starting in October 2007. Production ceased in September 2008 after Monto Minerals was placed into voluntary administration. The operation produced 14,042 tonne ilmenite, 5,269 tonne apatite, 9,905 tonne feldspar and 3,986 tonne titanomagnetite. Key issues identified that led to the poor performance were; grossly under designed feed preparation plant, lack of process control and monitoring, general undercapitalisation and poor engineering design.
- 2012/2013 – Belridge Enterprises operated Goondicum from September 2012 to June 2013. Production was 47,425 tonne of ilmenite and 2,769 tonne of apatite. Operations ceased largely due to the operation becoming uneconomic at that production rate.
- 2015 – Melior Resources operated Goondicum from April 2015 to July 2015 after upgrading the feed preparation plant which increased throughput from 250tph to 375tph significantly lowering the forecast cost structure. During this phase the operation produced approximately 20,000 tonne of ilmenite and 2,500 tonne of apatite. Operations were placed on care and maintenance in August 2015 due to poor market conditions.

The Goondicum project continues to be on care and maintenance awaiting an improvement in market conditions.

1.5 Geological setting and mineralisation

The Goondicum Complex is a layered mafic intrusion, mostly comprised of gabbro and leucogabbro, with some oxide gabbro. The gabbro has intruded Devonian mudstones, siltstones and sandstones, as well as higher metamorphic grade schists and slates, east of the major regional structure the Yarrol Fault. It is speculated that the fault may have controlled the gabbro intrusion. There is no evidence of a meteorite impact triggering the gabbro intrusion.

The mineralisation which is the subject of this report is associated with the Goondicum Gabbro. Breakdown of the gabbro due to weathering has generated both in-situ and colluvial material containing significant ilmenite mineralisation. During the chemical weathering of the gabbro some of the chemically less stable minerals are removed, and the ilmenite together with other resistant minerals, concentrate, by deflation, at or near the surface in a clay and/or sand-rich matrix.

The relatively complex weathering history of the gabbro has produced two main host types for the ilmenite and apatite mineralisation. The 'clay/sand' unit or ‘CS’ is believed to be an eluvial/colluvial deposit. The second type is 'decomposed gabbro' or ‘DG’, implying a less weathered eluvial or in-situ deposit. A subset of the clay/sand unit is the 'colluvium' unit or ‘CL’, and this may have had a more water transported-related origin. The CS occurs at or near surface and includes the uppermost 20-30cm of the soil profile. The CS can range in thickness, up to several metres, especially where the CL unit is associated. The CL is an important sub-set of the clay/sand mineralisation, having high slimes content, and may have formed from localised damming of alluvial channels resulting in localised flooding where the clay material in suspension settled out in depressions. The CS has been subdivided into a high slimes unit, CS_H, and a low slimes unit, CS_L, at a nominal 14% slimes content.

Generally, the higher grade ilmenite mineralisation is hosted by the CS_H and locally the CL. There are occasions where the CS_L also hosts higher grades, while generally the DG is low grade. Conversely the apatite grades typically increase with depth in the weathering profile.

The mineralisation is essentially flat lying with an undulating base. For the ML its dimensions are 3,000 x 1,500metres with an approximate viable range in thickness of 2–10metres (low grade mineralised DG can add to a maximum thickness of 25metres). For the MLA the mineralisation dimensions are 4,000 x 2,000metres with an approximate viable range in thickness of 2–10metres (low grade mineralised DG can lead to a maximum thickness of 25metres).

1.6 Drilling

Drilling data for the Goondicum deposit comprises two sets:

- 1996–2004 – Monto Minerals drilling consisting of RC drillholes, some hand auger holes and test pits on a 100 x 100metre grid. Drilling was undertaken on both the ML and the MLA. 370 holes for 2,152metres were drilled on the MLA and 368 holes for 2,667metres on the ML.
- 2009 – Belridge drilled aircore holes with a similar system as 1996 and drilled on a 125 x 125metre grid. Drilling was on the ML only. Overall 224 holes were drilled in 2009 which comprise 2,394metres.

No drilling has been conducted on the site since 2009.

1.7 Sampling and analysis

The aircore drilling generated chip samples that were collected as bulk samples for each 1metre drilled interval.

The 1996 drill samples were transported to the Monto-based laboratory where they underwent sub-sampling, screening, and washing, prior to magnetic separation. The 1999/2000 samples were transported direct from the drill site to Readings Laboratory in Lismore where they underwent a similar program of sampling, screening, and washing, prior to magnetic separation to that used previously in the Monto laboratory.

The 2009 samples were transported to the Goondicum Minesite where they underwent sub-sampling prior to magnetic separation. The samples then underwent size and magnetic fraction analyses at Belridge's minesite laboratory before dispatch of selected composited intervals to Downer EDI Mining – Mineral Technologies Pty Ltd (Mineral Technologies) for Clerici float/sink testwork to determine ilmenite and apatite content.

In both cases, 1996–2000 and 2009, following magnetic separation, composited intervals of the 5.5amps magnetic fractions were forwarded to MD Mineral Technologies Laboratory, on the Gold Coast, for Clerici float/sink testwork and XRF analysis to determine the contained ilmenite.

The QAQC for the sampling included the use of matrix-matched standards and field duplicates of the original aircore samples with no significant issues reported.

1.8 Mineral processing and metallurgical testing

The Project was identified in the mid-90s by Monto Minerals Limited (Monto Minerals) as being prospective for ilmenite, apatite, titanomagnetite and feldspar production. The process flowsheet was developed through a series of testwork programs largely undertaken by Mineral Technologies with the objective of recovering ilmenite, apatite, feldspar and titanomagnetite mineral products. The metallurgical processing stages are orientated towards separating the contained valuable heavy minerals into product streams by exploiting the differences in their physical properties (size, specific gravity and magnetic susceptibility).

The Goondicum mineral sands mine and processing plant was commissioned in late 2007. Frequent plant stoppages and periods of operation at low throughput, however, meant that the processing plant was not able to sustain the design production rates with overall plant utilisation rates reportedly ranging from 20% to about 60% at times. More consistent operation was not achieved until April 2008 but even then was well below design throughput rates. Eventually the operation was placed into voluntary administration in August 2008 by Monto Minerals.

During the 9-month period of operation the plant produced 14,000tonnesof ilmenite, 5,200tonnesof apatite, 9,900tonnes of feldspar and 4,000tonnesof titanomagnetite. Monthly mineral recoveries averaged between 70% and 83% for ilmenite and 69% to 82% for apatite.

Upon acquiring the shares in Monto Resources Pty Ltd on 1 May 2009 the operating company's name was changed to Belridge Enterprises Pty Ltd. Being aware of the previous short comings of the processing plant, the company continued with a redevelopment program which they had started in January 2009. The plant was reconfigured and re-commissioned in August 2012 at a 250tph feed capacity. This time the plant operated for 10 months before being put on care and maintenance due to declining market prices. During this period of operation approximately 650,000tonnesof dry ore was processed to produce 47,000tonnesof ilmenite and 2,769t of apatite product. According to the metallurgical accounting data for the period of operation, the ilmenite recovery averaged 72%, ranging from 57% and 80% while the apatite recovery averaged 30% ranging from 18% to 45% on a month to month basis. At that time the apatite circuit had not been optimised and was designed to only extract a portion of the apatite.

Under the ownership of Melior Resources the plant was upgraded in 2015 which saw the plant capacity increase by 50% to 375tph of dry feed. During the upgrade the scrubber capacity was doubled and a 700tonne constant density tank added ahead of the wet concentrator plant to improve plant performance and availability by ensuring a consistent supply of constant density feed to the wet concentrator plant. Work also began on the construction of the new eastern access road linking the mine with the port at Gladstone which reduced the product haul distance by 100km.

The plant was commissioned and operated briefly from April to July 2015 at which point it was placed on care and maintenance due to unfavourable market conditions for ilmenite. During the four-month period the mine processed approximately 300,000tonnes of feed to produce 20,000tonnes of ilmenite and 2,500tonnes of apatite. Analysis by Mineral Technologies after the plant was stopped suggested an average ilmenite recovery of 53%. This was considerably lower than expected and according to the review was likely due to the apparent loss of +53micron material to the thickeners resulting in a commensurate loss of recoverable ilmenite product. The high wet concentrator plant losses were attributed to unliberated particles reporting to non-mags and/or spiral tails. Losses to the apatite circuit and to sump overflows were not quantified.

Based on the available testwork program results and plant performance from the brief periods of operation the following key comments can be made:

- Good TiO_2 grade and high recovery was usually achieved when processing predominantly CS material.
- The results of testwork demonstrated that there was a significant improvement in the scrubbing process (mass yield to oversize) with the addition of rocks as a scrubbing medium.
- Poor recovery of the <75micron apatite streams on traditional spirals demonstrated the need to include shaking tables in the apatite circuit to maximise apatite recovery.
- Grinding of the DG material is required to liberate the ilmenite grains.
- There is a notable change in plant performance (FPP throughput and WCP product recovery) for various incoming blend ratios of CS, CL and DG material. The current mine plan makes provision for feeding of CS and CL material only and is expected to have a positive impact on the ilmenite recovery at the WCP. The increased ore slimes content will be mitigated by the dual scrubbing units and addition of rocks into the FPP feed to assist with deagglomeration and liberation of the slimes.

1.9 Mineral Resource estimates

Reporting of the resource estimates in both the ML and MLA uses a 2.5% ilmenite cut-off grade and partial percent volume adjustment factors for the topographic and the base-of-assaying surfaces. For the ML the 'available ilmenite' field was used for reporting the grade. The ilmenite grade for the MLA is based on the 5.5AM value multiplied by the ilmenite conversion factor which makes provision for likely ilmenite recoveries from processing. An additional constraint for the MLA was the mapped outlines of prospective areas generated from the recent mapping work. Classification of the resource estimates in both cases is primarily based on the search criteria after consideration of other impacting criteria (for example, grade continuity, QAQC, sample recovery, density and geological understanding).

Table 1.1: ML and MLA Resources

ML80044							
Category	**Tonnes (Mt)**	**Ilmenite (%)**	**Apatite (%)**	**Slimes (%)**	**Ilmenite (Mt)**	**Apatite (Mt)**	**Slimes (Mt)**
Indicated	31.3	6.1	1.8	22.9	1.90	0.55	7.17
Inferred	30.9	6.3	1.6	24.3	1.93	0.49	7.51

Note: (minor rounding errors)

ML80141					
Category	**Tonnes (Mt)**	**Ilmenite (%)**	**Slimes (%)**	**Ilmenite (Mt)**	**Slimes (Mt)**
Indicated	15.6	5.1	29.5	0.79	4.60
Inferred	12.3	5.2	27.3	0.64	3.37

Note: (minor rounding errors)

The apatite data for the MLA is limited in scope and has not been included in the resource estimate.

1.10 Mine methods

Dry mining open pit methods are to be used at Goondicum as outlined in the following process:

- The land is cleared of vegetation (trees and grass) using a bulldozer to prepare the area for mining. Approximately 20cm of topsoil is removed and stockpiled for later rehabilitation.
- Ore mining is to use a combination of scrapers, and an excavator and truck model. The mining operation will also utilise scrapers on short haul and excavator mining where the haul distance is longer.
- Four 40 tonne 6WD trucks will be used to haul the mineralisation from the excavator to the ore stockpile at the feed preparation plant (FPP). The average haul distance for the ML will be 300metres and the maximum haul distance will be 2,000metres.
- Sand tailings from the wet concentrator plant will be pumped back to the mine to fill in the mine void. A dozer will be available to prepare and manage the tails stacking area, and the landform will be contoured to a shape that will restore the original drainage patterns.
- Once mining is sufficiently advanced, the stored topsoil will be spread over the sand tailing filled mining void. Rehabilitation activities will then proceed to stabilise the topsoil and initiate revegetation.

Given that the maximum plant throughput is estimated to be 375tph, the capacity of the mining fleet is planned to be less than 500tph. This assumes that mining will be undertaken on a 24-hour basis.

A mining schedule has been developed taking into account the key factors of ore grade, throughput rate, slimes levels, feed blend and tailings sequence. *Table 1.2* summarises the mine schedule used in this PEA. This ML life of mine plan is preliminary and does not constitute a Mineral Reserve Estimate.

Table 1.2: ML LOM Schedule

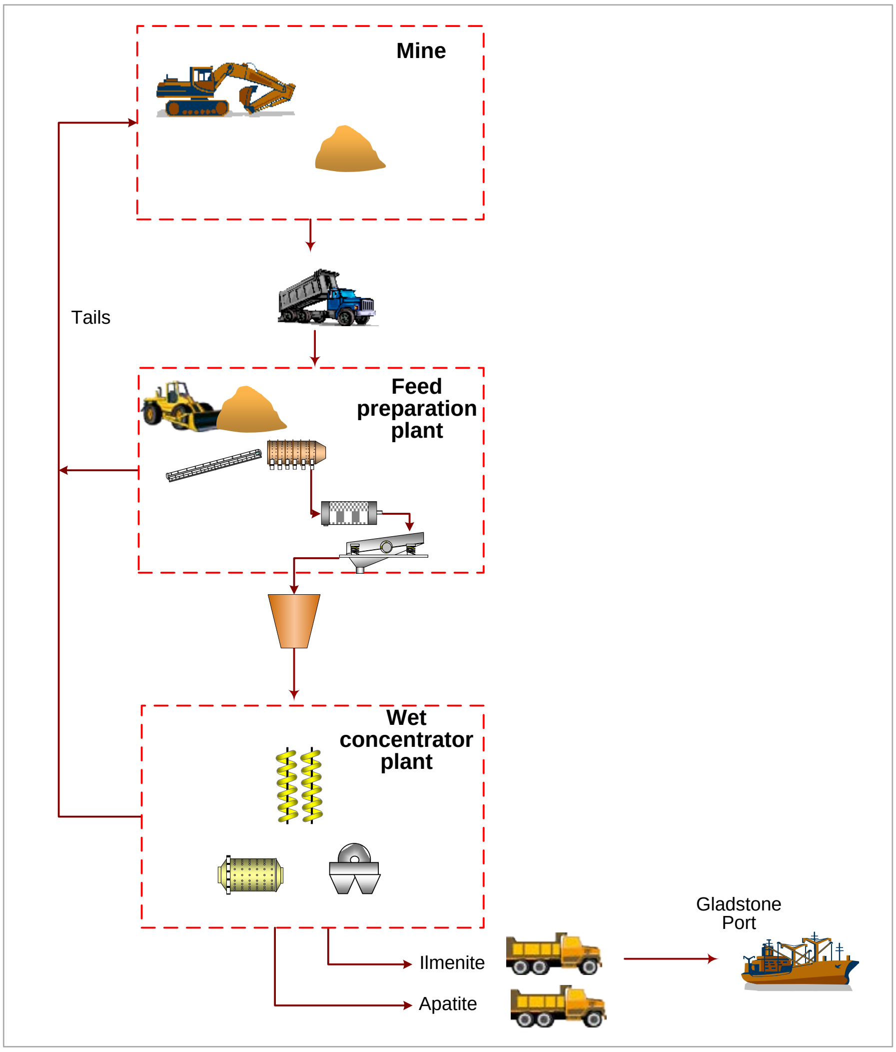
Parameter	Units	2018	2019	2020	2021	2022	2023	2024	2025	2026	Total
Mill feed	Mt (dry)	1.88	2.57	2.79	2.79	2.79	2.79	2.79	2.79	0.82	**22.01**
Ilmenite	%	10.7	10.5	10.5	10.1	9.7	9.2	9.3	8.2	8.6	**9.7**
Apatite	%	1.5	1.7	1.6	1.8	2.0	1.9	1.9	1.9	1.7	**1.8**
Slimes	%	40	40	40	35	34	37	39	35	35	**37**

1.11 Recovery methods

The mining and recovery processes are similar to that typically employed in many mineral sands processing operations around the world. The ore is dry mined and fed into a feed preparation plant where the contained minerals are liberated from clay (slime) matrix through a series of washing and scrubbing stages. The deslimed material is then pumped as a slurry into a wet concentrator plant where conventional mineral sands processing equipment is used to separate the minerals into final products by exploiting the differences in their physical properties. After separation the ilmenite concentrate is dried before transporting to the port of Gladstone for export. The apatite product is stockpiled and drained before being loaded onto trucks on site for delivery to the customer on a FOT basis.

The tailings from the mineral processing operations are returned to the mine area and deposited into a tailings retention system (TRS). Coarse rejects are also returned to the mine void. An overview of the mining and processing flowsheet for the Goondicum operation is shown in *Figure 1.2*

Figure 1.2: Overview of the Goondicum flowsheet



Mine site process water is recovered and recycled where possible using dewatering cyclones and by recovering excess water from the tailings retention systems. Water recovery for reuse in the process is maximised by use of flocculent to settle the fine solids thus rapidly releasing a large portion of the water.

The 2015 plant upgrade saw the throughput increase to make best use of the available infrastructure (power and water). *Table 1.3* shows the anticipated production parameters:

Table 1.3: Expected plant performance parameters

Plant area	Units	Overall
Availability	%	85
FPP Feedrate	dry t/h	375
Slimes content	%	30-40%
WCP Feedrate	dry t/h	180-200
Ilmenite production	tpa	200,000
Apatite production	tpa	40,000

Various metallurgical testwork trials were conducted as part of flowsheet development, the results of which clearly demonstrated that ilmenite and apatite products could be successfully recovered from each of the geological domains within the deposit, albeit at different recoveries. More recently actual plant operating data has further confirmed the performance of the process flowsheet with the production and sale of products to local and international markets.

The plant has been operated intermittently since it was first commissioned in 2007 and a number of improvements made since the initial start-up which have largely focused on the preparation of feed material for the wet concentrator plant. The process has also been simplified with the focus being shifted from producing four products to two products, which should translate into improvements in ilmenite and apatite recovery.

Of the three brief operating periods the metallurgical performance data for the 2012/2013 period is believed to be most representative of what might be expected once the plant is fully operational.

Various product recoveries have been quoted in the test reports and plant production statistics. A detailed review undertaken by TZMI has estimated product recoveries based on the available data and industry experience. The product recoveries used for the economic evaluation have been included in Table 1.4for the current FPP/ilmenite flowsheet and proposed apatite circuit.

On start-up it is expected that the product recoveries will be towards the lower end of the range and increase to the upper end as the plant is ramped up to full production and the process is optimised for the feed blend. Ultimately the product recoveries should settle at the upper value quoted.

Table 1.4: Product recoveries

Product	Recovery (%)
Ilmenite	55 to 78
Apatite	40 to 75

Note: Apatite recovery is quoted for an apatite feed analysis assuming a 42% P_2O_5 content and for a final apatite product assaying 32% P_2O_5.

1.12 Project infrastructure

The Goondicum Industrial Minerals Project is well located with respect to infrastructure and services. The region is a developed rural area with a network of highways, roads, rail lines and electricity transmission corridors.

The Goondicum mine site is accessible via a public road which is suitable for light vehicles and low intensity heavy vehicle use. A state government controlled main road connects Monto and Gladstone. During the previous operating period ilmenite product from the Goondicum mine was road hauled 260km from the mine site via Monto and Biloela to the port of Gladstone where it was shipped to international export markets. There is potential to reduce this haulage distance from 260km down to 160km with the construction of a new 22km access road to an existing gravel road linking up to the Bruce Highway, lowering off-site logistics' costs significantly. About 5km of the 22km link road has been upgraded so far with the remainder planned to be completed following the restart at an estimated cost of A$4 million. Based on quotes provided during the previous operating period the eastern access road can deliver savings of A$12 per tonne along with a saving on road tax liabilities of A$4.50/t.

The Project previously built and retains ownership of a 23km 66kV powerline which connects the mine to Ergon's main 66kV line at Dakiel. The installation has a capacity of 5MW which has surplus capacity to the likely Project peak requirements of approximately 4MW.

As with most mineral sands plants water is not consumed in the process but large volumes of water are required as a processing medium and to transport the minerals around the plant in the form of a slurry. Only a small proportion of the total volume utilised around the plant is lost to tailings streams and process water is recovered and recycled where possible. Water supply for the Project site is sourced from the Mulgildie borefield under license (74220M) which allows for drawing up to 3,000ML per annum of water from the Mulgildie borefield. The existing bore is allowed to draw 1,500ML of water per annum, which is sufficient to sustain the current plant when it is in operation.

Liquified Natural Gas (LNG) is available from an 80,000L on site storage vessel and associated equipment supplied by Elgas and is used for drying of the final ilmenite product down to <0.5% moisture to meet market requirements. The ilmenite is dried using a gas fired vibrating fluid bed dryer and the gas consumption is estimated to be 0.22 GJ/tonne of ilmenite.

The apatite product will be sold free on truck (FOT) at the mine site, while the ilmenite will be trucked to the port of Gladstone for export. The Port of Gladstone has a well established reputation gained over many years of operation catering for export of coal, mineral, and agricultural products and the import of raw materials, petroleum products, and general cargo. It is an efficient port with a good industrial relations record. During previous operating phases the Project has previously shipped ilmenite from Gladstone and rented a storage facility there with a capacity of 35,000t. The rights to the storage facility have since been given up to save costs while the plant is on care and maintenance. The storage shed is currently unutilised and there is a high likelihood that a revised contract with the port authorities could be renegotiated. Ship loading had previously been contracted to both Gladstone Ports Corporation (GPC) and Qube. Ships were loaded at Barney Point under GPC using their fixed ship loader. A similar method of ship loading is envisaged in the PEA.

1.13 Marketing

1.13.1 Ilmenite market

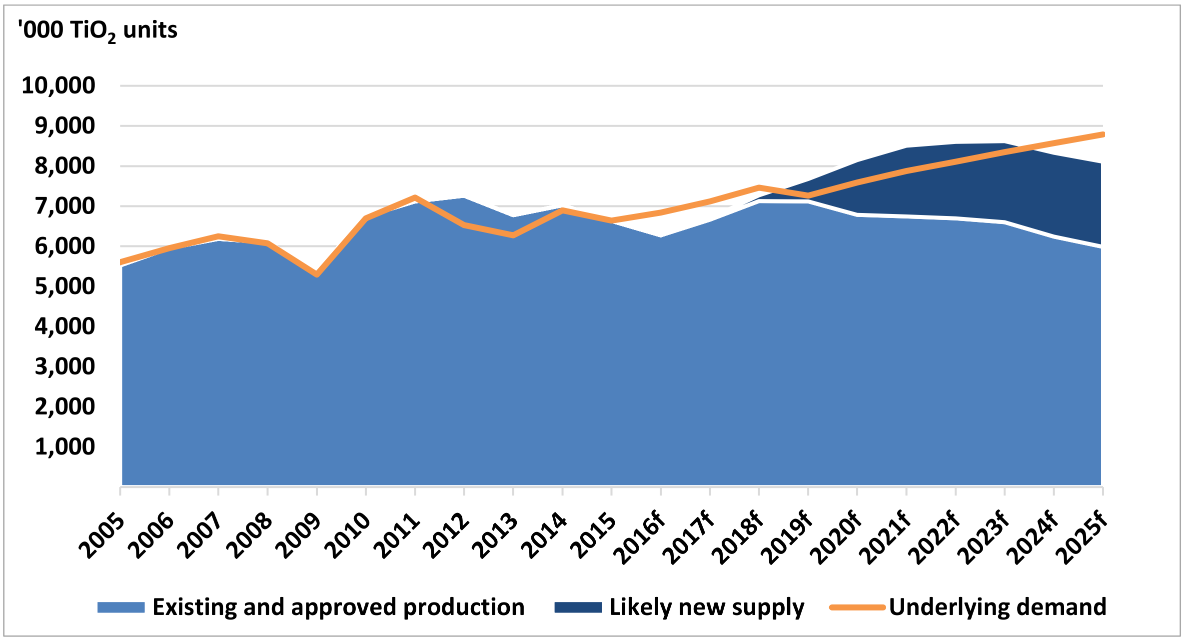
Ilmenite is a titanium-iron oxide mineral with an idealised formula of $FeTiO_3$. It is the most common titanium mineral and naturally-occurring ilmenite contains between 35% and 65% TiO_2.

The ilmenite market is used as a feedstock for the production of titanium dioxide (TiO_2) pigment and titanium metal. The global TiO_2 pigment market accounts for around 90% of all titanium feedstock demand, and is therefore the dominant driver of offtake. TiO_2 pigment is used predominantly in the production of high quality surface finishes, and is essentially a lifestyle product.

Titanium pigment can be manufactured by two processes; sulphate and chloride. The titanium feedstock used in each process varies dependent upon specific physical and chemical characteristics. The Goondicum ilmenite is suited as a feedstock for the sulphate pigment process.

Figure 19.3 shows the supply/demand balances for the global titanium feedstock market from 2005 to 2025. TZMI forecasts indicate that based on supply from existing producers and approved new projects, the overall market is expected to remain tight through to 2019. It is only with the onset of likely new projects that will move the market into a moderate surplus position during the period 2019 to 2022, and any delay in bringing such new supply on stream would obviously reduce the potential market surplus. The global market for all titanium feedstocks is expected to be in supply deficit beyond 2016 unless a significant volume of supply from new projects can be commissioned.

Figure 1.3: Total titanium feedstock supply/demand balance: 2005 – 2025



Source: TZMI

TZMI's estimates indicate that in the longer term, global net availability of sulfate ilmenite for pigment end-use is expected to decline progressively due to the increasing use of merchant ilmenite for slag manufacture, particularly in China and Saudi Arabia from 2017. As far as demand is concerned, TZMI forecasts that global consumption of sulfate ilmenite (net of beneficiation) will grow at approximately 1% per annum from 2.75 million TiO_2 units in 2015 to 3.0 million TiO_2 units in 2025, with China expected to account for most of the forecast growth.

Based on TZMI's estimates, total sulfate ilmenite inventory in the system is estimated at 1.5 million TiO_2 units at the end of 2015, some 490,000 TiO_2 units above normal inventory level. However, as 2016 progresses, signs of supply tightening are becoming more evident given the extent of the price increases achieved by feedstock producers, both for China domestic producers and western producers. The global sulfate ilmenite market will begin to experience tight market conditions again in 2017 as total inventory falls below normal levels. Nevertheless, the global sulfate ilmenite market is expected to move into progressively larger deficit beyond 2017 if no new supply is brought online to meet the demand for the product.

For the Goondicum sulfate ilmenite, the product is suitable as a feedstock for sulfate route TiO_2 pigment production and this will be the main target market for the product, in particular China given the tremendous growth the country has experienced over the last five years.

As far as prices are concerned, prices of sulfate ilmenite started the year in the low US$60s per tonne FOB but recovered strongly in Q3 following the spike in spot prices in the Chinese domestic market. Higher prices are anticipated in 2017. TZMI's current forecast indicates a global weighted average price of US$150 per tonne FOB in 2017. The long term price for sulfate ilmenite is US$189 per tonne FOB (real 2017 dollars) and it is expected that prices will trend toward this level by 2019.

1.13.2 Apatite market

Apatite is the name given to group of phosphate minerals which includes; Fluoroapatite - $Ca_5(PO_4)_3F$, Chloroapatite - $Ca_5(PO_4)_3Cl$ and Hydroxylapatite – $Ca_5(PO_4)_3OH$.

Approximately 85% of global phosphate production is used in the manufacture of fertiliser. The balance of 9% is used for technical phosphates (detergents, personal care, food products, medical and water treatment) and 6% for animal feed.

There is a steady and predictable demand growth for phosphates as fertilizer consumption is closely correlated to world population growth. World population has steadily increased in the past 60 years and is expected to reach 9.2 billion in 2050 (source: United Nations) up from 7.4 billion currently. An additional factor to fertiliser consumption growth is the worldwide increasing calorie intake per capita. This phenomenon is particularly strong in the developing world with China and India leading the change. As arable land expansion is being superseded by population growth, the only possibility left is an increase in agricultural production yields. Since more food is required from less land, fertilisers that support increased yields are increasingly demanded.

More than 80% of global phosphate supply is from sedimentary rocks (China, US, Morocco and Western Sahara), with igneous rock phosphate being sourced from Russia, South Africa and Brazil. A small amount of phosphate mineral is sourced from bird droppings (guano). The largest global production capacity of phosphate rock comes from two companies - Mosaic in the US and OCP (Morocco).

Moroccan phosphate rock export pricing is commonly used to indicate benchmark pricing for the industry. Prior to the price spike from late-2007 to late-2008, phosphate rock exports from Morocco traded in a tight band around US$60 per tonne (CIF). Prices rose from around US$100 per tonne CIF in early 2010 to over US$200 per tonne CIF by early 2012, before dropping slowly over the following 4.5 years back to 2010 levels. TZMI believe that the future prices of phosphate rock will trade in the range of US$100-150 per tonne FOB over the forecast period to 2025.

For apatite, the Goondicum product is suitable for use in the fertiliser manufacture. Given the planned Goondicum output for apatite, TZMI is of the opinion that this volume can be easily absorbed within the Australian domestic market. In fact, a potential customer has indicated willingness to secure the entire planned volume of apatite from Goondicum once the project is restarted, at an indicative price of A$150 per tonne ex-works.

In addition, a leading farm inputs company based in New Zealand had previously indicated willingness to develop a long term commercial relationship with Goondicum. TZMI has sighted the Memorandum of Understanding (MoU) signed between the two parties. For the export market, TZMI estimates that the Goondicum apatite should achieve a price consistent with the price rock phosphate ex Morocco, in the range of US$100-150 per tonne FOB.

1.14 Environmental, permitting and social licence

During previous operating phases of the Goondicum project various environmental studies have been undertaken including studies on groundwater, topsoil, flora and fauna. These studies have led to the various approvals required to undertake operating activities at Goondicum.

As part of the environmental requirements, Melior continues to undertake environmental monitoring which culminates in annual environmental reporting.

Melior also has in place the financial assurances (bonds) for both the ML and MLA. For the ML the FA is A$1.123 million and the MLA financial assurance is A$0.072 million. These FAs are held by the state government for final restoration of the site if the holder is unable to undertake restoration at the time of closure.

Future mining is planned to use local contractors, service providers and employees, providing a significant economic impetus to an area that is struggling to maintain population and facilities. Anecdotally, the unemployment rate for the region is higher than the Queensland average due to the shutting down of most local industry in the last few years.

Various levels of government will obtain considerable revenue from direct and indirect taxation, royalties, port charges, stamp duty and other government charges.

1.15 Capital cost estimate

The estimated capital costs for the Goondicum PEA were developed by TZMI after taking account of:

- condition of the existing plant and equipment based on the site visit
- Melior capital estimates
- TZMI independent experience in similar operations
- Reviewing available quotes
- Planned upgrades as part of the next restart

The estimated start-up capital costs include a contingency of 30%. The accuracy range for the project estimate is ±40%. All capital costs are provided in US dollars (US$) and the nominal exchange rate applied is US$0.78 per A$1.00. The estimate is given in real terms with a base date of 01 January 2017.

The total project direct capital cost estimates are shown in *Table 1.5.*

Table 1.5: Capital cost summary

Item	Start-up (US$'000)	Sustaining (US$'000)	Closure (US$'000)	Total (US$'000)
Restart	750			750
Apatite circuit	470			470
Western Access road	200			200
Eastern access road	3,130			3,130
Port storage	40			40
Subtotal	**4,590**	**-**	**-**	**4,590**
Sustaining capital	-	11,390	-	11,390
Subtotal	**4,590**	**11,390**	**-**	**15,980**
Closure costs	-	-	970	970
Subtotal	**4,590**	**11,390**	**970**	**16,950**
Contingency (30%)	1,380	-	-	1,380
Totals	**5,960**	**11,390**	**970**	**18,320**

1 - Eastern access road is developed during the first year of operation.
2 – Costs are rounded to the nearest US$10,000. Rounding errors may occur.

1.16 Operating cost estimate

The estimated operating costs for the Goondicum PEA were developed by TZMI after taking account of:

- Previous operating history
- Labour numbers and current labour rates
- Melior estimates
- TZMI independent experience in similar operations
- Reviewing available quotes

The accuracy range for the operating cost estimate is ±40%. All operating costs are provided in US dollars and the exchange rate applied is US$0.78 per A$1.00 (nominal). The costs are expressed in real terms with a base date of 01 January 2017.

Table 1.6: Operating cost summary

Item	LOM Total (US$ '000)	Unit cost (US$/t ore)	Unit cost (US$/t product)
Mining	55,780	2.50	29.30
Processing	68,430	3.10	35.90
Product transport	32,290	1.50	17.00
Product storage and ship loading	15,060	0.70	7.90
Administration and marketing	28,680	1.30	15.10
Royalties	20,180	0.90	10.60
Totals	**220,420**	**10.00**	**115.80**

Costs are rounded to the nearest US$10,000. Addition errors may occur due to rounding.

Over the life of the operation fixed costs represent 26% of operating costs while variable costs account for 74% of costs.

1.17 Economic analysis

The economic evaluation was prepared using the standard discounted cashflow methodology (DCF). The key input assumptions for the economic analysis are shown in *Table 1.7.*

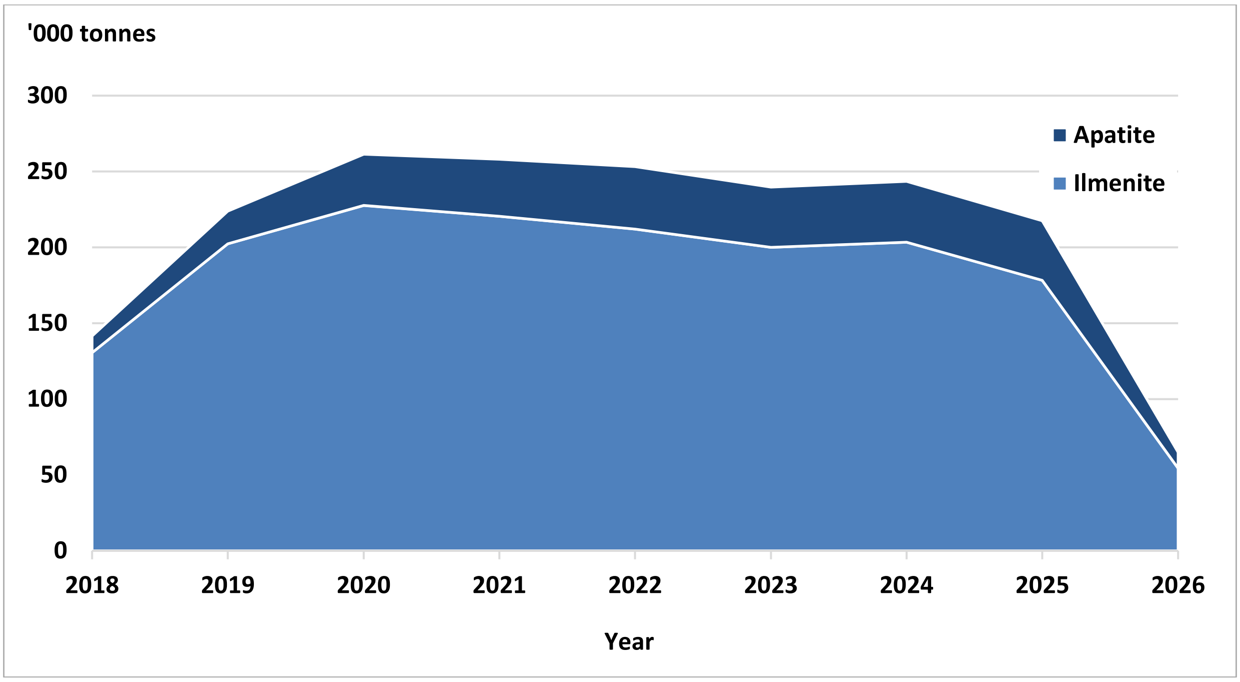
Table 1.7: Key assumption

Assumption description	Units	Assumption value
Mining		
Material mined	Mt	22.0
Ilmenite grade	%	9.7
Apatite grade	%	1.8
Slimes grade	%	37
Processing		
Ilmenite recovery (average)	%	76
Apatite recovery (average)	%	70
Revenue		
Ilmenite price (average)	US$/t FOB	192
Apatite price (average)	US$/t FOT	119
Capital costs		
Start-up	US$'000	5,960
Sustaining (LOM)	US$'000	11,390
Closure	US$'000	970
Operating costs		
Mining	US$/t product	29.30
Processing	US$/t product	35.90
Product transport	US$/t product	17.00
Product storage and ship loading	US$/t product	7.90
Administration and marketing	US$/t product	15.10
Royalties	US$/t product	10.60
Tax		
Corporate tax rate	%	28.5
Economic		
Discount rate	% real	10
Exchange rate	US$:A$ (nominal)	0.78

Note that tax assumptions have been provided by Melior. All other assumptions have been developed by the QP.

The annual production profile derived for the PEA is based on the mine plan and the physical assumption as outlined in *Table 1.7*. The resulting production for ilmenite and apatite is shown in *Figure 1.4*.

Figure 1.4: Production profile



Total production over the life of the mine is forecast to be 1.6 million tonnes of ilmenite and 275,000 tonnes of apatite. The average annual production is 181,000 tonnes of ilmenite and 31,000 tonnes of apatite. Peak production is in the year 2020 with 228,000 tonnes of ilmenite and 34,000 tonnes of apatite produced. Production is lower in the first two year associated with the ramp-up in production, the result of lower utilisation and recoveries. Production decreases in later years due to declining ore grades.

The key economic measures for the Project are presented in *Table 1.8*.

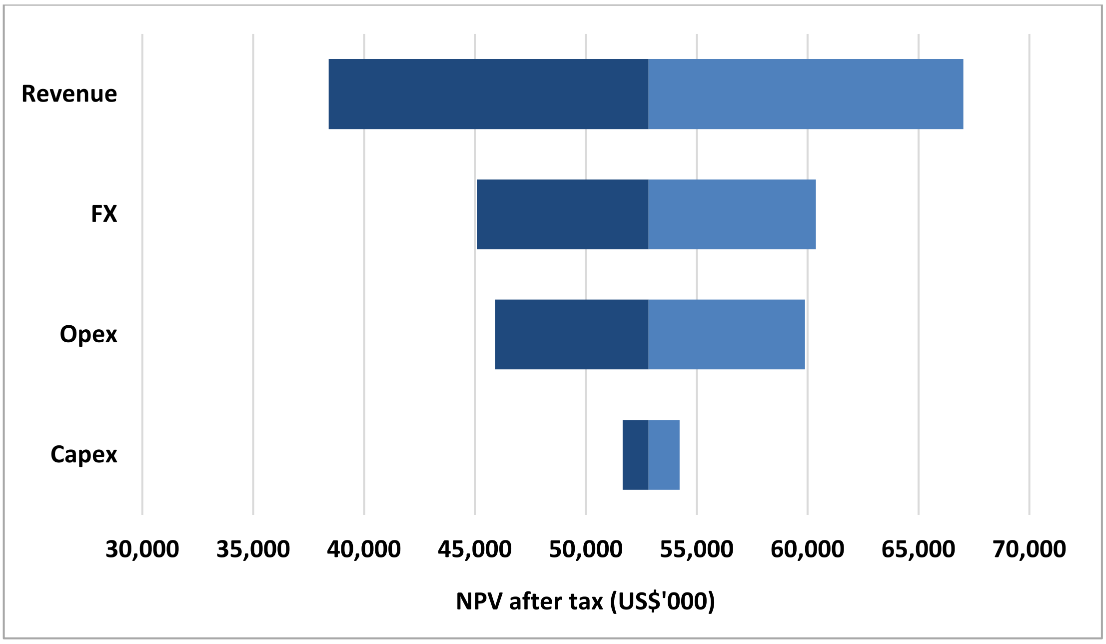
Table 1.8: Economic results

Measure	Units	Result
Before tax		
NPV	US$'000	65,360
IRR	%	187
Payback period	Years	1.2
After tax		
NPV	US$'000	52,830
IRR	%	178
Payback period	Years	1.2

The economic results of this PEA indicate a robust project given the assumptions used in this report. The IRR of the project is high which is consistent with the brownfield nature of the project and low restart capital costs. This is also reflected in in short payback period.

TZMI has conducted a sensitivity analysis on the Goondicum PEA economic model. This analysis is summarised in *Figure 1.5*. Four key areas have been tested in the sensitivity analysis; revenue, foreign exchange rate (FX), operating costs and capital costs. Each component has been flexed by plus and minus 10%. The Project is most sensitive to revenue, followed by the FX rate, operating costs and then capital costs.

Figure 1.5: Sensitivity tornado



1.18 Cautionary notes

This preliminary economic assessment is preliminary in nature. It includes Inferred Mineral Resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorised as Mineral Reserves. There is no certainty that this preliminary economic assessment will be realised. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.

Certain information and statements contained in this section and in the Report are 'forward looking' in nature. Forward-looking statements are described in more detail in *Section 22.0* of this report.

1.19 Opportunities and risks

The following is a list of potential risks which future work on the project should address:

- The Mineral Resources used as the basis for the mine plan in this PEA contain a significant proportion of Inferred Resources. The use of Inferred Resources in the mine plan increases uncertainty. The uncertainty with the Mineral Resources in the mine plan would be reduced if they were upgraded to Measured and Indicated status.
- The sequencing and handling of tailings, particularly fine tailings, is critical to sequencing of the mine plan and production performance. Poor sequencing of mining and tails dam development could impact production levels.
- Treating of the CS material only will increase the amount of incoming slimes which will add load to the slimes rejection and water recovery circuits when compared to treating the CS and DG together. The heavy mineral feedrate to the concentrator plant WHIMS/LIMS plant will also increase significantly potentially reducing the separation performance by overloading certain parts of the circuit.
- The process recovery assumptions used to forecast product output have in part been based on previous operating performance. Previous plant operation was interrupted and consistent plant operation was not

achieved with reported recoveries below expected levels. The recovery assumptions have been estimated based on a review of previous testwork results, actual operating data and TZMI industry experience. There is a risk that actual recoveries and product quality may differ from those forecast.

- Water consumption is primarily a function of the incoming ore slimes content and efficiency of the water recovery processes. The increased proportion of the high slimes CS/CL material in the incoming feed will increase the overall make-up water requirements and there is a risk that the current water supply infrastructure may become limiting.
- Completion of the Eastern access road is dependent on granting of the necessary environmental approvals. While it is understood that this is a matter of process the risk exists that the approvals are denied or delayed which will increase the operating cost.

The following is a list of potential opportunities which could add value to the Goondicum project:

- The current mine plan only includes the Mineral Resources contained on the ML. Value could be added to the Project if the mine plan included the Mineral Resources contained on the adjacent MLA.
- The dry density assumed for the Goondicum deposit, particularly for the CS unit, could be underestimated based on TZMI experience at similar deposits. Further work could result in an increase in the density assumptions and the resultant Mineral Resource tonnes.
- The mining method assumed in this study includes double handling of ore at the ROM stockpile. This double handling adds significant cost. Therefore, there is an opportunity to reduce costs by directly feeding ore into the hopper without double handling.
- Feeding DG material has been seen to have a beneficial impact on overall plant operation by diluting slimes content and also reducing the overall loading on the downstream circuits. Ilmenite recovery from DG material may be greater than anticipated through the liberation of ilmenite from composite grains that was not reported by the drill sample analytical method. The total amount of material in the mine plan available for processing would be increased at the same time.
- The Goondicum deposit has two other potential products; titanomagnetite and feldspar. Hence with further development there is potential to increase the product suite and potentially revenue.
- The current apatite circuit employs a single spiral separation stage. Recovery of fine <75micron (µm) apatite to final product was shown to improve through the use of a wet shaking table stage. The current restart plan makes provision for the inclusion of shaking tables in the apatite circuit which should translate into a recovery improvement. This benefit has been incorporated into the recovery assumptions used for the production forecast.

1.20 Conclusions

This Goondicum PEA has been prepared in accordance with NI 43-101 and Form 43-101F1. The PEA describes the potential technical and economic viability of restarting the Goondicum operation. Based on the work carried out in this PEA, and the resultant economic evaluation, a positive business case has been identified for the restart of operations.

Recommendations to reduce project risk and capture potential value adding opportunities have been developed. These recommendations are summarised below.

1.21 Recommendations

1.21.1 Exploration

Phase 1 of the proposed exploration programme for the ML involves a desk study to try and incorporate more of the 1996-2004 Monto Minerals exploration data, in particular the 1996-2000 aircore drilling data. If the amalgamation of the drilling data can be achieved, then new resource estimates should be completed which will allow for an upgrading of the resource as effectively there will be double the number of drillholes. If the amalgamation cannot be achieved then Phase 2 needs to be implemented, which is an infill drill programme for the northern arcuate half of the deposit where there is generally better grade and tonnes available. This will allow for the upgrading of the resource to include a significantly increased amount of Indicated and possibly Measured Resources.

The infill drilling will use QEMSCAN analysis of the 1metresamples. These analyses would allow for the distinguishing of the different titanium minerals based on their titanium content and thus provide a more accurate measurement of ilmenite content in the samples.

A two- phased exploration budget is enclosed to allow for the upgrading of the resource estimates.

Phase 1: Desk Study for Mine Lease			
Activity	**Rate**	**Number**	**Cost A$**
Interrogate 1996-2004 data in order to try and convert ilmenite data for use with 2009 data	A$1,720/day	5 days	8,600
Upgrade geological model using the 1996-2004 data in particular redefine lithology boundaries eg CS_H & CS_L using 1996-2004 slimes data, pitting results and mapping information	A$1,720/day	10 days	17,200
Rerun resource model using new data and/or new geological models	A$1,720/day	10 days	17,200
Compile new resource estimation report	A$1,720/day	10 days	17,200
		Sub-total	**60,200**
Phase 2: Infill Drilling to Upgrade Resource			
Activity	**Rate**	**Number**	**Cost A$**
Aircore Drilling (approximately 114 holes – all in cost)	A$90/m	1,250	112,000
Sampling & magnetic fraction recovery inc personnel			40,000
QEMSCAN analysis for new drilling	A$280/sample	1,250	350,000
		Sub-total	**502,000**
Diamond Drilling of 4 holes, inc mobilisation & sundry costs	A$350/m	50	17,500
Core processing inc personnel			5,000
		Sub-total	**22,500**
Upgrade geological model using the new drilling data	A$1,720/day	5 days	8,600
Rerun resource model using new data and geology	A$1,720/day	10 days	17,200
Compile new resource estimation report	A$1,720/day	10 days	17,200
		Sub-total	**43,000**
		Total	**627,700**

There are opportunities for expanding the size of the resource on the MLA by drilling in the identified prospective areas of the crater that have no drilling to date. Further field inspection of the periphery of the prospective areas is required to confirm suggestions from the resource modelling of additional resource marginal to the target areas.

Further exploration opportunities exist within the remainder of the Goondicum Crater as some of the earlier drilling work by Monto Minerals had intersected significant amounts of similar style ilmenite mineralisation within the eastern part of the crater.

Further proposed exploration on the MLA is primarily designed to expand the size of the resource. An exploration budget is enclosed to allow for the expansion and some upgrading of the resource estimates.

Phase 1 : Infill Drilling to Upgrade Resource			
Activity	**Rate**	**Number**	**Cost A$**
Aircore Drilling (approximately 92 holes – all in cost)	A$90/m	1,100m	99,000
Sampling & magnetic fraction recovery inc personnel			20,000
		Sub-total	**119,000**
Diamond Drilling of 4 holes, inc mobilisation & sundry costs	A$350/m	50m	17,500
Core processing inc personnel			5,000
		Sub-total	**22,500**
Upgrade geological model using the new drilling data	A$1,720/day	5 days	8,600
Rerun resource model using new data and new geological models	A$1,720/day	3 days	5,160
Compile new resource estimation report	A$1,720/day	8 days	13,760
		Sub-total	**27,520**
		Total	**169,020**

1.21.2 Mining

The current ROM management philosophy results in significant double handling of the incoming ore. There will be a significant cost advantage if the ore can be fed directly into the FPP from the dump trucks used to transport the ore from the mine. This may require minor modifications to be made to the ore receival system and options to accomplish this should be investigated.

Any new ore handling procedure and system will need to take account of the blending regime which is important to the performance of the process plant.

1.21.3 Process

Previous testwork showed poor recovery of fine apatite (<75micron) over spirals with significantly improved recovery using shaking tables. The current plant configuration makes use of spirals in the apatite circuit. An upgrade is planned to include a classification stage at 100micron with the overflow and underflow streams being passed over coarse and fine shaking tables respectively. Given most of the required equipment is already on site and the cost to modify the circuit is minimal this work should go ahead as a matter of priority to improve the recovery of apatite to final product.

Losses of ilmenite to the fines tails stream (slimes) was previously reported as a significant loss. A work program should be initiated to quantify this and implement process changes to address this.

The ilmenite and apatite recovery assumptions here are based on an analyses of testwork data available and supported by the TZMI knowledge base. Due to the significant variability in the feed and change in anticipated blends additional flowsheet development work should be done to finalise the optimum process flowsheet and process assumptions. In particular, the effect of feeding CS material only should be investigated.

2.0 Introduction

2.1 Melior Resources Inc.

Melior Resources Inc. (Melior) is a TSX Venture Exchange listed company focussed on assessing, developing and operating resources projects.

Melior's major asset is the Goondicum Ilmenite and Apatite Mine (Goondicum) located near Monto in Queensland, Australia. Melior purchased the holding company of Goondicum in May 2014 in an all script transaction when the project was on care and maintenance. The details of the Goondicum purchase were as follows;

- Melior acquired 100% of Belridge Enterprises (Belridge) in an all-share transaction
- Approximately 38 million new common shares were issued to Belridge shareholders
    - Equivalent to 18% of Melior's pro forma share balance
    - The Vendor's are entitled to receive an Earn-Out payment, payable in Melior shares, based on the performance of the Melior share price
    - Earn-Out shares issued can range from zero (if the Melior share price is less than C$0.41 per share) up to a maximum of 38.1 million shares (where the Melior share price exceeds C$1.11 per share)
    - Transaction was structured by way of a share purchase agreement
    - Melior's TSX-Venture Exchange listing status converted from a Tier I Investment Issuer to a Tier I Mining Company
    - Belridge Managing Director, Mark McCauley, remained in this role and additionally assumed the role of Melior CEO and is part of the Melior Board of Directors.
- The earn-out consideration will be available for a period of four years from the date of closing of the transaction.
    - If a change of control event occurs during the validity period and the price at which the Melior common shares are trading exceeds specified levels above the current price, the Belridge shareholders would have a right to receive the earn out consideration on a pro-rata basis.
    - In the event that no change of control event occurs during the validity period, the Belridge shareholders would, at the end of the validity period, be entitled to receive the earn-out consideration, on a pro-rata basis, if the trading price of the Melior common shares exceeds specified levels above the current market price.

A change of control event is defined as any party or parties acting in concert, other than Pala Investments (Melior's current majority shareholder, "Pala Investments"), acquiring more than 50% of the fully diluted common shares of Melior. The payment of the earn-out consideration would be subject to the satisfaction of customary eligibility and performance conditions including continuation of operations of the Goondicum project and the Belridge Shareholders continuing to hold all the consideration shares.

Following Melior's purchase of Belridge, the latter was renamed as Goondicum Resources Pty Ltd (GR), a wholly owned subsidiary of Melior Resources.

2.2 Terms of Reference and Purpose of the Report

The Goondicum 2016 PEA is an Independent Technical Report on the Goondicum Project prepared for Melior Resources Inc. as part of the strategy for redevelopment of the project.

The Goondicum 2016 PEA is a Preliminary Economic Assessment with an effective date of 25 November 2016 that has been prepared using the June 2011 edition of Canadian National Instrument 43-101 Standards of Disclosure for Mineral Projects.

The following companies have undertaken work in preparation of the Goondicum 2016 PEA:

- TZ Mineral International (TZMI) – Overall report preparation, mining, mineral processing, infrastructure and financial model.
- H&S Consultants (H&SC) – All other sections. These sections have not been materially updated since the previous released 43-101 report on the 17 October 2016.

All measurement units used in this Technical Report are metric units and abbreviations are summarised in Section 27. The currency used is either US dollars or Australian dollars.

2.3 Principal sources of information

TZMI and H&SC have based its review of the Project on information and data provided by Melior, along with other relevant published and unpublished data. The Qualified Persons (QPs) have endeavoured, by making all reasonable enquiries, to confirm the authenticity and completeness of the technical data upon which the Technical Report is based.

Reference to the main sources of information used are provided in *Section 27.1*. Additional information was provided by Melior personnel as requested.

2.4 Qualified Persons

The following people served as the Qualified Persons (QPs) as defined in National Instrument 43-101, Standards of Disclosure for Mineral Projects, and in compliance with Form 43-101F1:

- Mark Dufty, BSc Hons (Geology), FAusIMM (106196), MAIG (6643), employed by TZMI as Principal Consultant, was responsible for: Sections 1, 2, 13,15, 16, 17, 18,19, 21, 22, 24, 25, 26,27.
- Simon Tear, BSc Hons (Mining Geology), P.Geo (17), EurGeol (26), employed by H&SC as a Director and Consultant Geologist, was responsible (or partly responsible) for: Sections 3, 4, 5, 7, 10, 11, 12, 14, 23, 25, 26, 27.
- Graham Lee, BSc (Geology), FAusIMM CP(Geo) (101602), MAIG (1990), employed by Graham Lee and Associates Pty Ltd as a Director and Consultant Geologist, was responsible (or partly responsible) for: Sections 6, 8, 9, 10, 11, 25, 26.

2.5 Site Visits and Scope of Personal Inspection

Site visits were performed as follows:

- Simon Tear completed a site visit to the Goondicum property in February 2014 to assess various aspects of the property including geography and geology of the general area and the deposit itself. The site visit allowed for several facets of the data verification process to be completed.
- Mark Dufty visited the Project on 12 October 2016. The visit included briefings from Melior personnel and a site inspection of geology, processing equipment, infrastructure and port facilities.
- Graham Lee completed a lot of the field work on the Monto Minerals project from 1996 to 2005 for Peter H Stitt & Associates Pty Ltd, consultants to Monto Minerals.

3.0 Reliance on other experts

3.1 Introduction

The Authors have used information supplied by the client, reports by associate consultants and information available in the public domain either as reports or interactive websites. The Authors have used reasonable judgement to assess the veracity of information given in this Technical Report and original sources are cited in the relevant sections and listed in the References provided in *Section 27.1*.

In addition, the Authors have relied upon, and believes there is reasonable basis for this reliance, the following reports that provided information regarding legal, political, tax and environmental matters relevant to the property in sections of this Technical Report as noted below.

3.2 Mineral tenure

The QPs have relied upon, and disclaim responsibility for, information prepared by other experts regarding the legal status or ownership of the Project area or underlying property agreements (*Sections 4.2* and *4.5* of this report). The QPs have fully relied upon GR's legal counsel for this information through the following documents:

1. EA MIC203279211 – EPM-19382:- Environmental Authority (Exploration or Mineral Development) Code Compliant Level 2 Mining Project. Issued by the Queensland Government, Department of Environment and Resource Management, 4/11/2011
2. EA MIM80017060603 – ML80044:- Environmental Authority (Exploration or Mineral Development) Code Compliant Level 2 Mining Project. Issued by the Queensland Government, Environmental Protection Agency, 19/10/2005
3. EA MIN201008809 – EPM9100:- Environmental Authority (Exploration or Mineral Development) Code Compliant Level 2 Mining Project. Issued by the Queensland Government, Department of Environment and Resource Management, 23/12/2009.

3.3 Company structure

The QPs have relied upon, and disclaim responsibility for, information prepared by other experts regarding GR's company structure, book value of assets and the Melior purchase deal (*Section 2.0* of this report). The QPs have fully relied upon GR's legal counsel for this information through the following documents "Change of name Certificate.pdf", "Belridge Fixed Asset Register 17/03/2014" and emails (available on request).

3.4 Surface rights and access

The QPs have relied upon, and disclaim responsibility for, information prepared by other experts regarding the legal status of surface rights and access agreements (*Section 4.5* of this report). The QPs have fully relied upon GR's legal counsel for this information through the following document 'Mining Lease - Compensation Agreement - Campbell - EXECUTION version.pdf'.

3.5 Environmental

The QPs have fully relied on and disclaim responsibility for information regarding the status of environmental permits and liabilities (*Section 4.4* of this report) through opinions and data supplied by independent legal experts in the following documents:

1. EA MIC203279211 – EPM 19382:- Environmental Authority (Exploration or Mineral Development) Code Compliant Level 2 Mining Project. Issued by the Queensland Government, Department of Environment and Resource Management, 4/11/2011

2. EA MIM80017060603 – ML80044:- Environmental Authority (Exploration or Mineral Development) Code Compliant Level 2 Mining Project. Issued by the Queensland Government, Environmental Protection Agency, 19/10/2005
3. EA MIN201008809 – EPM9100:- Environmental Authority (Exploration or Mineral Development) Code Compliant Level 2 Mining Project. Issued by the Queensland Government, Department of Environment and Resource Management, 23/12/2009.

3.6 Taxes and royalties

The QPs have fully relied on and disclaim responsibility for information supplied by Melior staff for information relating to the status of the current royalties and taxation regime for the Project as follows:

1. Melior Resources Ltd., 2016: Unpublished email by representatives of Melior for TZMI, dated 21/10/2016
2. Melior Resources Ltd., 2016: Melior Financial Model_Restart_Revised_20161021.xlsx prepared by representatives of Melior, dated 21/10/2016.

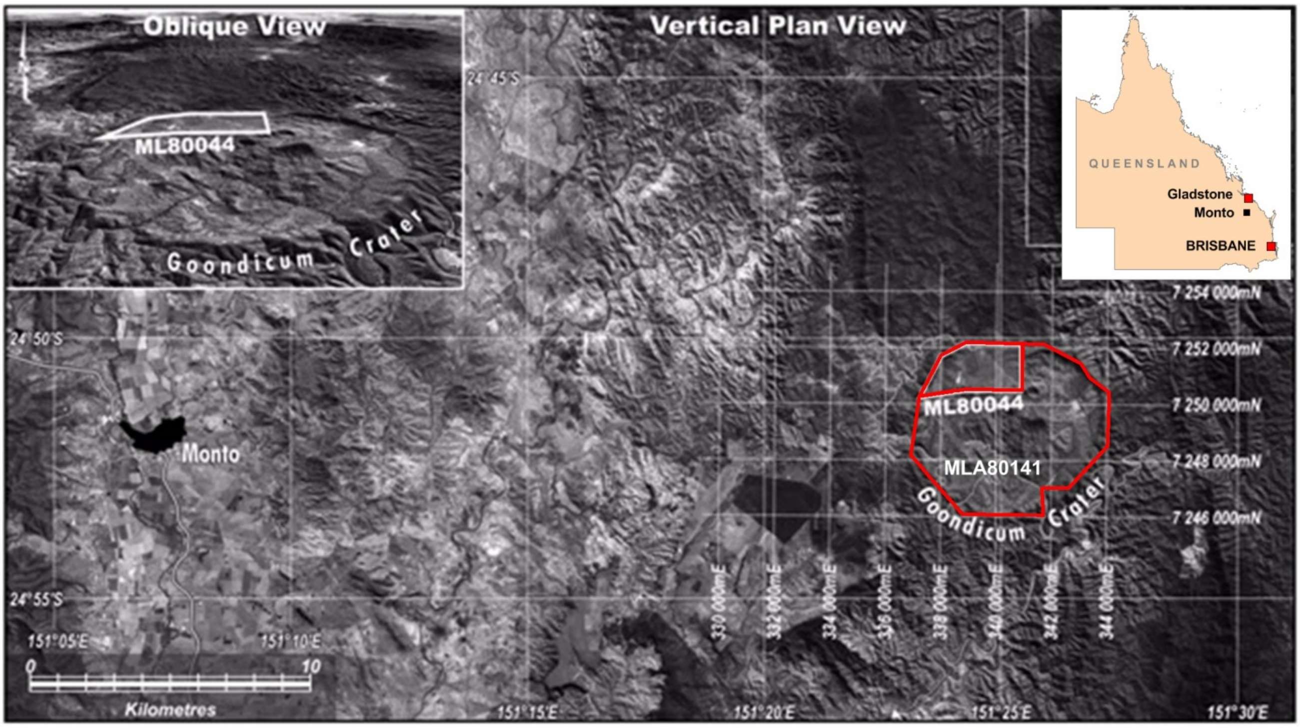
This information was used in *Sections 4.0*, *20.0*, *21.0* and *22.0* of the Report.

4.0 Property description and location

4.1 Property location

The Goondicum Industrial Minerals project is located 30km due east of Monto, or about 50km by bitumen and dirt road, and has an approximate elevation of 430metres above sea level. The centre point of the deposit is at 24°51'50s and 151°25'20'E or 339350mE and 7251560mN using the GDA94 Zone 56 grid projection *Figure* 4.1. All previous exploration work was completed in the Australian National Grid of AGD66 Zone 56.

Figure 4.1: Goondicum Project location map



(Lat/Long projection with AGD66 Zone 56 grid; modified by GR from Hoogvliet & Whitehouse 2011)

4.2 Tenure

The project is held under a granted Mining Lease ('ML') ML80044, which comprises 518 hectares. The remaining area of the Goondicum Crater is under a Mining Lease Application ('MLA') that was lodged in April 2007 (ML80141). The MLA is being maintained until operations in the existing ML have successfully restarted. Granting of an ML from this MLA is likely to take 12 months. Subsequently GR have acquired an Exploration Permit ('EPM') covering the area of the MLA.

A separate mining lease has been lodged (ML80185) over the 66kv power line which supplies power from the main grid.

The details of the mine leases are presented in *Table 4.1*.

Table 4.1: Mine Lease tenure details

Tenure Type	Tenure Number	Status	Name	Date Lodged	Date Granted	Date Expires	Principal Holder	Area in hectares	Division
ML	80185	Application	Mt Goondicum power supply	17-02-12			Goondicum Resources	402.20	M
ML	80044	Granted	Goondicum	16-12-96	2-09-99	30-09-31	Goondicum Resources	518.00	M
ML	80141	Application	Goondicum crater 2	26-04-07			Goondicum Resources	2863.13	M

(Table source: Geological Survey of Queensland IRTM v4.2 website 21/09/2016)

The granting of a mining lease by the Department of Natural Resources and Mines cannot proceed until an Environmental Authority ('EA') has been issued by the Department of Environment and Heritage Protection ('EHP'). Once a mining lease is granted for mining operations the following apply (source from the Queensland Government website (February 2014)):

- *Entitles the holder to machine-mine specified minerals and carry out activities associated with mining or promoting the activity of mining*
- *Is not restricted to a maximum term-this is determined in accordance with the amount of reserves identified and the projected mine life.*
- *Can be granted for those minerals specified in either the prospecting permit, exploration permit or mineral development licence held prior to the grant of the lease.*
- *Where an activity will result in significantly disturbed land, EHP may require an EA holder to pay financial assurance ('FA'). FA is a type of financial security provided to the Queensland Government to cover any costs or expenses incurred in taking action to prevent or minimise environmental harm or rehabilitate or restore the environment, should the holder fail to meet their environmental obligations. Subject to successful rehabilitation and the EA holder meeting their closure conditions, FA is returned at the end of the project*

The FA for ML80044 is A$1.213 million.

In addition, the ML and MLA for the whole of the Goondicum Crater and its environs are within Exploration Permits granted by the Queensland Government. Details of the EPMs are included in *Table 4.2*.

Table 4.2: Exploration Permit Tenure Details

Tenure Type	Tenure Number	Status	Sub-Status	Date Lodged	Date Granted	Date Expires	Principal Holder	Area (ha)
EPM	19382	Granted		3-Oct-11	25-Sep-13	24-Sep-16	Goondicum Resources	4,051
EPM	9100	Granted		2-Oct-92	12-Nov-92	11-Nov-14	Goondicum Resources	7,473

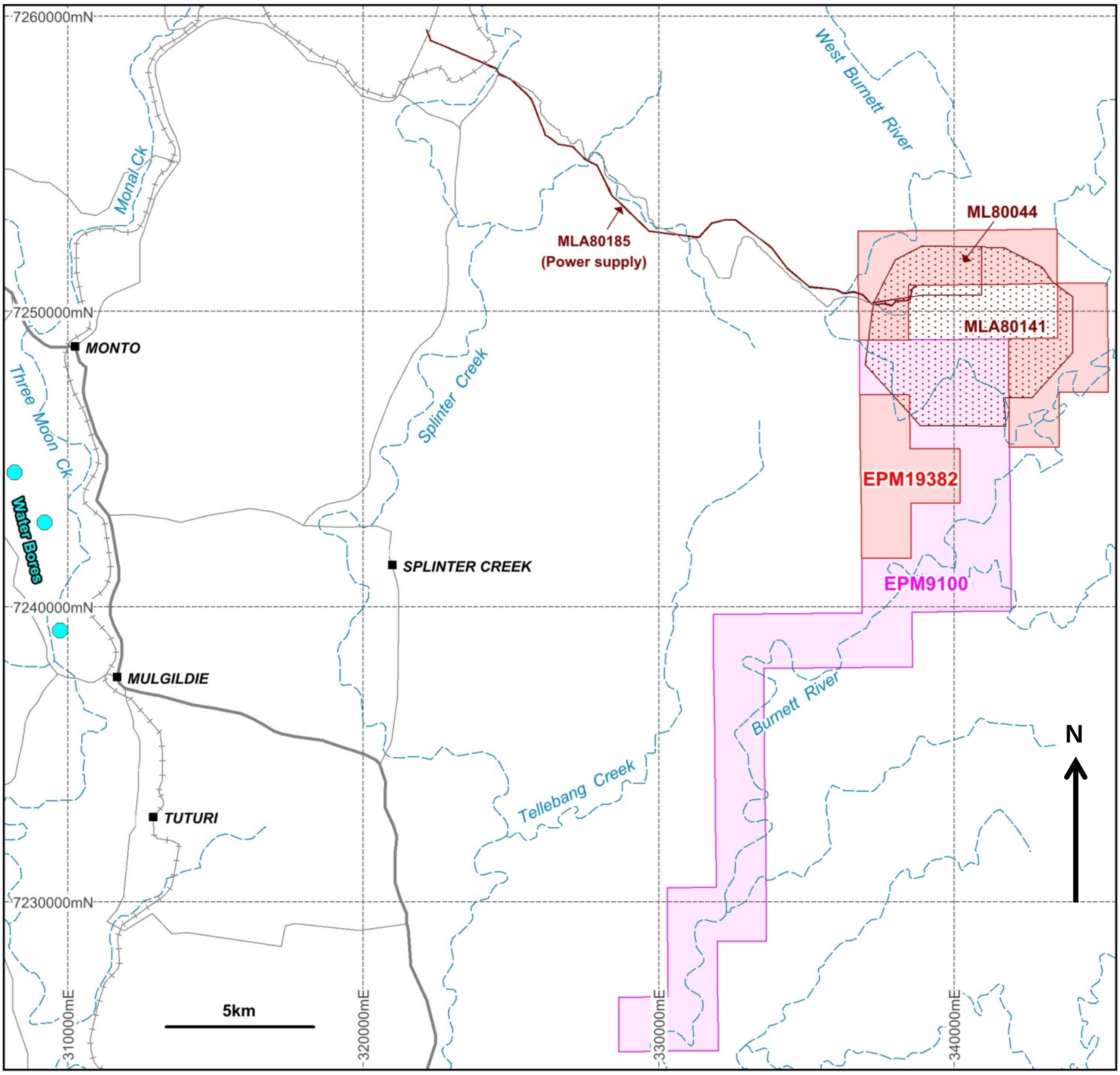
(Table source: Geological Survey of Queensland IRTM v4.2 website 21/09/16)

EPM 9100 has an annual exploration commitment of A$40,000 with an annual rental of A$3,153.70. The current licence conditions contain no requirement for the relinquishment of sub-blocks.

EPM 19382 has an annual exploration commitment of A$40,000 with an annual rental of A$1,766.70. If renewal of the licence is required after the 24th of September 2016 then a total 5 sub-blocks (1,557.5ha) must be relinquished.

A map of the MLs and the EPMs is included as *Figure 4.2* in MGA94 Zone 56 grid projection.

Figure 4.2: Mining Lease and Exploration Permit Location Map



(supplied by Melior)

4.3 Royalties and other payments

There are currently two separate entities that are entitled to receive the Finders Royalty on ilmenite and apatite sales. The existence of this royalty dates back to the original delineation of the resource in the late 1990s. The total of these royalties is 1.25%.

GR will pay the state government a royalty of 5% of the revenue for all ilmenite sales and approximately A$0.80/tonne for all phosphate rock sales.

The property lies on ground belonging to a single landowner for which a compensation amount has been agreed and paid in full.

4.4 Environmental liabilities

Previous mining has created some ground disturbance, but excavations are generally quite shallow except in a few small areas of depressed topography associated with palaeo stream courses.

A tailings dam was built by Monto Minerals Ltd. The tailings and feed preparation plant rejects are non-hazardous processed subsoils and are placed in previously mined areas commencing in the lower levels and working towards the higher levels. Tailings placement in this order maximises water recovery by allowing the natural direction of water to flow towards the lowest point. A topsoil study that was carried out by Environmental Earth Science (Report 713022 July 2013) indicated no significant differences in drainage patterns between topsoil and the tailings and rejects from the processing plant. Rehabilitation activities are planned to restore the landform to a shape which will restore the original drainage patterns.

A modest sized processing plant is currently on care and maintenance pending a planned resumption of mining.

The following environmental legislation applies to the Goondicum area specifically ML80044 as specified in the expert report Goondicum Project Flora and Fauna Protection Plan for ML80044 (ELP, 2013).

Legislation	Purpose	Administering Authority
Environmental Protection Act 1994 (Queensland) (EP Act)	Protects Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends (ecologically sustainable development).	Department of Environment and Heritage Protection (EHP)
Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth) (EPBC)	Protects environmental matters of national significance.	Department of Environment, Heritage, Water and the Arts (DEHWA)
Nature Conservation Act 1992 (Queensland) (NC Act)	Protects all plants and animals indigenous to Australia, and regulates the taking of individual native plants and animals.	Department of Environment & Heritage Protection (EHP)
Vegetation Management Act 1999 (Queensland) (VM Act)	Regulates the conservation and management of vegetation communities and the clearing of vegetation.	Department of Natural Resources and Mines

It is a condition of the Mining Lease that the top 0.2metre of soil material is preserved for ground rehabilitation after mining. This material can contain substantial ilmenite grades. As stated in the conclusions of the Topsoil Study report (Environmental Earth Science, 2013) '*the reject, or tailings, materials are suited to use as a basis for revegetation and rehabilitation of mined land with some considerations to be taken into account*' and '*the natural topsoil could be mixed with slimes and sand tailings at suitable proportions to provide a topdressing, as long as measures are taken to ameliorate any salinity issues*'. This could, subject to regulatory approval, allow for the extraction of the ilmenite from the top 0.2metre of soil without compromising the fertility of the soil when the mined areas are rehabilitated.

4.5 Mining permits

The granting of a Mining Lease is subject to the issuance of an Environmental Authority, which controls the mining activities including plan of operations, environmental management, waste water disposal etc.

No Native Title application covers the Mining Lease.

A compensation agreement with the landowner has been completed and allows sufficient access to the deposit for mining purposes.

An Environmental Authority is held for the stockpiling and loading of up to 250,000 tpa of ilmenite from Gladstone Port.

4.6 Significant factors to mining operations

The main risk to undertaking mining operations on the mining lease and the exploration permits is failure to comply with their conditions and requirements. H&SC sees no reason for non-compliance to be a case.

Relations with local landowners are managed at an operational level as appropriate.

The original water pipeline to the property was built by Sunwater, a Queensland Government agency. The pipeline and associated easements were transferred to GR ownership in early 2014 prior to the purchase of GR by Melior.

The Mining Lease ML80044 is not subject to a native title claim as demonstrated on the Queensland Government website (February 2014). As part of its commitment to the general community GR has a procedure for identifying potential significant native sites. This encompasses the use of an approved spotter to inspect areas earmarked for disturbance and their immediate environs.

5.0 Accessibility, climate, local resources, infrastructure and physiography history

5.1 Physiography

The terrain is typical cattle grazing country in a rural Australian setting and the area consists of small rolling hills with moderately broad watercourses. Vegetation is typically grassland with Eucalyptus trees as shown in *Figure 5.1*. The elevation for the area is around 400metres above sea level with a local range in elevation of approximately 50metres.

Figure 5.1: Typical landscape at Goondicum

5.2 Accessibility

The Goondicum Project is well located with respect to infrastructure and services. The region is a developed rural area with a network of highways, roads, rail lines and electricity transmission corridors.

Public road access is currently available to the Goondicum mine. Access from Monto is via 22km of sealed road to the Bancroft turn off, followed by a further 2km along Cannindah road to the Dakiel turn off. From that point there is a 24km site access gravel road which climbs around 500metres to the top of a range and then descends to the site and has been upgraded to handle haulage trucks. Four creek crossings have been built by the project in addition to around 7km of road widening and 5km of road sealing.

The ilmenite product from the Goondicum mine was previously hauled 260km from the mine site via Monto and Biloela to the port of Gladstone where it was shipped around the world to various customers. There is potential to reduce this haulage distance from 260km down to 160km with the construction of a new 22km access road to an existing gravel road linking up to the Bruce Highway, lowering off-site logistics' costs significantly.

5.3 Local resources

The Monto township is located in the North Burnett Region, and has a population of about 1,250 people. Another 1,250 people live within the Shire boundaries. The community is well serviced with a hospital (two permanent doctors) and an ambulance station with two ambulance vehicles. The Monto all-weather airstrip provides 24-hour availability for the air ambulance. Monto is 50km by road from the minesite and employees are able to commute by road with no accommodation required onsite.

5.4 Climate

The climate is classified as sub-tropical and comprises:

- Annual mean maximum temperature of 27.3°C with temperatures ranging between 20 - 35°C depending on the season.
- Annual mean minimum temperature of 12.9ºC with temperatures ranging between 5 - 20ºC depending on the season.
- Rainfall averages 740mm per year generally as heavy storms generally related to the North Australian Monsoon Trough during the summer months (‘Northern Australia’s Wet Season’). The area is sufficiently inland to be sheltered from any intense immediate impacts of cyclonic activity. However, the area can be prone to flooding as demonstrated by the 2013 summer floods.

It would be reasonable to expect any operation could operate all year round unless unusual heavy rainfall was to occur during the summer months.

5.5 Infrastructure

The Goondicum deposit lies in a relatively non-remote area of SE Queensland within 30km of the small town and major population centre of Monto. Approximately 2,500 people reside in the Monto area, half of those in the town itself, and the remainder being spread throughout the smaller communities of Mulgildie, Kalpowar and Mungungo and the rural area.

The area has power supply from the national grid.

A series of sealed roads service the area including access to the port cities of Gladstone and Bundaberg.

Gladstone is a major port with facilities for the export of mineral products. GR has previously shipped ilmenite from Gladstone. Bundaberg also has a port facility that may be amenable for shipping bulk ilmenite from.

5.6 Cultural heritage

A cultural heritage study was completed by Monto Minerals in 1996 in which the proposed mine development was examined for pre-historical and European cultural heritage sites. The report concluded that ‘the proposed development had no detrimental effect or impact upon the sparse background of archaeological material’ (Spencer 1996).

6.0 History

A substantial portion of the text in this section has been sourced from earlier reports by Graham Lee and Hugo Hoogvliet. In addition, discussions have been held with Graham Lee who is an associate of H&SC and has acted as a Qualified Person for parts of the subsequent chapters.

In 1992 the Monto Minerals Group commenced exploration of the surface of the Goondicum Complex and the Burnett River, which drains the complex.

Initial work by the company concentrated mostly on the alluvial deposits contained within the Burnett River channel. However, during this initial work period limited sampling and testing of eluvial mineralisation was carried out within the crater, which forms the surface of the gabbro complex. The area covered by this work exceeded 10km^2 and showed significant ilmenite concentrations to occur.

Subsequent to these initial investigations, Monto Minerals issued a Prospectus and listed on the Australian Stock Exchange. The company then undertook a number of investigations, of which the eluvial deposits occurring on the surface of the gabbro became the focus for a possible future production facility.

At about the same time as the Company commenced their investigations, Groen (1993) undertook a programme of mapping and petrological studies into the complex for his honours degree thesis at the Queensland University of Technology.

Monto undertook a programme of surveying, aerial photography and contour mapping, hand auger drilling (‘HA’), reverse circulation drilling (‘RC’), laboratory testing of drill hole samples, and metallurgical testing to provide the information upon which estimates of ilmenite resources were made. These investigations were carried out in three programmes during 1996, 1999, and 2000. At the time of the drilling, the main type of drilling was referred to as RC drilling, in fact it was actually an aircore method (aircore was a propriety trade name at the time), but for consistency between this report and Lee’s reports for 1996 and 2000, the term RC is maintained.

Monto Minerals completed a Feasibility Study in 1996-2005, which included a resource estimate compiled by Graham Lee of Peter Stitt & Associates of Sydney. The new resource estimates in this report for the MLA have been based on drilling data collected during this phase of work and substantial portions of the Feasibility Study report have been included in this report. Detailed resource evaluation of the crater area by Monto commenced in August 1996, with a programme initially comprising 9 lines of hand auger drill holes. This was followed by systematic RC drilling on both the MLA and the ML.

From 1997 to mid-1999 a number of studies and other works, mainly for the ML, were undertaken leading to a decision that further investigations were warranted in order to:

- define additional resources, and
- provide additional metallurgical test samples.

As a result of the 1996 investigation, further work was conducted between 1998 and 2000, mainly on the MLA, comprising a pitting and two additional drilling programmes (Lee, G, 2000).

“*In 2003 additional pitting was conducted within ML 80044, this programme comprised 10 pits. The testing programme included samples from those 10 pits as well as the samples from the 16 pits completed in 1999, and material available from five of the 2000 diamond drill holes. The testwork conducted in 2003 focussed on determining the quantity and quality of both the feldspar and apatite contained in these samples from ML 80044.*

“Resource estimates for feldspar and apatite prepared in 2003 were based on a 200m radius of influence around each sample point for Indicated Resources, and everything beyond the 200m radius, but within the

boundaries of the 3.0% cut-off for 5.5 amp recovered magnetics was treated as Inferred Resources.',(Lee, G, 2003).

"This was followed by a 99 pit program in 2004-2005 aimed at more thoroughly examining the feldspar and apatite resources in the westernmost approximately 1/3 part of the 'Initial Mine Area', and at the same time undertaking metallurgical work seeking to recover ilmenite with marketable TiO_2 grade but at lower yield", (Lee, G, 2005).

In 2005 a feasibility study was completed by Monto Minerals. This was followed in 2006 by an independent technical assessment (Oldroyd, 2006) with an update of the report completed in 2007 (Oldroyd, 2007).

In August 2008, after eight months of production, the operation was terminated by the voluntary administration of Monto Minerals.

In 2009, Monto Resources Pty Ltd, a subsidiary of Monto Minerals, was purchased by Belmont Park Monto Pty Ltd and Panorama Ridge Monto Pty Ltd and the company was renamed Belridge Enterprises Pty Ltd who then commissioned a redevelopment study. The work undertaken included a new drilling and analytical program to generate the development of a geological and a resource model for the redevelopment study.

"In March 2009, the historic data was used to build a detailed block model in Micromine covering the entire mining lease. Modelling of the historic data highlighted the lack of apatite data, in particular outside the SW corner, and below 5metre depth. It was determined that a new drilling program was in the best interest of the project. The main purpose of the drilling was to create a comprehensive and complete database for the apatite distribution. In addition, the drilling program was intended to confirm contained and recoverable ilmenite and titano-magnetite resource, and improve the understanding of the geology" (Hoogvliet & Whitehouse, 2011).

This new drilling programme resulted in a new resource estimate being generated that was published as a paper in November 2011 by Hoogvliet and Whitehouse. Unfortunately, the lead geologist Hoogvliet died soon after the presentation of the paper. Production recommenced at the minesite in 2012-13, after an earlier phase in 2008, but the 2009/11 block model significantly underperformed against the 2012-2013 production, with ilmenite production considerably higher than expectation.

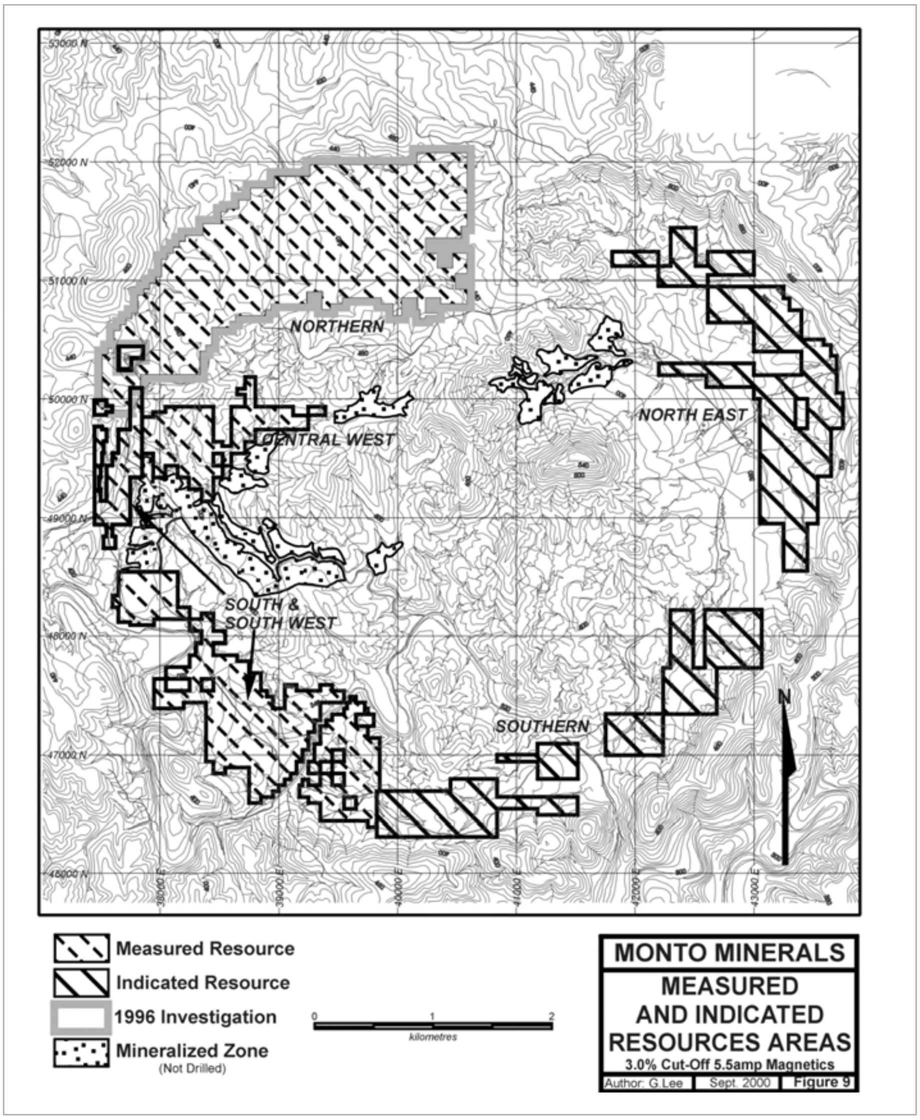
6.1 Previous resource estimates

Previous estimates have been reported for the Goondicum ilmenite deposit. These comprise work from Lee in 2000 (for the total area) and 2005 (only for the part of the resource then considered to be the Initial Mine Area), and Hoogvliet & Whitehouse in 2009. The previous resource estimates described in this section cover the same area. Previous resource estimates for the MLA section of the Goondicum ilmenite deposit have been reported in Lee, G., 2000 and Lee, G., 2004.

6.1.1 2000 ML & MLA resource estimates

In 2000 the resource estimates comprised several zones within the Goondicum Crater (see *Figure 6.1*); the relevant zone for the ML is the Northern Zone whilst the relevant zones for the MLA are the Central West, South, South West and the western half of the Southern zones. The resource estimates were modelled using the 5.5AM recovered magnetic fraction and an ilmenite conversion factor. This factor was derived by using Clerici sink data on sample composites combined with XRF assay of sink material for TiO_2. Different ilmenite conversion factors were developed for different areas and the two main lithologies i.e. CS and DG, which were applied to the 5.5AM data.

Figure 6.1: Location of 2000 Resource Estimates (Lee 2000)



(Note: AM refers to Amp Magnetics: the current sent through the induced roll magnet to separate less magnetic particles from more magnetic particles)

The resource classified as Measured was RC drilled (with a limited number of hand auger holes) on a 100 x 100 metre grid and had a cut-off of 3% applied for the 5.5AM recovered magnetic fraction. Ilmenite factors were determined for composited samples of the 5.5AM magnetic material. Geological and grade continuity were taken into account. No Indicated or Inferred Resources were classified on the ML. All estimates were calculated using manual polygonal blocks around drill holes.

The 2000 estimates for the Northern Area are based on a 5.5AM magnetic recovery fraction with a cut-off of 3% *(Table 6.1*).

Table 6.1: 2000 Northern Zone Resource Estimates for ilmenite

Lithology	Category	Tonnes (M)	5.5AM %	Ilmenite (Mt)
CS Unit	Measured	15.9	7.2	1.14
DG Unit	Measured	23.8	3.9	0.93
Total	**Measured**	**39.7**	**5.2**	**2.07**

Resource estimates for the Northern Area were also produced for apatite and feldspar. The informing data was a series of test pits dug in 1999 (16) and 2000 (10) and 5 cored holes. No material from the original RC drilling was available for analysis. The estimates are hosted within the ilmenite resource and are reported below in *Table 6.2* for a cut-off of 3.0% 5.5AM magnetics, 4.0% Feldspar, 0.1% Apatite. They are classified as Indicated and Inferred due to 'sample and quality variation'.

Table 6.2: 2000 Northern Zone Resource Estimates for apatite and feldspar

Lithology	Category	Tonnes (M)	Apatite %	Feldspar %
CS Unit	Indicated	5.7	2.25	9.0
DG Unit	Indicated	12.3	2.01	17.3
Total	**Indicated**	**18.0**	**2.09**	**14.7**
CS Unit	Inferred	6.2	1.73	**9.4**
DG Unit	Inferred	10.4	1.74	**14.1**
Total	**Inferred**	**16.6**	**1.73**	**12.3**
CS Unit		11.9	1.98	9.1
DG Unit		22.7	1.89	16.0
Total		**34.6**	**1.92**	**13.6**

The 2000 Measured and Indicated Resource Estimates for the MLA are based on a 5.5AM recovered magnetic fraction with a cut-off of 3% (*Table 6.3*). This has been converted to ilmenite using a correction factor generated during the mineralogical testwork. No apatite drilling data was available for resource estimation.

Table 6.3: 2000 Mineral Resource Estimates for the MLA

	Mt	5.5AM %	Ilmenite factor	Ilmenite (%)	Ilmenite (Mt)
CS Unit					
SW & S	6.9	7.0	0.898	6.3	0.44
Cent West	4.3	5.4	0.896	4.8	0.21
South	4.8	6.1	0.850	5.2	0.25
Total	**16.0**	**6.3**	**0.891**	**5.6**	**0.90**
DG Unit					
SW & S	6.1	6.5	0.658	4.3	0.26
Cent West	0.6	5.0	0.791	4.0	0.02
South	6.3	6.1	0.630	3.8	0.24
Total	**13.0**	**6.2**	**0.646**	**4.0**	**0.52**
Combined					
SW & S	13.1	6.8	0.789	5.4	0.70
Cent West	4.9	5.4	0.884	4.7	0.23
South	11.1	6.1	0.725	4.4	0.49
Total	**29.0**	**6.3**	**0.780**	**4.9**	**1.42**

No other factor (such as the minus 53micron fines content, or content of highly susceptible magnetics) was considered in determining the cut-off.

The work completed was of industry standard at the time of the undertaking.

GR does not treat the historical estimates as a current mineral resource.

There were an additional 99 pits dug in Dec 2004 in the western part of the ML that were used for testing ilmenite and especially for apatite and feldspar. The area tested was the planned first 3 years of production within the ML (see section 6.2).

6.1.2 2009 ML resource estimates

The 2009 resource estimates from Hoogvliet and Whitehouse's 2011 paper used the Inverse Distance Squared method on 1metre composites with flat, ovoid shape search ellipses oriented to the arcuate nature of the mineral zone. Classification of the resource estimates was based on the deduction that the 125metre drill spacing was sufficient to yield Indicated Resources (*Table 6.4*). Measured Resources were delineated on a defined shape basis ascertained by an interpretation of a zone of greatest geological continuity. No Inferred Resources were reported. To allow for the different minerals making up the resource estimate a net value per block method (revenue equals cost) was used to generate a cut-off for the resource estimate. The AUD0 value was compared to an ilmenite equivalent cut-off of 4%. The AUD0 net value per block was calculated as:

(percent ILM × tonnes × AUD120 × recovery + percent TM × tonnes × AUD100 × recovery +

percent APA × tonnes × AUD200 × recovery) - ((tonnes × 1.64) + (tonnes × 3.21))

(ILM = ilmenite; TM = titanomagnetite; APA = apatite)

The high ilmenite grade soil material designated as the first 20cm of ground disturbance was not included in the estimate. No segregation was made for the CS unit (see later chapter on geology).

Table 6.4: 2009 ML Resource estimates

Category	Lithotype	Tonnes (M)	Ilmenite (%)	Apatite (%)	Titanomagnetite (%)	Slimes %
Measured	CL	1.77	8.01	0.95	0.64	54.33
Measured	CS	13.48	5.13	2.30	2.49	24.24
Measured	DG	25.46	3.31	1.76	2.78	11.05
Sub-total		**40.71**	**4.12**	**1.91**	**2.59**	**17.30**
Indicated	CL	0.57	7.10	1.44	1.26	43.83
Indicated	CS	5.22	4.53	1.99	2.35	19.29
Indicated	DG	4.37	3.11	1.50	2.23	12.06
Sub-total		**10.15**	**4.06**	**1.75**	**2.24**	**17.55**
All	CL	2.33	7.79	1.07	0.79	51.78
All	CS	18.69	4.96	2.22	2.45	22.86
All	DG	29.83	3.28	1.73	2.70	11.19
Total		**50.86**	**4.11**	**1.88**	**2.52**	**17.35**

(minor rounding errors)

The reliability of the resource estimate has been severely compromised by the sudden death of the lead author, Hoogvliet, in 2011. Subsequent mining appeared to indicate the block model substantially underperformed for ilmenite production. There exists a lack of documentation for the processing of the 5.5AM recovered magnetic fraction data in conjunction with the Clerici sinks analytical work such that the ilmenite grades presented for modelling could not be verified but appeared inaccurate i.e. understated. There were other issues with some of the drilling data, for example density was calculated on the size of the aircore sample which is considered a semi-quantitative if not a qualitative measurement. There was no reason to question the quality of the logging and the analytical data.

GR does not treat the historical estimate as a current Mineral Resource.

As a result of the inconsistency between the operational performance and the 2009 resource model, H&SC were asked to complete a new resource estimate starting with just the raw data from the 2009 drilling programme and the accompanying analytical results.

6.2 Previous reserve statements

In 2005, based on all the previous investigations, including the 99 backhoe pits of 2004, Proven Reserve estimates were prepared for the 'Initial Mine Area' of the Northern Resource area in the crater i.e. within ML 80044. The area covered was the westernmost area approximately 1/3 of the Northern Resource (see *Figure 6.1*). *Table 6.5* presents the Mineral Reserves estimated in 2005 at a 3% 5.5AM recovered magnetic fraction.

Table 6.5: 2005 Proven Reserves Estimates for the initial mine area

Material	Raw	Ilmenite		Feldspar		Apatite	
	Mt	Kt	%	Kt	%	Kt	%
CS	1.6	130	8.5	110	8.4	30	1.9
DG	4.5	170	3.8	460	14.0	80	1.9
Total	**6.0**	**300**	**5.0**	**570**	**12.0**	**110**	**1.9**

(source Lee, 2005)

These estimates were qualified in regards to metallurgical testwork forming part of the then ongoing feasibility study, and reference to Table 15 on page 51 in Lee's 2005 report was given in regards to expected product quality for ilmenite and feldspar.

GR does not treat the historical estimate as a current Mineral Reserve.

6.3 Previous production

In October 2007 Monto Minerals commenced production on the ML which continued for nine months. Four mineral products were generated with the production listed in *Table 6.6* (source: The Goondicum Redevelopment Plan by Stanmore Resources Consultants, 2009).

Table 6.6: 2007/08 Production

	Ilmenite	Apatite	Feldspar	Titano-Magnetite	Total
Tonnes Produced	14,042	5,269	9,905	3,986	**33,202**
Revenue	A$1,071,760	A$263,623	A$147,175	0	**A$1,482,559**
Stock on hand	A$198,005	A$62,020	A$164,080	0	**A$424,105**
Revenue/t incl stock	A$90.43	A$61.08	A$31.42	0	

In August 2008 Monto Minerals was placed into voluntary administration. The primary reasons for Monto Minerals failure at Goondicum were indicated in the Stanmore Resources Consultants 2009 report and included the following comments:

1. Lack of real understanding of the physical and mineralogical attributes of the material being processed leading to a grossly under designed Feed Preparation Plant (FPP). This resulted in the slurried feed being fed to the Wet Concentrator Plant (WCP) being of unsuitable quality and consistency. The WCP ever only achieved 40% of design throughput.

2. Lack of effective process monitoring and control systems in the WCP that resulted in poor control of the process and final product outcomes
3. General undercapitalisation resulting in poor engineering and decision making throughout the project
4. The global financial crisis made it very difficult to source the additional capital required to rectify the engineering and design problems.

In 2012-13 GR recommissioned the plant and resumed mining operations on the ML. In addition, two new LiDAR airborne surveys were flown to provide detailed surface topography for pre-mining 2012 and post mining 2013.

The ilmenite production was in considerable excess of the block model prediction (*Table 6.7*).

Table 6.7: 2012/13 Production

	Production	2009 Block Model*
Ore Processed (wet) (t)	762,946	
Ore Feed Moisture (%)	13.94	
Ore Processed Dry (t)	656,718	282,582
Ore Stockpile Dry (t)	20,000	
Mined Ore (Processed + Stockpile) (dry t)	676,718	
Ore Head Grade (%)	10.0	
Mill Recovery Grade (%)	7.3	6.5
Ilmenite Produced (t)	47,425	18,396

(Production figures supplied by GR)

(The figures in this column were generated by reporting the resources estimates from the 2009 block model between the two LiDAR surfaces within a defined area of disturbance (supplied by GR). The supplied model appeared to have fundamental issues as resource reporting by H&SC for blocks with an ilmenite grade between the two surfaces could only achieve the tonnage figure listed in Table 6.7: 2012/13 Production. The problem is that there are blocks with no grade within the disturbed area but no understanding as to why that should be).*

GR operated the ilmenite mine and processing plant for approximately four months from mid-April to end July 2015. Attempts to reconcile its metallurgical performance have proved difficult.

Mineral Technologies Pty Ltd completed a metallurgical operations review on the Goondicum mine during the months of April to July 2015 (*Table 6.8*). In their executive summary they state that:

"Initial start-up issues related to equipment failures, poor instrument calibration, and operator inexperience impacted the early process performance and has resulted in some lost or corrupted data which prevents a highly definitive audit to be resolved.

"Poor instrumentation calibration at start-up, from mid-April through to around 25 May, has prevented a definitive mass balance and reconciliation for the entire period of operation through to end July from being resolved.

"Notwithstanding, there is reasonable evidence from the basic SCADA data that, over the period in question, around 290,000 dry tonnes of ore was processed through the Goondicum FPP and WCP circuits, producing at least 17,500 tonnes of ilmenite product. The slimes (-53µm) content of the ore was approximately 32%."

Table 6.8: 2015 Metallurgical performance parameters

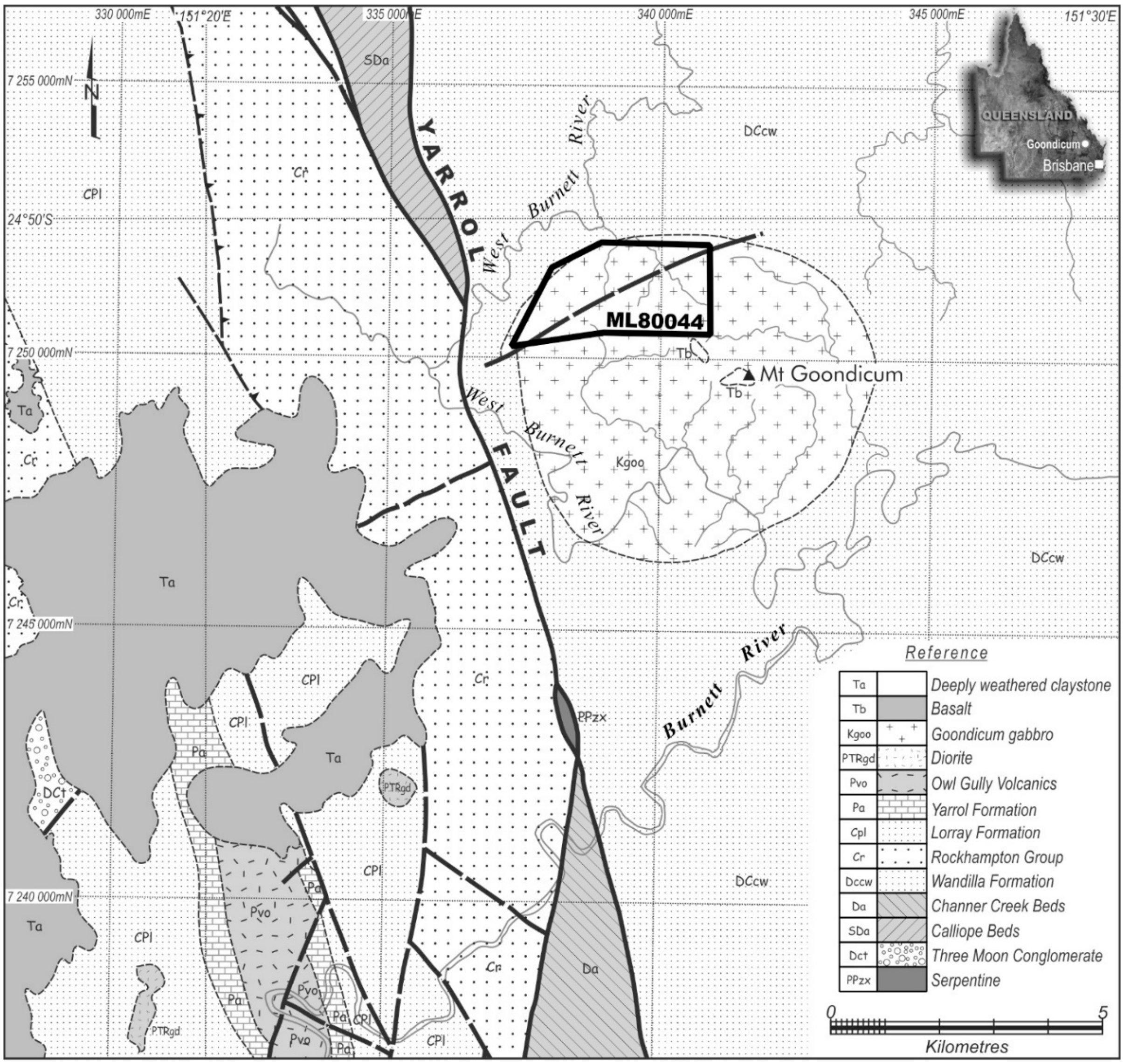
Plant Area		FPP	WCP	Overall
Utilisation	%	66	66	66
Feed Rate	dry t/h	273	124	273
Head Grade	% Ilmenite	10.5	22.4	10.5
Feed Slimes Content	%	32	2	32
Product Rate	dry t/h	124	16	16
Product Grade	% Ilmenite	22.6	98.8	98.8
Mass Recovery	%	44	13	6
Ilmenite Recovery	%	93	57	53

7.0 Geological setting and mineralisation

7.1 Regional geology

The Goondicum Complex is a layered mafic intrusion, mostly comprised of gabbros and leucogabbros, with some oxide gabbros (*Figure 7.1*). The layers appear to represent segregations of the intrusion. They are further intruded by a later stage of oxide gabbro, which is observed in the laminated gabbro as a concordant sill. A second oxide gabbro occurs in the central section of the pluton.

Figure 7.1: Regional Geology Map



(supplied by GR)

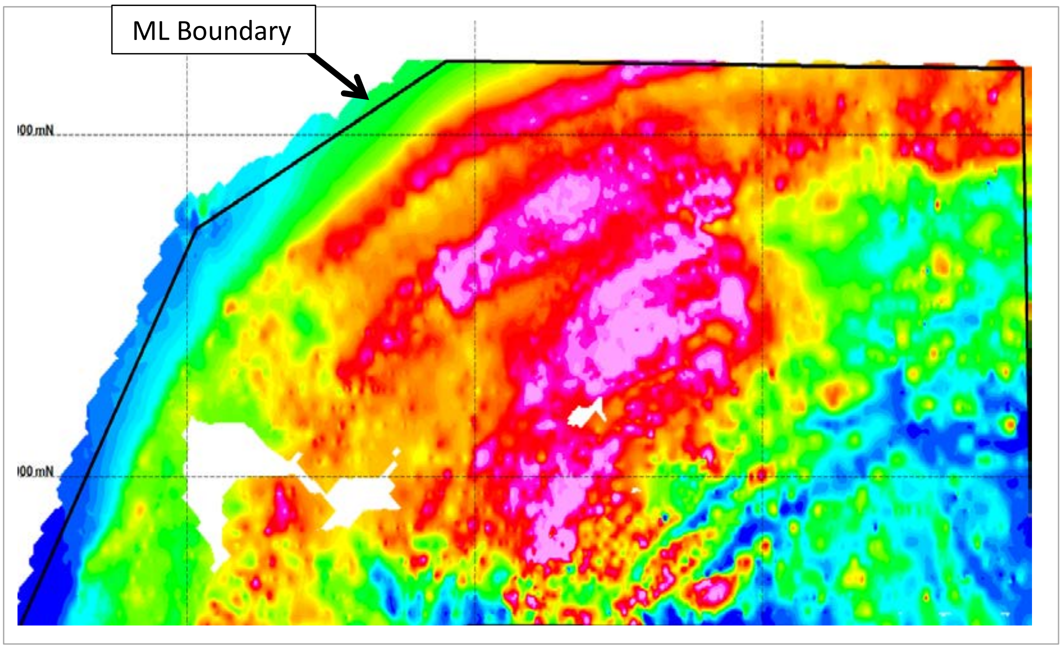
The gabbro has intruded Devonian mudstones, siltstones and sandstones, as well as higher metamorphic grade schists and slates, east of the major regional structure the Yarrol Fault. West of the Yarrol Fault lies later Upper Palaeozoic siliciclastic sequences in conjunction with slightly older basaltic and andesitic volcanoclastic sequences including andesites, conglomerates and limestones. The Yarrol Fault skirts the south-western margin of the complex. Serpentinite bodies are associated with the fault and are observed in outcrop both to the north and south of the Goondicum Crater. It is speculated that the fault may have controlled the gabbro intrusion. There is no evidence of a meteorite impact triggering the gabbro intrusion.

7.2 Local geology and mineralisation

The mineralisation which is the subject of this report is associated with the Goondicum Gabbro which Groen (1993) had mapped from the crater rim to the centre as comprising a ‘poikilitic marginal zone’ (hornblende gabbro), ‘lower zone laminated gabbro’, and ‘macrorhythmic zone’.

A ground-based detailed magnetic survey has generated data covering the crater that shows a number of concentric zones. The largest of these zones is a magnetic high, which forms an annulus inside the hornfels rim of the gabbro. This zone is particularly well developed along the western part of the crater, where it is both widest and has the highest anomaly of 59,000nT. *Figure 7.2* shows a subset of the magnetic intensity data for the Goondicum deposit within ML80044. It appears to indicate distinct zonation in arcuate patterns relative to the margin of the gabbro intrusive.

Figure 7.2: Goondicum deposit detailed ground magnetic intensity map



(supplied by GR)

Breakdown of the rocks due to weathering has generated both in-situ and colluvial material containing significant ilmenite mineralisation. During the chemical weathering of the gabbro some of the chemically less stable minerals are removed, and the ilmenite together with other resistant minerals, concentrate, by deflation, at or near the surface in a clay and/or sand-rich matrix.

The relatively complex weathering history of the gabbro has produced two main host types for ilmenite mineralisation. The 'clay/sand' unit or ‘CS’ is believed to be an eluvial/colluvial deposit i.e. some in-situ material and some transported material possibly due to both gravity slip and alluvial processes. The second type is 'decomposed gabbro' or ‘DG’, implying a less weathered eluvial or in-situ deposit. A subset of the clay/sand unit is the 'colluvium' unit or ‘CL’, and this may have had a more water transported-related origin. The CS occurs at or near surface and includes the uppermost 20-30cm of the soil profile, designated in the drillhole logging as 'soil horizon' or ‘SL’. The CS can range in thickness, up to several metres, especially where the CL unit is associated. The CL is an important sub-set of the clay/sand mineralisation, having high slimes content, and may have formed from localised damming of alluvial channels resulting in localised flooding where the clay material in suspension settled out in depressions.

The CS has been subdivided into a high slimes unit, CS_H, and a low slimes unit, CS_L, at a nominal 14% slimes content. The latter unit is marked in places as being very similar to the DG material, but the later 2009 drilling data for the ML area indicated much higher sample recoveries associated with it suggesting a much more poorly consolidated sandy unit, possibly of a higher energy alluvial origin. The earlier 1996-2000 work did not allow for the delineation of very much CS_L as it had not been recognised as a significant unit at that time. The CS_L is often covered by the CS_H but the reverse has not been observed to date.

On occasions the drilling penetrated to relatively fresh gabbro 'GA'.

Photographs of each lithology are included in *Figure 7.3*.

Brown clay and sandy layers occur in the CL, and often predominate; these sometimes contain high ilmenite grades particularly in the coarser grained, better sorted colluvial/alluvial material. Some of the CL has a very black colour that is believed related to an excess of contained montmorillonite (a clay mineral).

Figure 7.3: Photographs of the different lithologies

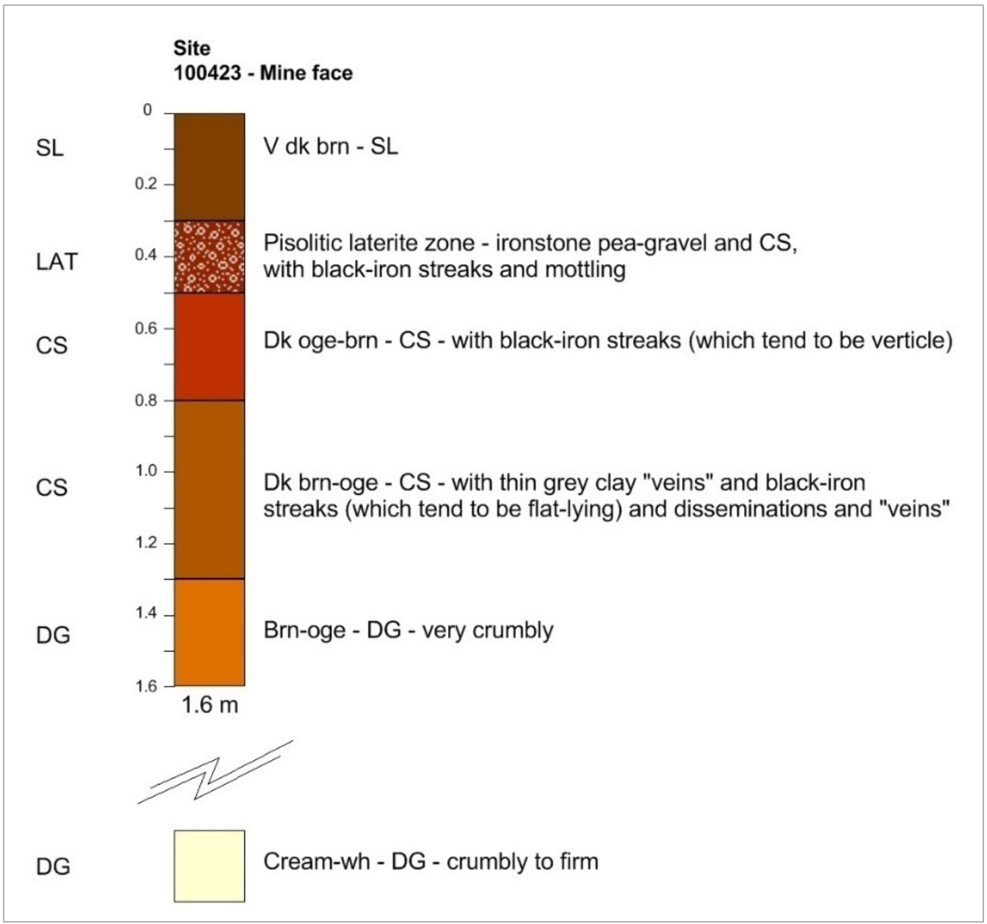
(Top – from left to right: SL, CL, CS_H. Bottom – from left to right: CS_L, DG

Generally, the higher grade mineralisation is hosted by the CS_H and locally the CL. There are occasions where the CS_L also hosts higher grades but generally the DG is low grade. The SL is defined as the top 30cm of the soil profile and is generally of higher grade. This is because there has been some removal of less dense material, for example, the clay fraction through wind and water that has resulted in an upgrading of the ilmenite content. The processing capabilities of the plant and its ability to handle the slimes material may mean that blending of mineralisation will be required. The blending would likely use some of the CS_L material and the lower grade DG material.

Ilmenite deposits also occur along modern stream channels as terrace remnants, which the reactivated stream has partly eroded. Less frequently, palaeo-stream channels are encountered which are filled with gravity flow colluvium with variable ilmenite grades.

R. Dawney of AUSMEC (consulting exploration geologist to GR) has completed some additional geological mapping, including a photo-geological interpretation, of both the ML and MLA areas of the Goondicum Crater. This work utilised the observation of a complete lateritic weathering profile in a mine face in the area of recent mining (*Figure 7.4*).

Figure 7.4: Graphic log for Site 100423 - Lateritic profile



(supplied by AUSMEC/GR)

Field examples of the mineralisation are included below. *Figure 7.5* shows the CS_H sitting on top of the DG (decomposed gabbro).

Figure 7.5: CS_H material sitting on DG Material

Figure 7.6 shows the brown coloured high slimes CL with some slightly less clayey zones.

Figure 7.6: High slimes brown CL material

(face 3metre high)

Figure 7.7 shows an exposure of the very high slimes black CL.

Figure 7.7: High slimes black CL material

Figure 7.8 shows high slimes CL (and SL) sitting on low slimes CS_L.

Figure 7.8: High slimes CL on low slimes CS_L material

The mineralisation is essentially flat lying with an undulating base. For the ML its dimensions are 3,000 x 1,500metres with an approximate viable range in thickness of 2–10metres (low grade mineralised DG can add to a maximum thickness of 25metres). For the MLA the mineralisation dimensions are 4,000 x 2,000metres with an approximate viable range in thickness of 2–10metres (low grade mineralised DG can lead to a maximum thickness of 25metres).

The fundamental geological control to the mineralisation is the underlying spatial distribution of the gabbro and its ilmenite content, followed by the topography at the time of the different weathering/erosion phases. Ilmenite grades are not entirely related to specific weathered rock types although there is a marked segregation between the high slimes units, CL and CS_H, having higher grades than the low slimes CS_L and DG host units. The ilmenite grades of the DG unit are more directly related to the original grade within the gabbro.

The geological development of the resource is described below (Dawney, 2014) and a schematic representation of the weathering and erosion history is included as *Figure 7.9*.

7.2.1 Early to Mid-Miocene*

In situ weathering of the gabbro causing the formation of the DG ended with the development of a zoned, gradational, deep lateritic weathering profile, with concentration of resistant heavy minerals (ilmenite-magnetite) in the upper surface layers of CS_L and CS_H by dissolution of less resistant material by the weathering process – refer to Figure 7.4 above (the upper soil layer is Recent from Stage 3). H&SC note that the drillhole recoveries for the CS_L on the ML are markedly higher than the other lithologies suggesting a poorly consolidated unit and perhaps suggest a higher energy fluvially derived source to the material.

7.2.2 Pliocene*

Erosion of the earlier profile from raised areas and deposition of a layer of reworked CS_H (and ilmenite-magnetite) across the landscape, with the earlier profile being preserved and covered in valleys. The erosion-deposition mechanism probably involved sheet-wash type processes. The dominant erosion-deposition direction (for the ML area) was from south to north, though some lateral erosion would have occurred.

7.2.3 Pliocene to Recent*

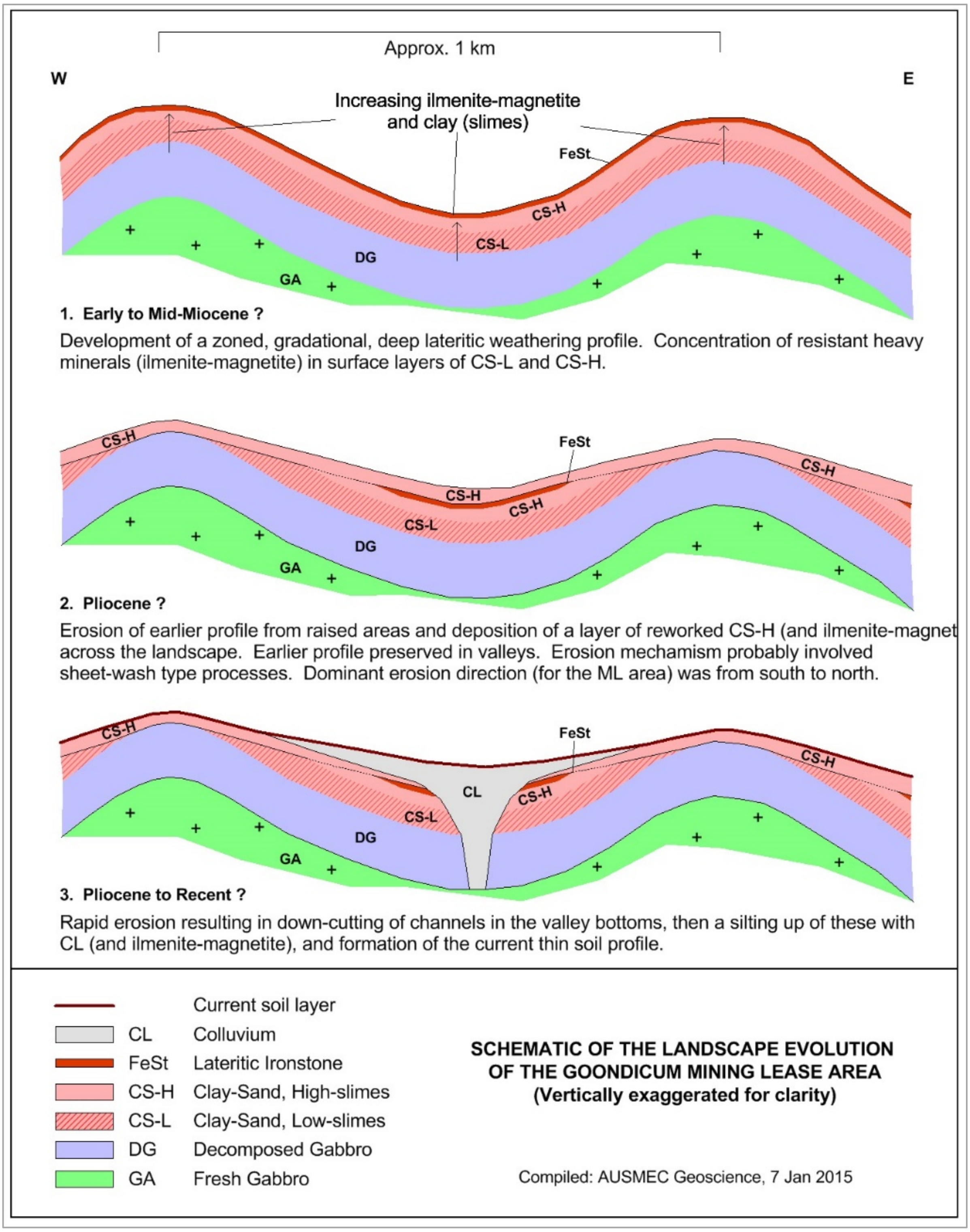
Rapid erosion then occurred, resulting in down-cutting of channels in the valley bottoms. Then the silting up of these channels with CL (and ilmenite-magnetite) occurred, which is thought to be in response to the southward tectonic tilting of the region which decreased the northward slope of the ML area. This southward tilting was likely responsible for the latest phase of erosion in the other areas of the Crater. The CL material is generally coincident with the earlier alluvial channels.

Finally, the SL occurred and may be related in part to the deposition of the CL. The SL unit is generally more strongly mineralised as very recent erosion, possibly water and/or wind-blown, has removed the lighter mineral grains increasing the ilmenite/magnetite grade.

Figure 7.9 indicates the relationship between the various lithology units. The DG material has been stripped out in palaeo-river valleys which have subsequently filled with CS_L followed by CS_H. These valleys continued to exist as depressions when a later phase of surficial activity allowed for the accumulation of the CL.

** Ages are estimated based on the various palaeo-climates considered appropriate for each stage of landscape evolution.*

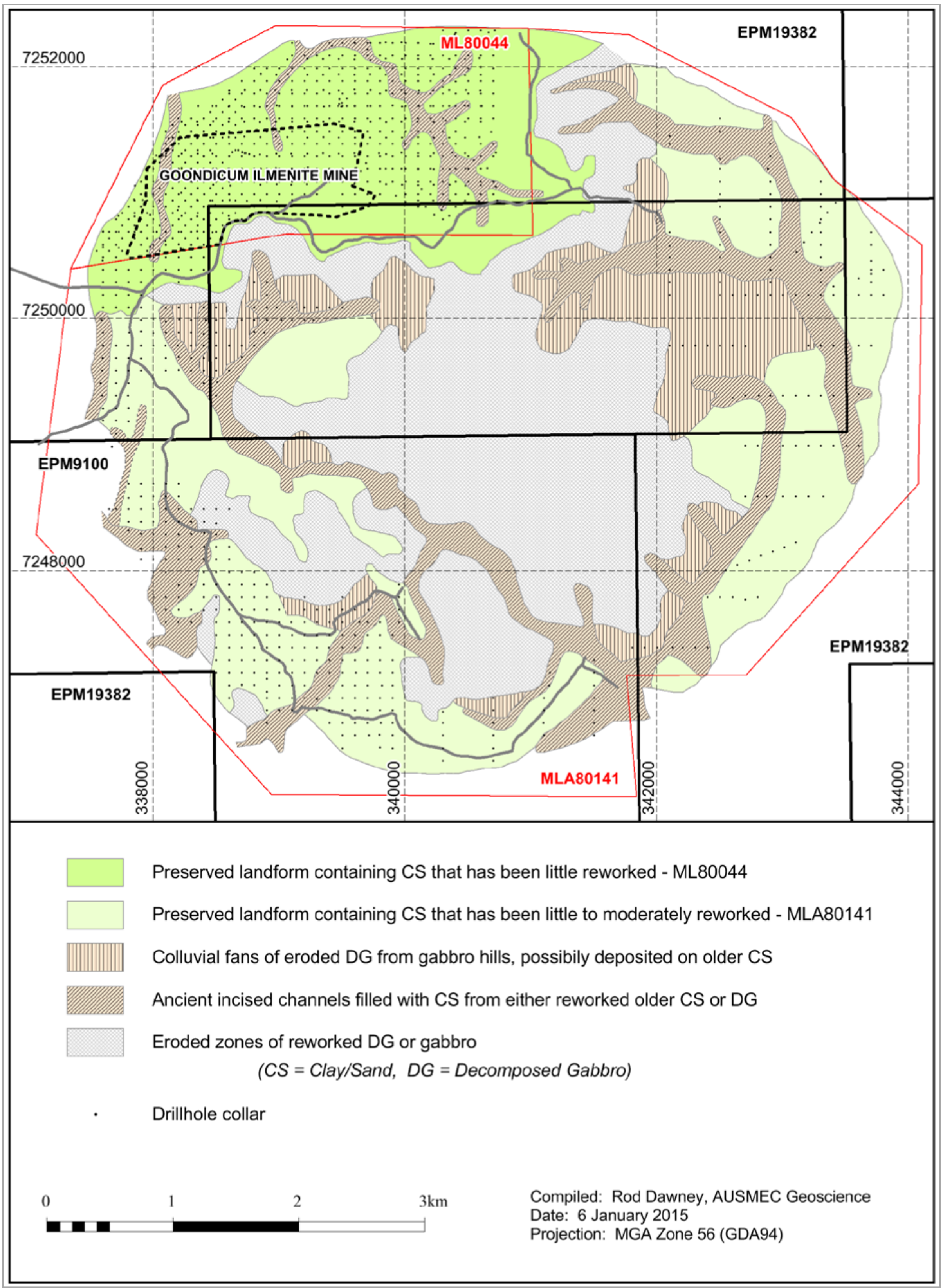
Figure 7.9: Schematic cross-section for development of mineral-hosting lithologies



(supplied by AUSMEC/GR)

As a result of these studies a new geological map has been prepared by R Dawney (*Figure 7.10*). The ML area of the Goondicum Crater has a different landscape to that of the rest of the Crater because it has largely escaped the latest phase of erosion affecting the other areas of the MLA.

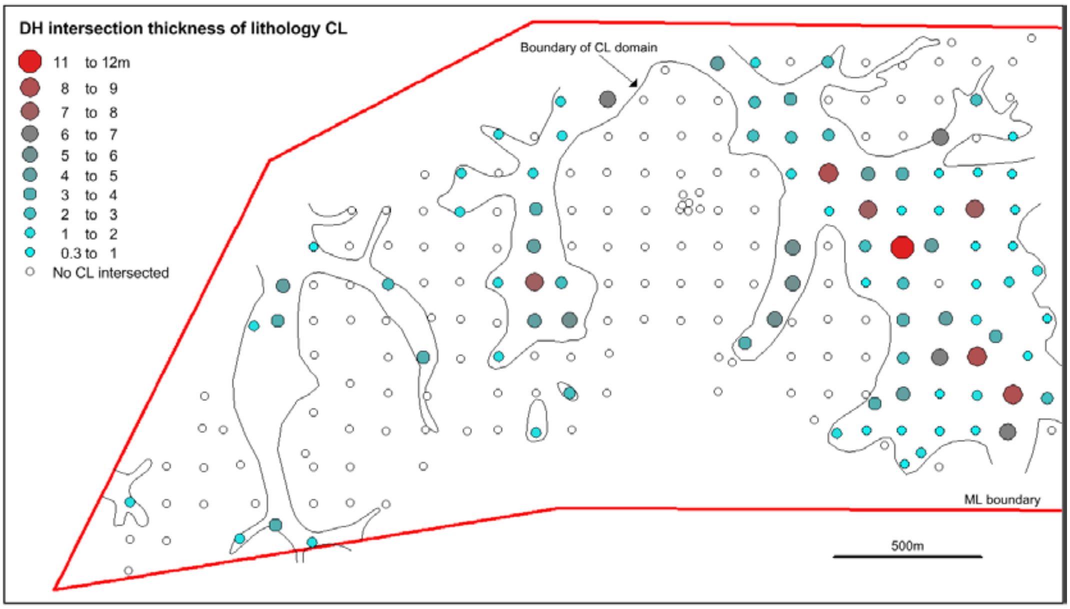
Figure 7.10: Goondicum deposit geology map



(supplied by AUSMEC/GR)

The following figures show the spatial occurrence and thicknesses of the different lithological units for the ML and contribute to a much improved geological understanding of the deposit. In *Figure 7.11* the outline of the CL was compiled from the drillhole occurrences and a surface geomorphological interpretation from the detailed air photographs.

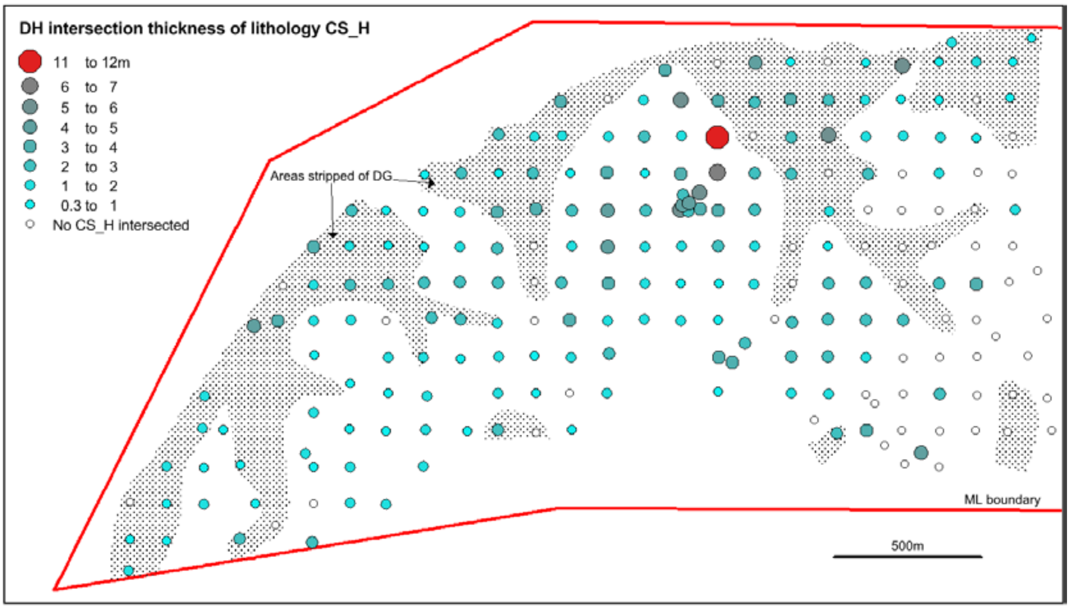
Figure 7.11: ML plan interpretation of CL distribution and thickness



(supplied by AUSMEC/GR)

Figure 7.12 shows a broad, relatively evenly distributed CS_H, both spatially and in thickness.

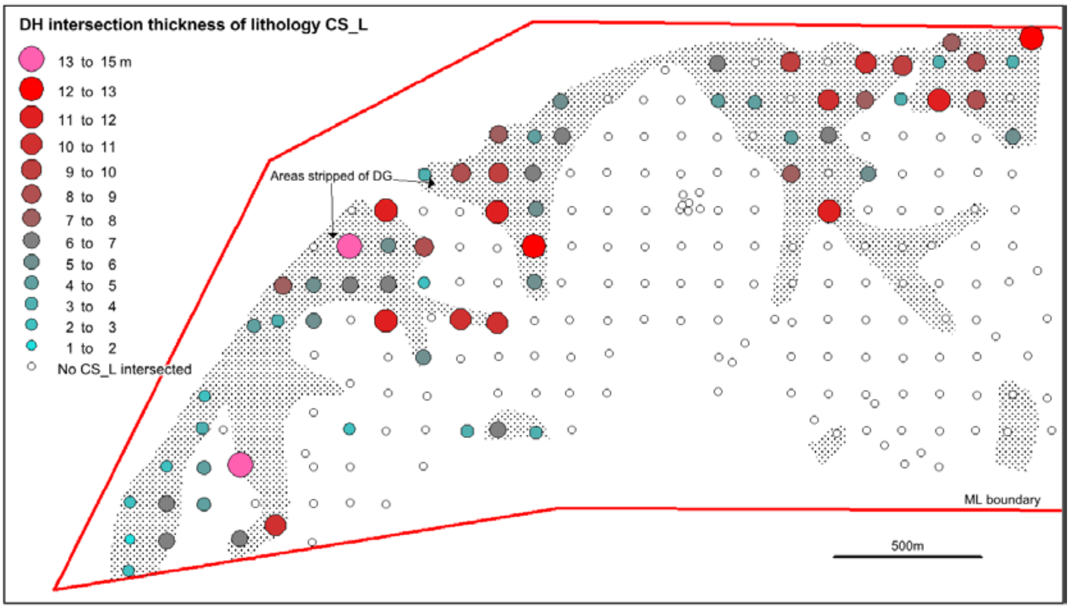
Figure 7.12: ML plan interpretation of CS_H distribution and thickness



(supplied by AUSMEC/GR)

In *Figure 7.13* the CS_L occurs in deep eroded valleys where the DG has been stripped.

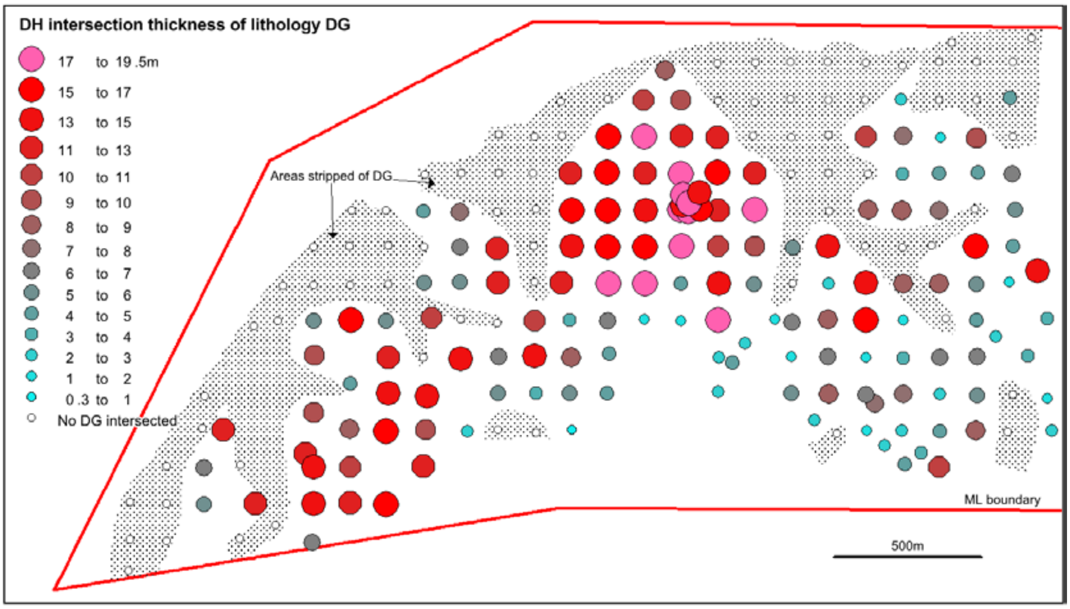
Figure 7.13: ML plan interpretation of CS_L distribution and thickness



(supplied by AUSMEC/GR)

Figure 7.14 shows relatively thick DG occurring as an arcuate zone paralleling the gabbro contact. A thinner coherent zone is observed in the SE corner of the deposit, known as the SE Quadrant, corresponding with a broad CL zone.

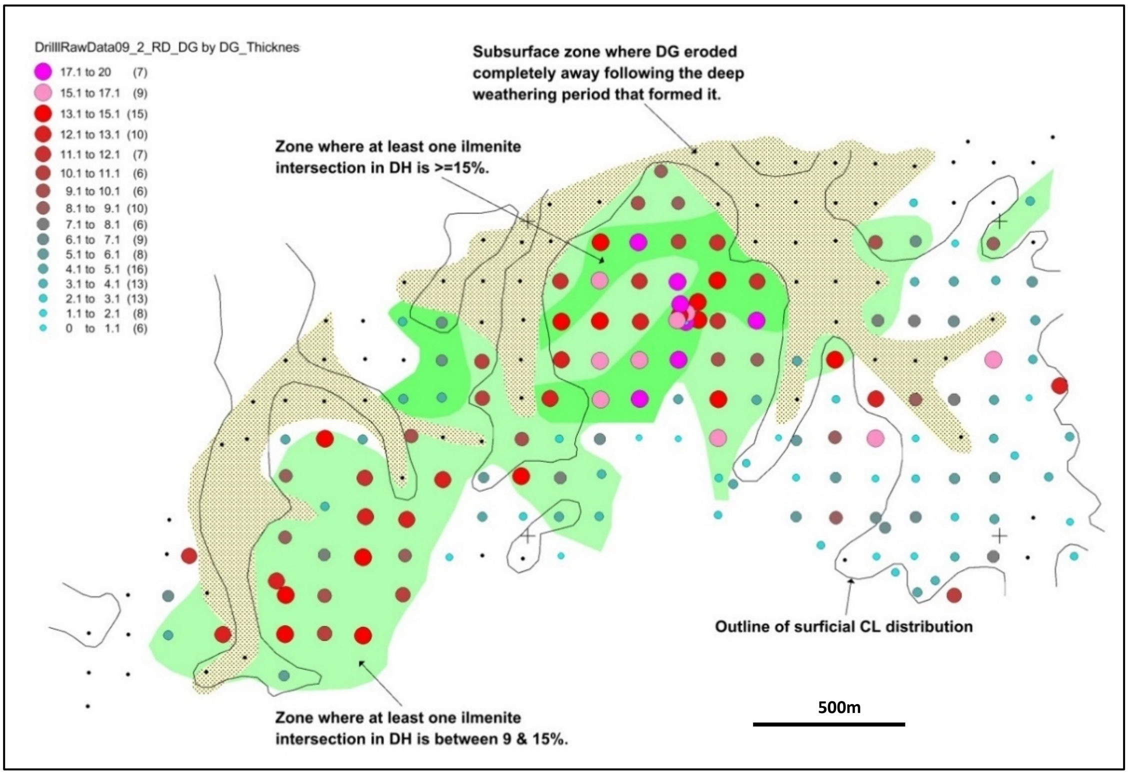
Figure 7.14: ML plan interpretation of DG distribution and thickness



(supplied by AUSMEC/GR)

Figure 7.15 indicates the relationship between the DG and the CL. The DG material has been stripped out in palaeo-river valleys which have then filled with CS_L followed by CS_H. These valleys continued to exist as depressions when a later phase of surficial activity allowed for accumulation of the CL unit.

Figure 7.15: ML plan interpretation of DG & CL mineralisation



(supplied by Ausmec/GR)

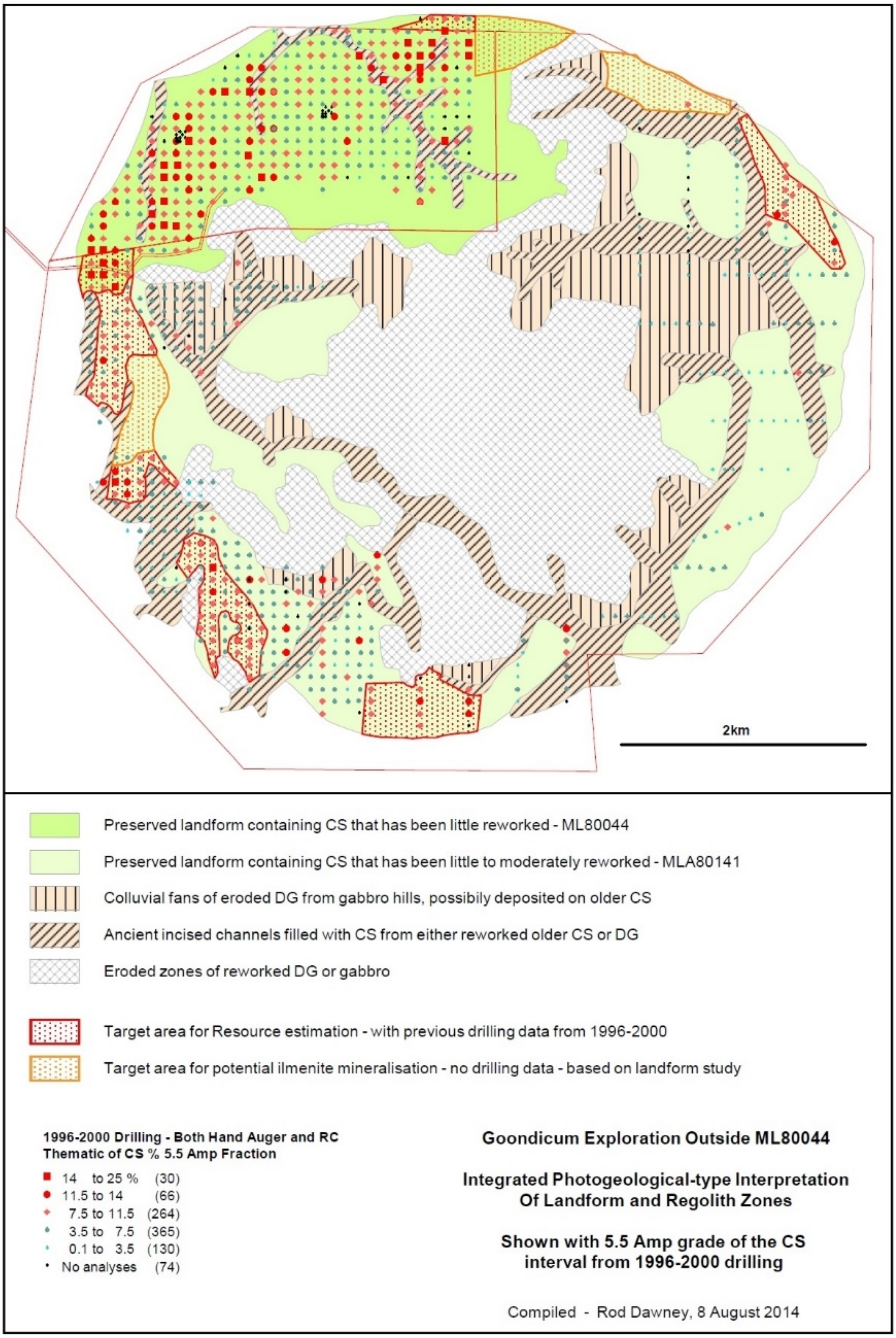
Another aim of the mapping work was to delineate the extent of prospective areas for significant ilmenite mineralisation within the MLA drilling, generally related to the CS. The outlines of these areas would provide some geological control for the subsequent resource estimation.

Figure 7.16 shows a thematic representation of the ilmenite grade of the CS in the 1996-2000 drillholes completed by Dawney. It uses the percentage value of the 5.5AM recovered magnetic fraction from drill samples as an indicator of the ilmenite grade. For the purpose of integrating with the photogeological study to define the most prospective landform for ilmenite, the pink and red symbols (at the drillhole collars), being quite high-grade, were used to show that the landforms coloured dark green and light green on the photogeological map are where the best ilmenite grades occur, or likely to occur where there is no drilling.

The most prospective landforms were those that were largely preserved ancient stabilised land surfaces that had been subjected to prior deep Tertiary weathering, when ilmenite was concentrated in the upper layers of the weathered profile.

Two types of target area were delineated, the first being in areas with drilling and the second where there was no drilling but prospective landforms. The latter offers potential to increase the resource size with further drilling. Five areas of potentially economic mineralisation were outlined, with the outlines being constrained by the boundaries of the prospective landform zones from the photogeological study.

Figure 7.16: Goondicum deposit prospective areas



(supplied by AUSMEC/GR)

8.0 Deposit types

The deposit type is rare in this part of Queensland. It is a flat lying residual oxide deposit of a weathered gabbro intrusion that has had modifications from surface water flow and soil creep. The host rock comprises a combination of weathered material and alluvium. Ilmenite mineralisation occurs as liberated fine grains often concentrated by surface water into more slimes-rich material but the concentration may in part be related to an underlying primary concentration in the gabbro. The gabbro appears to have a primary mineralogical zonation associated with the arcuate margin of the intrusion. The ilmenite has been widely distributed throughout the mining lease with no obvious specific lateral concentrations.

9.0 Exploration

GR has not conducted any exploration on any of the properties. All exploration activities by previous owners have been summarised in *Section 6.0*.

10.0 Drilling

GR has not conducted any drilling at Goondicum. The drilling reported in this section has been carried out by Monto Minerals and Belridge.

Drilling data for the Goondicum Ilmenite deposit comprises two sets covering roughly the same area:

1. 1996-2004: Monto Minerals: consists of RC drillholes, some hand auger holes and test pits on a 100 x 100metre grid. Drilling was for both the ML and the MLA.
2. 2009: Belridge: aircore holes drilled with a similar system as 1996 and drilled on a 125 x 125metre grid. Drilling was for the ML only.

The resource estimates reported in this document are based on data from the 2009 Belridge drilling campaign. Data from drilling prior to 2009 was not used in the resource estimation due to perceived incompatibilities with the ilmenite grades caused by perceived fundamental differences in the sampling method. This could be further investigated at a later time to determine where the differences occurred and try to resolve the issues with a view to ultimately integrating the data sets.

10.1 Pre-2009 Drilling

Detailed investigations by Monto Minerals commenced in 1996 and concentrated on evaluating the eluvial and weathered zones of the gabbro in the outer annulus of the circular structure where the topography is of lower relief and hence more suited to open-cut mining. Within this outer annulus, the company drilled 382 holes in 1996 on a 100 x 100metre grid to define Measured Resources. In addition, 103 holes on a 300 x 100metre or 400 x 100metre grid were drilled to define the 1996 Indicated Resources. Lee (1996) reported the detail of these 1996 investigations.

In 1999-2000 drilling comprising a further 384 RC holes was completed in other parts of the crater, generally on the MLA, on areas not previously drilled or previously only drilled with wide hole spacings. Locally a 100 x 100metre grid was used switching to a 100 x 400metre grid in more peripheral or less prospective areas that are removed from the main ilmenite resource.

Details of the drilling campaigns are included in *Table 10.1*.

Table 10.1: Monto Minerals drillhole information

Area	Year	Hole type	No of Holes	Metres
MLA	1996	RC	65	450.90
		HA	38	99.61
		sub total	103	550.51
	1999	RC	195	1,131.00
	2000	RC	72	470.50
		Total	370	2,152.01
	Assays	RC	2,403	
		HA	120	
		Total	**2,523**	

Continued next page

Area	Year	Hole type	No of Holes	Metres
ML	1996	RC	345	2,571.55
		HA	23	95.10
		sub total	368	2,666.65
		Grand Total	**738**	**4,818.66**
	Assays	RC	2,628	
		HA	102	
		Total	**2,730**	

The holes were located by ground survey and tied into Australian Map Grid co-ordinates. All survey data was collected in the AMG66 coordinate system. This data and all other data were converted to MGA94 Zone 56 grid projection by H&SC using the conversion factors supplied by GR (*Table 10.2*).

Table 10.2: Coordinate conversion details

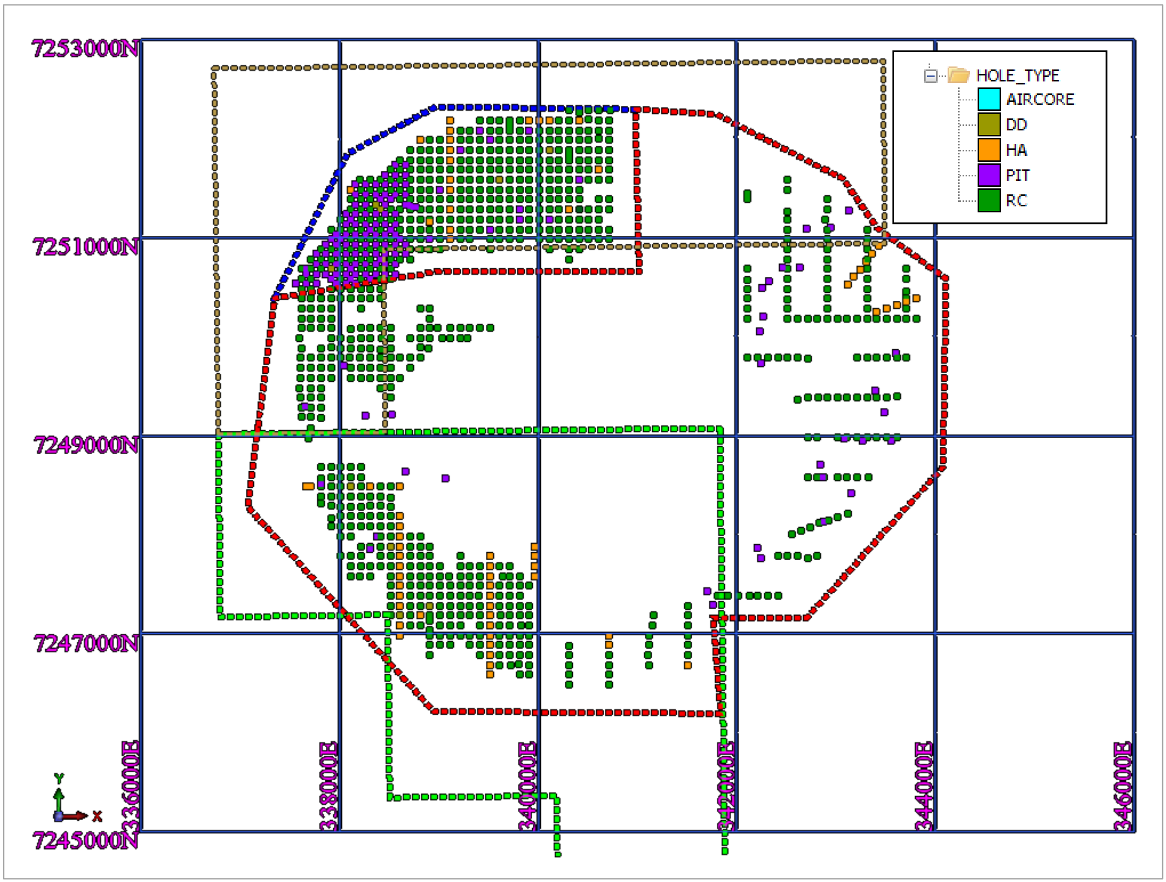
AMG66		MGA94			
East	**North**	**East**	**North**	**DeltaEast**	**DeltaNorth**
337242	7250207	337348	7250392	-106.02	-185.033
340876	7252118	340982	7252303	-105.81	-184.977
			Average	**-105.915**	**-185.005**

(Delta signifies the linear coordinate change from AMG66 to MGD94)

A 3D topographic surface was derived from aerial photography and digitised by Geo-Spectrum (Australia) Pty Ltd (Geo-Spectrum) for Monto Minerals in the late 1990s. The derived data has a quoted accuracy of ±0.2metre.

Figure 10.1 shows the location of the drill holes for the Monto programmes. The blue dashed outline is the ML boundary and the red dashed outline is the MLA boundary. The EPMs are shown as brown and green dashed lines.

Figure 10.1: Drillhole location map for Monto Minerals



No downhole surveys were completed as all holes were vertical and generally <15metre in depth.

Depth and other relevant data were recorded as hardcopy for each drilled hole. All samples were lithologically logged on site as clay, sand, or part of the decomposed gabbro – gabbro series. Panned semi-quantitative estimates of black heavy opaque mineral grade were made for most samples using the classifications high, moderate, low, and trace. However, since panned estimates were made using a small portion of the sample from the end of each 1metredrilled interval, they do not always reflect the grade for the whole interval, and the presence of dark heavy silicate minerals also serves to make visual grade estimation difficult.

10.1.1 Hand auger drilling

Hand auger drilling ('HA') was undertaken primarily for reconnaissance purposes during the 1996 investigations and prior to the larger RC drilling programmes. In 1996 HA holes were drilled at a few locations where access for the RC rig was impossible due to vegetation or creek channels. Some HA results have been utilised in the preparation of resource estimates for the South and South-Western Crater area and the Southern Crater area, for sites where no other RC drill sample test results were available.

Twelve HA holes (totalling 35.8m) had RC holes drilled nearby and were used for a comparison of results obtained by the two drilling methods. These holes were in the Southern and South-Western Crater areas. More information is supplied in the QAQC section of this report.

All HA drilling utilised 75mm diameter auger shells on aluminium extension rods, manufactured by Dormer Engineering of Murwillumbah, NSW. The samples recovered were mostly bagged at lithological breaks or intervals of 1.0m, although some samples representing intervals of up to 2.0m were taken.

10.1.2 Reverse circulation drilling

Reverse circulation mechanical drilling ('RC') was undertaken to block out further resources in the South-Western, Southern, and Central Western areas of the crater (on a 100m x 100m grid) and the Southern areas (on a 100m x 400m grid). The 1999-2000 RC drilling was carried out in areas of the crater where reconnaissance hand auger drilling during 1996, widely spaced RC drilling during 1996, and pitting during 1998 had previously been completed. All RC holes have an 82mm diameter.

Equipment used in 1996 was a Mantis 300 hydraulic top-drive rig, with a Sullair 300cfm x 150psi compressor, while the 1999 drilling used a Mantis 75 with a 130cfm 110psi compressor. Both rigs were mobilised from the Cairns base of Wallis Drilling.

Throughout both the 1996 and the 1999-2000 programmes, samples were generally bagged at 1metre intervals.

RC drilling requires close control on the recovered sample volume to ensure that consistent sampling is maintained per unit interval drilled. Constant sample volume is dependent upon a number of factors, but most importantly drill penetration rate. Drill bit design is another factor, which can change the volume recovered. During the drilling programme variation in the sample volume due to changes in penetration rate were minimal. Changes in volume were noted under some ground conditions, for example, the more winnowed CS_L unit. For most of the 1999 drilling the same bit type was used. In the 2000 drilling the bit was slightly different to that used in 1999, but this type was maintained for the whole programme. Thus sample mass changes within each programme due to different bit designs were largely avoided.

An analysis of mass, for the 1999 drill samples as delivered to Readings laboratory after drying, was carried out to check on volume recovery. For the analysis 194 RC drill holes were used from the 1999 drilling.

All samples at the end of the hole, which did not represent a complete 1.0metre interval, were eliminated from the study. Only those samples subjected to laboratory testing had mass information recorded, therefore samples that were not tested are excluded. Thus 861 samples were used for the analysis, comprising:

- 192 samples from drill hole depth 0-1.0metre ('Top Interval');
- 669 samples from below 1.0metre down the hole ('Rest of Hole').

Table 10.3 presents a breakdown showing the number of samples in each mass class for both the 'Top Interval', and the 'Rest of Hole'. The 'Top Intervals' are considered separately because RC drilling does not give full sample recovery at the commencement of the hole. This is readily apparent from where the mode, or most frequent occurrence, is in the 4–5kg class for the 'Top Interval' whilst the mode for the 'Rest of Hole' intervals falls into the 6–7kg class.

Table 10.3: Analysis of drillhole Sample Mass

Mass class (kg)	Top interval 0 - 1.0m		Second interval 1.0 – 2.0m		Rest of hole 1.0m - end	
	Number	Percentage	Number	Percentage	Number	Percentage
0 to 1	1	0.5	0	0	0	0
1 to 2	2	1.0	1	0.5	2	0.3
2 to 3	9	4.7	3	1.6	8	1.2
3 to 4	53	27.6	9	4.7	20	3.0
4 to 5	89	46.4	31	16.1	47	7.0
5 to 6	32	16.7	50	26.0	103	15.3
6 to 7	4	2.1	54	28.1	155	23.2
7 to 8	1	0.5	24	12.5	125	18.7
8 to 9	1	0.5	17	8.9	99	14.8

Continued next page

Mass class (kg)	Top interval 0 - 1.0m		Second interval 1.0 – 2.0m		Rest of hole 1.0m - end	
	Number	Percentage	Number	Percentage	Number	Percentage
9 to 10	0	0	3	1.6	78	11.7
10 to 11	0	0	0	0	25	3.7
11 to 12	0	0	0	0	7	1.0
Total	**192**	**100**	**192**	**100**	**669**	**99.9**
Mean (kg)	4.33		6.03		7.08	
Std Dev. (kg)	0.93		1.44		1.81	

The theoretical mass recovered for an 82mm diameter drill hole in the CS is 6.8kg and in the DG is 9.5kg. Applying ±20% gives a range of:

- CS = 5.4 to 8.2kg range, and
- DG = 7.6 to 11.4kg range.

Considering the 'Rest of Hole' samples; 111 (16.6%) are less than 5.4kg and 2 (0.3%) are greater than 11.4kg. Thus 83% fall within the range defined above.

The 'Top Interval' (0-1.0m) mostly comprises the lower density CS and this gives a lower mass than for samples deeper in the hole. More importantly low 'Top Interval' mass values reflect poor recoveries in the first 0.5metre of each RC drill hole, a feature of this drilling technique. One hundred and seventy-six (91.7%) of 'top interval' samples have mass less than 5.4kg which is the lower end of the defined range, and only one sample exceeds 8.2kg which is the top of the defined range for clay/sand, i.e. 8.3% of the top intervals fall within the defined range.

Data is presented separately for the 'Second Interval' 1.0–2.0metre. This data shows the same general trends as for the 'Rest of Hole' intervals below 1.0m. The 'Second Interval' mode falls into the 6.0–7.0kg class and in this respect it is similar to the 'Rest of Hole' samples. The lower mean and standard deviation for the Second Interval is probably due to most samples being clay/sand, and this probably explains the slight skewing towards lower sample mass. The influence due to the small quantity of the higher density decomposed gabbro contained in samples is not sufficient to increase the mean or cause a spread in the mass values which is reflected in the smaller standard deviation.

Comparing the 1999 drill sample mass to the 1996 drill sample mass, shows that the 1999 samples overall are smaller. For the 'Rest of Hole' intervals the mean mass has fallen from 8.244kg (1996) to 6.995kg (1999), a drop of 1.25kg, while for the 'top interval' the mean has fallen from 5.413kg (1996) to 4.333kg (1999) a drop of 1.08kg. There are a number of possible explanations:

- Though the same reverse circulation drilling system was used, the 1996 programme employed a larger Wallis Mantis 300 rig with a Sullair 300cfm x 150psi compressor; while the 1999 programme employed a smaller Wallis Mantis 75 with a 130cfm x 110psi compressor.
- Different drill bit designs are recognised as causing sample size variation. In 1996 most of the drilling used bits with four tungsten carbide cutters, while in 1999 all holes were drilled using bits with three cutters.

The 1999 drilling intersected 45% of the higher density DG, which is less than the 60%, intersected during 1996. However, the content of DG is only part of the possible explanation since the top 1.0metre, which is almost totally comprised of CS and the mass for these samples, is also lower for the 1999 drilling.

In summary a statistical analysis of the mass of the 1999 RC drill hole samples showed:

- Below a depth of 1.0metre, 83% of the samples fell within ±20% of the calculated theoretical mass.

- For the 0 – 1.0metre samples, 8.3% of the samples fell within ±20% of the calculated theoretical mass.

Poor sample recovery at the commencement of a RC drill hole is a feature of this type of drilling.

It should be noted that the majority of the 1996 drilling was on the ML and the majority of the 1999-2000 drilling was on the MLA. Hence there is consistency in the sample recovery intra-programme.

10.1.3 Pit sampling

In addition to the drilling backhoe pitting comprising a total of 157 pits was undertaken on the MLA and ML to both obtain metallurgical samples and to increase the geological knowledge of the resource. These programs were: 1998 = 32 pits, 1999 = 16 pits, 2003 = 10 pits, 2004 = 99 pits.

All pits were excavated using a back hoe. In each case a slot was cut slightly wider than the digging bucket. Topsoil to 20cm was placed to one side and excluded from the sample. The pit was dug to the bottom of the CS, where upon a sample was removed. Sampling comprised digging from bottom to top by slicing from the end of the pit and partially filling the bucket. From the bucket the sample was placed into either large sample bags, 200L drums, or for a limited number of pilot plant trial samples into a truck body. The sample size was altered according to the testwork required and for the larger sample it required multiple slices to obtain the quantity. After collection of the CS, the pit was deepened into the underlying DG to either refusal or the extent of reach. A sample of DG was then collected in a similar manner to that used for the CS.

10.1.4 Density

A programme of diamond core drilling was completed at 10 sites within the ML and the South-Western Crater (MLA) during January 2000. Two sites within the ML had been cored during 1996 as the first stage of investigations to determine in situ bulk density of the mineralisation. Prior to core drilling, all sites had been drilled by RC with samples tested in either the Monto-based DFS or the Readings laboratories.

Drill sites for which bulk density determinations were made are shown in *Table 10.4*.

Table 10.4: Details of drillholes completed for density measurements

Year	Hole	Area
1996	40300E, 51000N	Northern
1996	40400E, 51100N	Northern
2000	38300E, 51100N	Northern
2000	39000E, 50900N	Northern
2000	39000E, 51800N	Northern
2000	39500E, 51400N	Northern

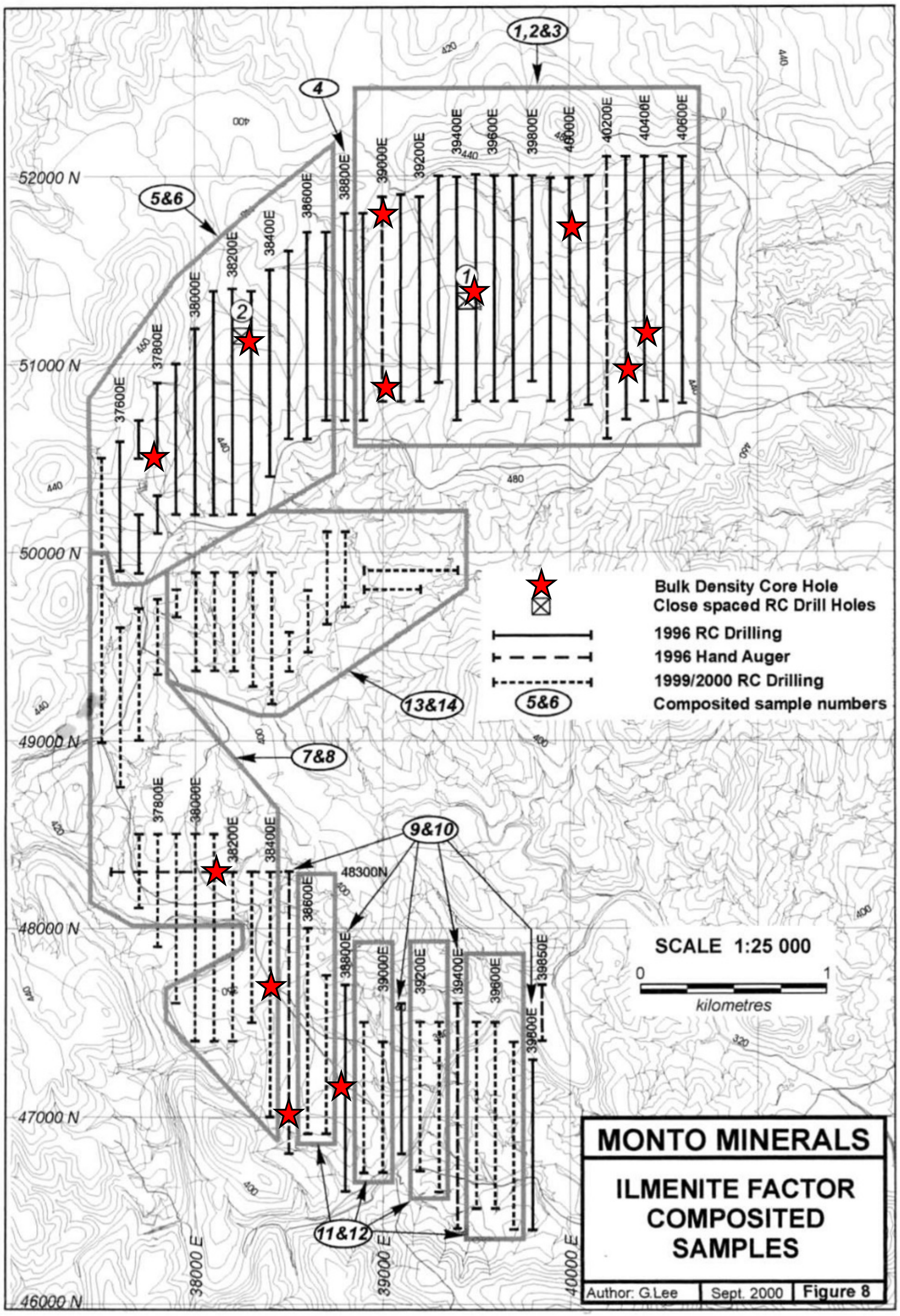
Year	Hole	Area
2000	40000E, 51700N	ML
2000	37800E, 50500N	ML
2000	38800E, 47100N	South
2000	38000E, 48300N	South
2000	38500E, 47000N	South
2000	38400E, 47700N	South

The location of each site is shown as a red star in *Figure 10.2*.

Schneider Drilling Pty Ltd, from Brisbane carried out the January 2000 core drilling. All holes were drilled using a HQ3 (triple tube) core barrel, with a bit internal diameter measurement of 63.4mm.

Upon retrieval of core from each run, samples of the undisturbed core were selected for density measurement. They were measured for length to the nearest millimetre with a steel tape, and diameter to the nearest 0.1mm using callipers. Ends of the core were cut perpendicular to the core axis with a knife, and the sample was transferred to a strong polythene sample bag, labelled, securely wrapped and sealed for transport.

Figure 10.2: Drillholes completed for density purposes



(supplied by P.Stitt & Associates/GR)

During field inspection and logging of cores it was noted that some intervals had swollen between the time of drilling and measurement of the core diameter. This was particularly pronounced in the dark grey/black clay samples from hole 39000E, 518000N.

After packaging, the samples were despatched to Readings Laboratory for drying at 120ºC to constant mass and then weighed.

The 10 holes drilled in January 2000 yielded 73 samples, representing a total 59.2metres of core length. Including the samples obtained from the 1996 drilling, 79 samples were used for density determination, representing 62.94metres of core.

The density of each sample was calculated from the volume measurements and dry sample mass. For the swollen core samples, calculations were also made after reducing the measured core diameter to 63.4mm, which represents the internal diameter of the diamond bit gauging stones. The justification is that core swelling occurred after drilling and while the core was retained in the inner tube, before recovery from the hole and measurement. Where the core diameter is the same or less than that of the bit, no adjustments were made to the measured diameter. There is a small increase in bulk density for the swollen core when the diameter is reduced to that of the drill bit. Since this probably more accurately represents the drilled diameter of the core, and therefore the in situ volume, these adjusted values have been selected as representing the true bulk density.

The information shown in *Table 10.5* summarises all of the density data available from both the 1996 and 2000 core drilling. The spread in results shown by the maximum and minimum values for each material category reflects the difficulty in placing boundaries within a sequence often changing gradually with depth. Notwithstanding this difficulty, there is otherwise good agreement within each material category, which is shown by the close agreement between the values for arithmetic mean, median, and weighted mean and also between the raw and adjusted core diameter results.

Table 10.5: Summary of dry in-situ Bulk Density by material type

	Dark Grey & Black Clay		Brown Clay Only		Decomposed Gabbro Only		Weathered Gabbro Only		All Clay/Sand		Decomposed & Weathered Gabbro	
	Raw	Adjust	Raw	Adjust	Raw	Adjust	Raw	Adjust	Raw	Adjust	Raw	Adjust
Total Length (m)	5.30	5.30	16.5	16.5	28.01	28.01	9.39	9.39	21.8	21.8	37.4	37.4
No. Samples	9	9	23	23	37	37	10	10	32	32	47	47
Arithmetic Mean (t/m^3)	1.35	1.40	1.67	1.68	2.12	2.13	2.57	2.57	1.58	1.60	2.22	2.22
Median (t/m^3)	1.39	1.39	1.67	1.67	2.15	2.16	2.52	2.52	1.62	1.62	2.26	2.27
Standard Deviation (t/m^3)	0.16	0.14	0.21	0.20	0.26	0.26	0.15	0.14	0.24	0.22	0.30	0.30
Maximum Value (t/m^3)	1.62	1.62	2.10	2.10	2.59	2.59	2.83	2.83	2.10	2.10	2.83	2.83
Minimum Value (t/m^3)	1.05	1.21	1.09	1.16	1.54	1.54	2.39	2.41	1.05	1.16	1.54	1.54
Mean Weighted for Length (t/m^3)	1.33	1.37	1.68	1.69	2.12	2.13	2.54	2.55	1.60	1.61	2.23	2.24
Preferred Value for Resource Estimates (t/m^3)		1.35		1.70		2.10		2.55		1.60		2.20

From *Table 10.5*, for resource estimation, a CS value of 1.60 tonne/m^3 has been adopted and for the DG a value of 2.10 tonne/m^3 has been adopted (*Table 10.6*). Although resource estimates contain some material that should probably best be categorised as weathered gabbro this is a relatively small component of the total resource.

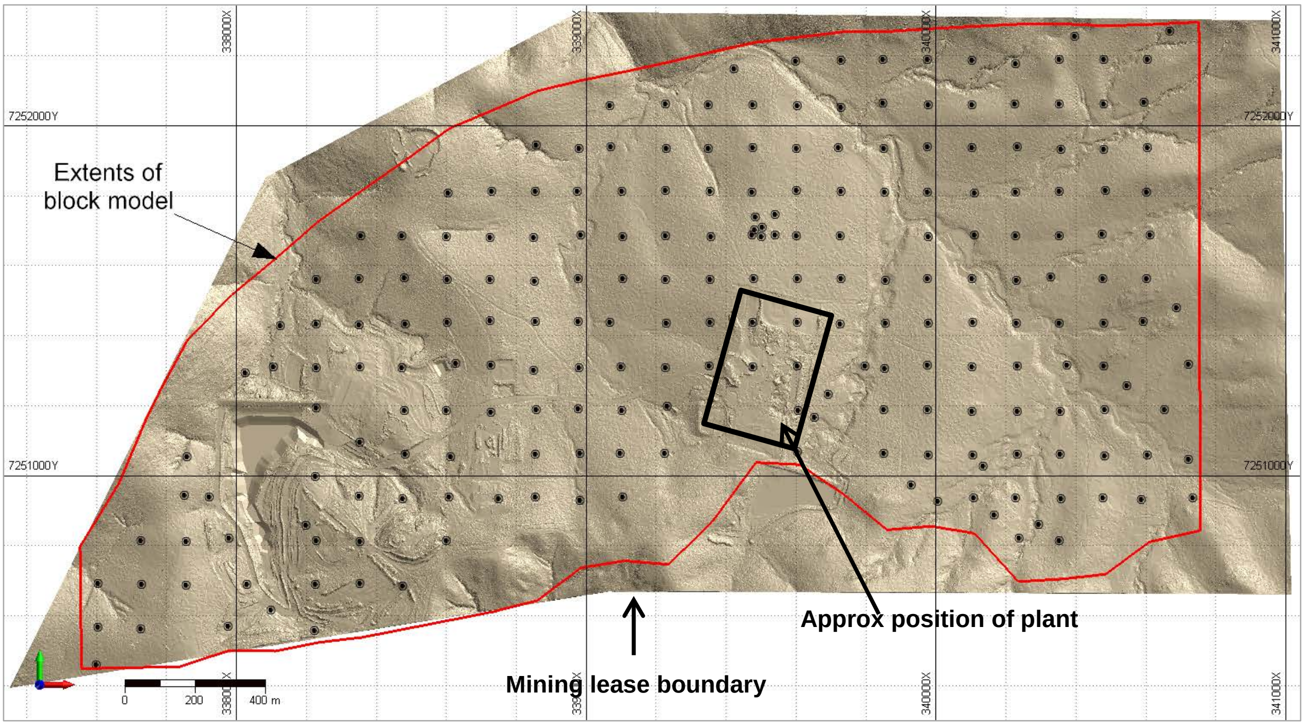
Table 10.6: Average Density values for lithologies

Lithology	Average Density t/m^3
CS Unit	1.6
DG Unit	2.1

10.2 2009 Drilling

In 2009 Belridge undertook a new drilling programme as it was felt that the earlier drilling had not properly tested the deposit. A total of 218 aircore (reverse circulation without hammer) holes, were drilled using a rig mounted on a 4WD vehicle, and drilled on a nominal 125 x 125metre grid. In addition, six closer spaced drill holes were drilled within a radius of 45metres to test short range variability. Overall the 224 drill holes drilled in 2009 comprise 2,394metres as per the drillhole database. The locations of the drill holes are shown on a topographic backdrop, cut to the outline of ML80044 (*Figure 10.3*).

Figure 10.3: ML Drillhole location map



Wallis Drilling Pty Ltd from Western Australia was selected as the drilling contractor. The drilling equipment included a Mantis 80 hydraulic top-drive drill rig, mounted on a 6 x 6 Landcruiser with on-board 200 cfm×150 psi compressor. All drilling was by 3¼' bit aircore (reverse circulation without hammer). In total 2,603metres were drilled at an average rate of 216.9 metres/day (Hoogvliet & Whitehouse, 2011).

Planned drill holes were located using a handheld GPS and staked out. The aircore drill rig was unable to penetrate unweathered gabbro. Each drill hole was drilled to refusal.

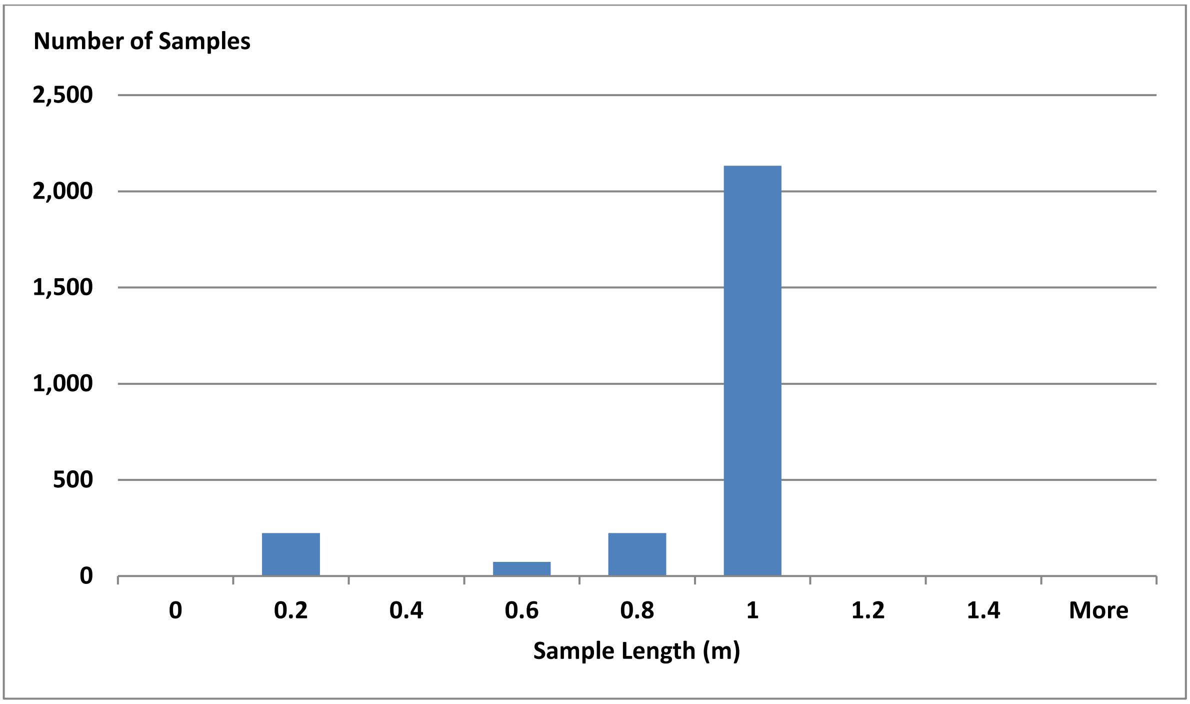
Topographic data comprises three datasets:

1. An original topography based on 1metre contour data
2. A LiDAR 2012 airborne survey pre-Belridge mining
3. A LiDAR 2013 airborne survey post-Belridge mining

The LiDAR accuracy is reported to be +/-25cm.

The project's EA requirements state that the top 20cm of soil is to be stockpiled for future rehabilitation. The top 20cm was therefore sampled separately during drilling. A typical hole therefore has 0.0–0.2metre as its first sample interval, and 0.2–1.0metre as its second sample interval. All subsequent intervals are 1metre, with the exception of the last interval, which may be less than 1metre. *Figure 10.4* shows a histogram plot of the sample lengths; the number of 0.2 and 0.8metre sample lengths are the same.

Figure 10.4: Histogram of ML sample lengths



"All sample material for each drilled interval was caught in a cyclone, and dumped in plastic bags at the end of each interval. All sample material was retained. The sample was weighed wet, sealed immediately and placed on a pallet at the back of a pick-up Ute [2 or 4 seat vehicle with uncovered trayback]. Typical sample weights were around 2kg for the first sample, to about 12kg for the bottom sample. From each bag a teaspoon of material was collected and stored in a chip tray. Other data collected included a second handheld GPS reading of the actual hole location, plan ID, actual ID, from, to, sample number, any inserted standards, duplicates (created after drilling) and brief comments on material type and other relevant details. The drilling proceeded too quickly to permit detailed logging while the holes were in progress." (Hoogvliet & Whitehouse, 2011).

When the drilling program was completed all intervals were re-logged by examination of the material in the chip trays. The final lithology was recorded as well as the colour with the aid of a Munsell colour chart. The material was logged as soil (SL- top 20cm), colluvium (CL), clay-sand (CS), weathered/decomposed gabbro (DG) and rare gabbro (GA).

"Subsequent to drilling all holes were surveyed in using a distomat theodolite. A comparison between final surveyed elevation of each hole and the DTM derived from aerial photography and digitised by Geo-Spectrum (Australia) Pty Ltd (Geo-Spectrum) revealed maximum differences of between +0.47 m to -0.57 m, with more than 70 per cent within 0.25 m from the Geo-Spectrum derived DTM. The Geo-Spectrum derived data has a quoted accuracy of ±0.2 m. All survey data was collected in the AMG66 [Zone 56] coordinate system." (Hoogvliet & Whitehouse, 2011).

10.2.1 Drill hole recoveries from 2009 drilling

Each sample was weighed in its sample bag as it came off the rig. The hole diameter was used to provide a volume which was then used for the calculation of the sample density. H&SC considers this an inappropriate method for determining density for this type of drilling.

However, as no actual recoveries were supplied in the drilling data, H&SC has used the sample weight divided by the reported density to give a volume. Interestingly this volume was not the same number for all 1metrelengths assuming the same sized hole. Multiplying the volume by default densities from the 1996 and 2000 drilling for the different rock types (see density section below) allowed for the calculation of an expected weight for the sample. The recovered sample weight was divided by the expected weight to give an approximate recovery for the sample. The average recovery results for the individual lithologies should be considered as semi-quantitative.

A review of the recoveries indicated many samples with a recovery >100%. This is not unexpected with the aircore drilling method, for example, the last sample is often subject to an extended phase of air pressure to clear out the hole which would give larger than expected samples. However, the recoveries for the CS_L averaged much greater than >100% and were significantly higher than for other lithologies. H&SC suspects this is due to the type of drill bit used and a more gravelly/loose sand nature to the unit. This meant more material fell into the face of the bit and so the amount of material brought to surface was greater than for other lithologies.

Table 10.7 shows the drilling recoveries for the individual units with any end of hole samples in the relevant lithology removed.

Table 10.7: ML Drillhole recoveries

Lithology	No of Samples	Recovery (%)	EOH Samples
SL	224	82.7	n/a
CL	295	63.2	69.4 (10)
CS_H	372	64.8	83.3 (4)
CS_L	325	112.8	121.7 (46)
DG	1,142	84.7	89.8 (124)
GA	9	99.3	95.1 (34)
Totals	**2,209**	**84.3**	

The average recovery for the end of hole samples for each lithology is also included (numbers in brackets = number of samples removed). The mean of the end of hole samples for each lithology tended to be slightly higher than the mean for the rest of samples by between 5 and 10%.

The SL sample represents the top 0.2metre of the drillholes and taking into account the nature of the drilling method and its associated sample return variation issues for this interval any measure of recovery may be considered suspect. There is in H&SC's view a possibility that the sampling has underestimated the ilmenite grade. Further statistical analysis of the data may allow for resolution of the issue and its likely impact on the resource estimate but H&SC believe at this stage that the impact is low.

The impact of collecting more material than expected for the CS_L unit and the interpreted nature of the material could have a significant effect on the recovered magnetic fraction and subsequently the 'available' ilmenite grade. The high recovery can often lead to down-grading of the contained heavy mineral compared to the real grade. This issue highlights a possible lack of confidence in the accuracy of the ilmenite grades for this unit, which could be higher than reported.

Figure 10.5, Figure 10.6 and Figure 10.7 show the drillhole sample recovery against the available ilmenite grade for the different lithologies. The recoveries for the SL unit (*Figure 10.5*) show no obvious bias between recovery and available ilmenite grade. It also shows that the top 20cm of soil is significantly higher grade than the other host lithologies. This is likely due to the winnowing out of lighter material due to surface water flows. The CL, CS_H and CS_L units appear to show no bias between ilmenite grade and recovery whereas the drilling recoveries for the DG and GA units do appear to be biased with higher grades associated with lower recoveries. This aspect should be investigated further but may be due to possible mis-logging, for example, the samples are CS_L.

Figure 10.5: ML ilmenite vs Recovery in the SL Unit

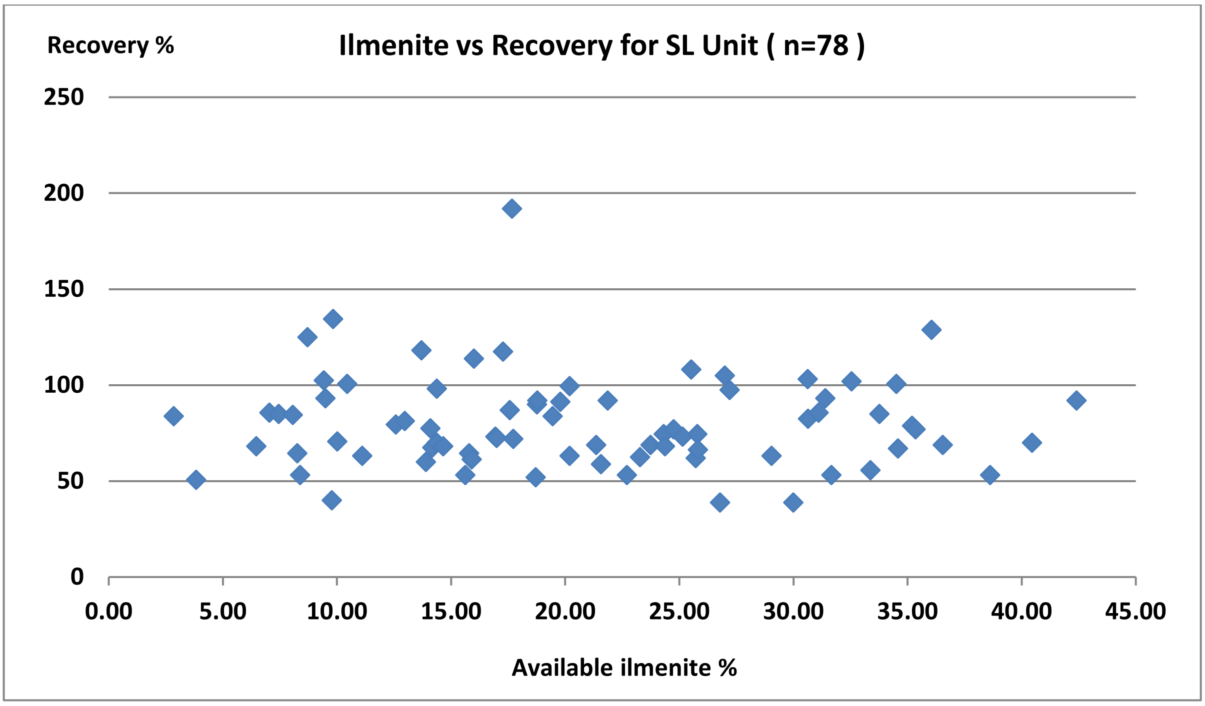


Figure 10.6: ML ilmenite vs Recovery in the CL & CS Units

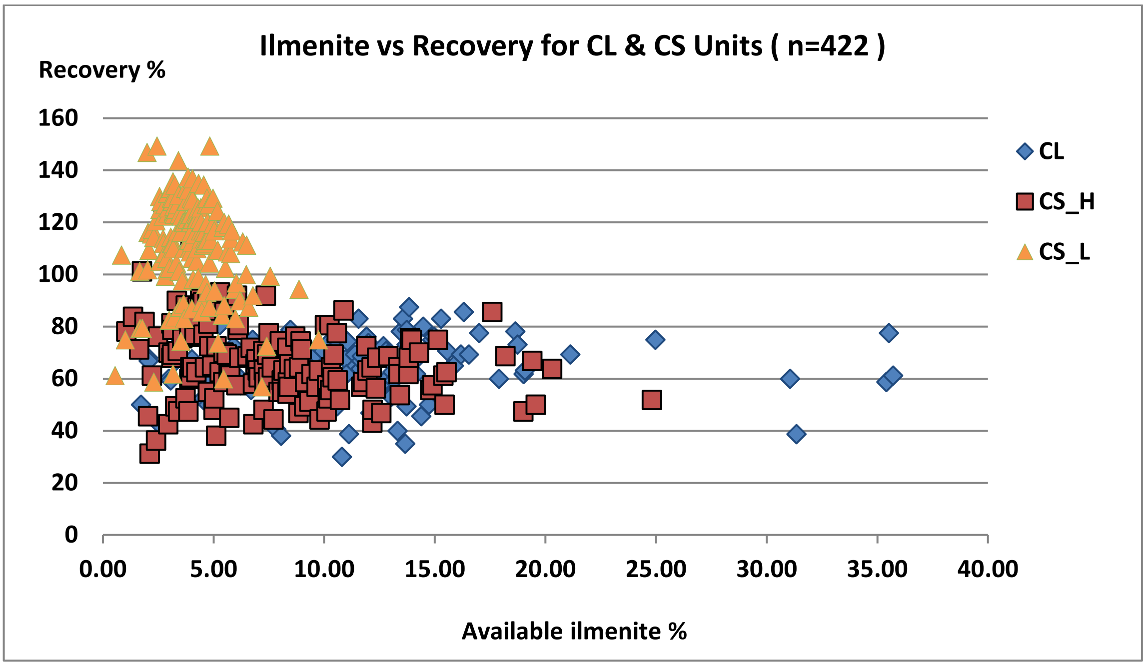
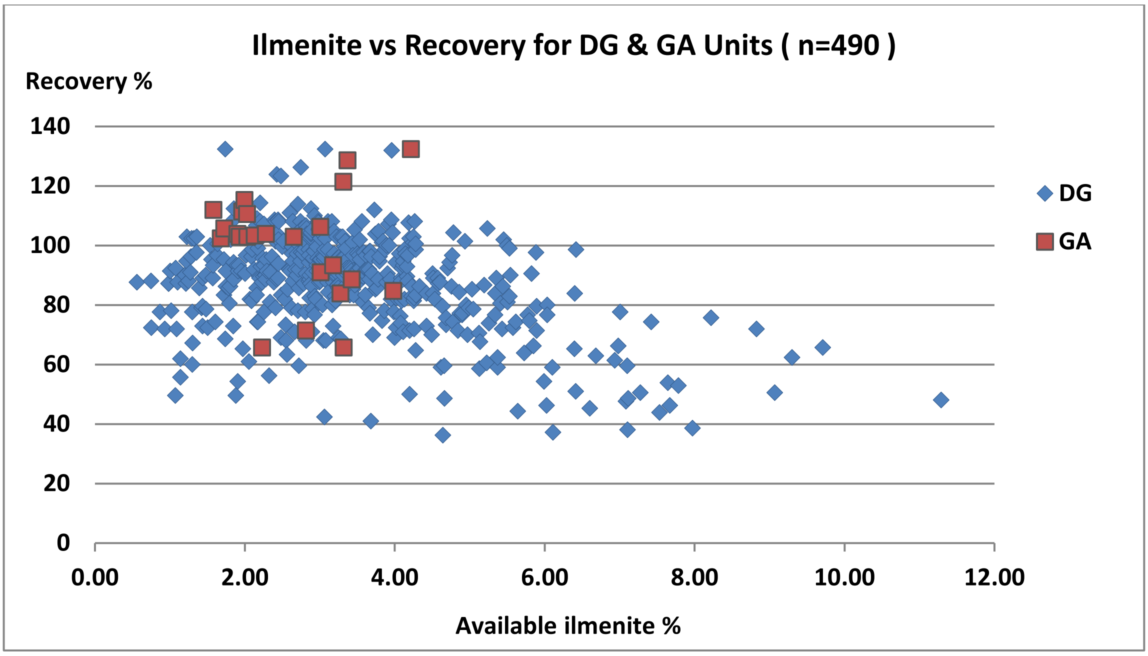


Figure 10.7: ML ilmenite vs Recovery in the DG & GA Units



Drilling has generally been perpendicular to the mineralisation and is considered appropriate with no bias.

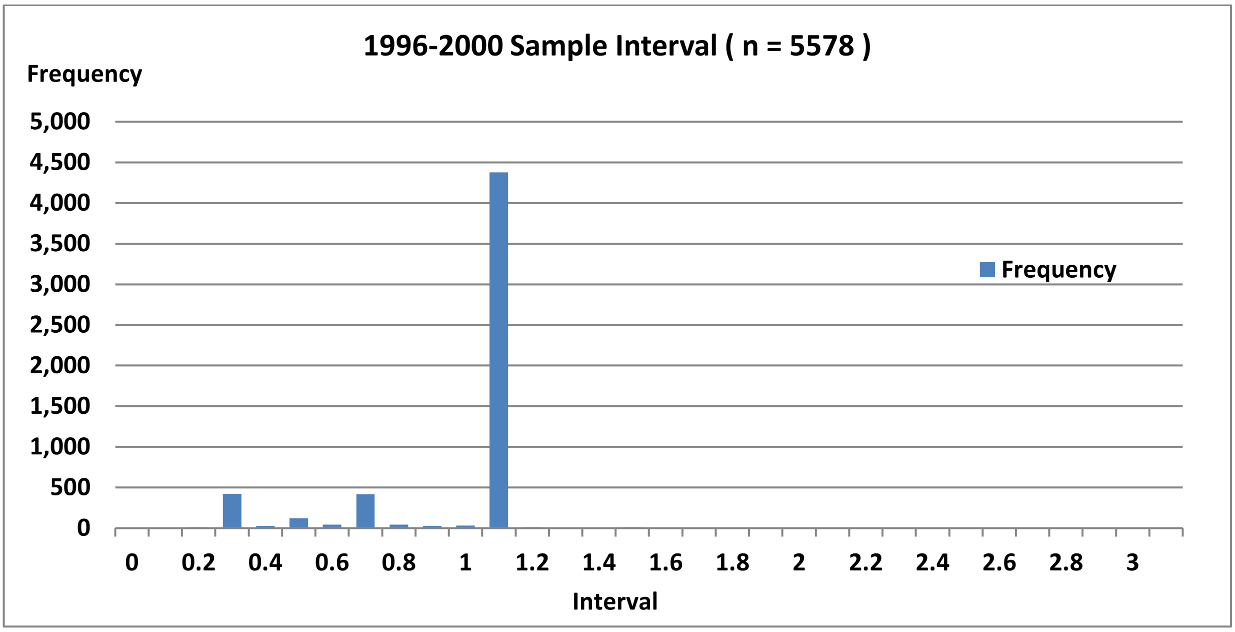
11.0 Sample preparation, analyses and security

11.1 Pre-2009 Drilling

Samples generated from the 1996 RC drilling were forwarded to the DFS laboratory, which was established at Monto specifically for the testing of samples derived from the investigations being conducted by Monto Minerals. The samples from the 1999-2000 RC drilling were treated in the Lismore laboratory of H.T. Reading Pty Ltd.

The predominant sample length was 1metre. The first metre was sampled as one interval but in the database was represented as two samples. The first one was 0 to 0.3metre and the second was 0.3 to 0.7metre. Both samples were given the same assay values. This practice was done in order to recognise that the top 30cm of soil would to be stockpiled by any mining operation for future rehabilitation. The 0.3metre sample was not sampled separately as it is often very difficult to get a quality sample due to poor top-of-the-hole recovery, typical with the drilling method. All subsequent intervals are 1m, with the exception of the last interval, which may be less or slightly more than 1metre. End of sampling was based on visual recognition of the DG and the lack of ilmenite observed in qualitative panned samples, and does not necessarily coincide with the base of drilling. *Figure 10.4* shows a histogram plot of the sample lengths; the numbers of 0.3metre and 0.7metre sample lengths are the same.

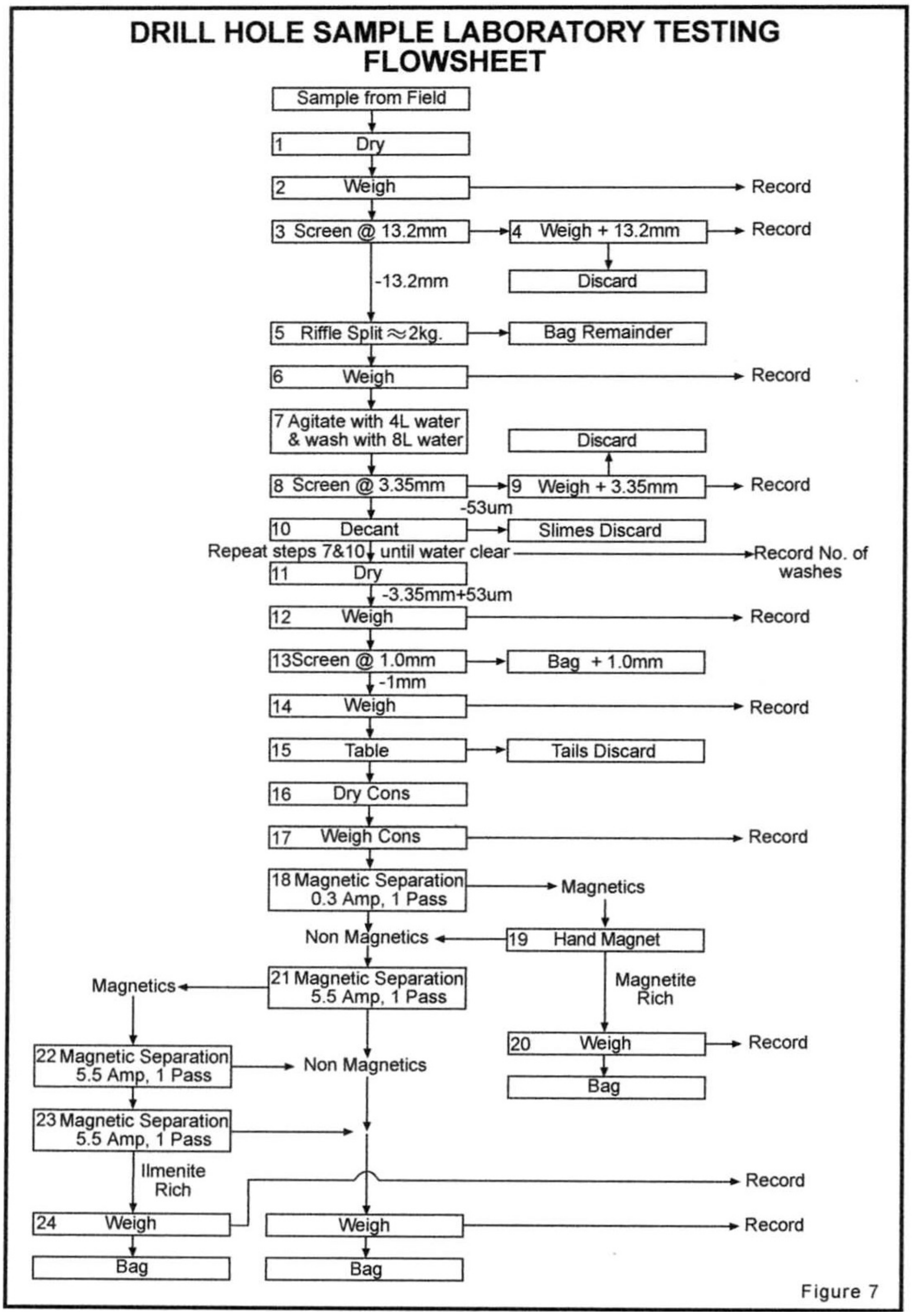
Figure 11.1: Histogram of Sample Lengths for MLA and ML



The procedure developed for the treatment of samples from the 1996 testing programme was used for the 1999/2000 investigations so that the two data sets could be compared.

The testing procedure was designed to produce ilmenite concentrates, which were as clean as could possibly be obtained from a standardised test procedure. It was not feasible to vary the procedure to accommodate the differences between individual samples, as relativity would be lost. The main difficulty experienced was that the percentage of composite particles and silicate minerals (mainly pyroxenes) reporting to the concentrate increased, as the decomposed gabbro became less weathered. *Figure 11.2* is the flowsheet for the 1996-2000 test procedure.

Figure 11.2: 1996-2000 sampling flowsheet



(supplied by P.Stitt & Associates/GR)

Ilmenite losses occurred at the following points through the testing:

1. Washing to remove fines: losses of mostly fine-grained ilmenite and particularly -53micron ilmenite. These losses have no bearing on the project economics, as fine ilmenite was deemed not saleable at the time of the work completion.
2. Tabling: a small quantity of mostly fine grained ilmenite and ilmenite associated with composites would have been lost in tabling. (See *Section 11.1* of this report for determination of ilmenite contained in Readings table tailings.)

3. Magnetic separation: losses would have occurred at this point in the testing, due to:
   - Ilmenite reporting with, or entrained in, the 0.3A magnetic fraction.
   - Ilmenite reporting to the non-magnetic fraction at 5.5AM input current; mostly grains being misdirected during the two stages of cleaning the ilmenite concentrate.
   - Ilmenite contained in the material swept from the magnetic separator during clean-up on completion of each sample, this material was included into the non-magnetic fraction.

While every effort was made to maintain a consistent test procedure between the 1996 and 1999-2000 programmes, some changes were inevitable. The changes most likely to have had an influence on the results are:

- None of the 1999-2000 laboratory operators were present in the DFS laboratory in 1996.
- The shaking tables used by the two laboratories were different. In 1996 the table was hired from MD mineral technologies (now EDI Downer) and had a greater number of higher profile riffles, extending to the lower right hand corner of the deck. By comparison the 1999-2000 Readings table had a lesser number of riffles each with a lower profile, which did not extend the full length of the deck. In effect the final separation on the Readings table took place on the smooth surface at the discharge end of the deck. The positioning of splitters therefore had to be different.
- By virtue of the different shaking table designs it was necessary to adopt somewhat different approaches to table operation. In both cases the feed for the first pass was dry and for subsequent passes it was wet. In the DFS laboratory in 1996, the first pass (dry) produced a relatively clean concentrate with middlings reporting to the tailing. The tailing was re-passed (wet), with the middling this time cut to the concentrate and the clean tailing rejected. The two concentrates were then combined, and re-passed (wet) to produce a final concentrate by rejecting as much of the remaining silicate as could easily be rejected without losing ilmenite and magnetite. At Readings, the first pass (dry) produced a clean concentrate, a middling, and a clean tailing. The middling was re-passed (wet) with a clean tailing being rejected and the concentrate being combined with the first concentrate.

11.1.1 Ilmenite content of readings laboratory table tailings

Readings laboratory, during the routine treatment of the 2000 drill hole samples from the close spaced arrays 1 and 2 (see QAQC section), collected two composite samples of shaking table tailings. Each of the tailing composite samples comprises 50 drill hole sample table tails, designated Batch Q1 1–50, and Batch Q2 51–100 and each weighs about 55kg. The samples were forwarded to MD mineral technologies for determination of the contained ilmenite.

The test procedure carried out by MD mineral technologies was:

- Split out a suitable working sample.
- Separate the heavy mineral fraction using bromoform at 2.85sg.
- Magnetically separate the heavy fraction to produce a 0.3 to 5.5AM magnetic fraction.
- On the 0.3 to 5.5AM magnetic fraction, undertake a further density separation at 4.05sg.
- Analyse the +4.05 fraction for TiO_2.
- Record the yield at each separation stage.

The results are set out below in *Table 11.1*.

Table 11.1: Evaluation of readings shaking table tailings

	Tail Q1 1-50		Tail Q2 51-100	
	Value (%)	TiO_2 (%)	Value (%)	TiO_2 (%)
5.5AM magnetics in original sample	5.6		6.0	
Original raw sample total weight	99.12kg		101.87kg	
Tailings total weight	54.18kg		55.42kg	
No Clay/sand samples in tailings	11		17	
Percentages of Tailings Sample				
-2.85sg fraction	58.6		64.4	
+2.85sg fraction	41.4		35.6	
Highly susceptible magnetics 0-0.3A	7.2		6.1	
0.3 to 5.5Amp magnetics	21.3		17.7	
Non magnetics	12.8		11.8	
-4.05sg fraction	18.3		15.4	
+4.05sg fraction	3.1	45.0	2.3	43.3
Percentage of Original Raw Feed				
+4.05sg fraction	1.7		1.3	

From the Ilmenite Conversion Factor testwork (see *Section 11.2*) there are TiO_2 analyses available for the ML (which includes the drill holes comprising Q1 and Q2) of 44.5% for the CS and 35.6% for DG. If it is assumed that the two tailings +4.05sg fractions, with TiO_2 of 45.0% and 43.3% respectively, represent somewhat similar material to the 5.5AM recovered magnetic fraction in the routine testing, then both values can be added to obtain an estimate of the 5.5AM magnetics recovered from the routine testing.

Thus for:

Q1 5.6/(5.6+1.7) = 5.6/7.3 = 76.7% recovered in routine testing

Q2 6.0/(6.0+1.3) = 6.0/7.3 = 82.2% recovered in routine testing

In fact, the approach of adding the +4.05 sg fraction from the tailings to the 5.5AM magnetics from the routine testing probably gives a low estimate of the total available 5.5AM magnetics. This is due to the TiO_2 content of the +4.05 sg fraction being higher than for the 5.5AM magnetics, especially when considering the DG, which is the major component of both tailings composite samples. In fact, the +4.05 sg fraction derived from the tailings more closely resembles an ilmenite factor product than a 5.5AM magnetics product.

The above recovery values are a guide. They could be further refined by completing Ilmenite Conversion Factor tests at various density cuts on a composite of the 5.5AM magnetics from each of Q1 and Q2 and by comparing the size grading of the products derived from both the routine ilmenite factor testwork and the tailings testwork.

Based on the results of the two tailings samples examined, it would appear on a conservative estimate that Readings have 'lost' something in the order of between 18% and 23% of the total 5.5AM magnetics in their routine sample testing. However, this has been partially offset by their higher values for the ilmenite conversion factors. The reader should be reminded that the Readings work was for the 1999-2000 MLA drilling whilst a majority of the DFS laboratory work was for the 1996 ML drilling. It is reasonable to suggest that the 5.5AM results for the MLA drilling might be considered as conservative.

Unfortunately, it is not possible to run a similar test on the DFS laboratory sample tailings.

11.1.2 Ilmenite conversion factor determination

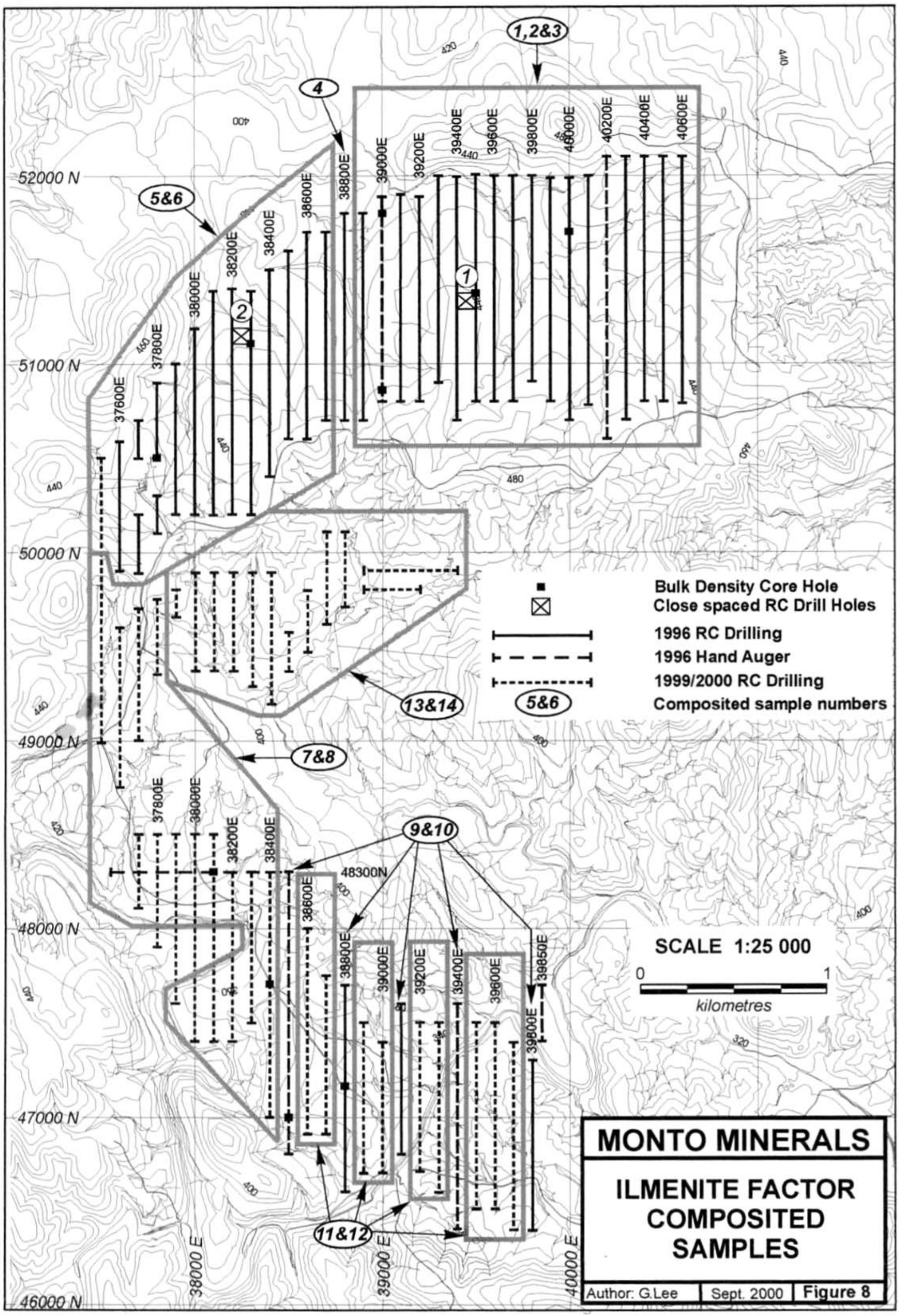
Results from drillhole samples tested by the routine procedure detailed in *Figure 11.2* are reported as 'percent 5.5AM magnetics'. The 5.5AM recovered magnetic fraction is an ilmenite-rich concentrate, having ilmenite content that varies laterally and especially with depth. Determination of ilmenite content in the 5.5AM magnetics is relatively expensive, and prohibitively expensive to undertake on each drill hole sample interval. In order to contain the cost of testing, the ilmenite content of the 5.5AM grade has been quantified for groups of related drill holes, with the two main mineralisation types (CS and DG) tested separately. From these test results an estimate can be made of the ilmenite content of mineralisation represented by the drill holes comprising each composite.

Before commencing the programme of testing composited samples representing the bulk of the mineralisation, a pilot group of samples were treated. This pilot group comprised seven composited samples from Line 38800E, 50700-51800N, with 5.5AM grade above a 3.0% cut-off. The location of this line of holes is shown on *Figure 11.3*, as sample number 4, and the seven composited samples represent:

- **SAMPLE A** 0 to 1.0metre drill hole interval,
- **SAMPLE B** 1.0metre to base of CS drill hole intervals,
- **SAMPLE 1** the top 1.0metre interval of DG,
- **SAMPLE 2** the second 1.0metre interval of DG,
- **SAMPLE 3** the third 1.0metre interval of DG,
- **SAMPLE 4** the fourth 1.0metre interval of DG,
- **SAMPLE 5** those samples of DG samples below the fourth sample but still above 3.0% cut-off.

The results from treating this pilot group of samples are detailed in a report by Lee and McLatchie (2000) and are integrated into *Section 11.1.2.4*, below, along with all other Ilmenite Conversion Factor results. Sample locations are shown in *Figure 11.3*.

Figure 11.3: Location for Composite samples for ilmenite Conversion Factor work



(supplied by P.Stitt & Associates/GR)

Following receipt and analysis of the pilot test results, 11 additional composited samples were prepared incorporating 5.5AM results from the more densely drilled areas. The location of all of these composited samples is shown on *Figure 11.3*. Again a 3.0% cut-off was applied and, based on the results from the pilot study, the CS was treated separately from the DG.

The procedure adopted for determining the ilmenite content of each composite sample is set out below in *Sections 11.2.1* to 11.2.3.

11.1.2.1 Composite sample preparation

Composited samples of drill hole 5.5AM recovered magnetic fractions were prepared in the Monto office of Monto Minerals, using a micro splitter to obtain a quarter split from the 5.5AM magnetics sample obtained from routine testing of individual drill hole samples. The procedure adopted was:

i. Individual samples representing each composite were located before starting splitting and compositing.

ii. Working with one sample at a time, each bag was opened and the contents poured into one tray of the micro splitter. Any grains adhering to the bag were carefully brushed into the tray along with the rest of the sample.

iii. With the material spread evenly along the length of the tray, the sample was tipped into the top of the splitter.

iv. One of the halves was re-passed, after ensuring the sample was spread evenly along the tray before tipping it through the splitter.

v. The ¾ split of the sample was then re-bagged into the original bag, sealed and again returned to the drum for storage.

vi. The ¼ of the split of the sample was combined with the other ¼ splits comprising the composite. Upon completing each composite, the bag was securely tied, and then placed inside another strong bag.

vii. The bags containing the composited 5.5AM magnetics samples were forwarded to MD mineral technologies for further testwork.

11.1.2.2 Laboratory testwork

Testwork was carried out by MD mineral technologies in their Gold Coast laboratory. The procedure adopted was:

i. Weigh the sample as received and thoroughly mix.

ii. Split a 200 – 300g working sample from the as received composite sample for the following testwork. Bag and retain unused composite sample material. Where samples are small work with the whole sample.

iii. Weigh the sub sample to be tested.

iv. The following testwork was designed to simulate the metallurgical characterisation of head feed as carried out in the evaluation of the bulk sample obtained by pitting. (See the separate MD mineral technologies report No MS.00/80185/1 for details of testwork carried out on that bulk sample).

v. Size the sub sample at 1000 and 53micron to ensure that no stray grains are present in the sample. (The procedure adopted during laboratory separation of the 5.5AM magnetics from drill hole samples included sizing at 1000 and 53micron.) Record weights of all fractions.

vi. Magnetically fractionate the sample using a Readings HIRMS into:

- 0.3A mags
- 0.3 to 5.5AM mags
- 5.5AM non mags.
- Record weights of all fractions.

- (Again this step was a repeat of work previously carried out and was undertaken to ensure all samples were uniform in respect of the contained magnetic fraction.)

vii. Split a sub-sample of the 0.3 to 5.5AM magnetic fraction for density separation. Also, split out a head sample of the density separation feed for TiO_2 analysis.

viii. On the 0.3 to 5.5AM magnetic fractions sub-sample, carry out density separations at 3.90, 4.05, and 4.25 sg using Clerici solution. Record weights of all fractions. Density fractionation at 3.90, 4.05, and 4.25 was only carried out on the composite samples prepared for 38800E, 50700N to 51800N for the pilot investigation. All other composites were density separated at 4.05 sg only.

ix. Analyse for TiO_2 the following fractions from each composite:

- A split of the head feed to the density separation
- 3.90 sg floats
- 3.90 to 4.05 sg fraction
- 4.05 to 4.25 sg fraction
- 4.25 sg sinks

OR, where only one density separation was performed

- A split of the head feed to the density separation
- 4.05 sg floats
- 4.05 sg sinks

11.1.2.3 Calculations

The following calculations were completed to determine the Ilmenite Conversion Factor and Feed Stock Ilmenite (FSI) for each composite sample:

1. For each composite, calculate the recovery of the 0.3 to 5.5AM magnetics in each density fraction:
   - 3.90 sg floats
   - 3.90 to 4.05 sg fraction
   - 4.05 to 4.25 sg fraction
   - 4.25 sg sinks

   as a percentage of the sample feed sample. Also, calculate TiO_2 distribution for each fraction.

2. The recovery calculated above for each composited sample is the Ilmenite Factor at the given separation density.
3. From the individual drill hole samples comprising each composited sample, calculate the 5.5AM magnetics content for the composite prepared in 4.10.1 step vi.
4. FSI = (Ilmenite Factor x 5.5AM magnetics in the composite)/100.

11.1.2.4 Results

Ilmenite Conversion Factor test results are set out in MacHunter (2000), a report by MD Mineral Technologies.

Table 11.2 below, summarises the results for each composite sample tested, and also gives totals and mean values (weighted for drill hole intersection) derived from the testing of all drill hole samples with +3.0% 5.5AM grades. The results are also set out so that samples derived from CS and DG, different drilling, and different testing campaigns can be identified for each part of the deposit tested.

Table 11.2: Ilmenite Conversion Factor results

Sample No.	Location in crater	Drill year & type	Lab	Material	Total intervals (m)	5.5am magnetics (weighted mean)	Ilmenite factor @4.05 sg (%)	Fsi (%)	TiO_2
3	North	1996RC	DFS	Colluvium	215.4	8.03	91.8	7.4	50.5
1,2,5,6	North	1996RC	DFS	CS	795.0	8.32	84.5	7.0	49.2
1,2,5,6	North	1996RC	DFS	DG	1,145.4	5.88	64.5	3.8	46.7
4	38800E	1996RC	DFS	CS	40.0	11.40	76.2	8.7	49.5
4	38800E	1996RC	DFS	DG	61.0	7.40	50.2	3.7	45.6
7-8	West	1999RC	Readings	Clay/sand	175.2	6.70	88.7	6.0	49.3
7-8	West	1999RC	Readings	DG	131.0	7.91	62.2	4.9	45.8
9-10	Southwest	1996RC & HA	DFS	CS	91.2	8.23	86.7	7.1	49.2
9-10	Southwest	1996RC & HA	DFS	DG	133.2	5.77	66.3	3.8	46.6
11-12	Southwest	1999RC	Readings	CS	237.4	5.87	92.6	5.4	49.3
11-12	Southwest	1999RC	Readings	DG	57.0	5.09	75.7	3.9	46.7
13-14	Central/west	2000RC	Readings	CS	269.0	5.46	89.6	4.9	50.3
13-14	Central/west	2000RC	Readings	DG	28.0	4.86	79.1	3.9	47.9
Clay/sand & colluvium									
Total				**7 samples**	**1,823.2**				
Weighted Mean						7.45	87.5	5.8	49.6
Decomposed Gabbro									
Total				**6 samples**					
Weighted Mean						6.05	64.6	3.8	46.6
All samples									
Total				**13 samples**	**3,378.8**				
Weighted Mean						6.81	76.9	4.9	48.4

Observations arising from *Table 11.2* include:

1. The CS contains a significantly higher level of ilmenite (87.5%) than does the DG (64.6%). On average, the ilmenite derived from the CS with 49.6% TiO_2 meets a 49.0% minimum TiO_2 specification without further metallurgical treatment, while ilmenite derived from the DG needs further processing to increase the TiO_2 from an overall average of 46.6% in order to reach 49.0%.
2. Ignoring effects due to changes in the resource characteristics, a comparison of results for CS samples treated by the two laboratories shows:
   - that the DFS laboratory has achieved higher recoveries of 5.5AM magnetics,
   - the Readings laboratory has obtained higher Ilmenite Conversion Factors
   - TiO_2 content of the +4.05 sg fractions are very similar for the two laboratories, and apparent differences need to be examined in light of the number of samples from different parts of the deposit tested by each laboratory.

   Thus Readings have produced a concentrate with higher ilmenite content though the differences between laboratories are hard to quantify due to many of the results representing samples from different parts of the resource. An examination of samples 9-10 (DFS) with 11-12 (Readings) which are two composites prepared from interposed drill lines from the South-Western Crater helps to quantify the difference. DFS laboratory has 2.4% (absolute) higher yield of 5.5AM magnetics, and Readings have 5.9% (absolute) higher Ilmenite Conversion Factor which combine to show the DFS laboratory with 1.7% (absolute) higher FSI and almost identical TiO_2 contents in the +4.05sg fractions.
3. Examination of the DG data for the two composites from the South-western Crater (samples 9-10 and 11-12) again shows the DFS laboratory to have a higher yield (0.7% absolute). Readings laboratory has a higher Ilmenite Conversion Factor (9.4% absolute), but in this case the FSI and TiO_2 of the +4.05sg fractions are almost identical. The rest of the DG data from different parts of the deposit is inconclusive as localised influences are greater than those due to differences between the laboratories.

The report of MacHunter (2000) contains a plot showing %TiO_2 in the 5.5AM magnetics before density separation at 4.05sg and %TiO_2 after density separation. This plot shows a good correlation at 0.952.

11.1.3 QAQC

QAQC for the 1996-2000 work has been documented in Lee, G., (1996) and Lee, G., (2000). A summary of the programmes and the outcomes is included below.

Work completed:

- Variation associated with close spaced drilling.
- Comparison of sampling methods between 1996 HA drilling and 1999 RC drilling; and between 1996 RC and 1999 RC drilling.
- Duplicate samples for 1999-2000 work
- Comparison of laboratory processing between DFS in 1996 and Readings in 2000

11.1.3.1 Variability determination – Close spaced RC drilling

Two sites in the ML area, which were drilled at 100metre hole spacing during 1996, were selected for drilling using closer hole spacing in order to determine the rate of change in the grade and other properties of the mineralisation. Two arrays were selected with eleven RC holes drilled in each array during January 2000 with separations ranging from 5metres to 70.7metres within a 100 x 100metre square block bounded by four previously drilled (1996) holes. The south-western corner of each array was drilled twice, first in 1996 and again in 2000, while the other three corners were only drilled in 1996. Samples from the four holes drilled in

1996 and forming the corners of each array were tested in the DFS laboratory, and samples from seven of the eleven holes drilled in 2000 were tested by Readings laboratory. Four of the holes drilled in 2000 in each array have not been tested.

The results show the expected vertical change in characteristics observed from elsewhere within the Goondicum mineralisation. The minus 53micron content is highest in the top two or three intervals and then tends to gradually decrease with depth as weathering effects decrease. The highly susceptible magnetics (0.3A) is relatively low in the top interval, reaches a maximum in the second or third interval, and then decreases to an intermediate level, which may fluctuate in the underlying DG. The 5.5AM magnetics is highest in the top interval and then decreases until the DG is intersected where the grade is mostly influenced by the parent gabbro. Generally, the horizontal variation in the measured properties is small, even between holes over the larger separations of up to 70metres and 100metres. A visual comparison of the data (without applying any statistical analysis) shows a high level of correlation for both Arrays 1 and 2. The results also showed a greater horizontal variation in properties within the DG than in the CS suggested to be due to underlying variation in the primary mineralisation in the layered gabbro or possibly the occurrence of the CS_L.

11.1.3.2 Comparison of sampling methods

1996 Hand auger and 1999 Reverse circulation drilling

In order to establish correlations between different drilling techniques, comparative tests were carried out for 12 sites where 1999 RC drill holes were located near 1996 HA holes. Direct comparison is complicated by the two drilling campaigns having been undertaken at different times with each campaign employing different sample intervals, and the samples being treated in different laboratories. For the 1996 HA programme samples were bagged at lithological breaks and were treated in the DFS laboratory, while for the 1999 RC drilling samples were bagged at intervals of 1.0metre and were treated in the Readings laboratory.

Although the holes in each pair were drilled at the same ‘site’ there was maybe up to 4metres separation between the two holes. This is due to each hole being located within about 2metres of the survey peg.

The data for the minus 53micron material shows the RC drilling to give higher contents than the HA when comparing weighted mean values. The scatter plots showed poor correlations. A possible explanation for the higher minus 53micron content for the RC drilled samples is a more vigorous desliming agitation of samples treated in the Readings laboratory.

The data for the highly susceptible magnetics shows the RC drilling to have lower recoveries than the hand auger when comparing weighted mean values. The scatter plots showed fair to poor correlations, with correlation coefficients in the range 0.35 to 0.62. A possible explanation for the difference is lower recoveries by the Readings laboratory.

The 5.5AM magnetics weighted mean grade results were compared for 7 pairs of 1996 hand auger and 1999 RC holes. While there is generally good agreement, the 1999 samples have slightly lower grade, which may be partly due to lower recoveries by the Readings laboratory. From the scatter plots, there is a very high correlation for the 5.5AM magnetics in the ‘Top Intervals’ which probably reflects the clean ilmenite occurring near the surface of the deposit. As drill hole depth increases the pyroxene and composite particle content increases, thereby making laboratory separation more difficult and less repeatable. The scatter plot for the ‘Rest of Hole’ reflected this scenario.

A comparison of samples obtained from the top interval by HA drilling (1996) and RC drilling (1999) showed the RC samples to contain 87.7% of the hand auger 5.5AM magnetics, with a low scatter in the results and therefore a high degree of correlation. For the Rest of Hole interval (below the top interval) the RC drilled samples were found to contain 81.9% of the 5.5AM magnetics contained in the HA samples, with some scatter in the results.

Comparable trends and similar grades were obtained from paired RC drill holes at the same location, giving confidence that the programme employed suitable drilling, sampling, and testing techniques.

Most of the differences between the two data sets are likely to be due to testing being undertaken in two separate laboratories. With respect to the 5.5AM magnetics content, the 1999 RC holes (tested by Readings) generally gave slightly lower grade, and in this respect the comparative differences between HA and RC drilling are similar to those obtained in 1996. Other comparisons have shown the Readings laboratory to consistently obtain lower recoveries of 5.5AM magnetic fraction when compared to the DFS laboratory (see *Section 11.1*)

There is the possibility that the HA results are slightly upgraded. This might be due to carry down of near surface high-grade mineral upon re-entry of the auger into the hole, after recovery of a sample. RC drilling, when compared to HA drilling, of heavy mineral bearing deposits, gives a slightly lower recovery of the heavy mineral. This has been demonstrated on numerous occasions in the evaluation of near coastal sand deposits. The Goondicum Crater deposit contains more clay and fine binding material than most other heavy mineral-bearing sands, so this should serve to reduce the down- grading effect of RC drilling.

1996 and 1999/2000 Reverse circulation drilling

To ascertain if the two RC campaigns (using different size drill rigs and with samples tested by two separate laboratories) introduced any significant difference into the results, other comparative tests were carried out at seven RC drillsites in 1996 and again in 2000.

Two of these sites, located in the ML, were also drilled using closely spaced arrays of holes to test for variability in the mineralisation over small distances. The other five sites are located in the south-western, MLA, part of the crater.

The data show a relatively good correlation for the minus 53micron (slimes) content of samples examined as a number of cases i.e. all samples, top intervals separate, CS separate, and DG separate. For the minus 53micron content, in each case examined, the correlation coefficient ranges from 0.46 to 0.76. The trend line gradients are nearly one for each of the four cases. From the individual results, it is apparent that the 2000 drilling and testing has yielded a 10% increase in minus 53micron content when compared to the 1996 data.

The highly susceptible (0.3A) magnetics were also examined as four cases: all samples, top intervals separate, CS separate, and DG separate. Here, for each case examined the correlation coefficient ranges from 0.09 to 0.30, with ‘flat’ trend lines indicating that the 2000 drilling and testing results are lower than those from the 1996 drilling and testing. Overall, the 2000 data shows highly susceptible magnetics yield about 44% below that of the 1996 data. Reasons for this may be cleaner 0.3A original material i.e. better deslimed, some of the material may have gone into the 5.5AM recovery and there may be more composite grains. All these factors could arise because the sampled material is in a different part of the crater or is purely a product of two different labs. H&SC does not consider it an issue at this stage as there are no plans to sell a titano-magnetite product.

The 5.5AM magnetics were also examined as four cases: all samples, top intervals separate, CS separate, and DG separate. Here, for each case examined the correlation coefficient ranges from 0.07 to 0.57 with the highest correlation being for the top interval. Trend lines are ‘flat’ indicating that the 2000 drilling and testing results are lower than those from the 1996 drilling and testing. Yields are 25% below those of the 1996 data. The poor correlation and the lower yields for the samples from the 2000 drilling and testing reflect a combination of effects due to drilling and the laboratories.

In summary, the data shows similar trends for the minus 53micron, but has a 10% relative increase for the 2000 drilling. There is a poor agreement for the highly susceptible magnetics, with a 44% relative decrease in yield for the 2000 drill samples. There is a poor to moderate agreement for the 5.5AM magnetics, with an overall 25% relative decrease in yield for the 2000 drill samples. It is suspected that the differences noted are primarily due to the two laboratories employed. However, the outcome will have an impact on the classification of the resources estimates and it is likely that the estimates will be slightly conservative.

11.1.3.3 Repeat/duplicate sampling 1999/2000

Tests were run on 67 samples treated as repeat/duplicate samples by Readings laboratory showing an acceptable level of agreement. In addition, a group of four head samples split from a bulk metallurgical sample (prepared by compositing 8 pits dug in July 1999) were included as a set of repeat tests, see Lee, G., (2000) for details of the results. The results pertaining to the two samples with the highest and lowest 5.5AM magnetic contents were also included as part of the repeat test data set. This gave a total of 73 repeat test comparisons.

Overall, there was a small increase in the recovery (6.4%) and the quality of the 5.5AM recovered magnetic fraction for the re-tested samples, suggesting increased familiarity with the mineralisation and improved laboratory techniques as the programme progressed.

The best correlation is for the minus 53micron fines where, the correlation coefficients for the two samples comprising each duplicate are very high at 0.96 to 0.97.

For the highly susceptible (0.3A) magnetics the correlation is not as close as that obtained for the minus 53micron fines and is influenced by a greater scatter in the results. The plot of all duplicate samples showed the regression line to have a gradient of 0.72 and an intercept at 0.72, however the correlation coefficient is 0.67 indicating the greater spread of results.

For the 5.5AM magnetics, the plot of all duplicate samples shows a slightly higher yield for the values below 6% in the first test and a slightly reduced yield for the values above 6% in the first test. The correlation coefficient is 0.69.

Comparing the mean values for 5.5AM recovered magnetic fraction from the original test with the re-test for all 73 cases showed that the re-test results gave a 7.3% higher yield than the original results.

The scatter in the highly susceptible magnetics and the 5.5AM magnetics can be influenced by the operation of the shaking table and the cut point selected for each individual sample. Middlings in particular can contain high levels of magnetic silicates and composite particles. Whether this middling fraction reports to the concentrate, or is rejected to tailings, depends on the table operator and can vary from sample to sample. Middlings included into the concentrate will increase the quantity of 5.5AM magnetics recovered. Given this operational constraint, there is reasonable agreement between the repeat test results.

Overall, the repeat test results show an acceptable level of agreement, particularly for the 5.5AM magnetic fraction, which contains the ultimate product.

In summary, the repeat testing of a selection of samples through the Readings laboratory obtained from the 1999 drilling programme, indicates that generally the results are reproducible, but there is a slight bias, with higher recoveries as the testing programme progressed.

11.1.3.4 Comparison of Laboratory Processing

In order to make comparisons between the results obtained from the DFS laboratory in 1996 and the Readings laboratory in 1999, the remainder of 33 samples, which had previously been tested in the DFS laboratory, were submitted to Readings for re-testing. 16 samples representing CS and 17 representing DG were selected from storage at Monto to give equal representation of the two material types. The results showed:

- Generally comparable results between the two laboratories for the minus 53micron fines fraction with a correlation co-efficient of 0.94. At low fines contents the two laboratories agree closely, while at higher levels Readings tend to report a higher content than does the DFS laboratory.

- Readings laboratory produced a much smaller shaking table concentrate by approximately 50%. Further, the correlation coefficient is low at 0.58 with a scatter in the results
- Readings laboratory produced lower yields of 0.3A magnetics, about 1.7% absolute (47% relative) below the DFS laboratory value. However, the trend line for the highly susceptible magnetics is strongly influenced by the one very high result but the correlation coefficient at 0.79 is fair.
- Readings laboratory yielded lower 5.5AM magnetics, about 2.5% absolute (30% relative) below the DFS laboratory value. However, the data show a fair correlation with results over a range of values and a correlation coefficient of 0.82

A possible explanation for these differences lies in the different shaking tables used in the two laboratories to separate heavy minerals from light minerals. In the DFS laboratory the table had riffles along almost the full length of the discharge side of the deck, while the Readings table had shorter riffles of lower profile with about one third of the discharge side of the deck not riffled. The likely effect of this difference is that the DFS laboratory table would be more likely to carry the coarser grained particles (eg ilmenite-silicate and magnetite-silicate composite grains) into the concentrate, where the Readings table would discharge them to tailings. Once particles report to the concentrate they are then available to report to the magnetic products if a magnetic mineral comprises part of a mixed mineral grain.

Examining the results obtained from treating CS and DG separately further supports the difference in the shaking table used. The 5.5AM yield from the Readings laboratory when treating CS is 79.8% of that obtained from the DFS laboratory. When treating DG, Readings obtain a lower recovery (57.3%) when compared to the DFS laboratory. Readings would appear to have been more effective in eliminating magnetic silicates (pyroxene, etc.) from the shaking table concentrate, especially when treating the DG, which contains more magnetic silicates, but in the process have rejected some ilmenite. Thus Readings have obtained a cleaner concentrate at the expense of ilmenite recovery.

For all comparisons between Readings and DFS laboratories, the Readings laboratory has lower recoveries of both the 0.3A and the 5.5AM magnetics. For the most important 5.5AM magnetics, when all data is considered, Readings recoveries are approximately 20% lower than those of the DFS laboratory and the range is from 10% to 40% lower. Testing the Readings table tailings, where at least an additional 18% to 23% of 5.5AM magnetics was recovered, supports the 20% lower recovery figure.

A conservative increase of 20% to the Readings 5.5AM magnetics data would appear to be justified in order that this data set is more comparable to the DFS laboratory data set. H&SC has refrained from adjusting any data at this stage preferring to remain conservative but it should be noted that there is some potential upside in the resource estimate associated with the MLA data (but not the ML data) as the Readings work was completed on the MLA 1999-2000 drilling.

A 20% relative increase would have the effect of increasing the overall 5.5AM magnetics grade, the 5.5AM tonnage and quantity of raw mineralisation. All 5.5AM magnetic grades between 2.5 and 3.0% would be increased to 3.0%, or above, and therefore would be included when applying a 3.0% cut-off. However, there is a natural cut off to the ilmenite mineralisation that is around the 2.5-3% 5.5AM value so H&SC does not expect a considerable increase in the overall MLA resource size.

These are significant differences and the uncertainty associated with it will be reflected in the classification of the resource estimates.

11.1.3.5 Coarse rejects

None completed

11.1.4 Audits

None completed

11.1.5 Conclusions on sample preparation, analyses and security

The drilling technique and sampling methodology are considered appropriate for the deposit type. There has been a consistency to the MLA sampling with well documented procedures. All sampling methods and samples sizes are deemed appropriate though the compositing of samples for Clerici testwork may have introduced unnecessary smoothing.

The test procedure adopted (as outlined in *Figure 11.2*) is typical of that expected for evaluating this type of deposit. The immediate removal of samples from drill sites to the laboratory for sub-sample preparation has significantly reduced the risk of sample tampering. Some of the more critical and specialist aspects (eg Clerici separations and TiO_2 assays) were undertaken by well- regarded industry laboratories. It would appear, based on the information made available, that the testing approach adopted is suited to the objective of assessing the ilmenite content of the drill hole samples.

An appropriate level of QA/QC checks have been undertaken to ensure that sample testing has been properly carried out. While some deficiencies were found, these were of such nature in terms of the overall objectives to be minor. The QA/QC programme did discover the difference in recovered magnetic fractions from the two laboratories due to the design of the shaking table, but the majority of the MLA work was completed at one laboratory so there is a small risk in combining the two dataset for the MLA resource estimation. However, the MLA estimates might be considered conservative.

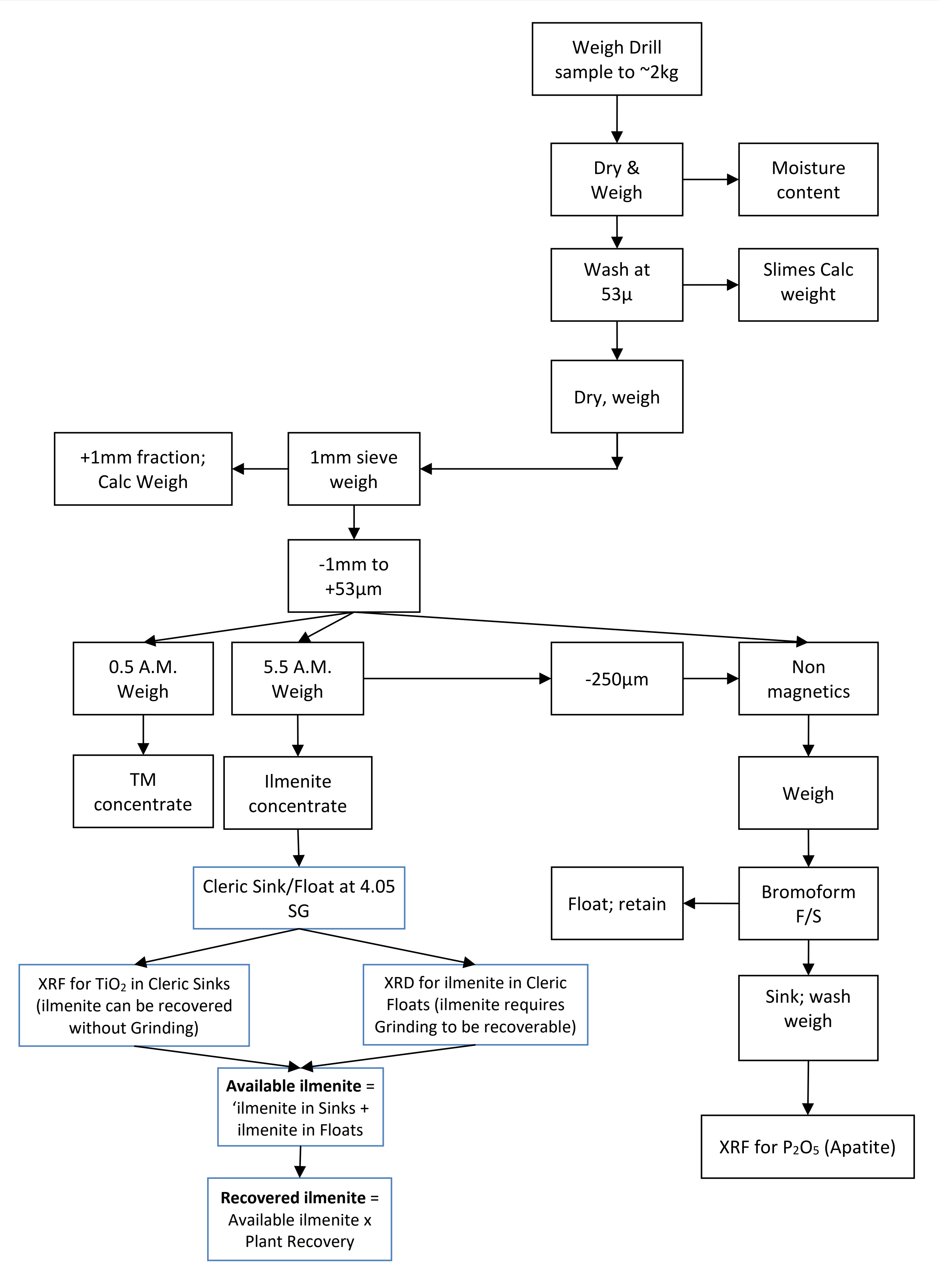
11.2 2009 Drilling

The aircore drilling generated chip samples that were collected as bulk samples for each 1metredrilled interval. All sample material for each drilled interval was caught in a cyclone, and dumped in plastic bags at the end of each drilled interval. All sample material was retained. The sample was weighed wet, sealed immediately and placed on a pallet at the back of a pick-up Ute. Typical sample weights were around 2kg for the first sample (0.2metre soil interval), to about 12kg for the bottom sample.

The samples were transported to the Goondicum Minesite where they underwent sub-sampling prior to magnetic separation. The sampling and assay flowsheet is included as *Figure 11.4*.

The samples then underwent size and magnetic fraction analyses at Belridge's minesite before dispatch of selected composited intervals to Downer EDI Mining – Mineral Technologies Pty Ltd (Mineral Technologies) for Clerici float/sink testwork. The QAQC for the sampling has included the use of a matrix-matched standards and field duplicates of the original aircore samples.

Figure 11.4: Sampling and assaying flowsheet[1]



Downer Mineral Technologies was at the time of the Clerici float/sink analyses in 2009, a wholly-owned subsidiary of Downer Australia. This company had been audited and found to be in accordance with the requirements of the management system standards detailed below:

Delivery of integrated asset life-cycle solutions and services to customers in the following market sectors:

- *Capital Project*
- *Minerals& metal/Oil& Gas*
- *Rail Infrastructure*
- *Transport Infrastructure*
- *Power*
- *Water*
- *Communications*
- *Property*

With the following certifications

AS/NZS 4801: 2001 – Original Approval date 4th Dec 2002 : Valid to 12th Sept 2013

AS/NZS 9001:2008 – Original Approval date 24th Dec 2000 : Valid to 12th Sept 2013

AS/NZS 14001:2004– Original Approval date 20th Jan 2005 : Valid to 12th Sept 2013

11.2.1 Sample processing at Goondicum

Upon receipt from the drill rig the sample material was stored in plastic bags until processing was available. Processing was completed and supervised by suitably qualified Belridge personnel. The sample material was split using a 1:1 riffle splitter to produce a sample of around 2kg and then dried at 105°C for 12 hours and then weighed. Each sample was then de-slimed wet at 53micron, re-dried and weighed. Material greater than 1mm was removed by passing through a 1mm screen and the remaining -1mm to 53micron fraction was weighed again. If the -1mm to 53micron fraction weighed over 400g the fraction was split using a riffle splitter. The -1mm to 53micron fractions were then submitted to magnetic separation testwork using an Eriez laboratory magnet at 0.3AM, 0.5AM, 5.5AM and 8.5AM. *Figure 11.5* is an example of the current on site magnetic separator.

[1] Note: AM refers to Amp Magnetics: the current input to the induced roll magnet to separate less magnetic particles from more magnetic particles.

Figure 11.5: Current on site laboratory-based magnetic separator

(Note: this is not the machine used by Belridge but is similar to the machine used by Monto in 1996)

Belridge inserted one standard into the sample sequence at a rate of approximately one per 20 samples to verify the splitting and magnetic testwork. In total 123 monitor standards were employed. Results and discussion of these standards are presented in *Section 11.2.2.1*.

Selected intervals, of which some were composited, were sent for off-site Clerici testwork.

11.2.1.1 Clerici testwork

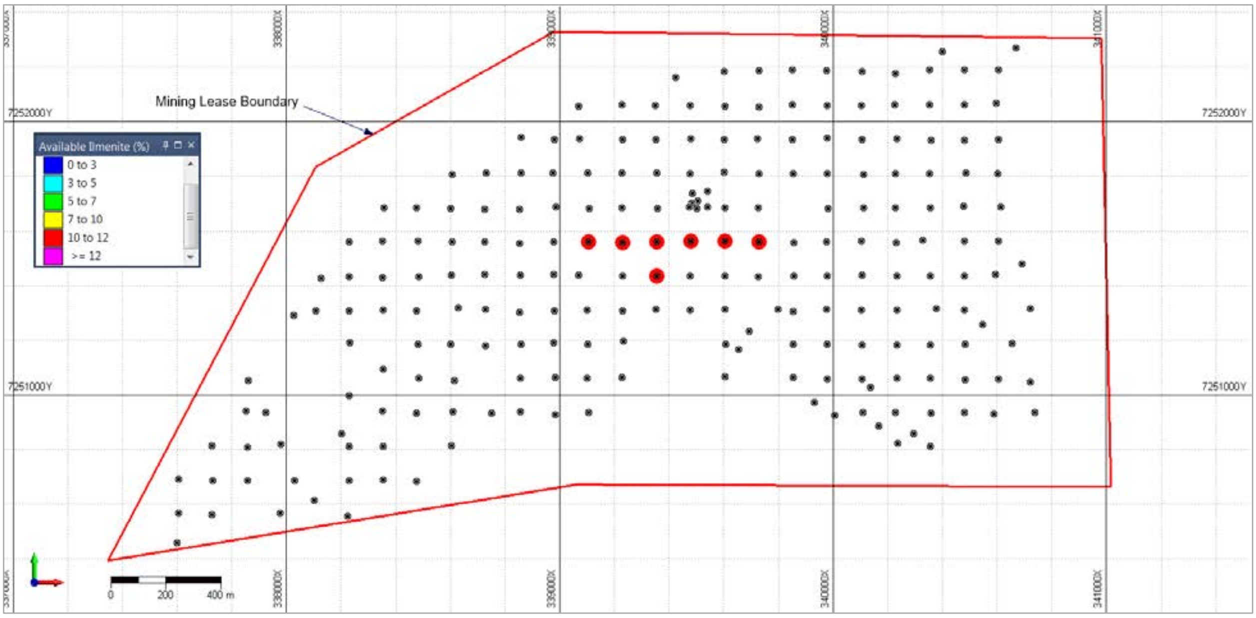
Clerici Testwork was carried out by Downer Mineral Technologies, an independent metallurgical testwork laboratory located at 11 Elysium Road, Carrara QLD, QLD 4211. They are a renowned Australian metallurgical testwork facility which is recognised as a leader in mineral separation and mineral processing solutions worldwide, delivering a comprehensive range of integrated equipment and services. The testwork was carried out in accordance with their standard metallurgical testwork procedures. Downer Mineral Technologies is entirely independent of Belridge.

In total 163 samples were submitted for Clerici testwork. 34 of the 163 samples were individual 1metresamples with the remaining 129 samples composed of composited intervals.

Composite samples were composed of intervals in the same logged lithology (SL, CS and DG) from neighbouring drillholes. No distinction was made between CS_H and CS_L lithologies as the distinction had not been identified at the time of testwork. The proportional weight of each sample to be added to the composite was defined by the relative weights of the 5.5AM fraction. Compositing was carried out by riffle splitting the 5.5AM fraction down to a representative weight.

Figure 11.6 shows an example of the drill holes included in a single composited Clerici sample. Each drill hole marked in red contributed between one and 3metres to the composite.

Figure 11.6: ML Example of sample locations for a single Clerici composite



The Clerici testwork included an additional desliming, float/sink test in Clerici solution and XRF TiO_2 assays on the float and sink fractions. The Clerici solution consists of thallium formate ($Tl(CHO_2)$) and thallium malonate ($Tl(C_3H_3O_4)$) dissolved in water and, with a density of 4.05 g/cm^3, is one of the heaviest aqueous solutions available. The high density of the Clerici solution means liberated particles of ilmenite, with a density of over 4.7 g/cm^3, sink whereas other common minerals float.

The composites were produced in order to decrease the cost of the testwork. The effect of compositing material from different drill holes is likely to have smoothed any differences that may be present in the rock type which will likely result in over-smoothed estimates of available ilmenite.

11.2.1.2 Assaying of sink and float fractions

All laboratory analytical work was carried out by ALS Global, a NATA accredited laboratory facility with a global presence and whose analytical procedures are also accredited according to the international norm EN ISO/IEC 17025:2005. The Clerici sinks and the floats were sent for XRF analysis to determine the TiO_2 content of the sinks and an XRD analysis was used to determine the ilmenite content of the floats. The TiO_2 in the Clerici sinks was used to calculate the liberated ilmenite while the ilmenite content of the floats is considered to be composited ilmenite which can be liberated through grinding. By adding the two ilmenite portions from the sinks and the floats, the total available ilmenite can be calculated.

The apatite assay data was derived from the Bromoform circuit and had a conversion to apatite factor applied based on the phosphate XRF assays. The derivation of this factor in the 2009 drilling has not been documented but H&SC has assumed it is reasonable.

11.2.1.3 Calculation of available ilmenite

For the H&SC resource estimation work an 'Available ilmenite' field was created in order to represent the total amount of ilmenite present in the 5.5AM fraction. The available ilmenite values were calculated for each interval that had been submitted (usually as part of a composite sample) for the Clerici testwork and was calculated using the original 5.5AM recovered magnetic fraction data and the Clerici data. The Clerici data included the float and sink weights, XRF assays of sink fraction and average ilmenite proportions of the float for CL, CS and DG. The Clerici samples underwent an additional desliming at the laboratory but this fraction was ignored in the calculation of available ilmenite and the Clerici slimes are therefore essentially assumed to be of a similar composition to the rest of the sample.

The percentage of Clerici sinks is multiplied by the TiO_2 XRF assay corrected to the stoichiometric formula for TiO_2 relative to ilmenite (2.04). This gives the percentage of ilmenite in the sink fraction as a percentage of the total sample submitted for the Clerici testwork. The percentage of Clerici floats is multiplied by the average ilmenite proportions of the float for CL (2.4%), CS (5%) and DG (7.2%). The proportion of ilmenite in the floats was determined using XRD analysis. The proportions of ilmenite in the float and sink fractions were then added together and multiplied by the 5.5AM fraction (expressed as a fraction of the original sample) and the result divided by the total material field. The total material field represents a sum of the proportions of material in the different size fractions. The formula for the available ilmenite is given below:

$$\frac{(Clerici\ Sink\% * ((\frac{TiO2\ \%}{100}) * 2.04))) + (Clerici\ Foat\% * Float\ Ilm\ av)) * 5.5amp\%\ recovery}{Total\ material}$$

The available ilmenite field therefore represents the total amount of ilmenite present in the 5.5AM fraction expressed as a fraction of the total sample. This formula may closely estimate total ilmenite in the sample, but not necessarily reflect recoverable ilmenite due to ilmenite in composite particles, especially from the float fraction and/or the float fraction may contain materials that reduce the TiO_2 content of ilmenite product were they to form part of the product.

Stoichiometrically there is 52.6% TiO_2 in ilmenite which translates as a TiO_2-to-ilmenite factor of 1.9. However, this assumes that all the 5.5AM TiO_2 is ilmenite which is not the case with Goondicum. In the above formula a TiO_2-to-ilmenite factor of 2.04 is used. This factor was determined through testwork conducted by Downer Mining Laboratories (Mineral Technologies or CPG) that indicated that the Goondicum ilmenite could be upgraded to 49% TiO_2.

H&SC investigated ways to relate the results of the Clerici testwork to the data available for each drilled interval with the aim to interpolate available ilmenite values from the 5.5AM fraction for example. Unfortunately, no reliable relationship was found and so available ilmenite was not calculated for samples that were not submitted for Clerici testwork.

The lack of distinction between the CS_H and CS_L lithologies at the time the Clerici testwork was conducted means that two lithologies, with possibly different responses to Clerici testwork, were analysed together. H&SC recommends Melior to investigate the effect of this issue.

11.2.2 QAQC

(italics = Hoogvliet & Whitehouse)

11.2.2.1 Standards and blanks

For the 2009 drilling program, two 200 litre drums of freshly excavated Goondicum decomposed gabbro were sent to Ore Research & Exploration Pty Ltd ('Ore Research') in Melbourne. This material was used to prepare a Goondicum-specific 'monitor' standard and the material was treated as follows:

- dry at 105ºC
- screen at 3mm
- attrition oversize in tumble blender, and rescreen at 3mm; discard oversize
- following a specific sequence of blending and splitting, 2kg parcels were produced, each of which is a monitor standard

During the drilling, a monitor standard was inserted into the sample sequence at a rate of approximately one per 20 samples. The sealed bag was broken, and the sample put in a normal drill sample plastic bag. In total 123 monitor standards were employed for the resource drilling. Each monitor standard was theoretically 'blind' having a number in sequence with the drill samples. However, they could easily be recognised during the sample processing due to their uniform weight, low slimes and low moisture content.

In addition, ten monitor standards were processed by Titanatek Pty Ltd (Titanatek) of Ballina, New South Wales, to obtain umpire results. Titanatek is an independent professional sample preparation laboratory specialising in the heavy minerals industry. The results of both the on-site processing and those processed by Titanatek are presented in *Table 11.3*.

Table 11.3: Results of standards (%)

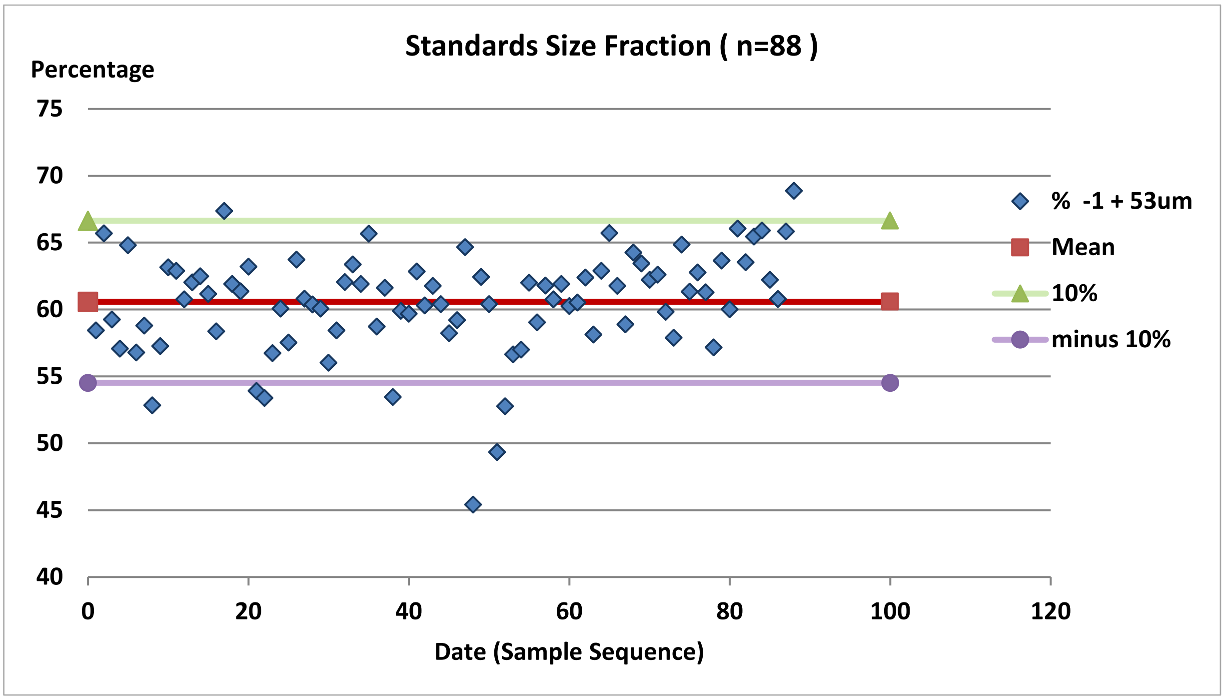
	Slimes	0.5AM	5.5AM	8.3AM	%floats	Sinks
Site results						
Mean	11.67	19.31	19.28	2.06	19.21	2.54
Maximum	15.50	21.80	23.30	3.30	22.10	4.20
Minimum	9.60	15.80	17.00	0.90	16.50	1.60
standard deviation	1.00	1.34	1.10	0.34	1.08	0.28
Range	5.90	6.00	6.30	2.40	5.60	2.60
Number	118	118	118	118	118	118
Titanatek results						
Mean	11.36	21.82	18.80	2.72	20.40	2.24
Maximum	12	23.12	20.70	4.25	21.48	2.61
Minimum	11	18.61	16.75	2.00	17.81	1.94
standard deviation	0.34	1.48	1.10	0.58	1.11	0.20
Range	1.00	4.51	3.95	2.25	3.67	0.67
Number	10	10	10	10	10	10

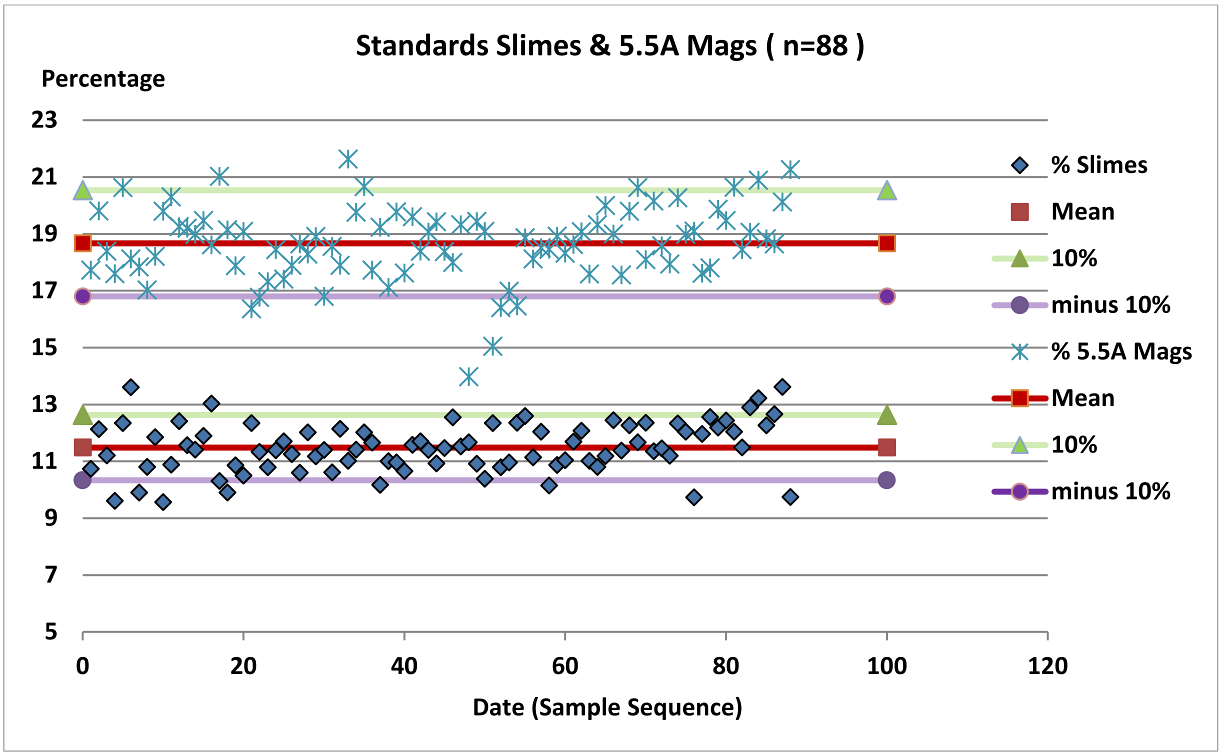
(from Hoogvliet and Whitehouse, 2011)

"As the results of the monitor standards became available during normal processing, it was noticed that a group of standards yielded significantly higher slimes content than the other standards, and the discrepancy was apparently increasing over time. An investigation into the issue revealed that the Kason screen had developed worn patches and several minor holes and material other than the -54µm was reporting to the undersize (slimes) fraction. After review, 95 drilling samples were reprocessed."

Plots of the standards with +/-10% margins to the mean values are shown in *Figure 11.7*. Most outcomes appear acceptable with no obvious bias.

Figure 11.7: ML results from standards





Another outcome from the use of monitor standards was that it was noted that some standards reported significantly more +1mm material than other standards. The error was possibly operator-related. Following a detailed investigation, a total of 456 samples were reprocessed. Reprocessing included re-screening the +1mm fraction, and combining the additional -1mm with all -1mm +54micron fractions, and reprocessing them from the magnetic separation stage onwards.

When processing a large sample of topsoil using the same method as used for the drilling samples, it was noticed that significant amounts of ilmenite reported to the middlings of the 0.5 AM fractions (middlings report neither to the magnetic nor the non-magnetic fraction). The middlings had been combined with the magnetics fraction. This prompted a review of all the 0.5AM magnetic fractions from the duplicate samples with a hand magnet. The high-slimes and topsoil samples were found to contain significant non-magnetic material that looked like ilmenite. It appeared there might be a risk that the recoverable ilmenite grade at Goondicum had been underestimated. After detailed testing and extensive discussions it was decided to reprocess the 0.5AM fraction at 0.3AM. This resulted in a lower titano-magnetite concentrate (but with expected higher recovery), and a larger 5.5AM fraction. Almost all 0.5AM fractions from the resource drilling (2,628 samples) were reprocessed.

The 0.5/0.3AM issue is a function to the deposit being 'young' i.e. close to the ilmenite source with the ilmenite relatively unoxidised and is therefore quite magnetic to the extent that some of it will report to the 0.5AM (the TiMag magnetic fraction). This phenomenon was recognised in the 1996/2000 work and its likely impact should be considered in any future work. Any such work would involve further metallurgical studies to measure the ilmenite distribution within the magnetic fractions.

11.2.2.2 Duplicates

Due to the speed of drilling, duplicates could not be created in the field. Instead, as samples were processed, approximately every 50th sample was split again to create a duplicate sample. Each duplicate was given a unique number, in sequence from the last drill sample.

A total of 56 duplicates were collected. All duplicates were processed near the end of all of the sample processing. The comparison between the original and duplicates are presented in *Table 11.4*.

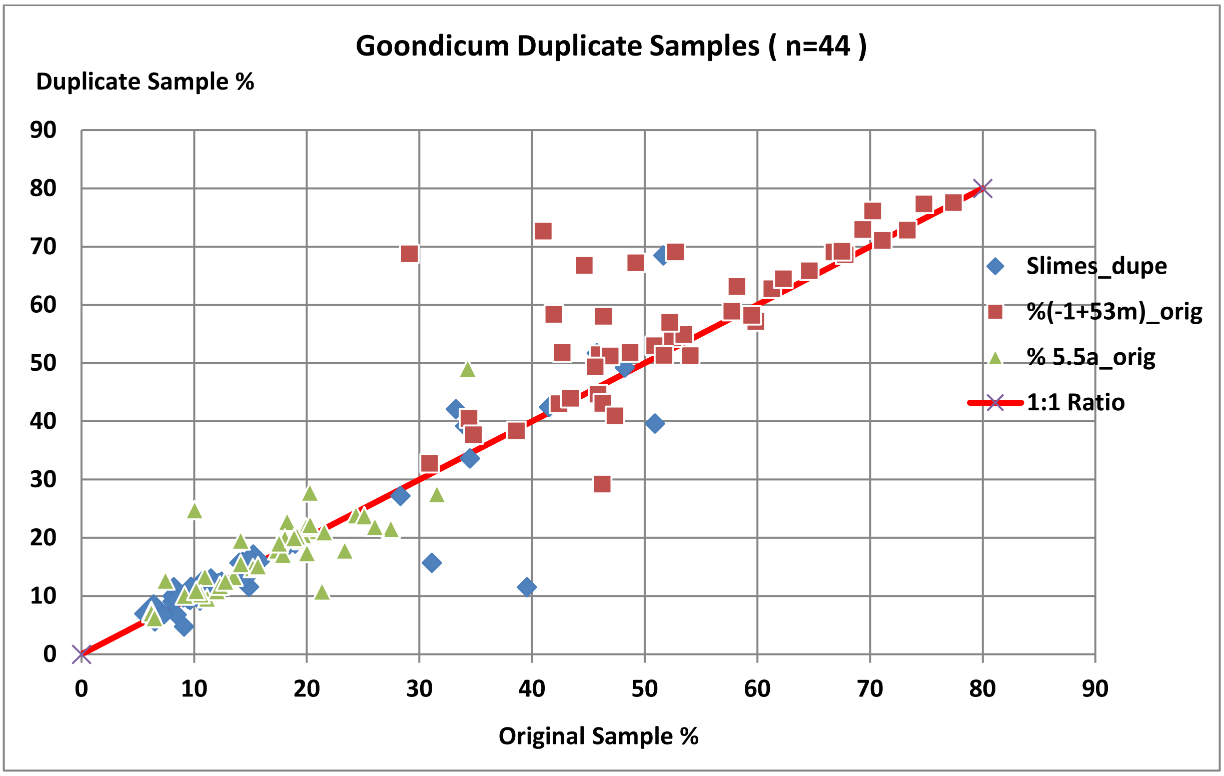
Table 11.4: Results of duplicates (%)

	Slimes	0.5AM	5.5AM	8.3AM	Floats	Sinks
Original						
Mean	16.18	9.01	18.43	3.65	21.65	1.99
Standard deviation	12.53	4.32	7.19	1.57	12.16	1.24
Duplicate						
Mean	16.61	9.11	18.21	3.73	22.81	2.10
Standard deviation	13.32	4.46	7.48	1.68	12.83	1.32
General						
Correlation coefficient	0.91	0.90	0.84	0.68	0.91	0.82
Number of pairs	56	56	56	56	56	56

(from Hoogvliet and Whitehouse, 2011)

An Excel file (Lab Calc Sheet ACopy.xlsx) of duplicates was supplied, but contained only 45 of the expected 56 duplicate samples. However, a plot of the duplicates is included as *Figure 11.8*. There are some discrepancies in repeatability especially for the -1mm to 53micron size fraction (red squares) in which there is a slight bias towards the duplicates returning higher values.

Figure 11.8: ML Duplicate results



11.2.2.3 Hole twinning

In Hoogvliet's report mention is made of 2009 hole twinning with the 1996 drilling. The following statement is replicated here.

In all twelve holes were drilled as twins, of which ten had meaningful results. In total there were 79 sample pairs. The average ilmenite content of the old samples was 5.47 per cent, and of the new samples it was 5.09 per cent. The correspondence between the two means is considered reasonable given that the analytical methods applied to the samples varied between the 1996 and 2009 holes.

With the acknowledged incorrect ilmenite data generated by the 2009 work the above supposition needs to be reviewed.

11.2.2.4 Second lab checks

None completed.

11.2.2.5 Coarse rejects

None completed and unlikely to show anything useful.

11.2.2.6 Audits

As part of the quality control procedures, GJN Enterprises Pty Ltd (Geos Mining) of Sydney visited the project site in July, 2009, to carry out an independent review of the sampling procedures on site. Geos Mining has extensive experience in industrial minerals and following the review concluded that:

"The sample testing program has been generally well designed and sufficient checks have been built in to ensure that the resulting data can be used in resource estimations which can be classified according to the

JORC code. The testwork is typical of that common in the industry, and has been designed as a compromise between industry best practice and cost and practicalities" (Border, 2009).

11.2.3 Conclusions on sample preparation, analyses and security

The drilling technique and sampling methodology are considered appropriate for the deposit type. There has been a consistency to the sampling with well documented procedures. All sampling methods and samples sizes are deemed appropriate though the compositing of samples for Clerici testwork may have introduced unnecessary smoothing. An appropriate level of QA/QC checks and audits have been undertaken to ensure that sample testing has been properly carried out. While some minor deficiencies were found, these were either corrected or of such nature in terms of the overall objectives to be insignificant. The QAQC programme comprises monitor standards and duplicate field samples and the programme indicates acceptable precision and no obvious biases. The test procedure adopted (as outlined in *Figure 11.4*) is typical of that expected for evaluating this type of deposit. The immediate removal of samples from drill sites to the mine site laboratory for sub sample preparation has significantly reduced the risk of sample tampering. Some of the more critical and specialist aspects (eg Clerici separations and TiO_2 assays) were undertaken by well- regarded industry laboratories. It would appear, based on the information made available, that the testing approach adopted is suited to the objective of assessing the ilmenite content of the drill hole samples.

12.0 Data verification

H&SC have assumed that all supplied drilling data is a fair and accurate record of work completed on the deposit.

12.1 Pre-2009 drilling

H&SC have assumed the supplied drilling data is a fair and accurate record of work completed on the deposit. In total 370 drill holes, drilled for 2,152metre and 2,533 samples, were used for the MLA resource estimates.

12.1.1 Supplied data files

Validation of the Pre-2009 drillhole database was conducted by H&SC to ensure that the database is internally consistent. The data was supplied as Excel spreadsheets (RC-Drill-Hole_Database.xls and Pit_Database.xls dated 29/08/14) which was loaded into an Access database (Goondicum_2014.mdb) with indexed fields. This allowed for additional checks, for example, duplicate sample intervals. The database was incorporated into a Surpac mine software workspace with an additional audit for overlapping samples, checking that no assays or geological logs occur beyond the end of hole and that all drilled intervals have been geologically logged. The minimum and maximum values of assays and density measurements were checked to ensure values are within expected ranges.

Almost all assay intervals contained data for the 0.3AM and 5.5AM recovered magnetic fractions, and slimes content. There was no apatite data.

H&SC used the drilling data and surface mapping to complete a geological interpretation, creating a series of 3D surfaces for different lithologies.

12.1.2 Field checking

H&SC completed a site visit to the property in February 2014. No evidence of the original 1996-2000 drill collars remains.

All samples from the 1996-2000 work have been destroyed along with all the hardcopy documentation. However, H&SC has been greatly assisted by Graham Lee who completed the work at the time and has been able to supply, via GR, much of the original data and information on procedures for sampling, analysis etc.

The data supplied by GR is suitable for geological interpretation and resource estimation detailed in this report.

12.2 2009 drilling

The 2009 drilling programme was instigated in answer to a perception that the 1996-2000 phase of drilling on the ML had not drilled to refusal with sampling limited to a visual inspection of >3% ilmenite. There was also limited apatite data. For the new ML resource estimates H&SC has used the supplied 2009 drilling data.

In total 224 aircore drill holes, drilled for 2,394m, were used for the resource estimates.

12.2.1 Supplied data files

Validation of the 2009 drillhole database was conducted by H&SC to ensure that the database is internally consistent. The data was supplied as an Excel spreadsheet (Drilling Raw Data 2009 – Reviewed 20140203.xlsx dated 03/02/14) which was loaded into an Access database (goondicum.mdb) with indexed fields. This allowed for additional checks, for example, duplicate sample intervals. This allowed for additional checks, for example, duplicate sample intervals. The database was incorporated into a Surpac mine software workspace with an additional audit for overlapping samples, checking that no assays or geological logs occur beyond the end of hole and that all drilled intervals have been geologically logged. The minimum and maximum values of assays and density measurements were checked to ensure values are within expected ranges. A summary of the drilling information is included as *Table 12.1*.

Table 12.1: ML Drillhole Information

Data type	Drill holes	Records	Metres
Collar Records	224	224	2,394.0
Lithologs	224	2,655	2,394.0
Clerici Data	217	977	905.0
Slimes Data	224	2,653	2,392.2

Almost all intervals contained data for the various magnetic recovery fractions, for example, 0.3AM, 0.5AM, 5.5AM and 8.5AM and size fractions, for example, slimes, 1mm to 53micron etc. along with density data, ilmenite and apatite conversion factors, ilmenite, apatite and titanomagnetite concentrations.

Selected intervals were composited to form 163 samples and sent for Clerici testwork. The results from the Clerici work were applied to the drillhole samples that contributed to the relevant composite sample, hence 163 Clerici samples equates to 977 records in the drillhole database.

12.2.2 Field checking

A total of 16 holes (8% of the total number of holes) were selected at random for spot checks on collar accuracies and consistency in geological logging. Unfortunately, many of the original collars, usually marked with a wooden stake, were overgrown and the stakes uprooted. Thus the collars were located by GR personnel using a hand held GPS in the MGA94 Zone 56 grid projection. Efforts were made to find the uprooted stakes and in seven instances the original peg was located. The pegs were labelled with coordinates in the AGD66 Zone 56 projection and matched the H&SC check readings using a hand-held GPS (in AGD66). This both confirms the relative accuracy of the hole collar locations, consistency with the database and the grid conversion (to MGA94) used for the 2014 block model. Thus it is concluded that the location methods used to determine accuracy of drillhole collars is considered appropriate.

The 2009 drillhole samples are stored in wooden crates at GR's Dakiel depot and the samples are generally in good condition. The samples for the 16 holes were laid out and compared with the geological logging. A key part of the geological interpretation is the colour designation for the individual samples as that often helped to define the host unit. No issues were noted with the logging.

The original assay sheets for the Clerici testwork were compared to the data supplied. No issues were noted.

The data supplied by GR is suitable for geological interpretation and resource estimation detailed in this report.

13.0 Mineral processing and metallurgical testing

13.1 Background

The Project was identified in the early 1990s by Monto Minerals Limited (Monto Minerals) as being prospective for ilmenite, apatite, titanomagnetite and feldspar production. The process flowsheet was developed through a series of testwork programs largely undertaken by Mineral Technologies with the objective of recovering ilmenite, apatite, feldspar and titanomagnetite mineral products. Under the ownership of Monto Minerals, approximately A$80 million was spent on the project culminating in a 200tph wet concentrator plant (WCP) and associated power, water and access infrastructure.

The metallurgical processing stages are orientated towards separating the contained valuable heavy minerals into product streams by exploiting the differences in their physical properties (size, specific gravity and magnetic susceptibility, *Table 13.1*).

Ilmenite and magnetite are 'very heavy' minerals (VHM) and are readily separated from the lighter minerals by gravity in a spiral concentrator circuit. Magnetite is a highly susceptible (HS) magnetic mineral and is separated from the ilmenite using LIMS (low intensity magnetic separators). Feldspar and apatite are non-magnetic and can be separated from any remaining weakly magnetic materials using WHMS (wet high intensity magnetic separators). Apatite is slightly 'heavier' than feldspar and can be separated to a certain extent by gravity separation. To enhance this separation, the apatite/feldspar feed material can be classified using fluid bed classifiers.

The physical properties of the four potential product minerals, plus quartz, found at the Goondicum mine are listed in *Table 13.1*.

Table 13.1: Physical properties of selected minerals

	Specific gravity	Magnetic susceptibility
Ilmenite	4.6-4.8	Moderate
Magnetite	5.2	High
Apatite	3.2	Low
Feldspar	2.5-2.9	Low
Quartz	2.7	Low

13.2 Metallurgical trials

13.2.1 Flowsheet development testwork

Various trials were conducted in support of early flowsheet development to investigate the performance of a number of conceptual flowsheets using material sourced from different geological domains within the Goondicum deposit. While the results from the testwork have largely been superseded by recent actual plant performance they provide detail relating to the operating boundaries and expected mineral recoveries.

The following is a brief account of the testwork programs undertaken as part of the metallurgical process development.

2001 Mineral Technologies testwork: Flowsheet confirmation for ilmenite recovery and investigation of by product recovery (Report MS.01/80354/1 Rev 4.0 - 8 April 2005)

Early on in the development of the project three individual lithological units were identified; claysand (CS), colluvium (CV) and decomposed gabbro (DG) (Refer to Section 7). As part of the initial test work program samples of material representing the three lithologies from the Goondicum deposit were submitted to Mineral Technologies for metallurgical testwork. The primary objective of the testwork was to confirm the process flowsheet for ilmenite recovery and to investigate the production of olivine, feldspar and apatite by-products. The work program also included scrubber and slimes processing testwork.

The results of the trials showed that both CS and DG material could be beneficiated using an appropriate spiral flowsheet provided the material was thoroughly scrubbed and deslimed to maximise product recovery. Overall VHM recoveries of 98% and 91% for the CS and DG material respectively were reported. The gravity concentrate was then processed through a series of magnetic separation stages incorporating a LIMS and WHIMS.

Flotation tests were conducted to investigate the production of an apatite product and demonstrated that an apatite product could be produced containing 40.4% P_2O_5 at a yield of 2% from DG and 1% from CS. The flotation circuit tailings stream was magnetically fractionated and hot acid leached to produce a feldspar product at yield with respect to the original feed 18% for the DG and 6% for the CS.

The testwork program concluded that with full dispersal of the feed material the recovery of CS ilmenite would be 90% at a grade of 48.9% TiO_2 while the recovery of DG material would be 81.8% at a grade of 46.4% with respect to 'ilmenite' in the feed. The grade and recovery of the DG material was also subject to rejection of composite ilmenite grains by gravity and magnetic separation.

2005 MT testwork: Ilmenite regrind flowsheet development (Report MS.05/81141/1 Part 1 – 8 April 2005)

Testwork was done by Mineral technologies to assess the benefit of grinding using samples of spiral concentrate generated from CS and DG feed material. The results showed that in order to meet a 0.13% P_2O_5 target for the ilmenite, the WHIMS magnetic fraction would need to undergo grinding. The liberation analyses showed that grind sizes of 100% passing 125micron for the DG ilmenite and 180micron for the CS ilmenite would be sufficient to liberate the contaminants. TiO_2 recoveries of 67% and 82% were achieved for the DG and CS ilmenite respectively with total yields to product ilmenite of 53.7% and 67.1% with respect to the DG and CS ilmenite feed samples.

2005 Mineral Technologies testwork: Ilmenite recovery determination (Report MS.05/81141/1 Part 2 – 8 April 2005)

Four drums of rougher spiral feed from CS and DG material were submitted to Mineral Technologies for mineral recovery work. The material was deslimed (-53micron) and passed through two and three stage gravity separation spiral circuits. The spiral concentrates were then subjected to magnetic separation on a LIMS followed by WHIMS. Based on the results of a previous test the WHIMS magnetic fraction of the DG material was ground to 100% passing 125micron before magnetic separation.

The recoveries were determined using the Monto Minerals feed assay method with reported ilmenite recoveries of 77% for CS and 117% for DG. The high recovery of ilmenite for the DG sample was attributed to grinding of the material to -125micron releasing liberated composite ilmenite grains which would have been lost during the standard laboratory procedure. It was believed that the yields could have been further increased by recirculating some of the streams, as would be the case for a full size flowsheet.

2005 MT testwork: Apatite development (Report MS.05/81142/1 Part 2 – 13 April 2005)

Tests were carried out to investigate the recovery of an apatite product using concentrate samples provided by Monto Minerals (Spiral con and non mag, Mid and non-mag). Shaking table tests carried out on coarse and fine size fractions of the CS material showed that approximately 80% of the apatite could be recovered to a product assaying 30% P_2O_5. Although the separation performance of the shaking tables was high their relatively low capacity would require a large number in the plant so a series of trials was conducted using MG4 spiral separators. The results of the spiral separator trials showed that a near grade (>30% P_2O_5) product could be produced. By recirculating the middlings fraction apatite recoveries across the spirals for the medium size fraction reached 90% removing the need for shaking tables on the medium size fraction (d_{50} 131micron). Overall the trials showed that a target grade of >30% P_2O_5 could be achieved from CS and DG material at high recoveries in the range of 80% to 85%.

2005 MT testwork: Process flowsheet integration (Report MS.05/81143/1 – 22 April 2005)

A testwork program conducted by mineral technologies in 2005 was used to finalise the ilmenite flowsheet. The flowsheet design incorporated spirals, LIMS and WHIMS stages as well as grinding to produce a final product. The testwork showed that the CS material did not require grinding to produce a product that complied with the specifications but would be required for the DG material. The yields from the testwork were compared with ilmenite determined by the standard laboratory technique. The ratio of the yields was 1.17 for the DG material and 0.77 for CS material. The high overall yield of the DG material was attributed to liberation of ilmenite contained in composite grains during grinding that would have been lost to tailings during laboratory sample processing.

2009 MT testwork: Mineralogy by Magnetic Separation of Scrubbing Tests for Recovery Determination (Reports 09/81947/1, 09/81974/1, 09/81976 - April 2009)

Scrubbing tests were done using samples of material representing various ore types from the Goondicum deposit including claysand (CS), colluvium (CV) and decomposed gabbro (DG). The results showed that approximately 25% of the material fed into the scrubber reported to the +2mm oversize after 1 minute of scrubbing with little improvement for significantly increased scrubbing times. A mineralogical investigation showed that ilmenite and apatite recoveries to the undersize were only slightly better than the mass recovery prompting further work to investigate methods to reduce losses of valuable heavy mineral to scrubber oversize. The results of the follow-up testwork demonstrated that there was a significant improvement in the scrubbing process (mass yield to oversize) with the addition of rocks as a scrubbing medium.

2012 MT testwork: Metallurgical Testwork to Evaluate the Potential to Produce an Ilmenite Marketing Sample (Report MS 11/82460/1)

A testwork program was conducted to evaluate the potential production of an ilmenite product using a prepared sample of 'CS Natural Ilmenite' from the Goondicum deposit. The results showed that a combination of wet screening (180micron), grinding and wet high intensity magnetic separation was capable of producing of a final concentrate meeting the target grade of >48.5% TiO_2 and <0.15% P_2O_5. The flowsheet employed screened the sample at 180micron with the undersize processed over a wide rotor WHIMS. The oversize underwent grinding in a ball mill followed by wet screening at 180micron with the oversize recirculated back to the mill and undersize fed into a wide rotor WHIMS. The magnetic fractions from the WHIMS were combined to generate a final ilmenite product.

13.2.2 Monto 2004 pilot plant

Monto minerals operated a pilot plant in 2004 to demonstrate the processing concept. The performance of the run was described by Mr B Graves in the Roche Mining report (MS.05/81143/1) as follows:

"The Monto pilot plant run in February to June 2004 was a qualified success in that it demonstrated that feldspar, ilmenite, apatite products suitable for market could be produced. The feldspar product was processed through the HAL plant at Dinmore and the product was used successfully for glass manufacture. The apatite was suitable for the market as envisaged.

The operation of the plant also indicated that the process was generally successful and showed that the operation could not be considered as a 'mineral sand' process. The outcome was that combined with the test program at the Roche facility a suitable process flowsheet has been developed.

A large number of negative features were identified in the pilot plant mechanical and process design that are to be avoided in the production plant.

However, as a result of the inconsistencies in the operation of the plant it is not practicable to write a comprehensive report on the operation."

13.3 Operating history

The Goondicum plant has been operated on a number occasions since it was built in 2007 and on all occasions successfully demonstrated that final products could be produced from the Goondicum mine. A number of valuable lessons have been learnt since the plant was first commissioned and prompted the implementation of various improvements into the plant design and operating practice. The following is a brief account of the operating history since the plant was started up in 2007.

13.3.1 Monto Minerals October 2007 to June 2008

The Goondicum mineral sands mine and processing plant was commissioned in late 2007. Frequent plant stoppages and periods of operation at low throughput, however, meant that the processing plant was not able to sustain the design production rates with overall plant utilisation rates reportedly ranging from 20% to about 60% at times. More consistent operation was not achieved until April 2008 but even then was well below design throughput rates. Eventually the operation was placed into voluntary administration in August 2008 by Monto Minerals.

During the 9-month period of operation the plant produced 14,000tonnesof ilmenite, 5,200tonnesof apatite, 9,900tonnesof feldspar and 4,000tonnesof titanomagnetite.

The primary reasons for difficulties experienced by the operation according to the 2009 Stanmore report included:

- Lack of real understanding of the physical and mineralogical attributes of the material being processed leading to a grossly under designed Feed Preparation Plant (FPP). This resulted in the slurried feed being fed to the Wet Concentrator Plant (WCP) being of unsuitable quality and consistency. The WCP ever only achieved 40% of design throughput.
- Lack of effective process monitoring and control systems in the WCP that resulted in poor control of the process and final product outcomes.
- General undercapitalisation resulting in poor engineering and decision making throughout the project.
- The global financial crisis made it very difficult to source the additional capital required to rectify the engineering and design shortcomings.

The production data reported for the period is shown in *Table 13.2*.

Table 13.2: Production statistics April 2008 to August 2008

Parameter	Production (tonnes)
Spiral feed	86,368
Ilmenite product	9,883
Apatite product	3,846
Raw feldspar product	7,021
Titanomagnetite product	2,650

Mineral recoveries for the products were calculated using production data and measures of spiral feed mineral content.

Table 13.3: Reported recoveries

Parameter	Ilmenite (%)	Apatite (%)
May '08	75	76
June '08	81	70
July '08	70*	69
August '08	83	82

*Notes: * Low recovery due to operating WHIMS at low current to improve grade*

At the time of the initial start-up, the laboratory procedure used to determine mineral content, reported recoverable product content with the above mineral recoveries represented on that basis. The inclusion of large proportion of DG material in the plant feed would have increased the yield due to the liberation of ilmenite from composite grains that would not have reported to the ilmenite product using the laboratory assay procedure at the time.

The apatite product included material that, due to small amount of adhering magnetic material, was not analysed in the laboratory separation process as apatite but reported to the apatite product without dropping the product specification below 30% P_2O_5.

13.3.2 Belridge – August 2012 to May 2013

Upon acquiring the shares in Monto Resources Pty Ltd on 1 May 2009 the Company's name was changed to Belridge Enterprises Pty Ltd. Being aware of the previous short comings of the processing plant, the company continued with a redevelopment program which they had started in January 2009. The primary objectives of the redevelopment program were to understand the geological, physical and mineralogical aspects of the feed so that throughput, recovery and product quality could be improved. As much of the existing equipment as possible was to be used and the throughput was to be designed to maximise use of the existing infrastructure (water and power). In the process, the flowsheet was simplified and the plant reconfigured to exclude the production of feldspar. The upgraded design would see the feed rate to the plant increase to approximately 3.5 million tpa (468tph and 7,500h uptime).

The expected yields and quality for the redeveloped project were reported in the Stanmore Redevelopment 2009 report.

Table 13.4: 2009 Redevelopment forecast yields and quality

Description	CS Ore (%)	DG ore (%)	Calculated Blend 34:66 (%)
Ore mined Grades			
5A mag portion (ilmenite)	8.41	6.12	6.90
Apatite	1.90	1.90	1.90
Titanomagnetite	3.10	3.10	3.10
WCP recoveries			
Ilmenite	80	60	68.3
Apatite	85	85	85.0
Titanomagnetite	47.5	47.5	47.5
			Calculated yield (%)
Ilmenite			4.71
Apatite			1.62
Titanomagnetite			1.47

Assuming a 500tph feed rate to the feed preparation plant the annual production levels were estimated at the time and are shown in *Table 13.5*.

Table 13.5: 2009 Redevelopment expected production levels

Description	Tonnes	Yield (%)	From spiral feed (%)
Raw feed	3.75Mt	100	
Spiral feed	1.50Mt	40	100
Ilmenite product	~188kt	5.0	12.5
Apatite product	~68kt	1.8	4.5
Titanomagnetite product	~56kt	1.5	3.75

Using the above production estimates as a basis the recoveries were calculated as:

- Ilmenite: 73%
- Apatite: 95%

The product specifications were based on previous test results and past production:

Ilmenite: >48.5% TiO_2, <0.15% P_2O_5

Apatite: >30% P_2O_5

After the upgrades to the processing equipment and reconfiguration the plant was re-commissioned in August 2012 at a 250tph feed capacity. This time the plant operated for 10 months before being put on care and maintenance due to declining market prices. During this period of operation approximately 650,000tonnesof dry ore was processed to produce 47,425tonnes of ilmenite and 2,769t of apatite product.

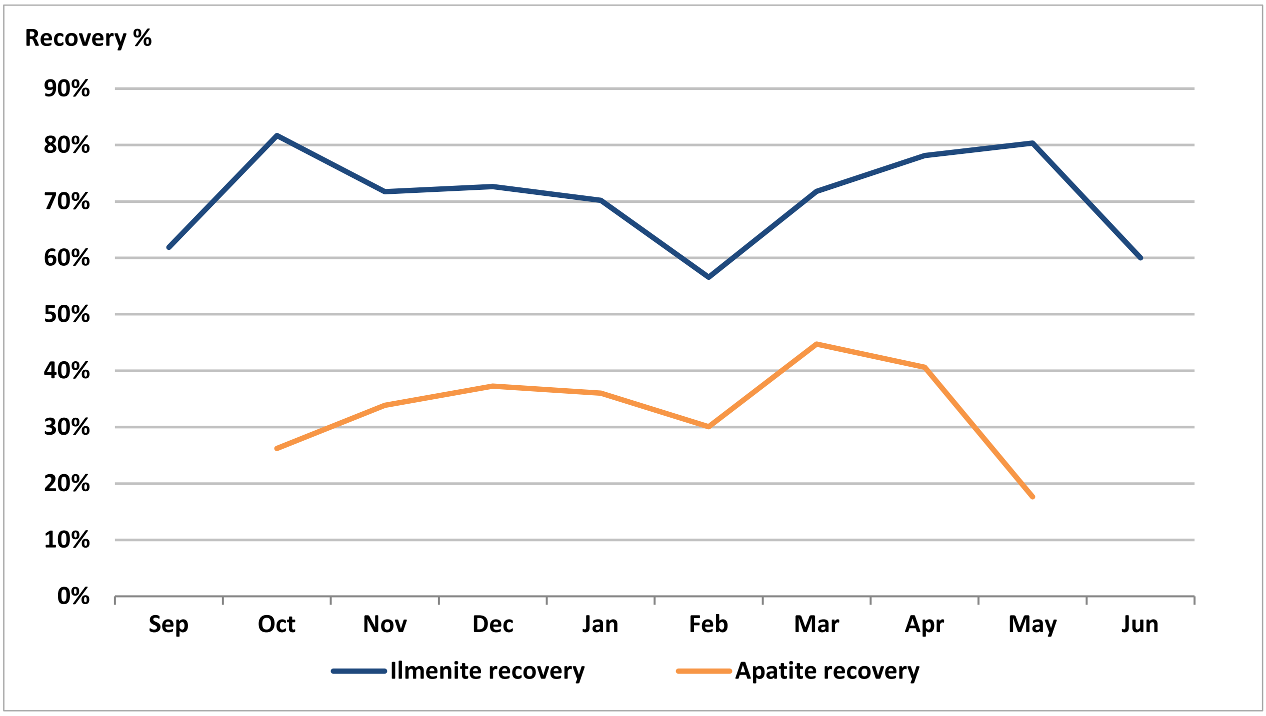
Table 13.6 shows the production figures reported for the operating period from September 2012 to June 2013.

Table 13.6: 2012-2013 Production performance

Parameter	Unit	Production
Ore processed (wet)	t	762,946
Ore feed moisture	%	13.94
Ore processed dry	t	656,718
Ore stockpile (dry)	t	20,000
Mined ore (Processed +stockpile)	Dry t	676,718
Ore head grade	% ilm	10.0
Ilmenite produced	t	47,425
Apatite produced	t	2,769

According to the metallurgical accounting data for the period of operation, the ilmenite recovery averaged 72%, ranging from 57% and 80% while the apatite recovery averaged 30% ranging from 18% to 45% on a month to month basis, see *Figure 13.1*. At that time the apatite circuit had not been optimised and was designed to only extract a portion of the apatite.

Figure 13.1: Actual 2012/2013 ilmenite and apatite recovery data



The average grades of the products produced were:

Ilmenite: 48.7% TiO_2, 0.22% P_2O_5

Apatite: 32% P_2O_5

13.3.3 Goondicum April to July 2015

In 2015 Goondicum Resources completed an additional plant upgrade for a total cost of A$7.6 million which saw the plant capacity increase by 50% to 375tph of dry feed. Also following on from previous operational difficulties experienced the scrubber capacity was doubled and a 700tonnesconstant density tank added ahead of the wet concentrator plant to improve plant performance and availability by ensuring a consistent supply of constant density feed to the wet concentrator plant. Work also began on the construction of the new eastern access road linking the mine with the port at Gladstone which reduced the product haul distance by 100km.

Planned production capacity was for 17,000tonnesof ilmenite per month at a budgeted recovery of 80%.

The plant was commissioned and operated briefly from April to July 2015 at which point it was placed on care and maintenance due to operations becoming uneconomic at the ramp-up production rate. During the four-month period the mine processed approximately 300,000tonnesof feed to produce 20,000tonnesof ilmenite and 2,500tonnesof apatite.

Mineral Technologies Pty Ltd completed a metallurgical review of the operations for the period to reconcile plant operating data with that of estimates of ore processed from the mining geological data.

Key outcomes of the MT review were:

- Initial start-up issues related to equipment failures, poor instrument calibration, and operator inexperience impacted the early process performance and has resulted in some lost or corrupted data which prevents a highly definitive audit to be resolved.
- Poor instrumentation calibration at start-up (April through to end May) prevented a definitive mass balance and reconciliation for the entire period of operation through to end July from being resolved.
- Notwithstanding, there is reasonable evidence from the basic SCADA data that, over the period in question, around 290,000 dry tonnes of ore was processed through the Goondicum FPP and WCP circuits, producing at least 17,500 tonnes of ilmenite product.
- The slimes (-53µm) content of the ore was found to be approximately 32%.

Based on the plant data available at the time the averaged key plant performance parameters during this time were determined by Mineral Technologies and reproduced in *Table 13.7*.

Table 13.7: 2015 plant operating metallurgical performance parameters

Plant area	Units	FPP	WCP	Overall
Utilisation	%	66	66	66
Feedrate	dry t/h	273	124	273
Head grade	% ilmenite	10.5	22.4	10.5
Slimes content	%	32	2	32
Product rate	Dry t/h	124	16	16
Product grade	%ilmenite	22.6	98.8	98.8
Mass recovery	%	44	13	6
Ilmenite recovery	%	93	57	53

Analysis by Mineral Technologies suggested an average ilmenite recovery of 53%. This was considerably lower than expected and according to the review was likely due to the apparent loss of +53micron material to the thickeners resulting in a commensurate loss of recoverable ilmenite product. The high WCP losses were attributed to unliberated particles reporting to non-mags and/or spiral tails. Losses to the apatite circuit and to sump overflows were not quantified.

Given the reported instrumentation calibration issues and the fact that plant was still in the process of being commissioned, the recovery data reported is not believed to be representative of optimised plant performance. The operating data reported by Goondicum Resources in the management reports was reviewed by TZMI to determine the ilmenite and apatite recovery factors for June, the month with the highest plant utilisation. Ilmenite and apatite recoveries have been estimated assuming a head feed grade of 10.9% ilmenite and 1.41% apatite which were based on the mine schedule. The averaged plant performance data is summarised in *Table 13.8*.

Table 13.8: June 2015 Metallurgical Performance Parameters

Period	Dry ore processed (tonnes)	Ilmenite produced (tonnes)	Apatite produced (tonnes)	Ilmenite recovery (%)	Apatite recovery (%)
June 1st to June 30th	130,031	11,910	1,112	60	64

13.4 Conclusions

Based on the available testwork program results and plant performance from the brief periods of operation the following key comments can be made:

- Good TiO_2 grade and high recovery was usually achieved when processing predominantly CS material.
- The results of testwork demonstrated that there was a significant improvement in the scrubbing process (mass yield to oversize) with the addition of rocks as a scrubbing medium.
- Poor recovery of the <75micron apatite streams on traditional spirals demonstrated the need to include shaking tables in the apatite circuit to maximise apatite recovery.
- Grinding of the DG material is required to liberate the ilmenite grains.
- There is a notable change in plant performance (FPP throughput and WCP product recovery) for various incoming blend ratios of CS, CL and DG material. The current mine plan makes provision for feeding of CS and CL material only and is expected to have a positive impact on the ilmenite recovery at the WCP. The increased ore slimes content will be mitigated by the dual scrubbing units and addition of rocks into the FPP feed to assist with deagglomeration and liberation of the slimes.

More details of mineral recovery are included in *Section 17.0*.

14.0 Mineral Resources Estimates

The resource estimates for both the ML and the MLA were prepared using Ordinary Kriging ('OK') in the Micromine software package. H&SC considers OK to be an appropriate estimation technique for the type of mineralisation and extent and nature of the available data. The resource estimation includes internal mining dilution. The resulting models were loaded into the Surpac mining software for resource estimate reporting and to facilitate any transition to future mining studies.

14.1 ML estimates

14.1.1 Composite data

Using the 2009 drilling data samples were composited to 1metreintervals within the mineralised zones with a minimum composite length of 0.5m. Each composite sample was assigned to the CL, CS_H, CS_L or DG zones. For the purpose of modelling the CL, CS_H and CS_L data were combined with the SL sample and treated as part of the CS unit. The DG unit contained the occasional GA (fresh gabbro) sample; both were treated as one unit.

A total of 2,430 composites were generated for the slimes and apatite mineralisation but because of the Clerici testwork only 977 of the intervals contained 'available ilmenite' data. These numbers do not match exactly with the numbers presented in *Section 12.2.1* because the down hole data was composited. A hard boundary was used to differentiate the CL-CS_H units from the CS_L-DG units for the available ilmenite and slimes modelling. The available ilmenite data was modelled without any recoverable ilmenite factor applied. This was accommodated as an additional field in the block model.

Four available ilmenite plan maps showing the data distribution and grades (of the uppermost sample) for the CL, CS_H, CS_L and DG units are shown in *Figure 14.1*, *Figure 14.2*, *Figure 14.3* and *Figure 14.4* respectively. There is a fairly even distribution of grade with no obvious high grade zones within any of the four lithologies. However, it is quite obvious that the CL and CS_H are markedly higher in ilmenite grade than the CS_L and DG. The SW corner of the deposit contains lower ilmenite grades in the CS_H unit, also possibly extending into the CL unit. The SE Quadrant area, particularly for the DG, contains lower grade material believed to be due to the underlying variation in the host gabbro reflecting the arcuate zonation associated with the curved margin of the original intrusive phases. There is little CS_H or CS_L material in this quadrant.

Figure 14.1: ML Composite data available ilmenite CL Unit

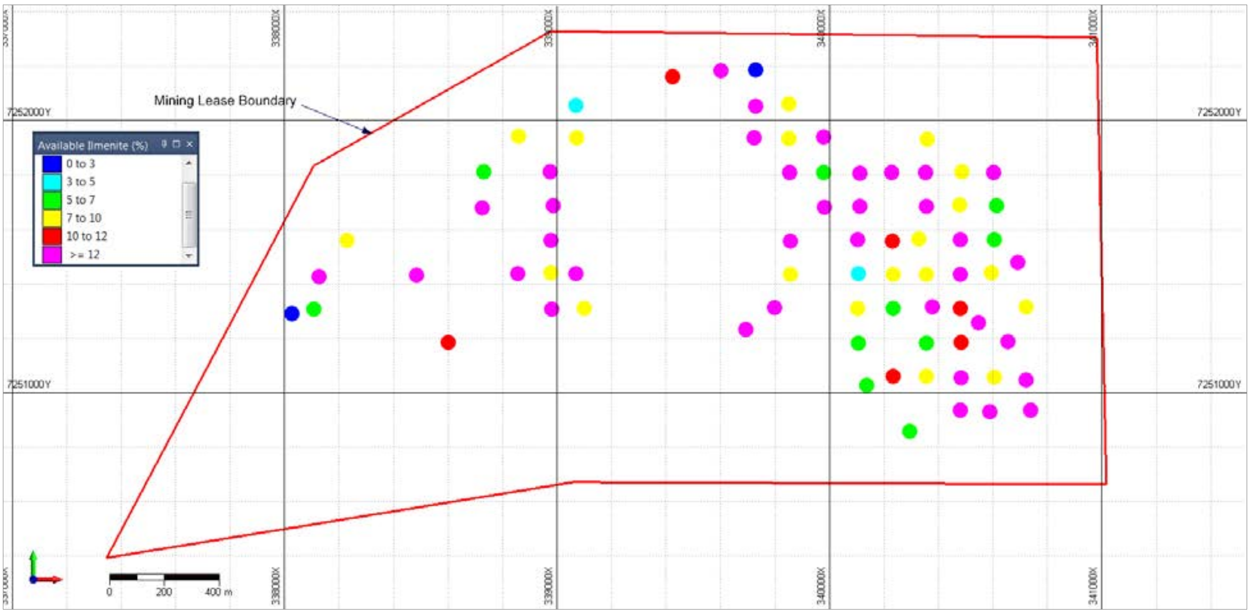


Figure 14.2: ML Composite data available ilmenite CS_H Unit

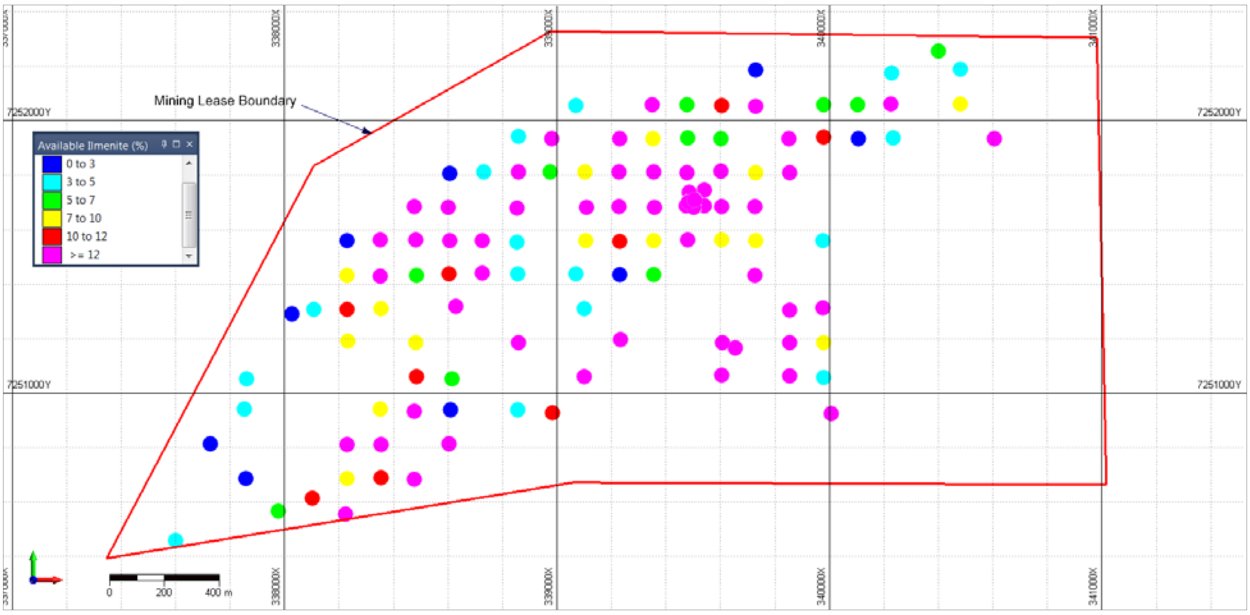


Figure 14.3: ML Composite data available ilmenite CS_L Unit

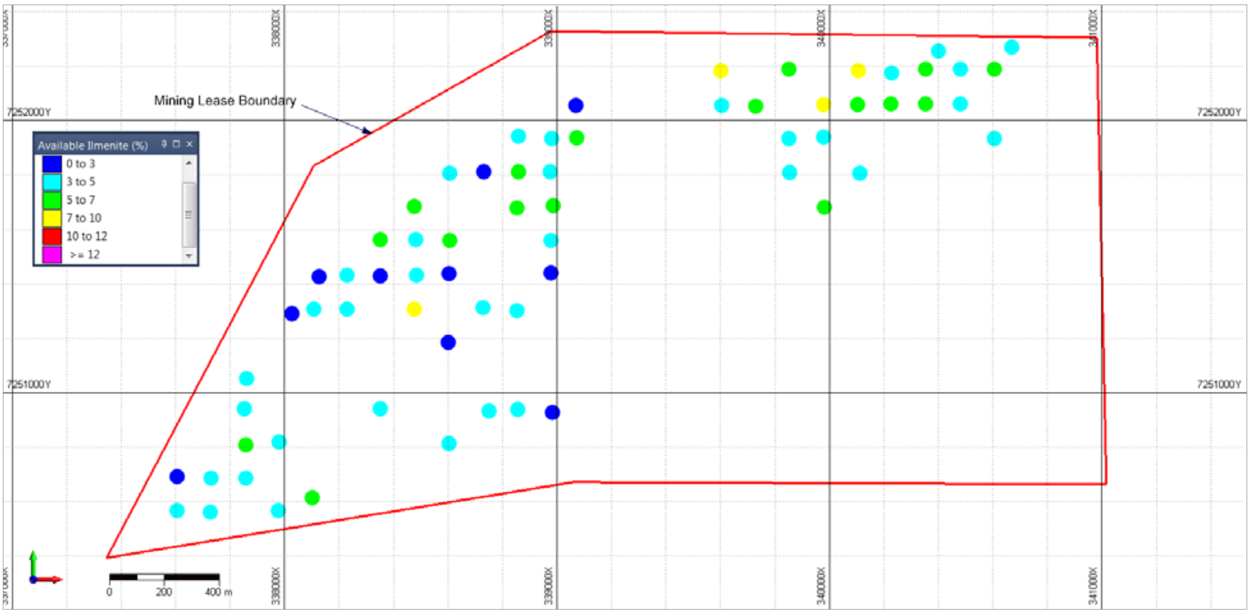
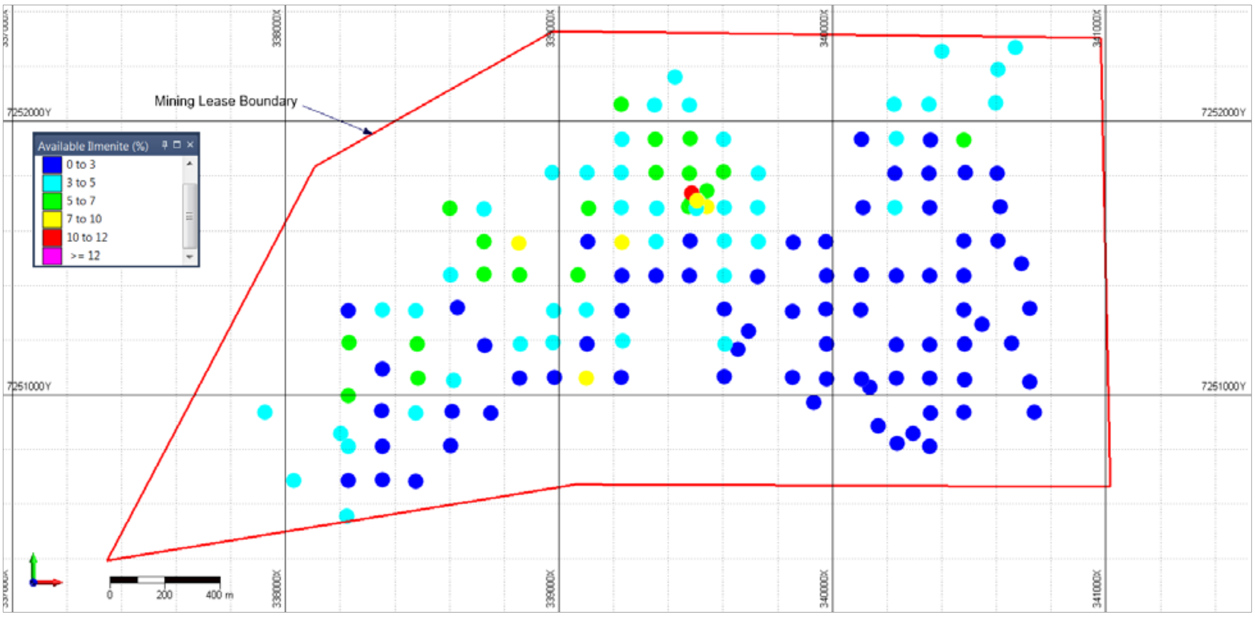


Figure 14.4: ML Composite data available ilmenite DG Unit



The DG zonation has some pattern similarities with the magnetic image of *Figure 7.2*.

For apatite the composite data clearly indicates two, possibly three populations for the area of the intrusive. The SE Quadrant of the ML area is considerably lower grade for both the DG (*Figure 14.5*) and the overlying CL (*Figure 14.6*), with a suggestion of a similar data pattern for the CS_H in *Figure 14.7*; there is no CS_L in this area (*Figure 14.8*).

Figure 14.5: Composite data DG Unit apatite

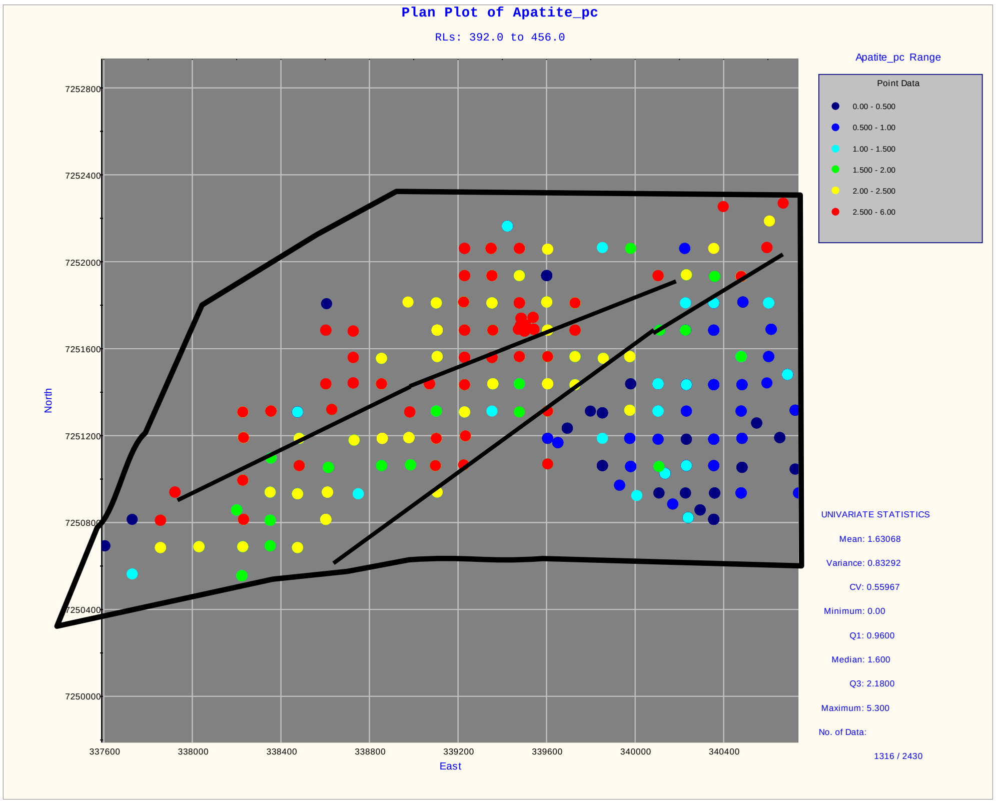
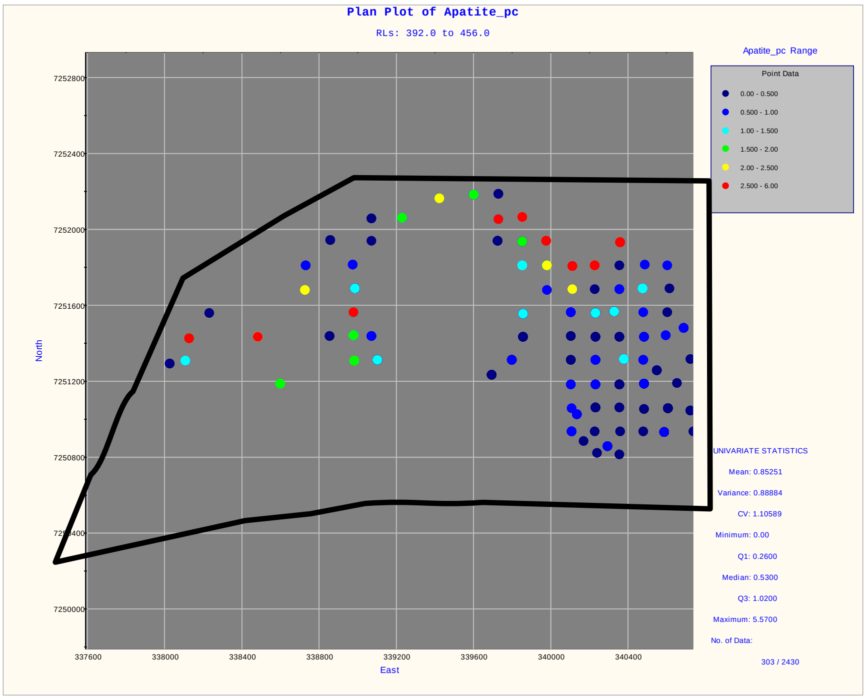


Figure 14.6: Composite data CL Unit apatite



The CS_H composite data also seems to indicate a narrow, low grade periphery to the northern margin of the gabbro, indicating the boundary of the mineralisation to the north (*Figure 14.7*). A rather diffuse bounded higher grade zone appears to exist on the Gabbro margin in the CS_H unit adjunct to the northern boundary and may signify a remanent primary apatite concentration pattern. This high grade zone is demonstrated in the CS_L data despite the limited amount of data.

Figure 14.7: Composite data CS_H Unit apatite

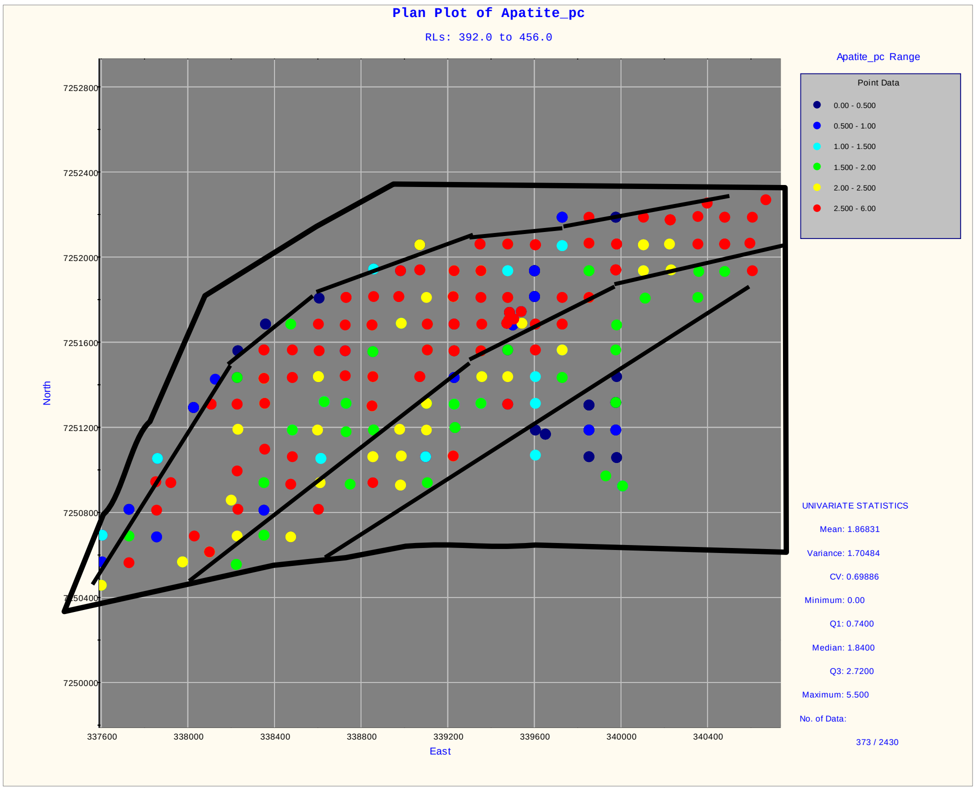
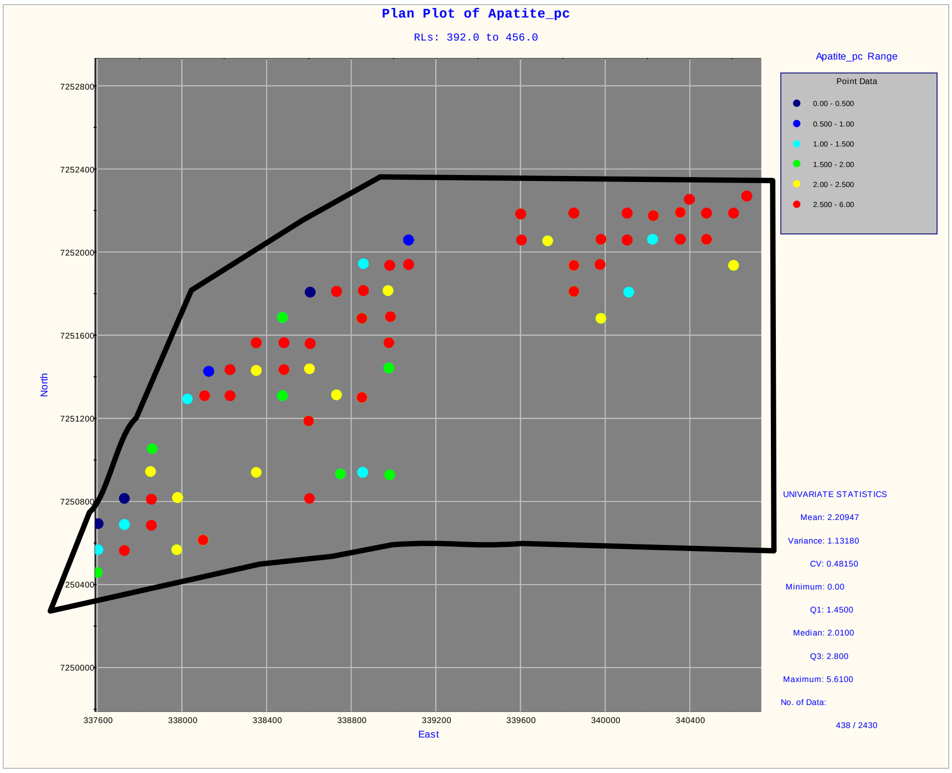


Figure 14.8: Composite data CS_L Unit apatite



The slimes for the CL (*Figure 14.9*) and CS_H (*Figure 14.10*) show widespread high grades with no particular zonation related to the mineralogy of the gabbro, the spatial arrangement of grades possibly reflects the interaction of topography and drainage. The CS_L (*Figure 14.11*) and DG (*Figure 14.12*) show low slimes grades with no particular zonation.

Figure 14.9: Composite data CL Unit slimes

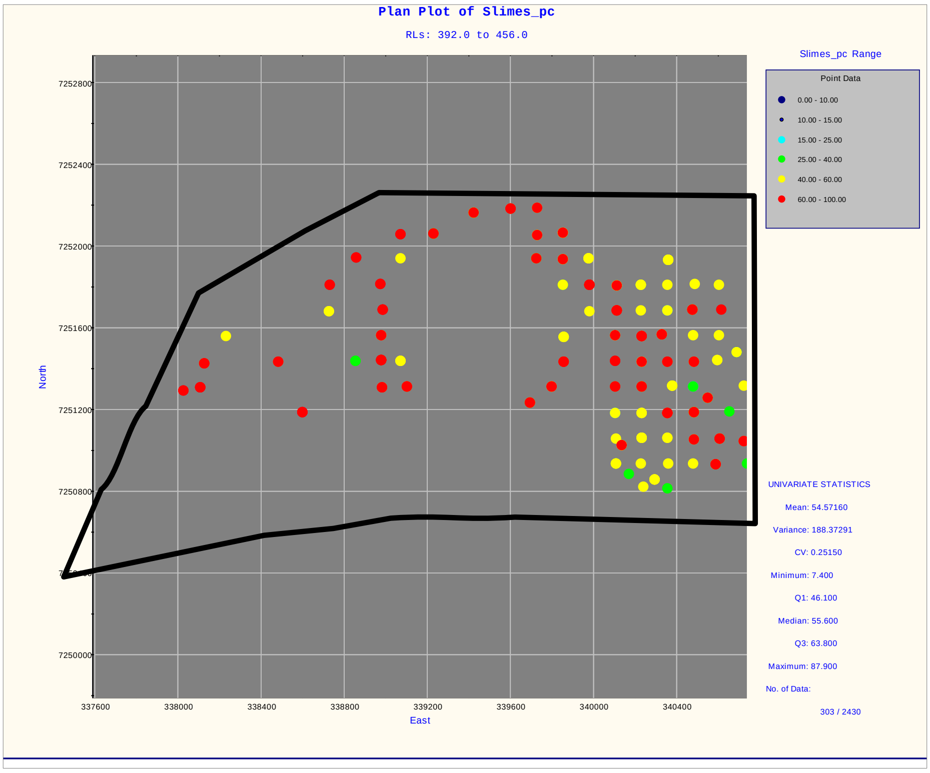


Figure 14.10: Composite data CS_H Unit slimes

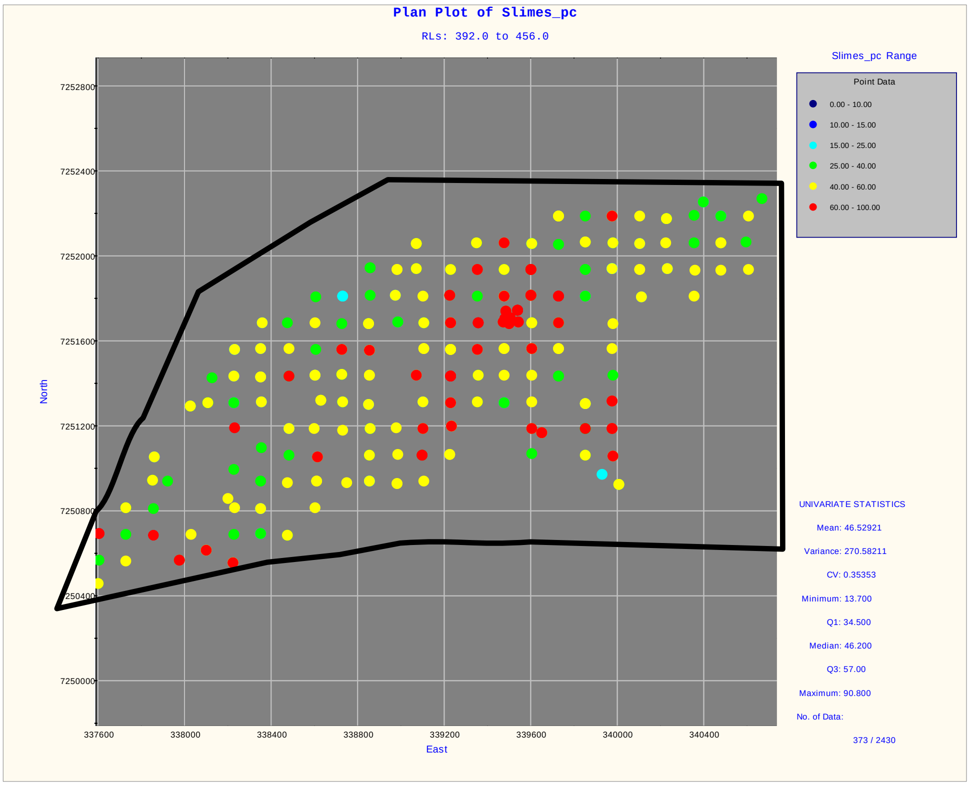
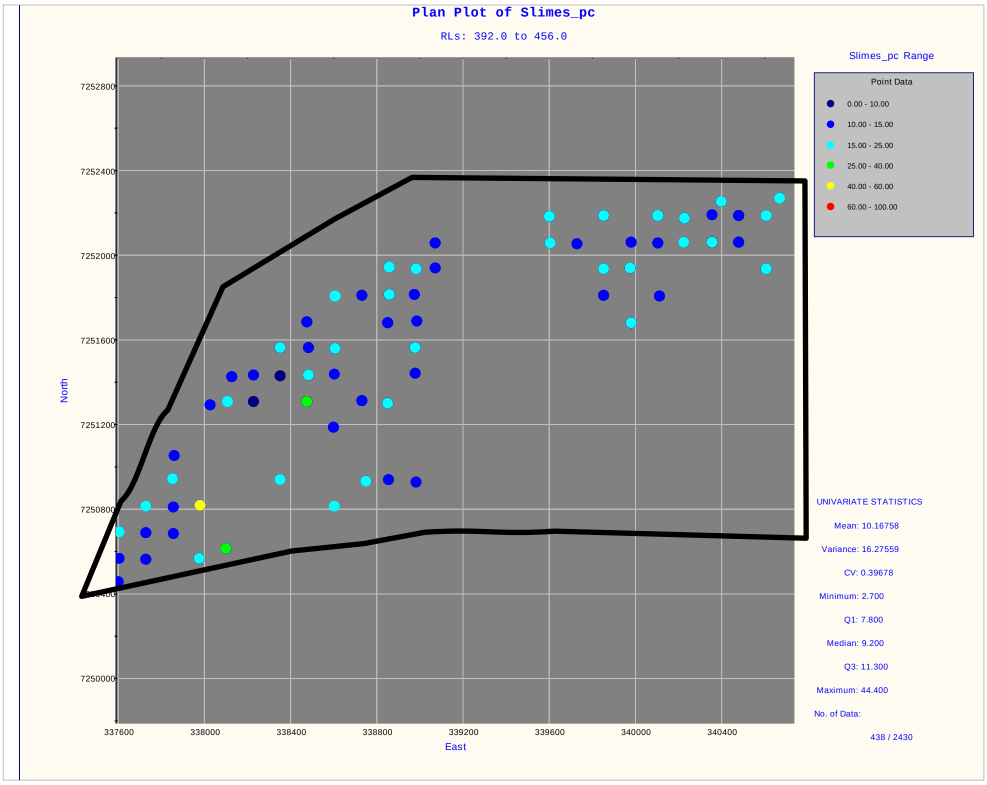


Figure 14.11: Composite data CS_L Unit slimes



The areas of raised slimes content in the DG data is in part a reflection of the sample cutting across the CS (as CS_H)-DG lithological boundary.

Figure 14.12: Composite data DG Unit slimes

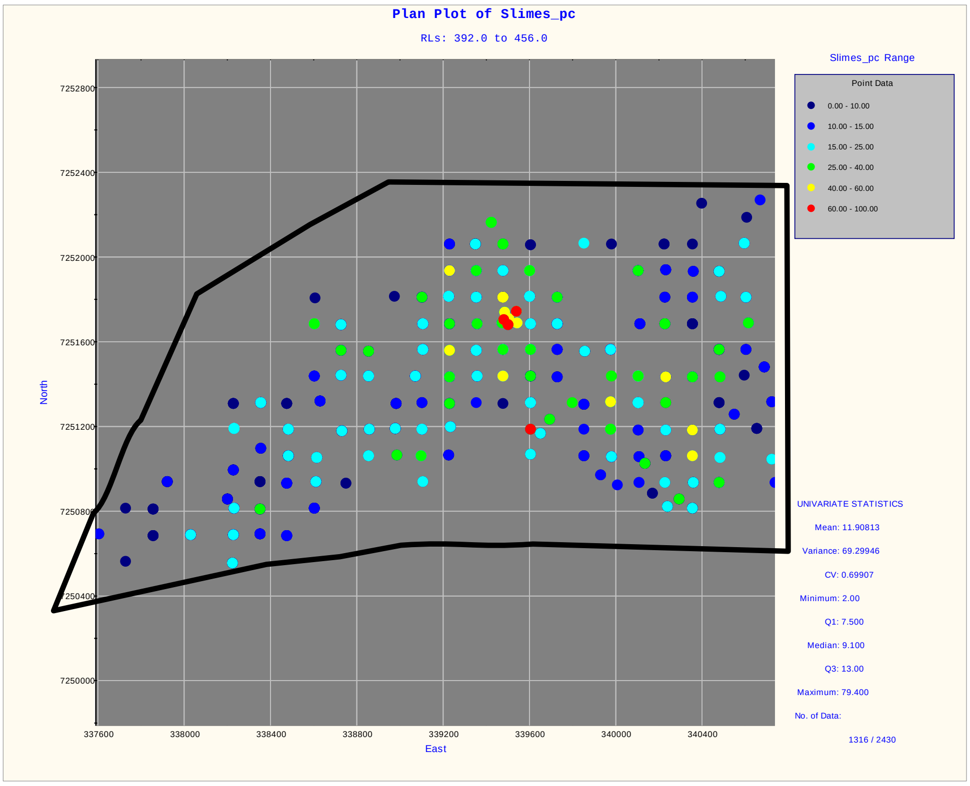
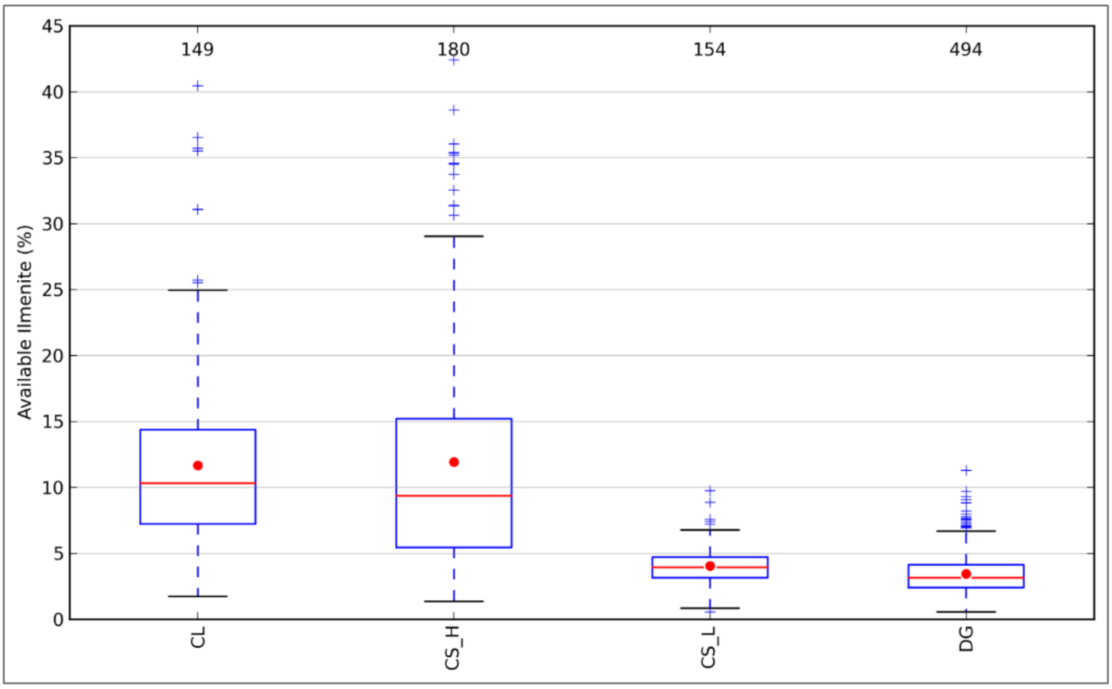


Figure 14.13, *Figure 14.14* and *Figure 14.15* show box plots of the available ilmenite, apatite and slimes composite grades for each zone. The CL and CS_H grades are similar but very different from the CS_L and DG grades for both available ilmenite and slimes but for apatite the main CS_H, CS_L and DG units show similar distributions. There is potential mis-logging in the DG slimes as there are a considerable number of outliers. This could be addressed if further modelling is undertaken.

Figure 14.13: Box Plot of available ilmenite composite grades by lithology



(Box plots show the distribution of composite data; interquartile range lies within the box, with the median marked by the red line. Minimum and maximum values (not including outliers) are covered by the whiskers. Outliers are marked by the blue crosses. The red dots denote the mean. The top row of numbers represents the number of composites within each lithology)

Figure 14.14: Box plot of apatite composite grades by lithology

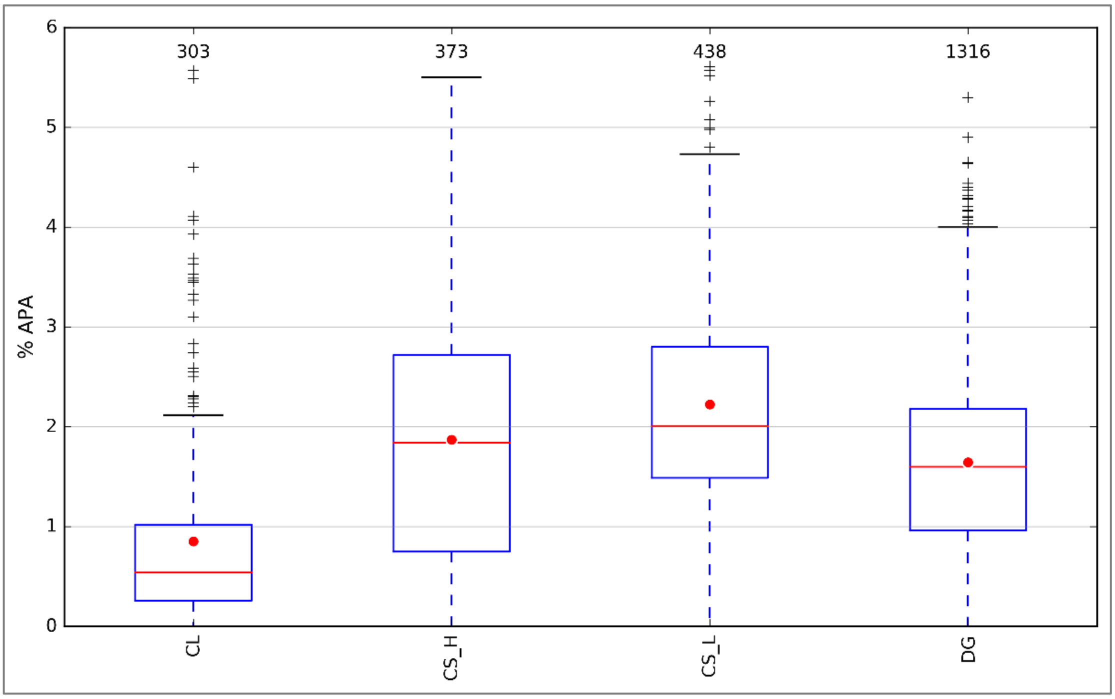
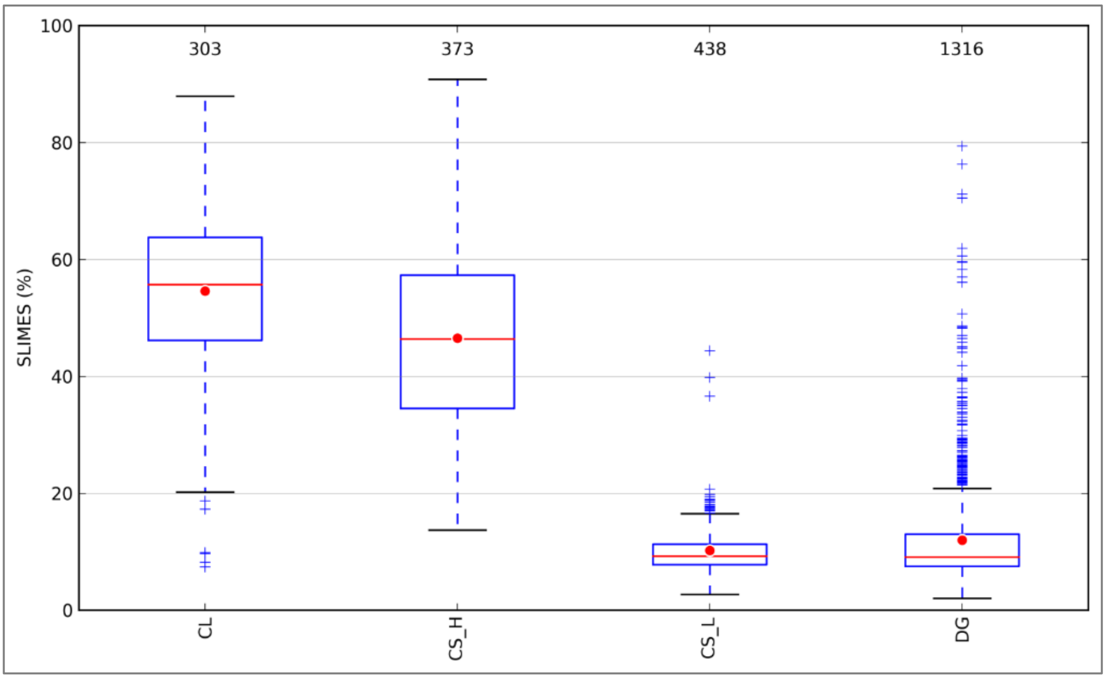
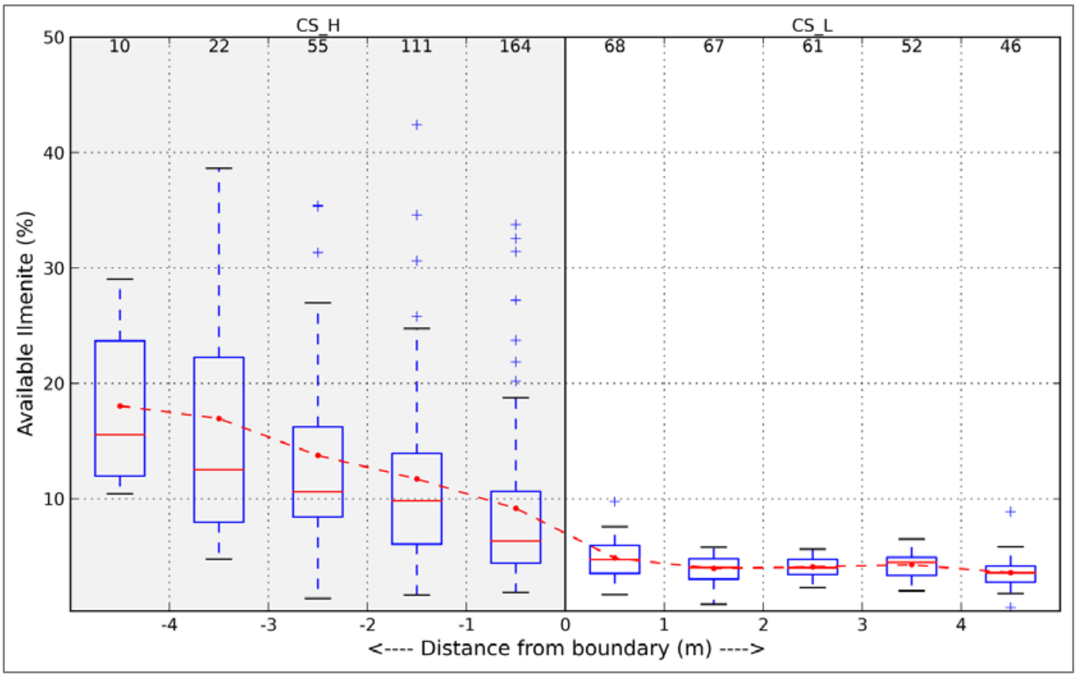


Figure 14.15: Box plot of slimes composite grades by lithology



A review of composite grade variations across the interpreted CS_H & CS_L boundary (*Figure 14.16*) indicates that the available ilmenite and slimes grades show a significant difference across the actual boundary. The available ilmenite in the CS_L unit is consistently low but the average increases steadily once into the CS_H unit (this may be due to a lack of segregation in the original sampling where CS_H and CS_L were not identified).

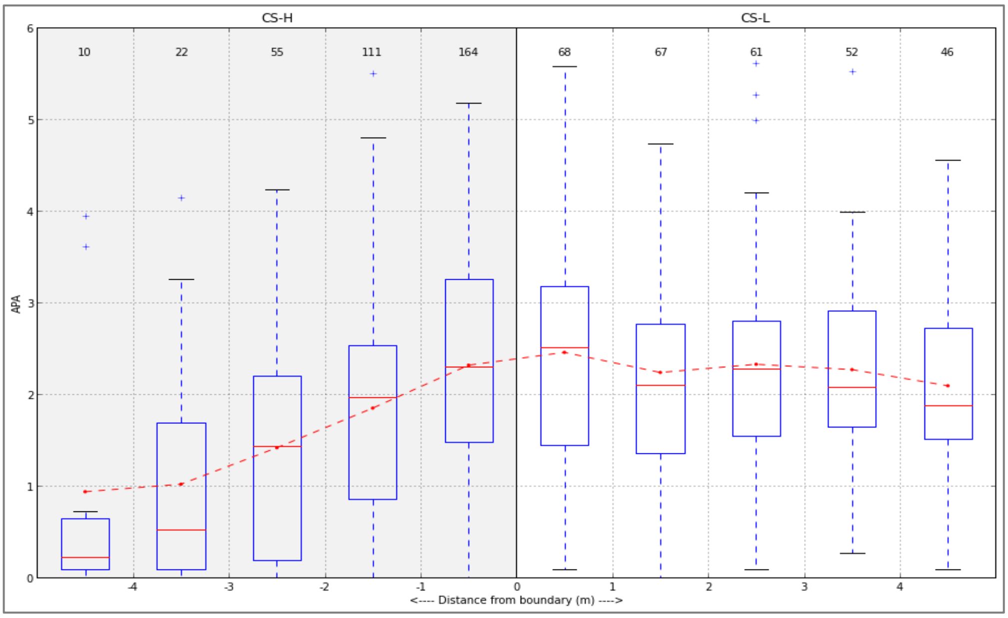
Figure 14.16: Box plot of available ilmenite grade variation across the CS_H - CS_L contact



(Box plots show the distribution of composite data; interquartile range lies within the box, with the median marked by the red line. Minimum and maximum values (not including statistical outliers) are covered by the whiskers. Outliers are marked by the blue crosses. The red dashed line marks the mean. The top row of numbers represents the number of points within each 1metre interval away from the contact)

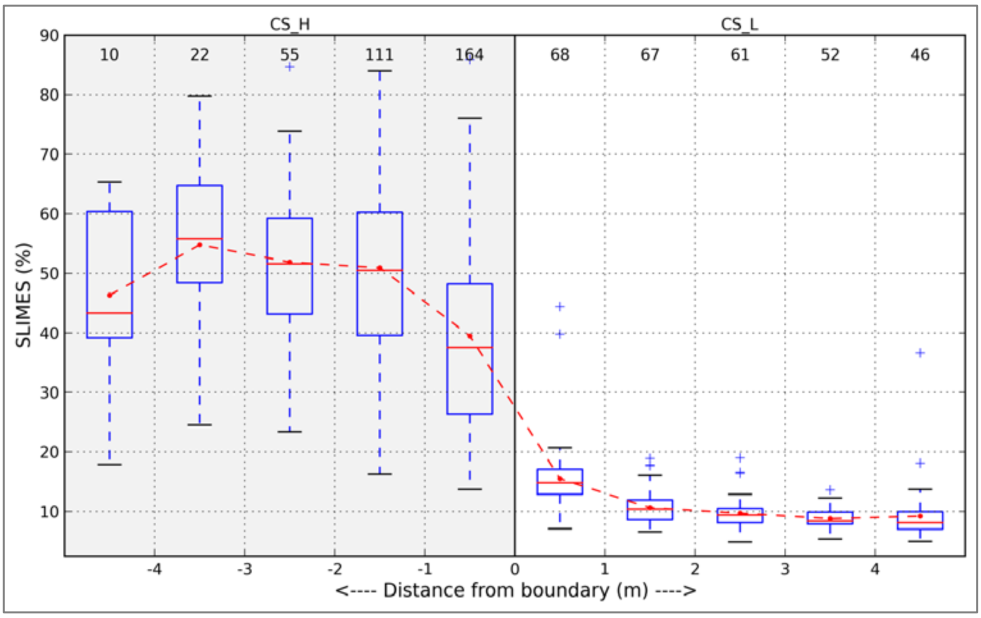
A review of the apatite composite grade variations across the interpreted CS_H & CS_L boundary (*Figure 14.17*) indicates that the apatite has no actual change across the boundary but there may be some form of subtle zonation in the CS_H with a gradual decreasing of grade away from the boundary.

Figure 14.17: Box plot of apatite grade variation across the CS_H - CS_L contact



The percentage of slimes shows a marked difference across the boundary indicating an abrupt change with no suggestion of any gradation (*Figure 14.18*). The base of CS_H was therefore treated as a hard boundary for the estimation of both available ilmenite and slimes.

Figure 14.18: Box plot of slimes grade variation across the CS_H - CS_L contact



The difference between grades of the CS_L and DG units was much less pronounced and therefore no boundary was used in the estimation for either available ilmenite or slimes between these two units.

14.1.1.1 Zone and domain characterisation

The geological domains from the sectional interpretation were based on a combination of the logging codes (modified after a 3D review with the lithology colour coding), the topographic surface and the ilmenite and slimes assays. The division for the CS unit into high and low slimes was based on a histogram review of the data which indicated a break at approximately 14% slimes (R. Dawney pers comm). Recognising that the relevant aircore sample for any lithology contact could have both lithologies present, geological sense was applied in the location of the lithological boundary within the drillhole.

Each lithological boundary in each hole tended to be a geological decision based on the available data. *Table 14.1* indicates the general definitions for the lithologies.

Table 14.1: Definition of geological domains

Lithology	Logging code	Ilmenite grade	Slimes	Colour
Colluvium	CL	Variable	>40%	Brown/Black
Clay Sand high slimes	CS_H	Variable	>14%	Red included
Clay Sand low slimes	CS_L	Variable	<14%	Red included
Decomposed Gabbro	DG	Variable	<14%	Yellow included

However, it is important to realise that there are discrepancies when trying to apply the above as a rigid set of criteria to the lithology definitions. Generally, the CL has high to very high slimes and low ilmenite, but this is not always the case. The decomposed gabbro has low slimes although in one or two instances significantly higher slimes were noted suggesting a different host unit. In these cases, the DG code was based on the lithology colour and so the coding was retained.

14.1.1.2 Univariate statistics

Summary statistics for the composite samples from the drilling, split by rock type can be seen in *Table 14.2*.

Table 14.2: Univariate statistics for composites

	CL Unit			CS_H Unit		
	Available ilmenite	Apatite	Slimes	Available ilmenite	Apatite	Slimes
Count	149	303	303	180	373	373
Mean (%)	11.7	0.85	54.6	11.9	1.87	46.5
Minimum (%)	1.7	0	7.4	1.4	0	13.7
Maximum (%)	40.5	5.57	87.9	42.4	5.50	90.8
Variance	48.2	0.89	188.6	78.1	1.71	270.9
Std Dev	6.9	0.94	13.7	8.8	1.31	16.5
CV	0.6	1.1	0.3	0.7	0.7	0.4
	CS_L Unit			**DG Unit**		
	Available ilmenite	Apatite	Slimes	Available ilmenite	Apatite	Slimes
Count	154	438	438	494	1316	1316
Mean (%)	4.0	2.21	10.2	3.4	1.63	12.0
Minimum (%)	0.5	0	2.7	0.6	0	2.0
Maximum (%)	9.8	5.61	44.4	11.3	5.30	79.4
Variance	2.0	1.13	16.4	2.4	0.83	70.3
Std Dev	1.4	1.07	4.0	1.6	0.91	8.4
CV	0.3	0.48	0.4	0.5	0.56	0.7

The low coefficients of variation ('CV') indicate that the data is not skewed and that Ordinary Kriging ('OK') is a suitable modelling method.

No top cuts were applied to the data as no extraordinary values were identified.

Figure 14.19, *Figure 14.20*, *Figure 14.21* and *Figure 14.22* contain histograms for the available ilmenite grade for the CL, CS_H, CS_L and DG lithologies respectively. There are suggestions of more than one population, particularly in the CS_H unit, but the composite plan figures above suggest that this observation is related to reasonably well defined host lithology variations rather than spatially overlapping populations. There is a clear difference between the grade distributions of the CL and CS_H units compared to the CS_L and DG units. The similarities in the CL-CS_H grade distributions as well as in the CS_L-DG grade distributions appear to suggest two similar datasets and negate the need for hard boundaries between the relevant composite sets.

Figure 14.19: Histogram of available ilmenite composites in CL unit

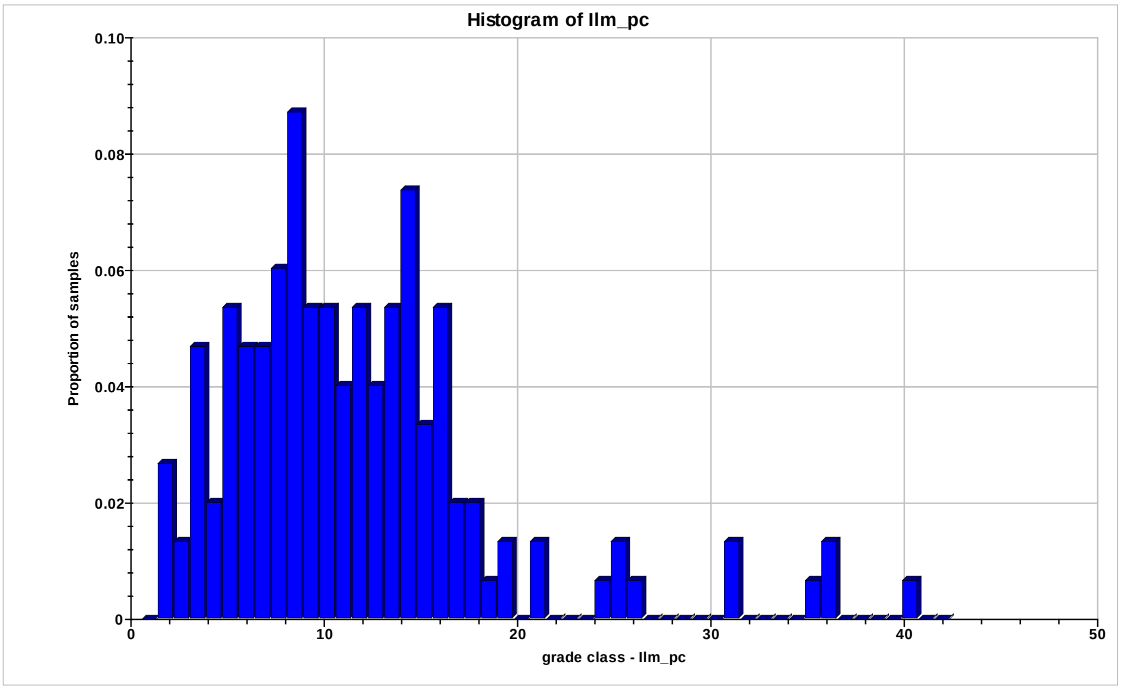


Figure 14.20: Histogram of available ilmenite composites in CS_H unit

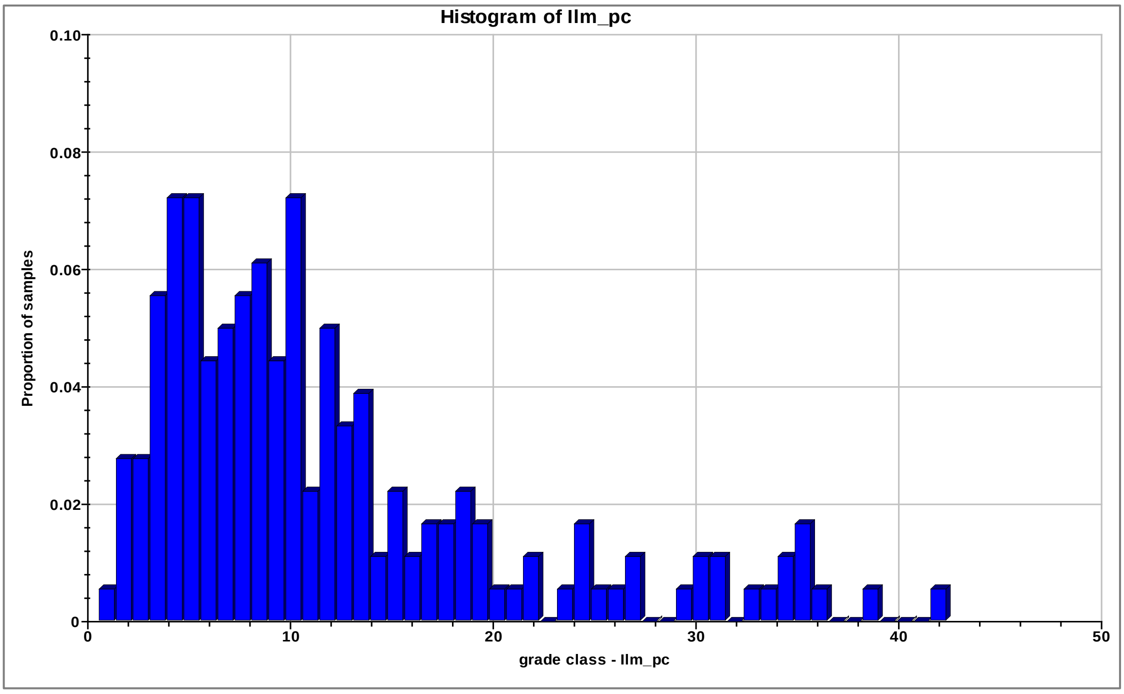


Figure 14.21: Histogram of available ilmenite composites in CS_L unit

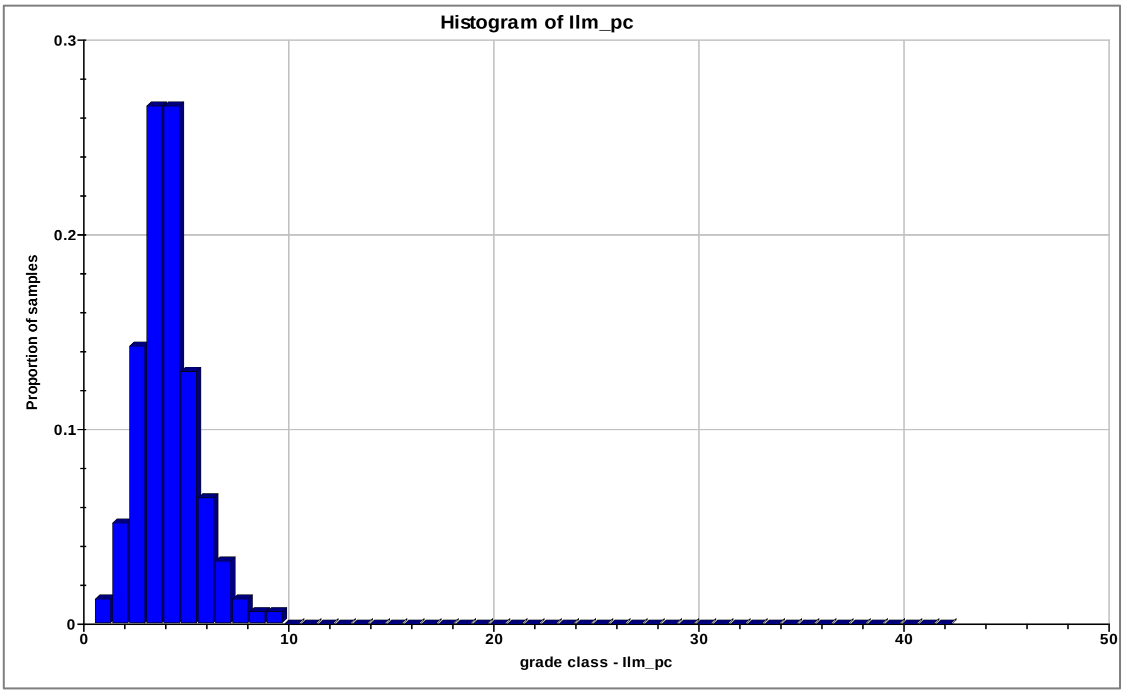
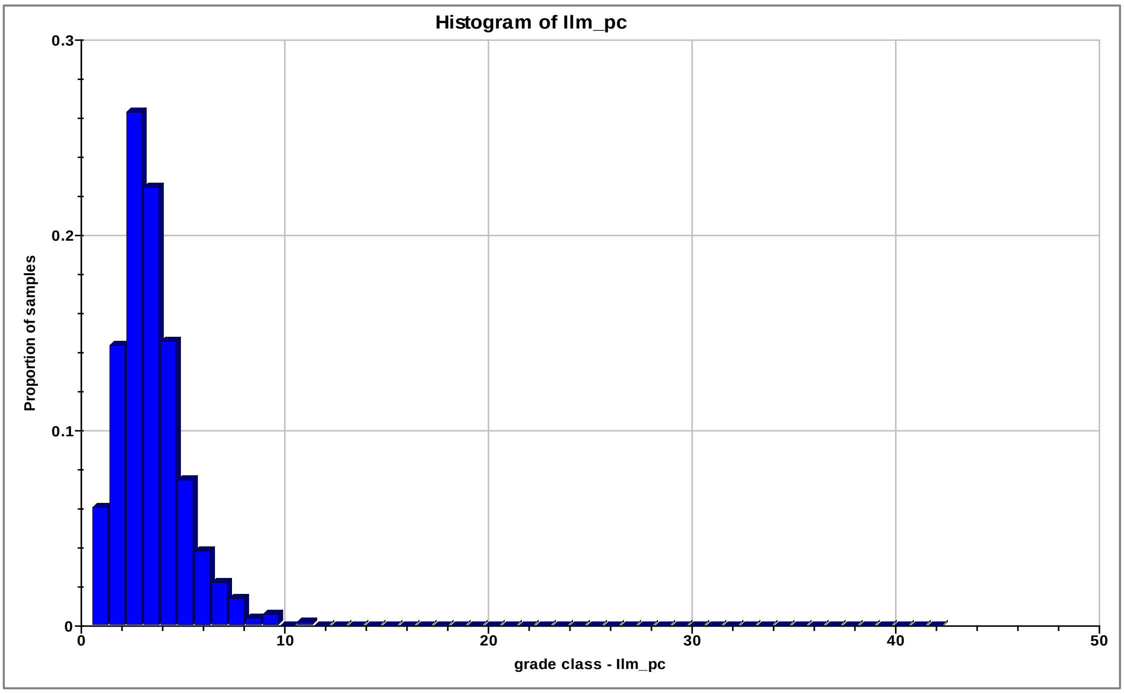
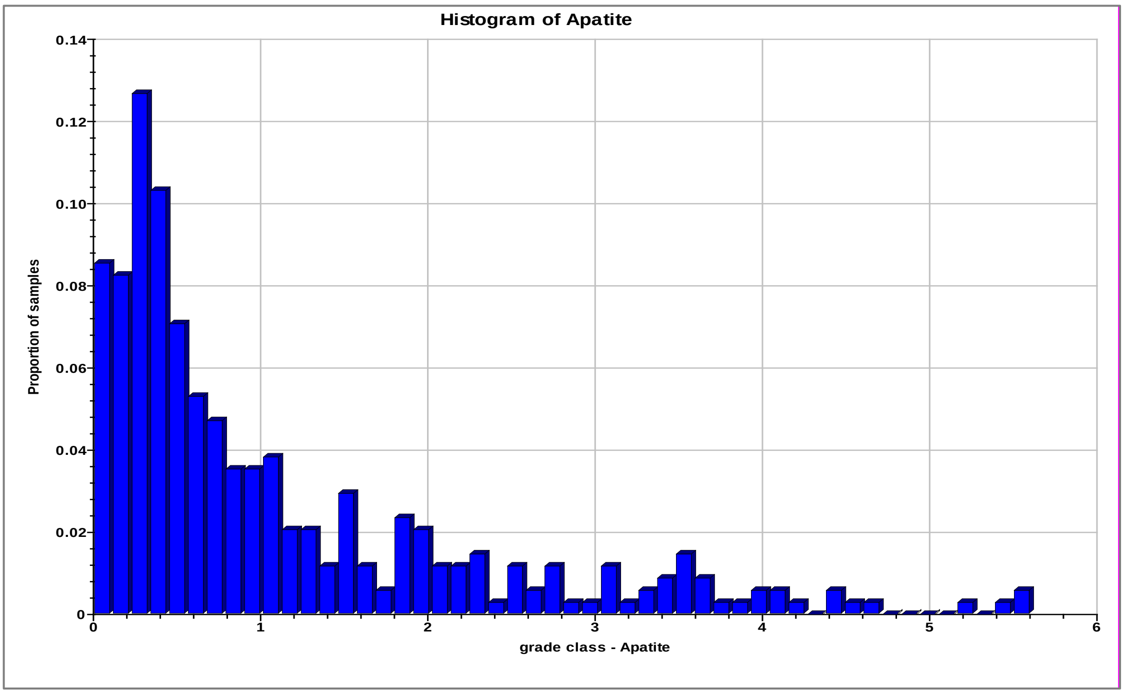


Figure 14.22: Histogram of available ilmenite composites in DG unit



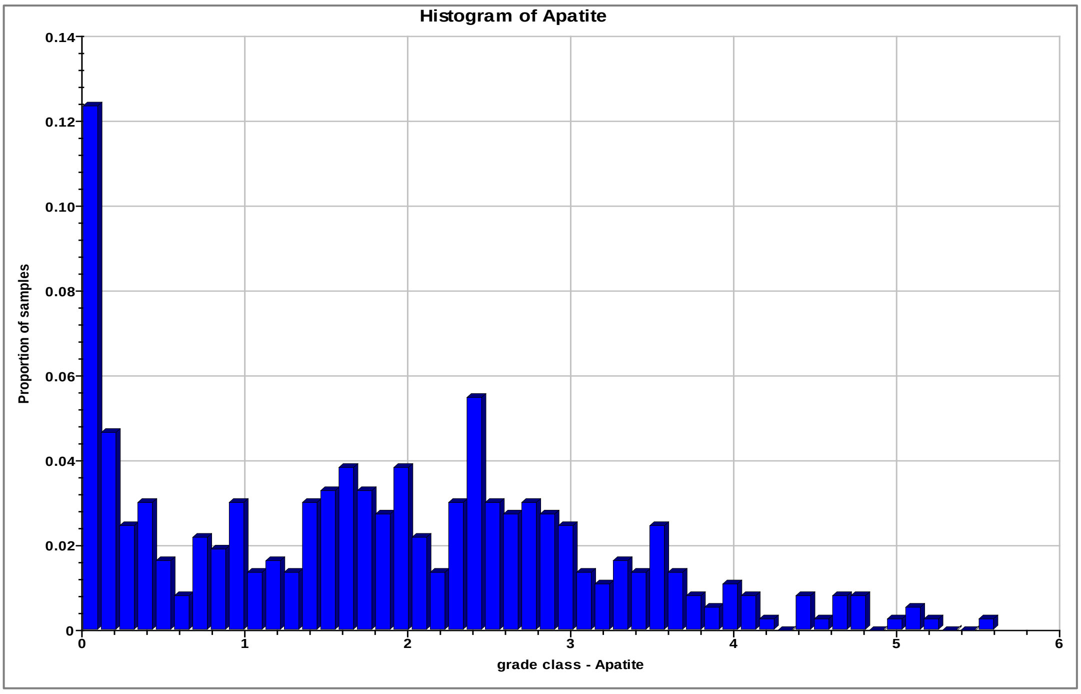
The histogram for the CL-hosted apatite composite data show positively skewed data that suggest more than one population (*Figure 14.23*). However, the composite plan figures above suggest that this observation is related to reasonably well defined host lithology variations rather than spatially overlapping populations.

Figure 14.23: Histogram of apatite composites in CL unit



A similar outcome is seen for the CS_H hosted data, although the second population, comprising a more normal distribution, has started to emerge from the data (*Figure 14.24*).

Figure 14.24: Histogram of apatite composites in CS_H unit



This normal distribution is more apparent in the CS_L and DG histograms (*Figure 14.25* and *Figure 14.26*).

Figure 14.25: Histogram of apatite composites in CS_L unit

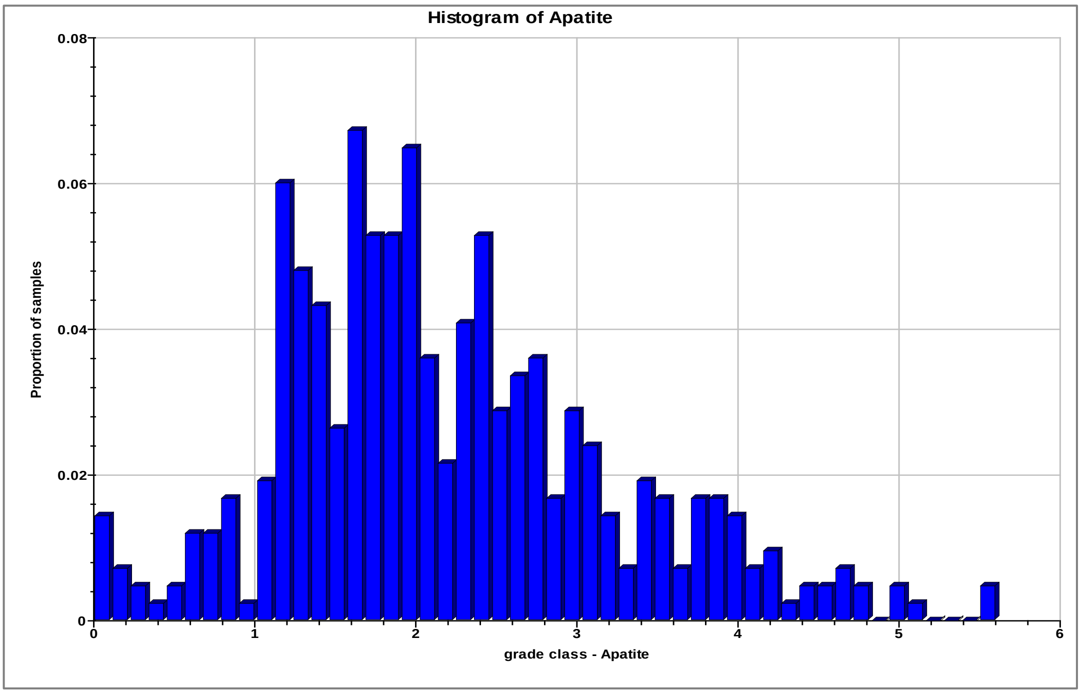


Figure 14.26: Histogram of apatite composites in DG unit

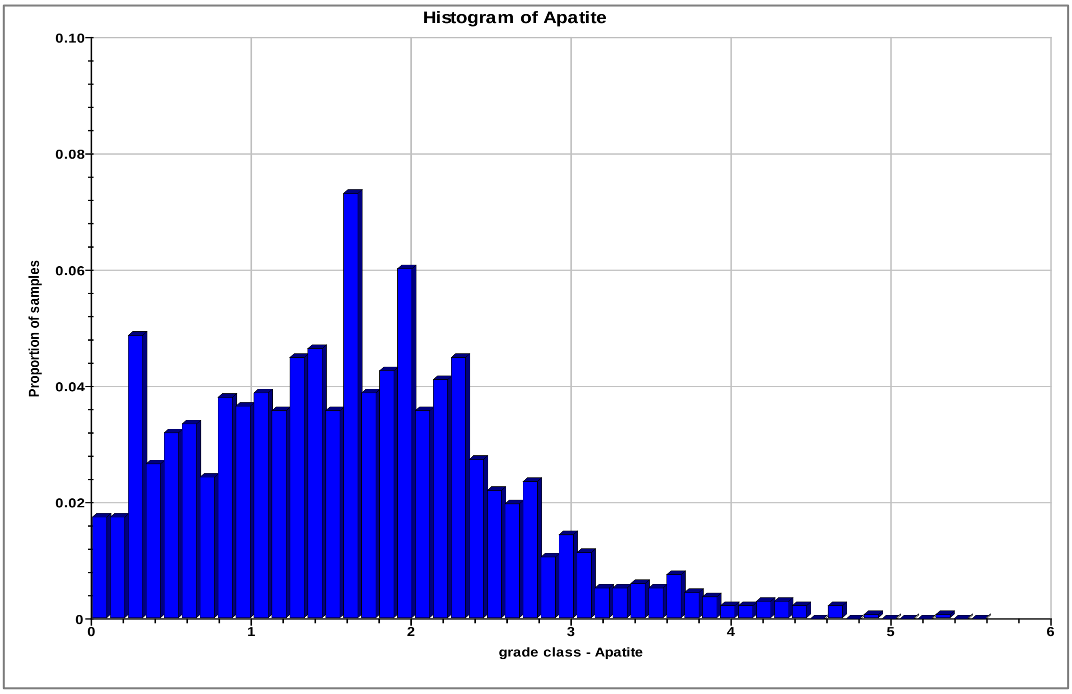


Figure 14.27, *Figure 14.28*, *Figure 14.29* and *Figure 14.30* show the histograms of the slimes grade for the CL, CS_H, CS_L and DG lithologies respectively. Clearly there is segregation between the CL-CS_H and the CS_L-DG pairings. The former would appear to contain more than one population, some of which might be due to mis-logging but H&SC suspects that it might be due to the complex multiphase weathering and material transportation regimes.

Figure 14.27: Histogram of slimes composites in CL unit

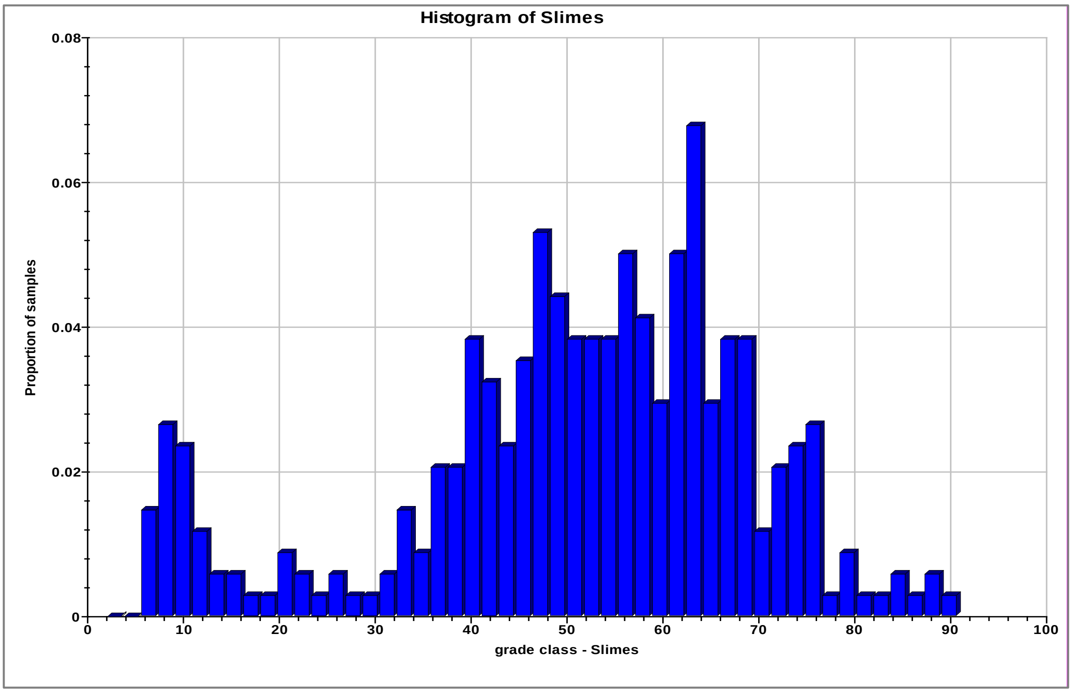
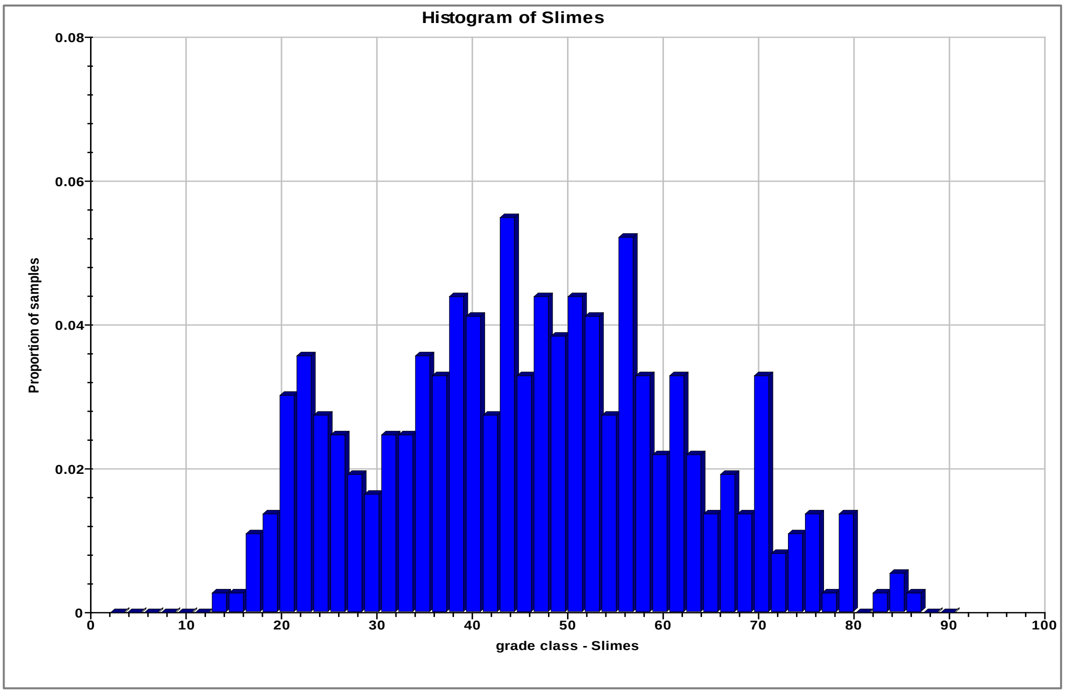


Figure 14.28: Histogram of slimes composites in CS_H unit



It is also clear that there are strong similarities between the CL and CS_H and the CS_L and DG.

Figure 14.29: Histogram of slimes composites in CS_L unit

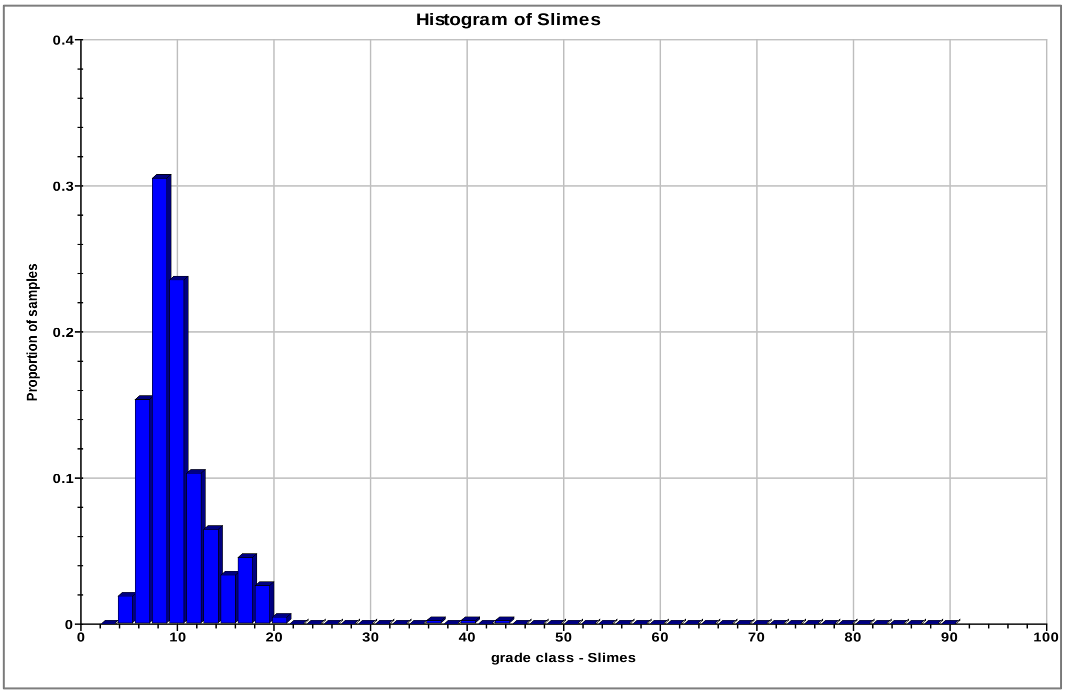
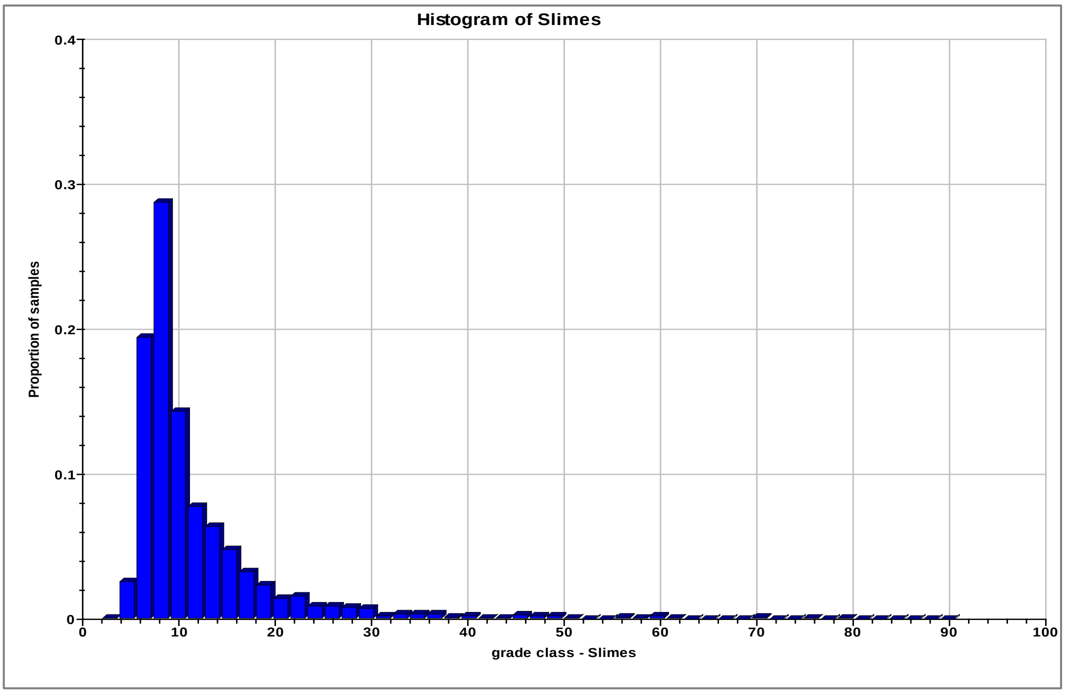


Figure 14.30: Histogram of slimes composites in DG unit



14.1.1.3 Bivariate statistics

A correlation matrix for the available ilmenite, apatite and slimes content is presented in Table 14.3. The elements are not strictly independent variables as the available ilmenite is weighted by the 1mm to 53micron size fraction imparting the slight negative correlation between the available ilmenite and slimes seen in the CL and CS_H units. The weak positive correlation between the available ilmenite and slimes in the CS_L and DG units may indicate that enriched ilmenite grades are associated with more intensely weathered zones, as might be expected.

Table 14.3: Correlation coefficients for lithologies

	Ilmenite	Apatite	Slimes
CL Unit			
Ilmenite	1		
Apatite	0.41	1	
Slimes	-0.37	-0.42	1
CS_H Unit			
Ilmenite	1		
Apatite	0.14	1	
Slimes	-0.11	-0.20	1
CS_L Unit			
Ilmenite	1		
Apatite	0.41	1	
Slimes	0.33	0.08	1
DG Unit			
Ilmenite	1		
Apatite	0.55	1	
Slimes	0.47	0.24	1

Figure 14.31, Figure 14.32, Figure 14.33 and Figure 14.34 show the scatterplots of ilmenite versus slimes for the CL, CS_H, CS_L and DG lithologies respectively. Clearly the CL and CS_H have a similar pattern, as do the CS_L and DG. The CL and CS_H diagrams appear to show a small amount of material that is similar to the DG and CS_L units suggesting some mixing of the two types that maybe a function of the logging, particularly the where colour was used to decide the lithology or may be due to the impact of the aircore sample straddling the lithological boundary.

Figure 14.31: Scatter plot of ilmenite and slimes composites for the CL unit

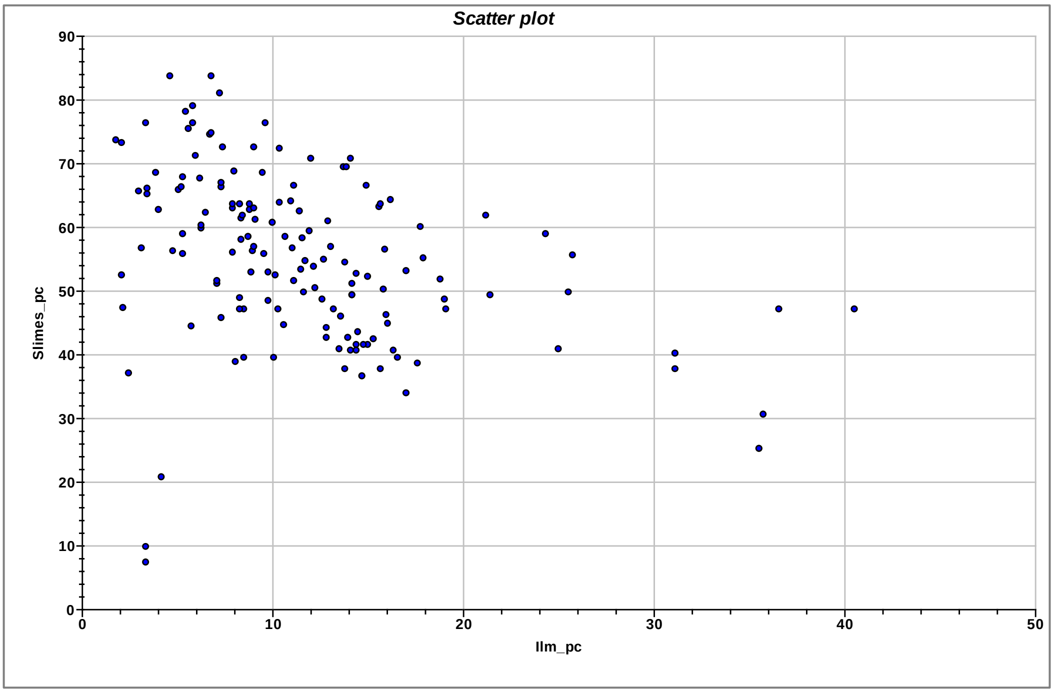


Figure 14.32: Scatter plot of ilmenite and slimes composites for the CS_H unit

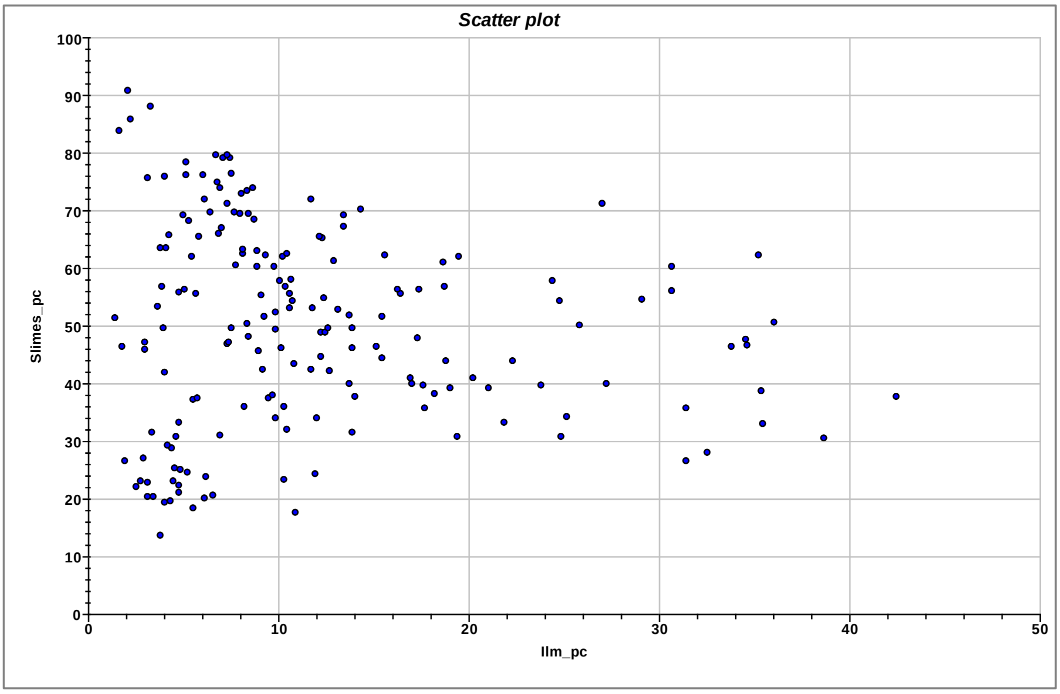


Figure 14.33: Scatter plot of ilmenite and slimes composites for the CS_L unit

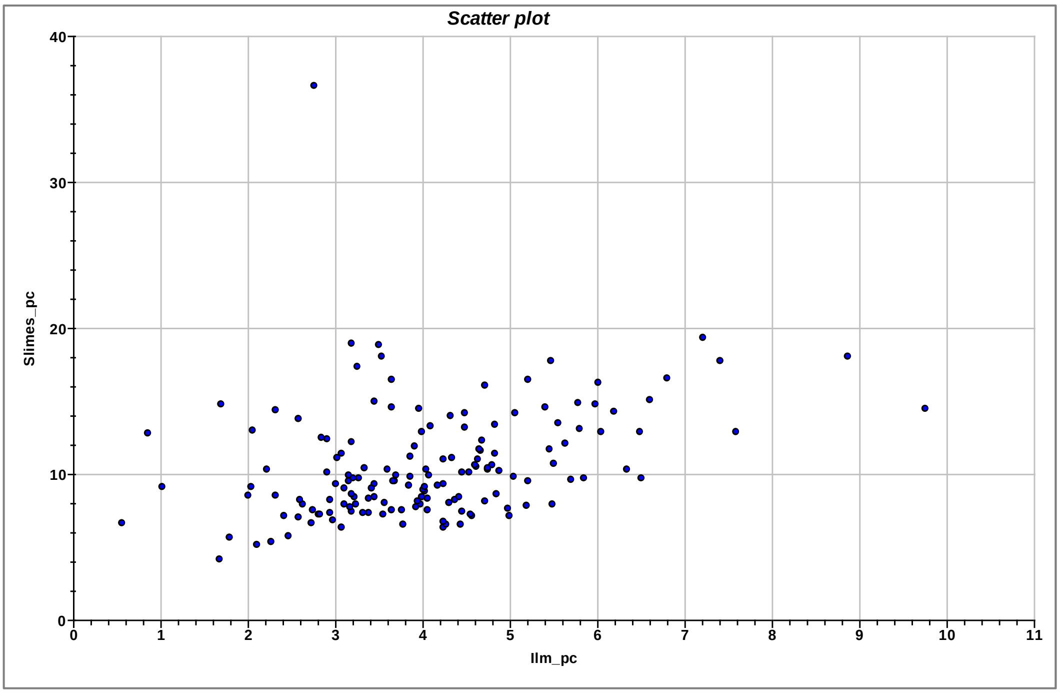
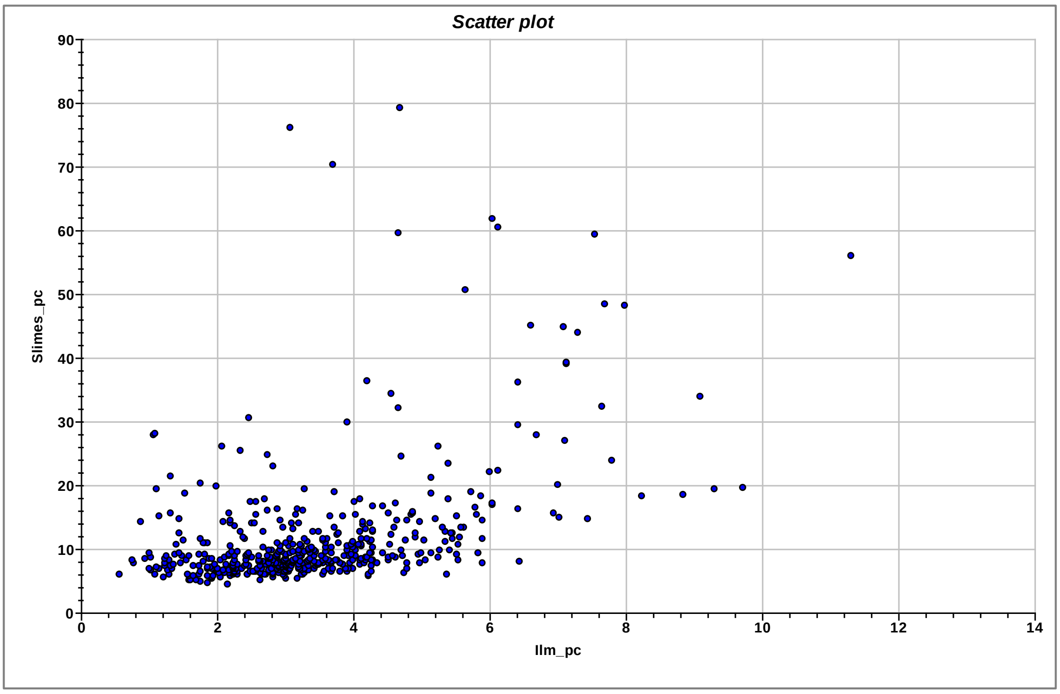


Figure 14.34: Scatter plot of ilmenite and slimes composites for the DG unit



14.1.1.4 Spatial analysis

The approach being used to analyse the data and generate models in this study is essentially a geostatistical modelling method which necessarily uses spatial continuity functions or variograms as part of the modelling process.

In the data analytical process, sample variograms are generated from the sampling data. The sample variograms like other statistical summaries provide a numerical measure of the spatial continuity of the element grades for specific populations of samples. The properties of sample variograms reflect both the spatial variation of the grades and the spatial limitations of the data sets. If a sample population has a limited or discontinuous spatial extent, this directly affects the ability to understand the spatial continuity. The variograms are used to generate a 3D variogram model.

Variogram models are required to serve as parameters for the OK modelling method with one variogram model required for each element.

Variography, using the GS3M software, was completed on the flattened composite data for available ilmenite and slimes content. To make sure sufficient data was available for meaningful analysis and in recognition of the lack change in grade across lithological boundaries all lithological data was combined into a single file.

Figure 14.35 shows the direction variograms for the available ilmenite data, which are shown in *Figure 14.36* as a three-dimensional contour model. Directions for the variogram axes are listed in *Table 14.4* with the directions in the trigonometrical system. The range of the vertical axis (Axis 3) is much shorter, as to be expected from weathered residual deposits such as Goondicum. A ten times vertical exaggeration was used when modelling the variography to decrease anisotropy. The ranges in the downhole variogram (Axis 3) are therefore ten times the actual value..

Figure 14.35: Variograms for available ilmenite

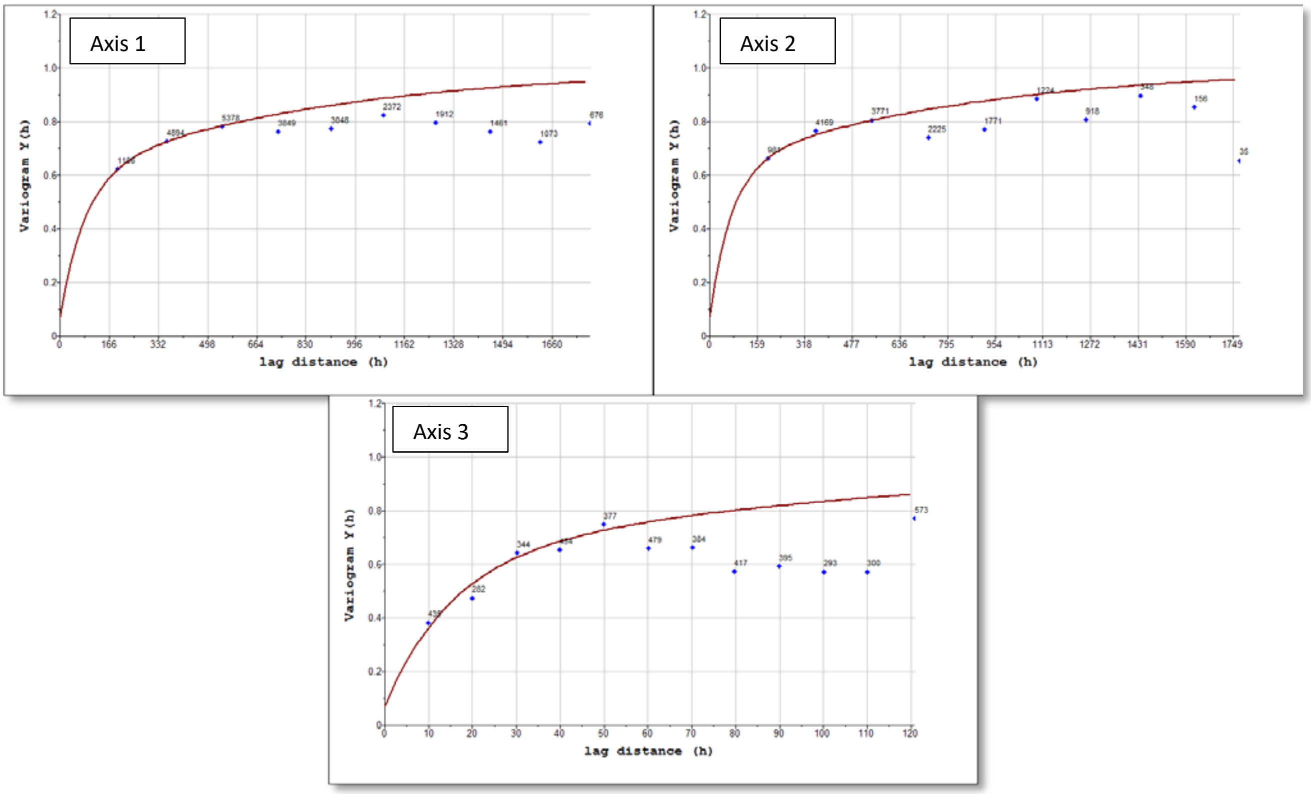
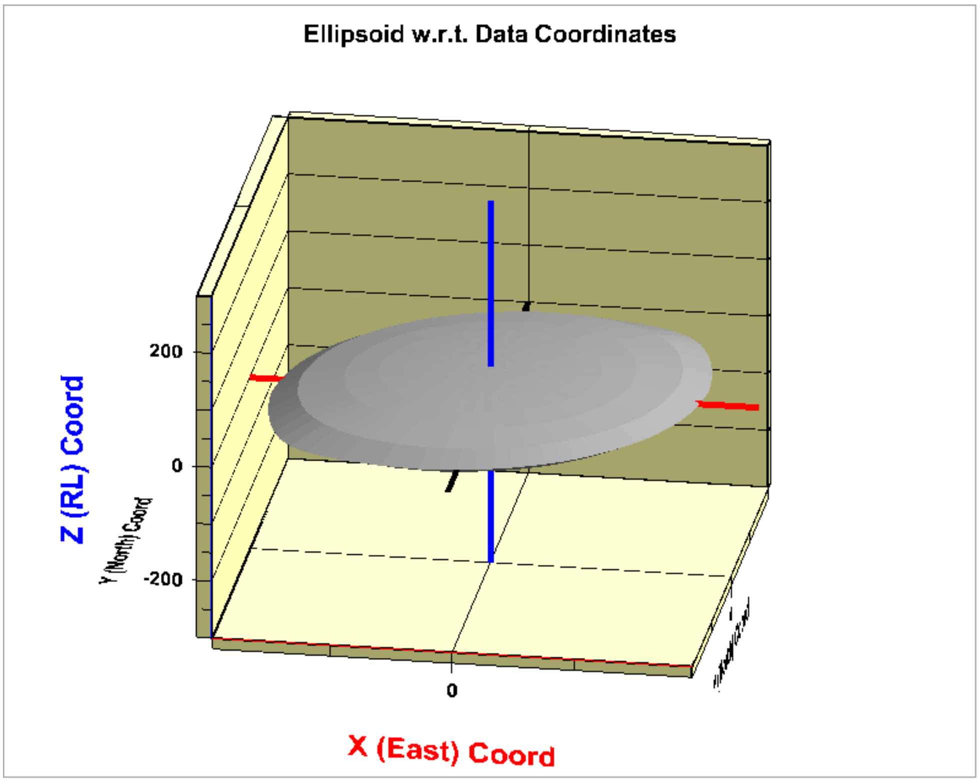


Figure 14.36: Variogram model for available ilmenite



Direction variograms for the apatite content are shown in *Figure 14.37* whilst direction variograms for the slimes are shown in *Figure 14.38*

Figure 14.37: Variograms for apatite

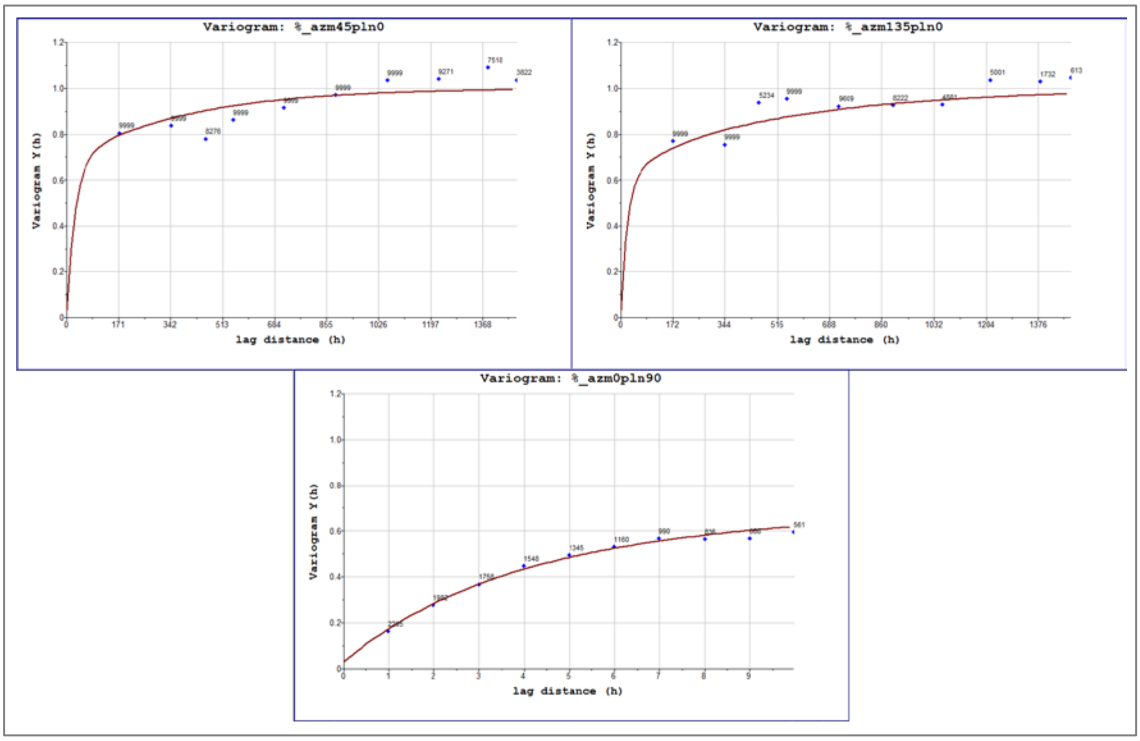
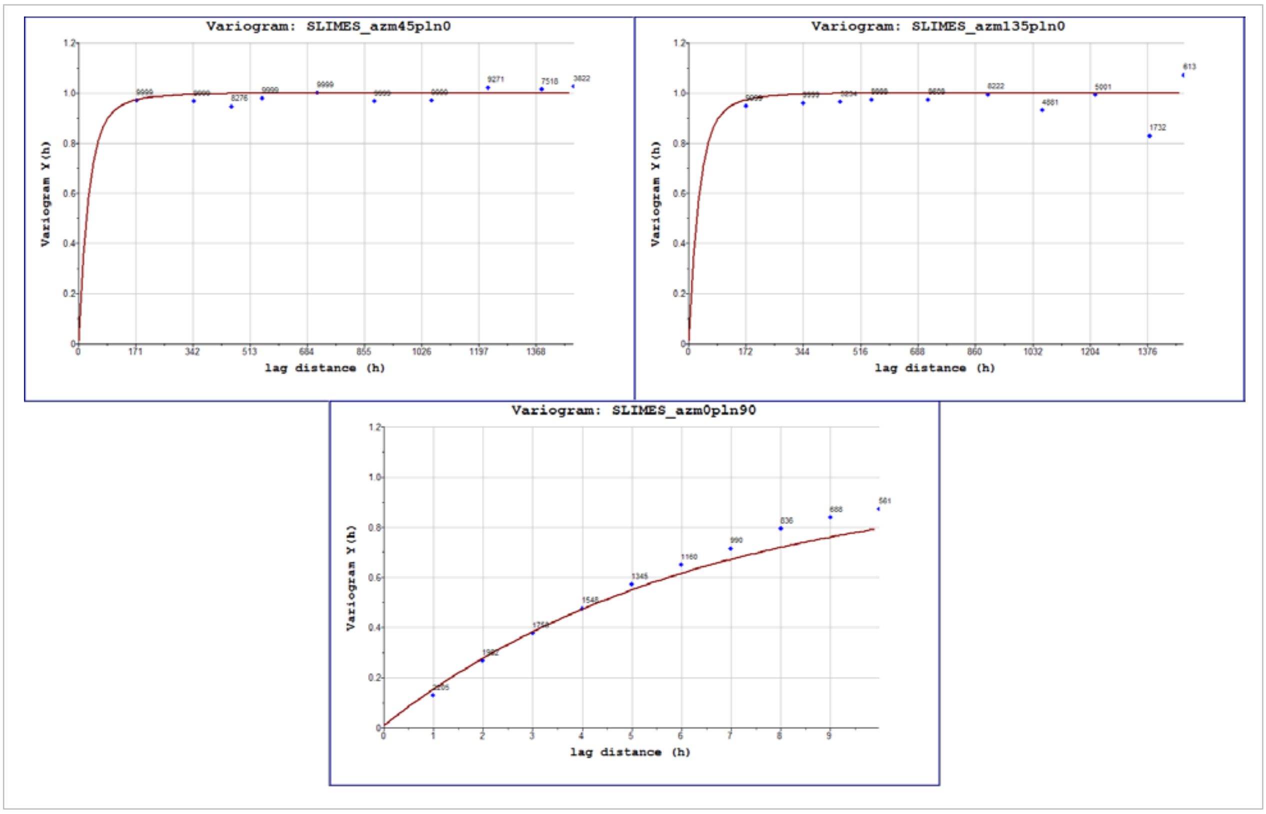


Figure 14.38: Variograms for slimes



Details of the variogram models are included in *Table 14.4*.

Table 14.4: ML Variogram models

Element	Axis 1 Orientation	Axis 2 Orientation	Axis 3 Orientation	Nugget	Sill	Axis 1 Range	Axis 2 Range	Axis 3 Range
Ilmenite	0 to 045	0 to 135	90 to 315	0.05	0.73	205.5	110	6
					0.11	330	300	39
					0.11	1068	1050	421
Apatite	0 to 045	0 to 135	90 to 315	0.03	0.55	84.5	61	10.5
					0.10	90	368	162
					0.32	1149	1739	163
Slimes	0 to 045	0 to 135	90 to 315	0.01	0.76	91	96	19
					0.13	100	98	19
					0.10	360	350	19

14.1.2 Block model dimensions

The block model was created under the assumption that mining at the Goondicum deposit will be conducted using shallow open pit mining methods. The effective minimum mining dimensions are equal to the block size. The coordinates of the centroids of these blocks can be found in *Table 14.5*. The east-west and north-south block dimensions were selected primarily on the drill hole spacing and the vertical dimension was chosen in recognition of the lithology thicknesses, horizontal layering and sample spacing.

Table 14.5: ML Block model dimensions

Parameter	East	North	RL
Minimum coordinate	337525	7250425	390
Maximum coordinate	340725	7252325	500
Block size (m)	50	50	1
No. of blocks	65	39	111

No sub-blocking was used.

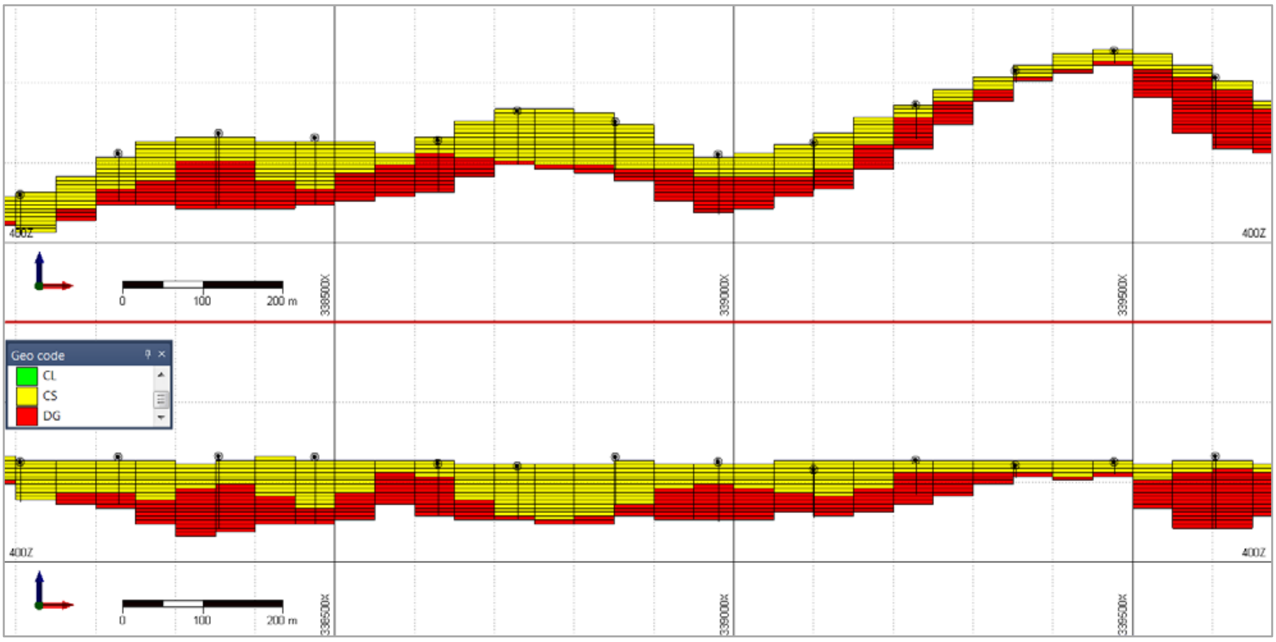
The block model was restricted to the plan extents of the CS-DG boundary wireframes.

14.1.3 Model flattening

The thickness of the lithological units is relatively small compared to the variation in elevation of the base of each unit. The composite data and block model were therefore 'flattened' relative to the original topographic surface in order to remove the effects of topographic variation. This process effectively assigns each of the drillhole collars with a similar elevation. The original topographic surface was used as the 2013 surface contained depressions associated with the recent mining. Slight errors are present in the flattened data as original drillhole collars are not always perfectly aligned with the original topographic surface. It is recommended that this original surface has the drillhole collars included in the dataset.

Figure 14.39 shows the effect of flattening the composite data and block model.

Figure 14.39: Example section of flattening



14.1.4 Search criteria

The search criteria used for the estimation can be seen in *Table 14.6* and consists of two search passes increasing in search radii and decreasing in data requirements. The search criteria were selected in recognition of the data spacing and the short vertical range shown in the variography. Declustering was carried out by the use of search sectors. There are no search rotations as the search ellipsoids are circular. Discretisation of blocks is based on 5 x 5 x 2 points (east, north and vertical respectively).

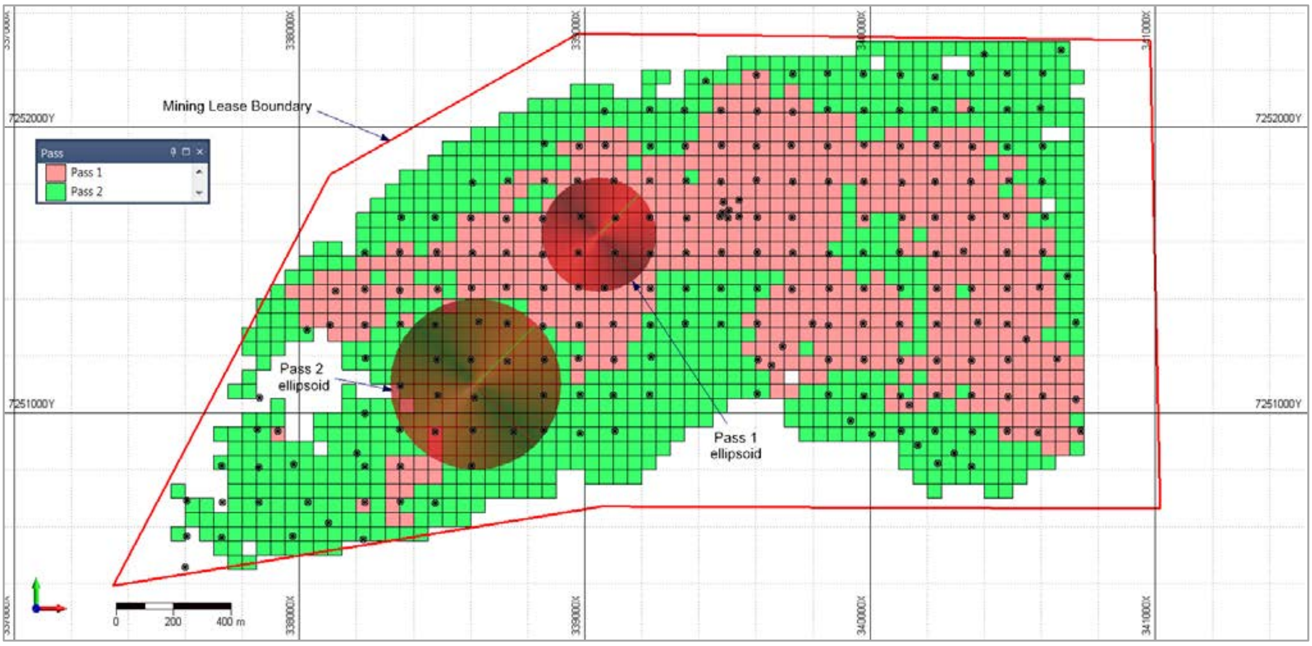
Table 14.6: ML Block Model search criteria

Axis	Pass 1	Pass 2
Axis 1	200m	300m
Axis 2	200m	300m
Axis 3	4 m	6 m
Composite Data Requirements		
Minimum data points (total)	8	4
Max points (total)	24	24
Sectors	4	4
Minimum drill holes	3	2
Maximum points per hole	4	6

Maximum extrapolation beyond the bounding drillholes was approximately 230metres.

For reference, a plan view map of the search ellipses and the block model coloured by Pass is shown in *Figure 14.40.* The figure also shows the extent of the block model relative to the drillhole spacing.

Figure 14.40: ML Pass 1 and 2 block locations



14.1.5 Domaining

Lithological domaining of the block model was completed by using the lithological surfaces in relation to the block centroids. Additional domaining consisted of flagging blocks in the DG unit that had a centroid inside the 3D solid for stripped DG.

There were no domains based on multiple search ellipse scenarios as it was a simple circular search in the X-Y directions; previous modelling had used ovoid search ellipses oriented to the strike of the arcuate zones of the intrusion mentioned previously.

14.1.6 Density model

Default densities from Monto Minerals 1996 to 2000 work were inserted into the block model for the different geological domains (*Table 14.7*).

Table 14.7: Default densities

Lithotype	Density t/m^3
CL	1.6
CS_H	1.6
CS_L	1.6
DG	2.1

In the 1996-2000 work the CL unit had an allocated density of 1.35 tonne/m^3 but H&SC considers that as there is more than one population within this unit, one of which is well mineralised, it has decided to retain 1.6 tonne/m^3. This decision is supported by the reconciliation work completed by H&SC (see *Section 14.1.9*).

14.1.7 Resource classification

The classification of the resources is primarily based on the search ellipse parameters (*Table 14.8*), subject to the impact of other relevant aspects, for example, drilling methodology, geological understanding, QAQC etc. The resources are planned to be mined in an open pit scenario and classification is also based on this assumption.

Table 14.8: Resource classification

Pass No	Classification
1	Indicated
2	Inferred

Impact on classification of aspects of the resource estimates are included below:

Positives:

- Regular drill pattern, accurately located holes, testing all lithological units
- Suitable drilling method
- Accurate topographic surfaces
- QAQC data indicates no critical issues
- An improved geological understanding
- Horizontal geological continuity between drillholes for each lithology
- Use of a more sophisticated modelling method i.e. Ordinary Kriging, allowing for a greater interaction between sample points

Negatives:

- Wide drillhole spacing and limited data points for the available ilmenite, requiring large search parameters for modelling, insufficient close spaced drilling to allow for greater confidence from geostatistical analysis
- Complex geology with the main host unit having local variations with ilmenite and slimes grades
- Limited Clerici testwork applied to composited intervals
- Minor issues with the QAQC data
- Clerici composites include material from several drill holes and mix CS_H and CS_L material together
- Uncertain definition of geological boundaries between drillholes. The wide drillhole spacing means lithological contacts can only have an accuracy +/-100metres
- Lack of density data plus the added fact that the original work was based on a single CS unit rather than the high and low slimes sub-divisions
- Possible suspect available ilmenite grades due to the high drilling recoveries in the CS_L unit. Mining grades could be higher than the current estimates for the unit
- Possible suspect available ilmenite grades with the SL samples. Sample grades could be higher due to difficulty in obtaining representivity of sample in the drilling

14.1.8 Estimation results

The resource estimates are reported in *Table 14.9* at a 2.5% available ilmenite cut-off grade with a partial percent volume adjustment for blocks cutting the topography i.e. the 2013 LiDAR surface. The base of the drilling surface also acted as a constraint to the reported estimates. In addition, blocks deemed to be inside the stripped DG wireframe were not reported. This amounted to roughly <4% of the total material.

Table 14.9: ML Block Model Goondicum Resource estimates by classification

ML80044				
Category	**Tonnes (Mt)**	**Available ilmenite (%)**	**Apatite (%)**	**Slimes (%)**
Indicated	31.3	6.1	1.8	22.9
Inferred	30.9	6.3	1.6	24.3

Note: (minor rounding errors)

Mineral tonnage			
Category	**Available ilmenite (Mt)**	**Apatite (Mt)**	**Slimes (Mt)**
Indicated	1.90	0.55	7.17
Inferred	1.93	0.49	7.51

Note: (minor rounding errors)

No allowance in the estimates has been made for any material sterilised by the plant which lies in the southern central part of the resource. The likely impact if this material is not mined is detailed in *Table 14.10*.

Table 14.10: ML Block Model Resource estimates associated with the general plant area

Lithology	Category	Volume (m^3)	Tonnage (Mt)	Available ilmenite (%)	Apatite (%)	Slimes (%)
CS_H	Indicated	35,000	0.06	16.6	1.0	54.8
DG	Indicated	90,000	0.19	3.2	1.6	11.9
	Total	**125,000**	**0.25**	**6.3**	**1.4**	**21.8**

Continued next page

Lithology	Category	Volume (m³)	Tonnage (Mt)	Available ilmenite (%)	Apatite (%)	Slimes (%)
CS_H	Inferred	284,000	0.45	14.5	1.3	52.5
DG	Inferred	606,000	1.24	3.0	1.0	11.9
	Total	**890,000**	**1.69**	**6.1**	**1.1**	**22.8**

Lithology	Category	Tonnage Mt	Available ilmenite (Kt)	Apatite (Kt)	Slimes Kt
CS_H	Indicated	0.06	9	0.6	31
DG	Indicated	0.19	6	3.0	22
	Total	**0.25**	**15**	**3.6**	**54**
CS_H	Inferred	0.45	66	5.8	238
DG	Inferred	1.24	37	12.9	148
	Total	**1.69**	**103**	**18.7**	**386**

(minor rounding errors)

The estimated resources for the Goondicum deposit are presented in *Table 14.11* by lithology.

Table 14.11: ML Block Model Goondicum Resource estimates by lithology

Lithology	Category	Tonnage (Mt)	Available ilmenite (%)	Apatite (%)	Slimes (%)
CL	Indicated	4.1	10.8	1.0	52.9
CS_H	Indicated	4.9	12.9	1.7	52.4
CS_L	Indicated	5.0	4.0	2.1	10.2
DG	Indicated	17.3	3.6	1.9	11.1
Totals	**Indicated**	**31.3**	**6.1**	**1.8**	**22.9**
CL	Inferred	2. 5	10.1	0.8	53.1
CS_H	Inferred	8.8	11.2	1.7	46.3
CS_L	Inferred	5.9	4.0	1.9	11.0
DG	Inferred	13.7	3.3	1.5	10.7
Totals	**Inferred**	**30.9**	**6.3**	**1.6**	**24.3**

Mineral Tonnes				
Lithology	**Category**	**Available ilmenite Mt**	**Apatite Mt**	**Slimes Mt**
CL	Indicated	0.45	0.04	2.22
CS_H	Indicated	0.63	0.08	2.55
CS_L	Indicated	0.20	0.11	0.51
DG	Indicated	0.62	0.32	1.92
Totals	**Indicated**	**1.90**	**0.55**	**7.17**
CL	Inferred	0.25	0.02	1.30
CS_H	Inferred	0.99	0.15	4.10
CS_L	Inferred	0.23	0.11	0.64
DG	Inferred	0.46	0.21	1.47
Totals	**Inferred**	**1.93**	**0.59**	**7.51**

(minor rounding errors)

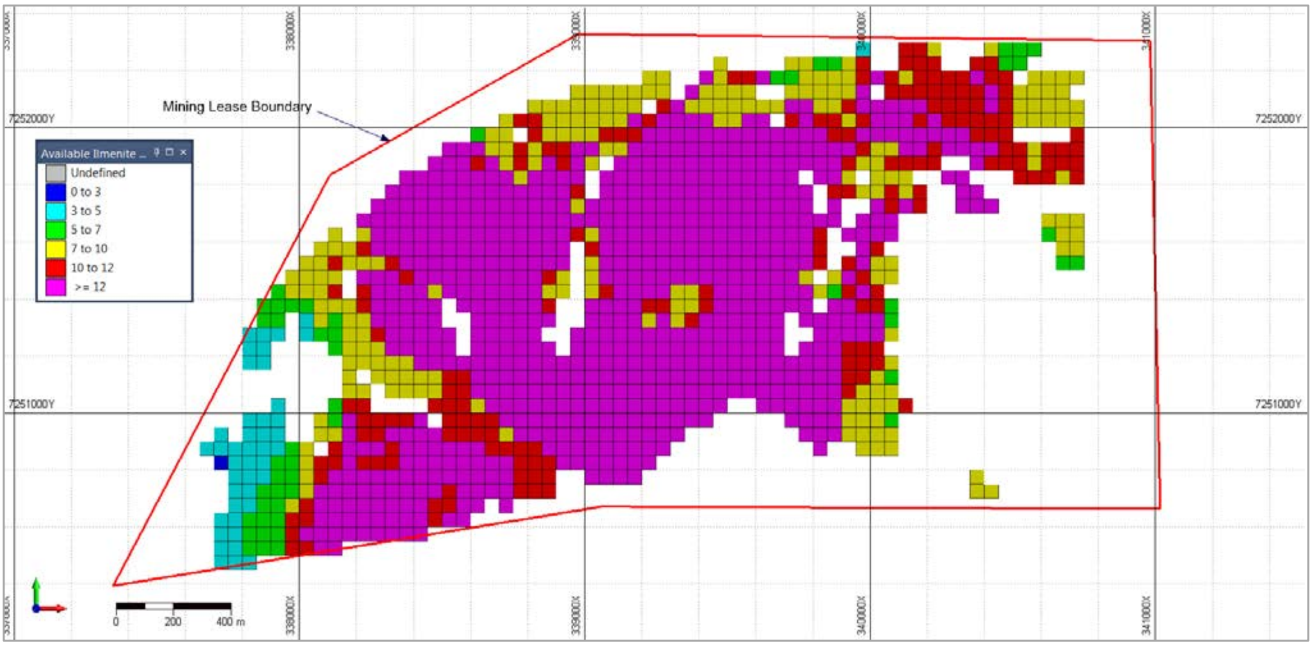
Reporting the resource estimates using the block centroid below the topographic surface rather than the partial percent volume adjustment resulted in a very minor difference of +0.5%. Reporting the resource estimates using the original topographic surface resulted in reduction of the resource by 1.6%.

Figure 14.41, *Figure 14.42*, *Figure 14.43* and *Figure 14.44* show plan views of the available ilmenite mineralisation for the different lithologies (note that only the top block of each column of blocks is showing). *Figure 14.41* shows the distribution of the blocks of the CL unit coincident with the topographic lows with the higher grade zones generally associated with the centre of the valleys. The evidence for transportation of the ilmenite is clear when the high grade SE Quadrant in *Figure 14.41* is compared with the low grade in the DG unit in *Figure 14.44*.

Figure 14.41: ML Block Model Global Resources plan view CL unit ilmenite

In *Figure 14.42* the high grade available ilmenite blocks are visible within the CS_H unit. The lower grade portions are normally associated with local topographic highs. Once again the implication is for the transported nature of this material.

Figure 14.42: ML Block Model Global Resources plan view CS_H unit ilmenite



In *Figure 14.43* the localised distribution for the CS_L unit does not provide evidence for mineral zonation.

Figure 14.43: ML Block Model Global Resources plan view CS_L unit ilmenite

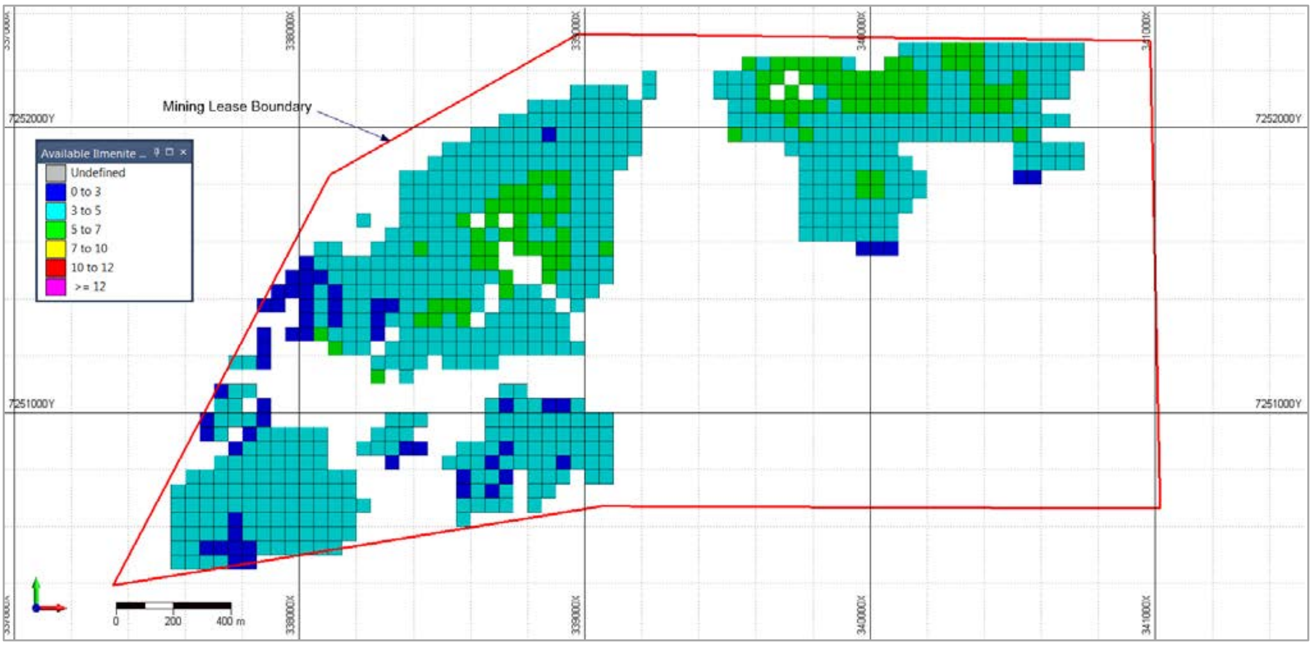
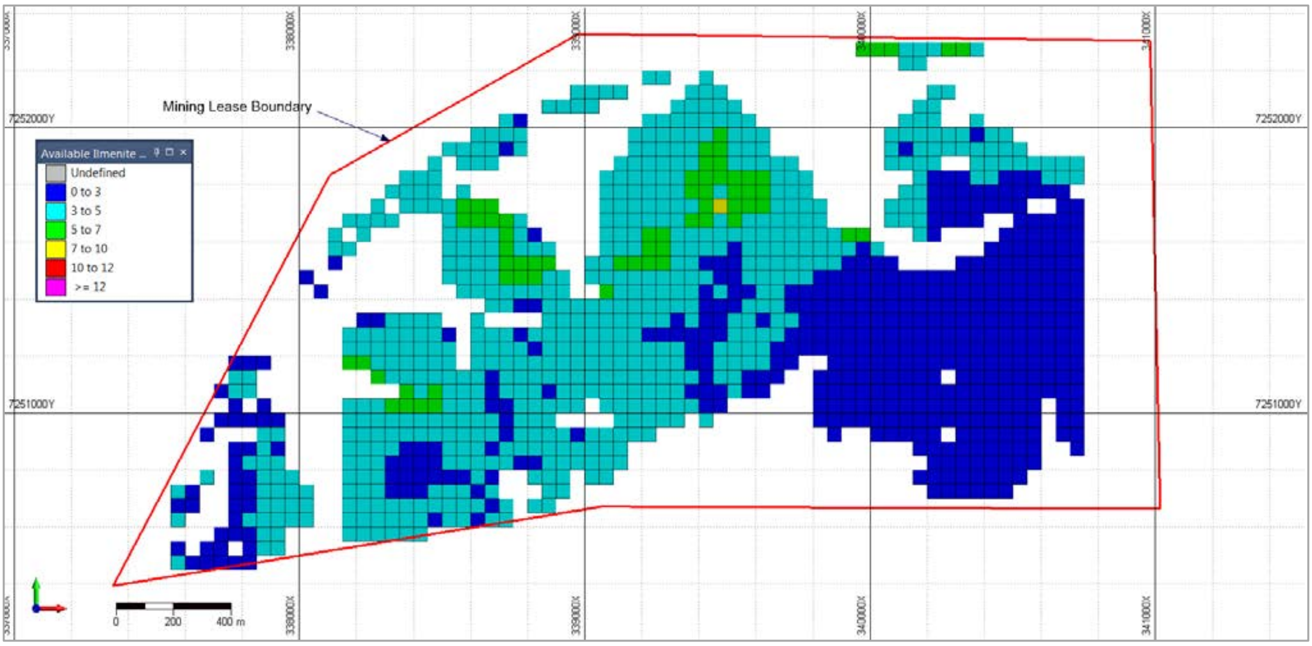


Figure 14.44 shows the DG unit with an arcuate grade pattern similar to the aero-magnetic image (see *Figure 7.2*). The relatively barren SE Quadrant can be clearly seen.

Figure 14.44: ML Block Model Global Resources plan view DG unit ilmenite



Examples of the apatite block grade distribution are included below. *Figure 14.45* show the grade variation for the CL particularly the dominance of the low grade SE Quadrant.

Figure 14.45: ML Block Model Global Resources plan view CL unit apatite

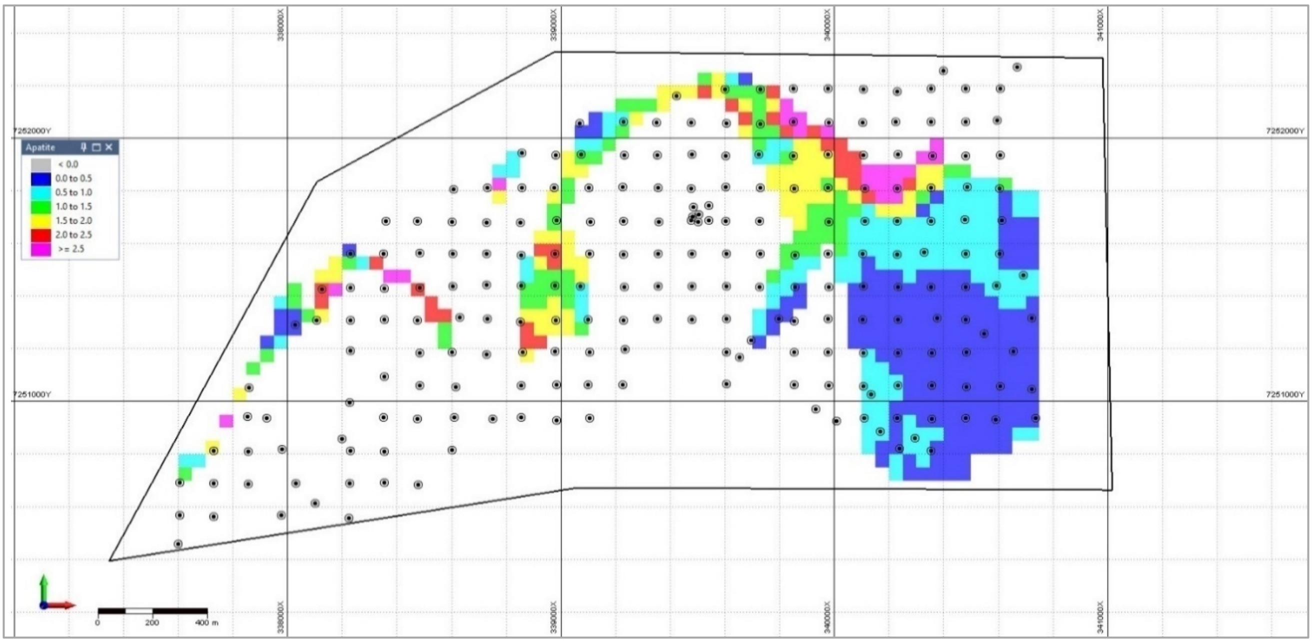


Figure 14.46 and *Figure 14.47* show similar distribution patterns for the CS_H and CS_L respectively, where there is available data.

Figure 14.46: ML Block Model Global Resources plan view CS_H unit apatite

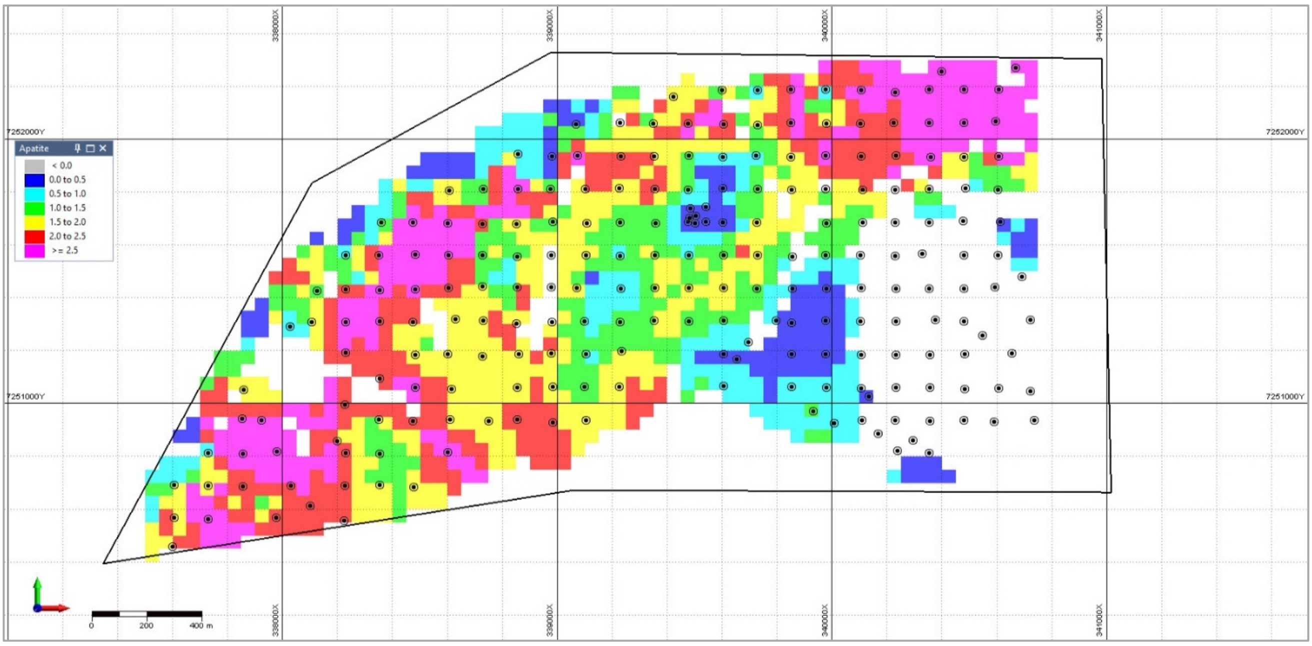


Figure 14.47: ML Block Model Global Resources plan view CS_L unit apatite

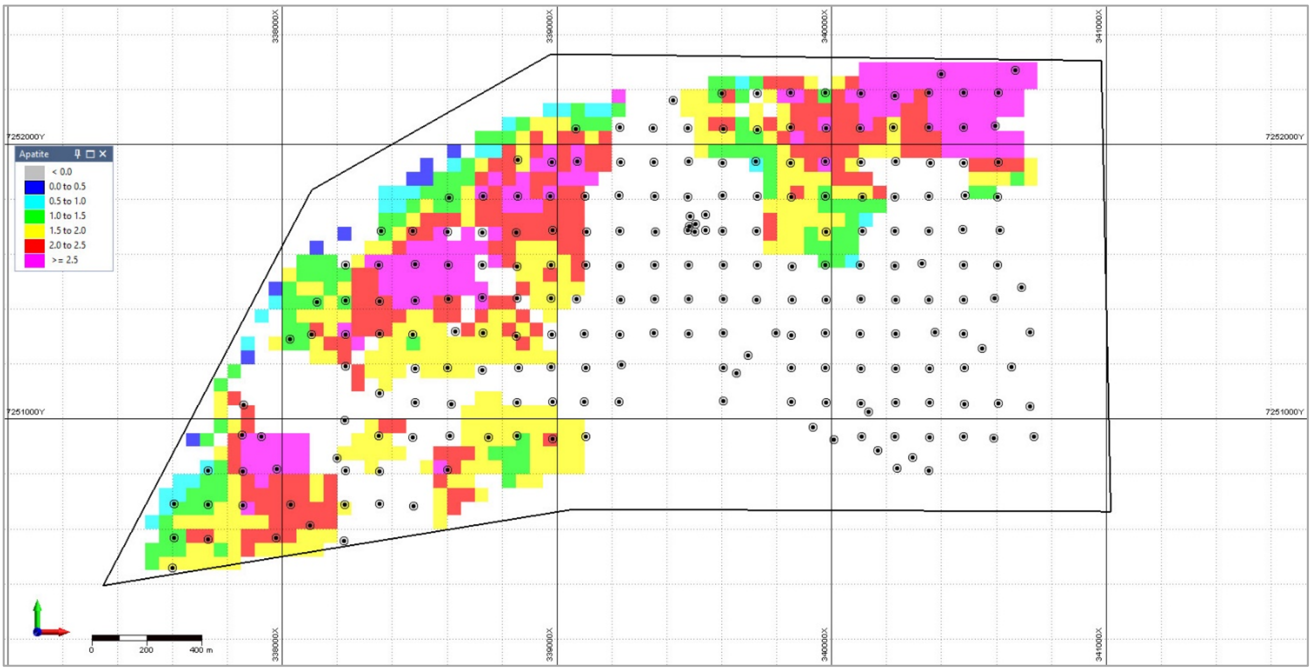
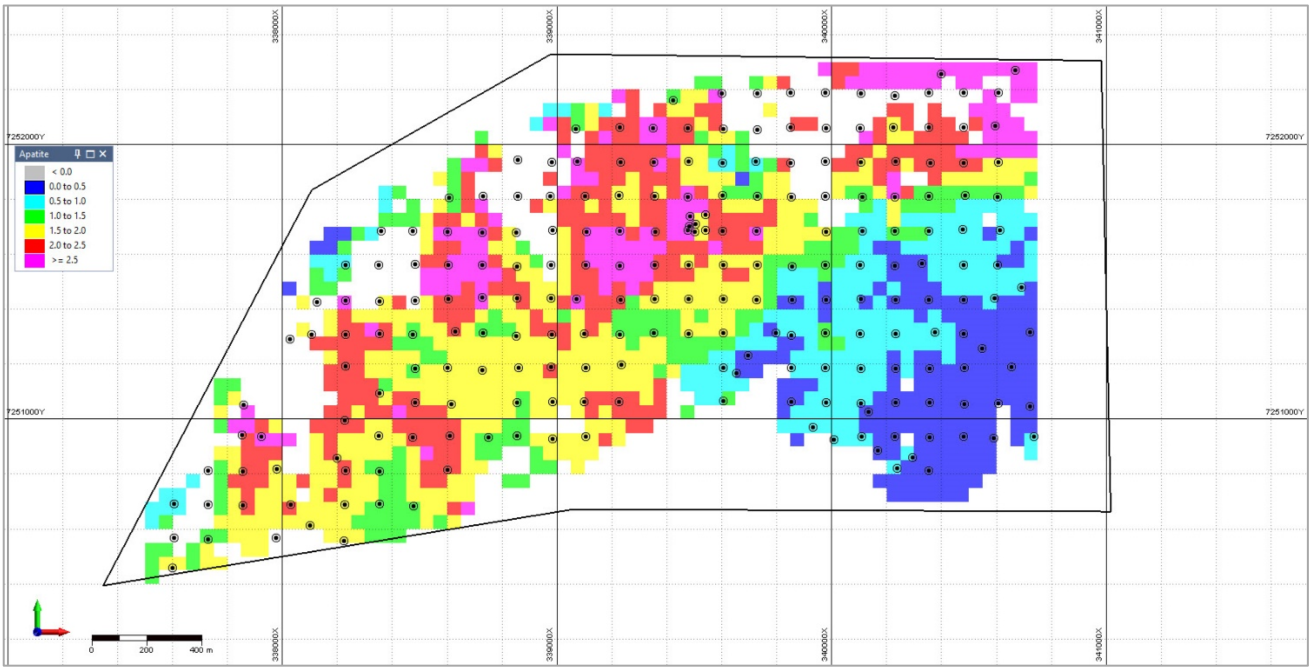


Figure 14.48 shows quite clearly in the apatite distribution in the DG and the relationship with the arcuate zonation associated with the gabbro. The DG pattern is also similar to the CS_H and the CS_L indicting perhaps less concentration effects from weathering on the apatite.

Figure 14.48: ML Block Model Global Resources plan view DG unit apatite



Examples of the slimes block grade distribution for the CL, CS_H, CS_L and DG are included below as *Figure 14.49*, *Figure 14.50*, *Figure 14.51* and *Figure 14.52* respectively.

Figure 14.49: ML Block Model Global Resources plan view CL unit slimes

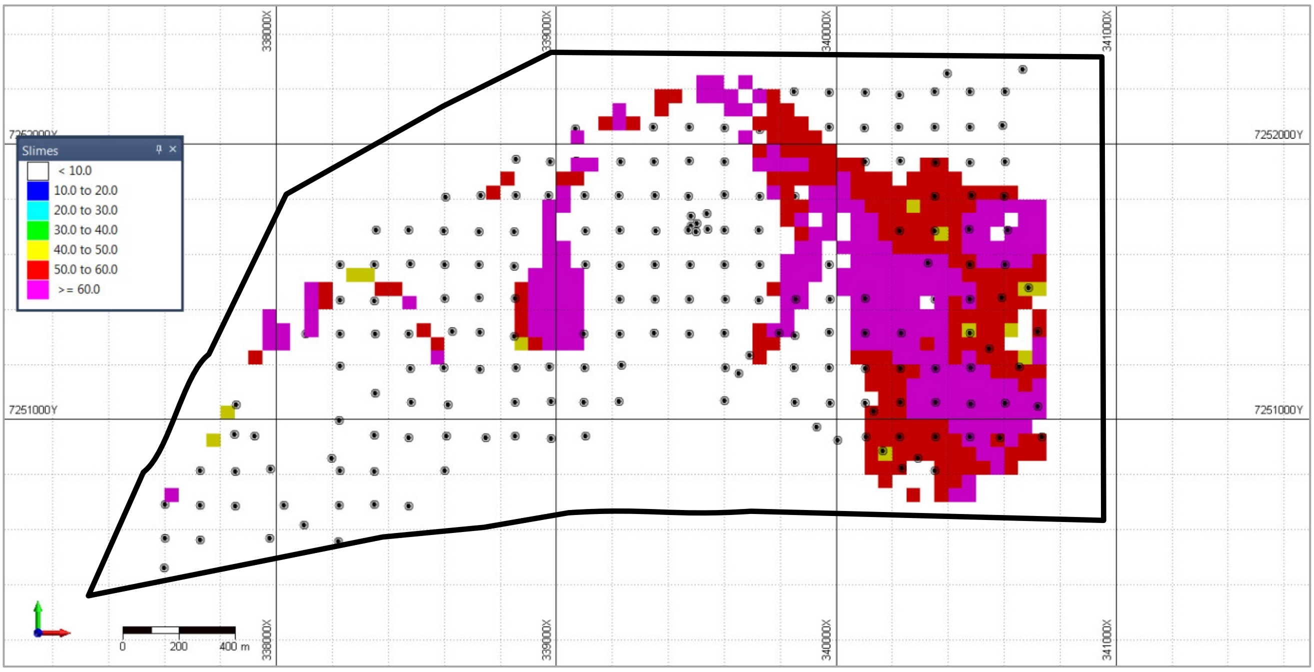


Figure 14.50: ML Block Model Global Resources plan view CS_H unit slimes

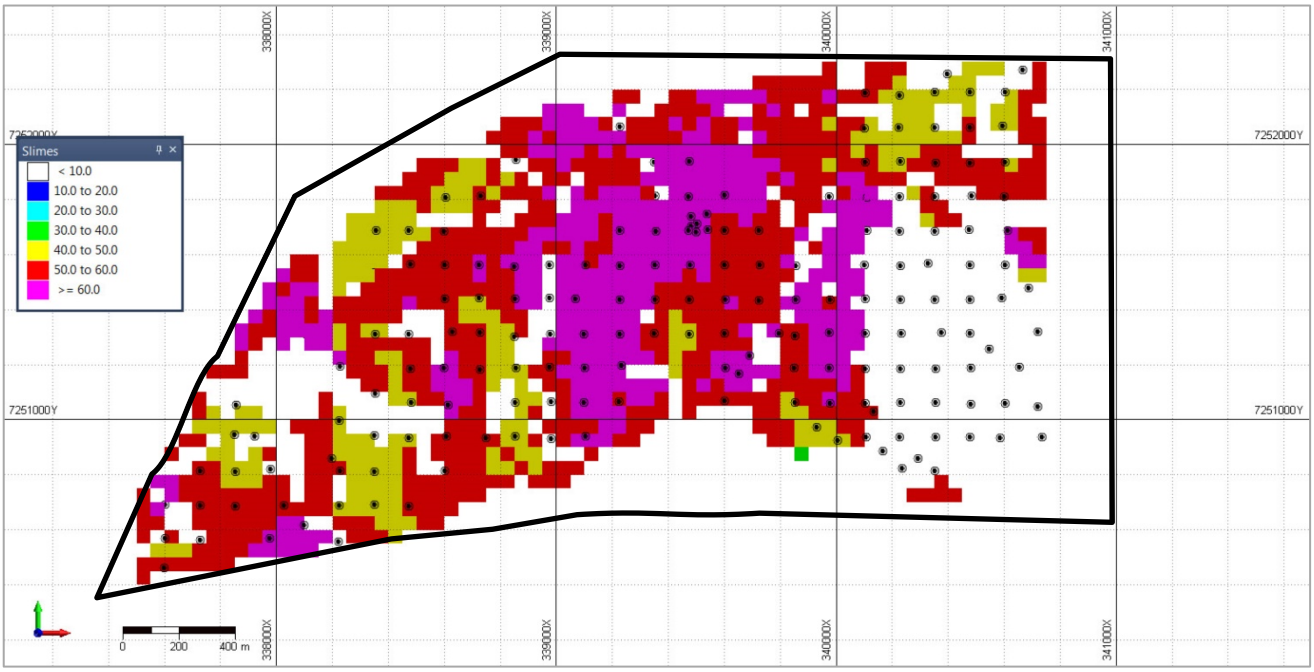


Figure 14.51: ML Block Model Global Resources plan view CS_L unit slimes

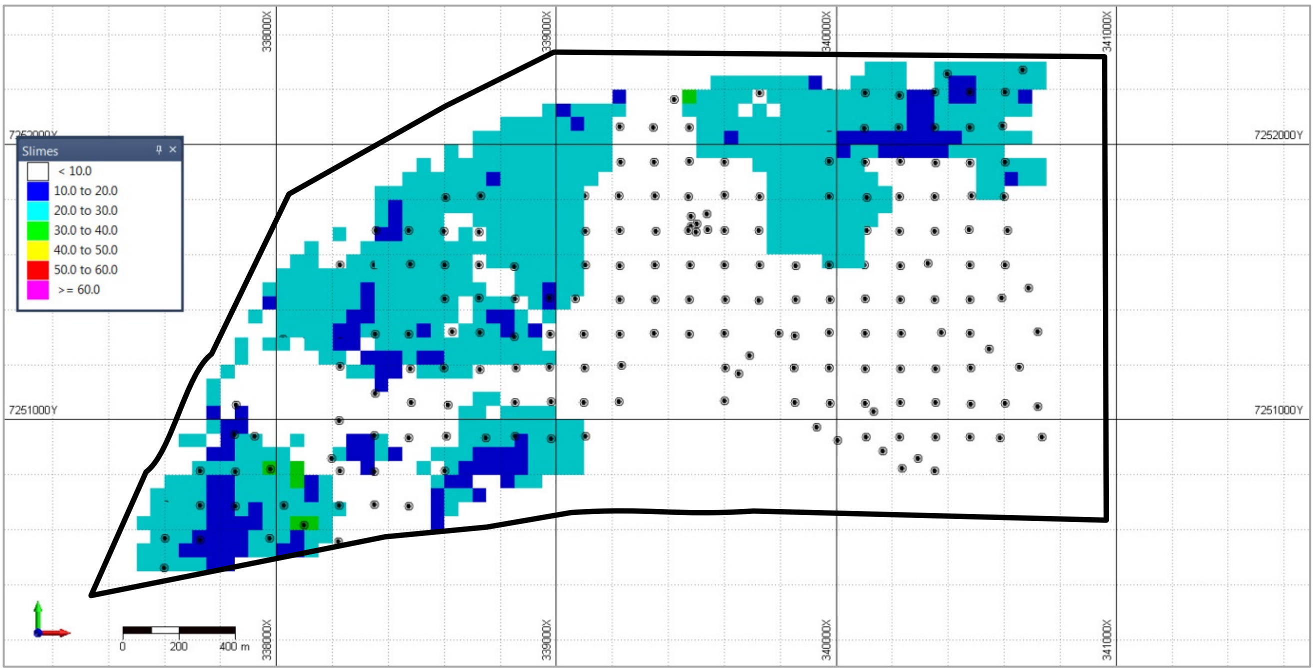
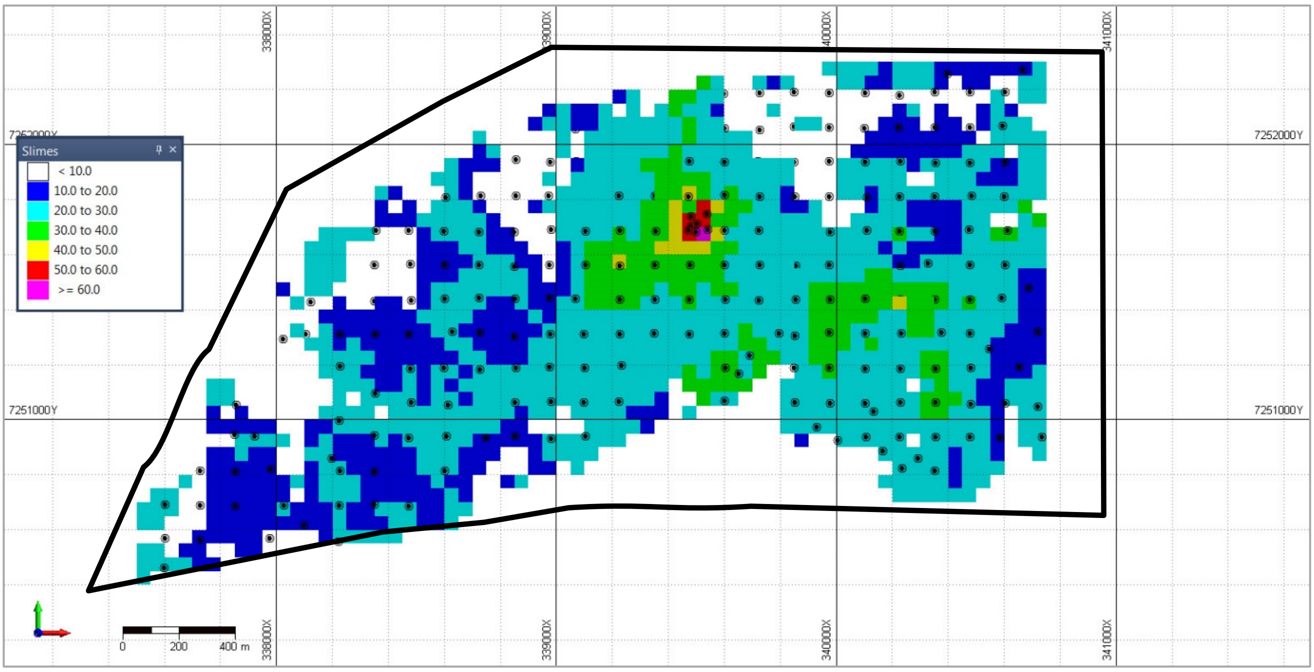


Figure 14.52: ML Block Model Global Resources plan view DG unit slimes



14.1.9 Block model validation

Validation of the block model consisted of visual comparison of block grades with the drillhole data and a review of global statistics for composites and block grades. Reconciliation with the 2012-3 production and 2015 production was also undertaken.

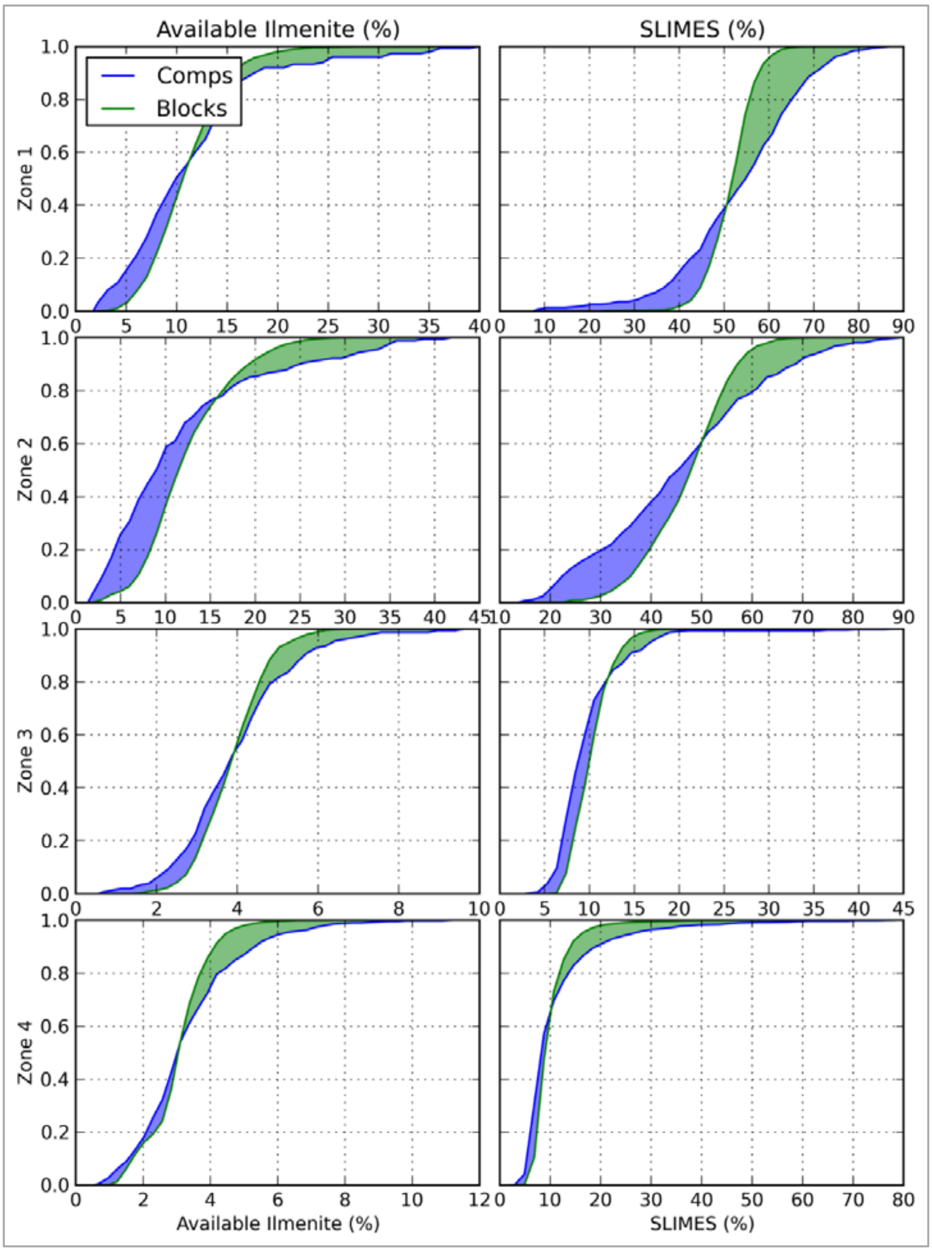
14.1.9.1 Block grade visualisation

A sectional review was completed of block grades against both assay grades and geological domaining. It indicated no issues with the modelling.

14.1.9.2 Composite/Block grade comparison

Comparison of global block available ilmenite and slimes grades with composite values for the different lithologies is included as *Figure 14.53.* The graphs show the cumulative frequency of the block grades (green line) with the cumulative frequency of the composite values (blue line). The patterns displayed indicate no problems with the modelling of available ilmenite and slimes content.

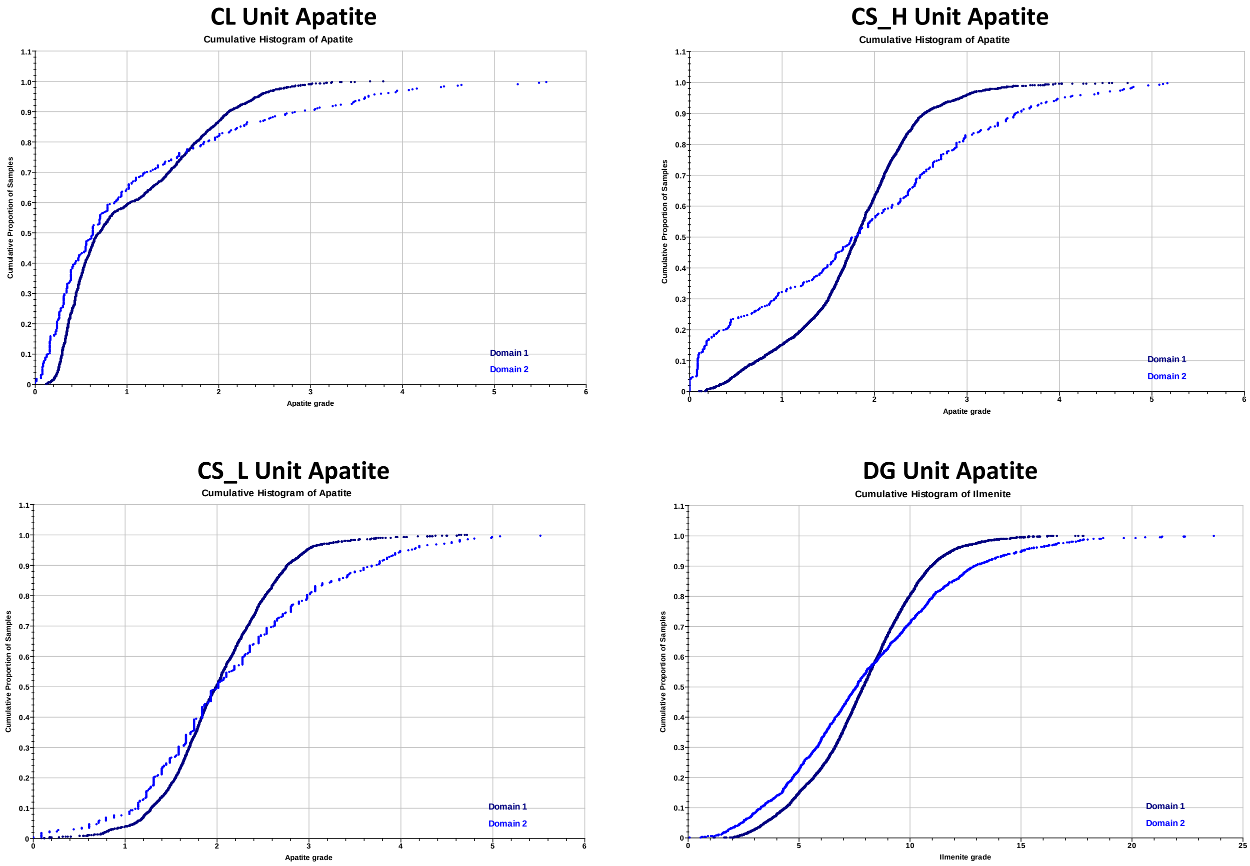
Figure 14.53: ML Composite-Block grade comparisons for available ilmenite and slimes



(Zone 1 = CL, Zone 2 = CS_H, Zone 3 = CS_L, Zone 4 = DG)

In a similar manner *Figure 14.54* shows the comparison of the apatite cumulative frequency curves for the block grades (Domain 1 – dark blue) with the cumulative frequency of the composite values (Domain 2 - blue). The unevenness in the curves for the CL apatite block grades is due to the distinctive spatial zonation of high and low grades. This may be the result of different depositional sources and/or regimes for the clay material.

Figure 14.54: ML Composite-Block grade comparisons for apatite



Domin 1 = Block grades Domain 2 = Composite values

14.1.9.3 Summary statistics for block grades and composites

A simple check on the grade interpolation for the block model is to compare summary statistics for the composite grades with the global block grades. Generally, in this type of deposit the composite means will be marginally higher than the block grade means. *Table 14.12* shows the comparisons for all the lithologies. In the majority of the cases the composite mean is higher than the block grade mean. The exceptions are for apatite in the CL and for slimes in the CS_H and CS_L units. The apatite discrepancy is due to the spatial zonation of grades with a larger number of lower grades covering a larger area. The exceptions are minor in scale and H&SC does not consider these exceptions to be significant.

Table 14.12: ML Summary statistics for block grades and composites

Zone/Stats	Available ilmenite (%)		Apatite (%)		Slimes (%)	
	Comp	Blocks	Comp	Blocks	Comp	Blocks
CL Unit						
Count	149	2878	303	3395	303	2878
Mean (%)	11.7	10.6	0.85	0.97	54.6	53.0
Minimum (%)	1.7	3.0	0	0.07	7.4	24.4
Maximum (%)	40.5	28.2	5.57	3.45	87.9	69.3
Variance	48.2	11.9	0.89	0.51	188.6	27.4
Std Dev	6.9	3.4	0.94	0.71	13.7	5.2
CV	0.6	0.3	1.1	0.73	0.3	0.1
CS_H Unit						
Count	180	6099	373	6614	373	6099
Mean (%)	11.9	11.8	1.87	1.76	46.5	48.5
Minimum (%)	1.4	2.5	0	0.04	13.7	24.3
Maximum (%)	42.4	31.8	5.50	4.17	90.8	73.1
Variance	78.1	18.9	1.71	0.53	270.9	71.3
Std Dev	8.8	4.4	1.31	0.76	16.5	8.4
CV	0.7	0.4	0.7	0.41	0.4	0.2
CS_L Unit						
Count	154	2965	438	2852	438	2965
Mean (%)	4.0	3.9	2.21	2.06	10.2	10.6
Minimum (%)	0.5	1.2	0	0.12	2.7	6.1
Maximum (%)	9.8	7.0	5.61	4.72	44.4	20.3
Variance	2.0	0.7	1.13	0.39	16.4	4.6
Std Dev	1.4	0.8	1.07	0.64	4.0	2.2
CV	0.3	0.2	0.48	0.30	0.4	0.2
DG Unit						
Count	494	7551	1316	7886	1316	7551
Mean (%)	3.4	3.2	1.63	1.59	12.0	10.8
Minimum (%)	0.6	1.0	0	0.14	2.0	5.7
Maximum (%)	11.3	7.7	5.30	4.41	79.4	53.0
Variance	2.4	0.8	0.83	0.45	70.3	14.0
Std Dev	1.6	0.9	0.91	0.67	8.4	3.7
CV	0.5	0.3	0.56	0.42	0.7	0.3

14.1.9.4 Reconciliation

Resource estimates for the perceived 2012-3 mined area are reported from the latest block model using a 0% ilmenite cut-off for material between the 2012 and 2013 LiDAR surfaces with a partial percent volume adjustment within the area defined as the Disturbed Area (as defined by a string file supplied to H&SC). *Table 14.13* shows the estimates along with the contained ilmenite tonnes and the production figures. The recoverable ilmenite tonnes field is the result of applying the plant recovery factor of 0.73, from Belridge's 2012-3 mining and processing operation, to the available ilmenite grade. The total recoverable ilmenite tonnes are within 10% of the production ilmenite tonnes, which suggests that the model may be slightly conservative.

The difference is considered acceptable for an Indicated Resource. As a result, H&SC conclude that its new 2014 model reconciles reasonably well with the 2012-2013 production.

Table 14.13: ML Block Model 2012/2013 mined material

Lithology	Volume (m^3)	Tonnes	Available Ilmenite (%)	Recoverable Ilmenite actual (%)	Recoverable Ilmenite actual (t)
CL	618	988	16.5	12.0	119
CS_H	289,785	463,656	11.4	8.3	38,585
CS_L	39,460	63,136	4.1	3.0	1,890
DG	40,188	80,774	3.8	2.8	2,241
Totals	**370,050**	**608,554**	**9.6**	**7.0**	**42,647**
	Production	**656,718**	**10**	**7.3**	**47,425**

The estimated average slimes content for the mined area from the block model was 39.3% compared to a production figure of 43%.

Mineral Technologies Pty Ltd completed a metallurgical operations review on the Goondicum mine during the months of April to July 2015. They estimated that “*290,000 dry tonnes of ore was processed through the Goondicum FPP and WCP circuits, producing at least 17,500 tonnes of ilmenite product. The slimes (-53µm) content of the ore was approximately 32%”.*

Figure 14.55 shows the areas mined in 2015, as numbered pits; the colours correspond to pit numbers. The shapes were created by H&SC from GR-supplied survey data cut to the 2013 LiDAR surface. *Table 14.14* details the volume removed from the dug pits and the reported resources for those pits from the block model. Two pits, Pits 2 and 3, were modelled but were so small that they did not cut into the block model due to minor discrepancies with the topographic data. Thus it would appear that just over 250,000 tonnes was mined. However, H&SC was also informed that some mined material was stockpiled and that some of the material from the old stockpiles was processed.

(Note: the recoverable ilmenite figures in 2015 Mined material from pits *Table 14.14* are based on an assumed recovery factor of 0.8 that was supplied by GR, based on some of its metallurgical testwork detailed in *Section 13.0*. In the block model this assumed recovery of 80% has been added as a ‘Recoverable Ilmenite’ field).

Figure 14.55: 2015 Mined areas

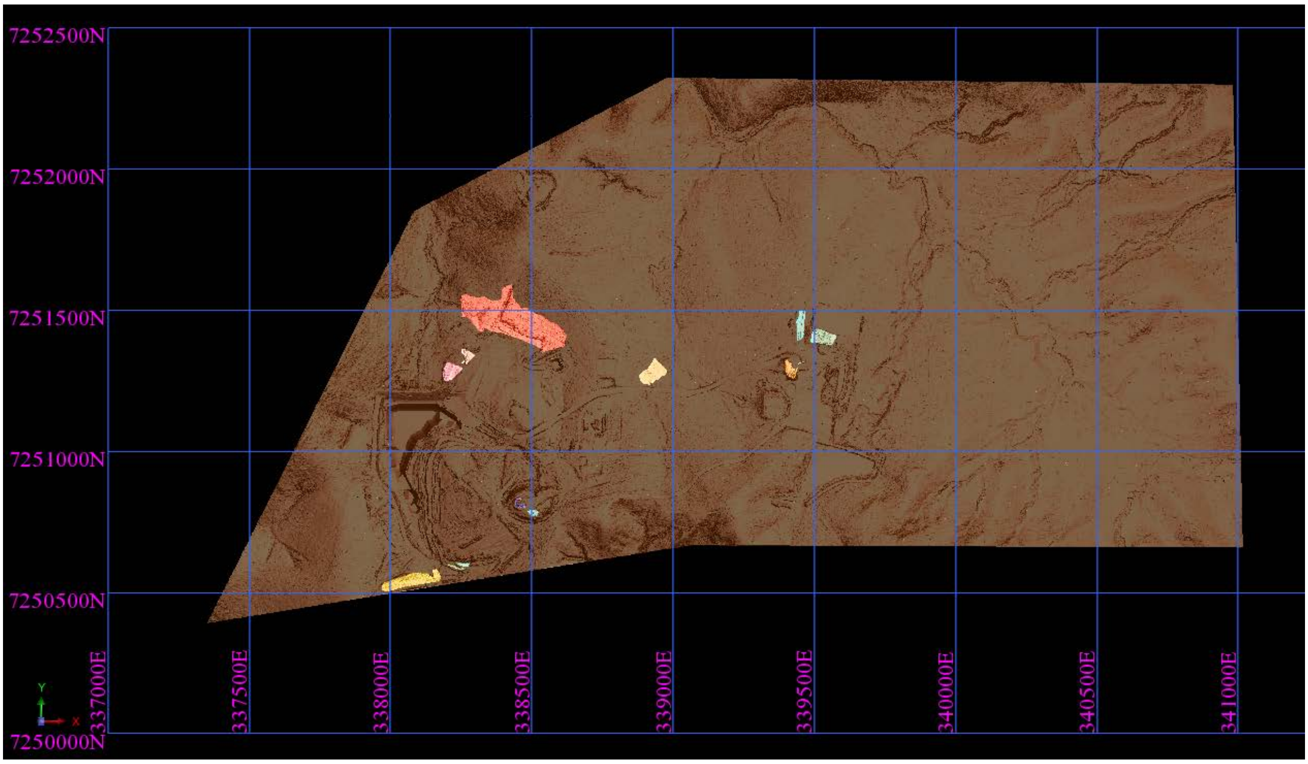


Table 14.14: 2015 Mined material from pits

Pit	Volume	Tonnes	Av Ilm %	Rec Ilm %	Slimes %	Av Ilm tonnes	Rec Ilm tonnes	Slimes tonnes
4	653	1,086	9.47	7.57	31.66	103	82	344
5	714	1,226	7.62	6.09	24.37	93	75	299
6	32,612	52,179	9.84	7.87	45.12	5,135	4,108	23,544
7	17,005	28,182	11.48	9.18	34.56	3,234	2,587	9,739
8	97,516	156,098	9.93	7.94	37.60	15,496	12,397	58,685
9	6,043	9,669	7.11	5.68	42.88	687	550	4,146
19	1,257	2,011	9.38	7.50	51.94	189	151	1,044
Total	**155,800**	**250,451**	**9.96**	**7.97**	**39.05**	**24,937**	**19,950**	**97,802**
Av density		1.608						

(Av Ilm = available ilmenite; Rec Ilm = recoverable ilmenite)

Survey data for the new stockpiles was used with the 2013 LiDAR surface to create a series of 3D shapes. H&SC was also informed that some barren sand material had been dug and had passed through the plant. Details of the additional material are included below in *Table 14.15*. Assumptions made by H&SC include that the dug stockpile is the same grade as the mined resource which may not be the case and that the new stockpile material is from mined material and not just push up from pre-exiting stockpile or sourced from elsewhere.

Table 14.15: Estimates for material processed through the plant

		Volume	Tonnes	Av Ilm %	Rec Ilm %	Slimes %	Av ilm tonnes	Rec Ilm tonnes	Slimes tonnes
	Pits 4 - 19	169,320	250,451	9.96	7.97	39.05	24,937	19,950	97,802
plus	Pits 2&3	1,642	2,691						
plus	Dug stockpile	4,187	6,731	9.96	7.97	39.05	670	536	2,628
plus	Sand	10,151	16,318						
		185,300	276,191				25,607	20,486	100,430
less	New Stockpile	28,266	46,319	9.96	7.97	39.05	4,612	3,690	18,088
	Totals	**157,034**	**229,872**				**20,995**	**16,796**	**82,342**

(Av Ilm = available ilmenite; Rec Ilm = recoverable ilmenite)

The conclusion from the 3D shapes and the block model is that just under 230,000 tonnes was processed and that just under 16,800 tonnes of recoverable ilmenite product would be generated with 39% of the processed material existing as slimes. Comparing this with Mineral Technologies estimation of 290,000 tonnes of throughput material indicates an approximate 24% difference in tonnes but only a 4% difference in the amount of ilmenite product with an overstating of 8% for the slimes grade.

The reasons for the discrepancies are not known but may be a function of/or a combination of uncertainty as to what was actually mined in the early part of the mining activity, possible pit survey inaccuracies, use of stockpiles and the relatively small amount of material for comparison.

14.1.9.5 Grade-tonnage data

Table 14.16 contains the Indicated Resource estimates for a range of available ilmenite cut off grades. The figures are represented as grade–tonnage curves for all lithologies (*Figure 14.56*).

Table 14.16: ML Block Model Indicated Resource estimates for grade-tonnage curves

Ilmenite			Avail ilmenite	Slimes	Avail ilmenite	Slimes
Cut off %	Domain	MTonnes	%	%	KTonnes	KTonnes
0	CL	4.1	10.8	52.9	450	2,195
	CS_H	4.9	12.9	52.4	625	2,550
	CS_L	5.1	4.0	10.2	204	519
	DG	19.5	3.4	11.1	662	2,154
	All Units	**33.6**	**5.8**	**22.1**	**1,941**	**7,417**
2.5	CL	4.1	10.8	52.9	450	2,195
	CS_H	4.9	12.9	52.4	625	2,550
	CS_L	5.0	4.0	10.2	202	511
	DG	17.3	3.6	11.1	623	1,918
	All Units	**31.3**	**6.1**	**22.9**	**1,899**	**7,174**
4	CL	4.1	10.9	52.9	449	2,190
	CS_H	4.9	12.9	52.4	625	2,546
	CS_L	2.6	4.6	10.9	117	277
	DG	4.1	4.6	14.6	186	595
	All Units	**15.6**	**8.8**	**35.9**	**1,377**	**5,608**
8	CL	3.3	12.0	52.6	393	1,720
	CS_H	4.4	13.4	52.1	593	2,300
	All Units	**7.7**	**12.8**	**52.3**	**986**	**4,020**
10.5	CL	2.2	13.4	51.8	292	1,125
	CS_H	3.2	15.0	51.6	478	1,643
	All Units	**5.4**	**14.4**	**51.7**	**770**	**2,768**

There appears to be a natural cut off at about 2.5% available ilmenite for the resource as a whole, which is believed due to the primary concentration of ilmenite in the underlying gabbro.

Figure 14.56: ML Block Model Indicated Resource grade-tonnage curves

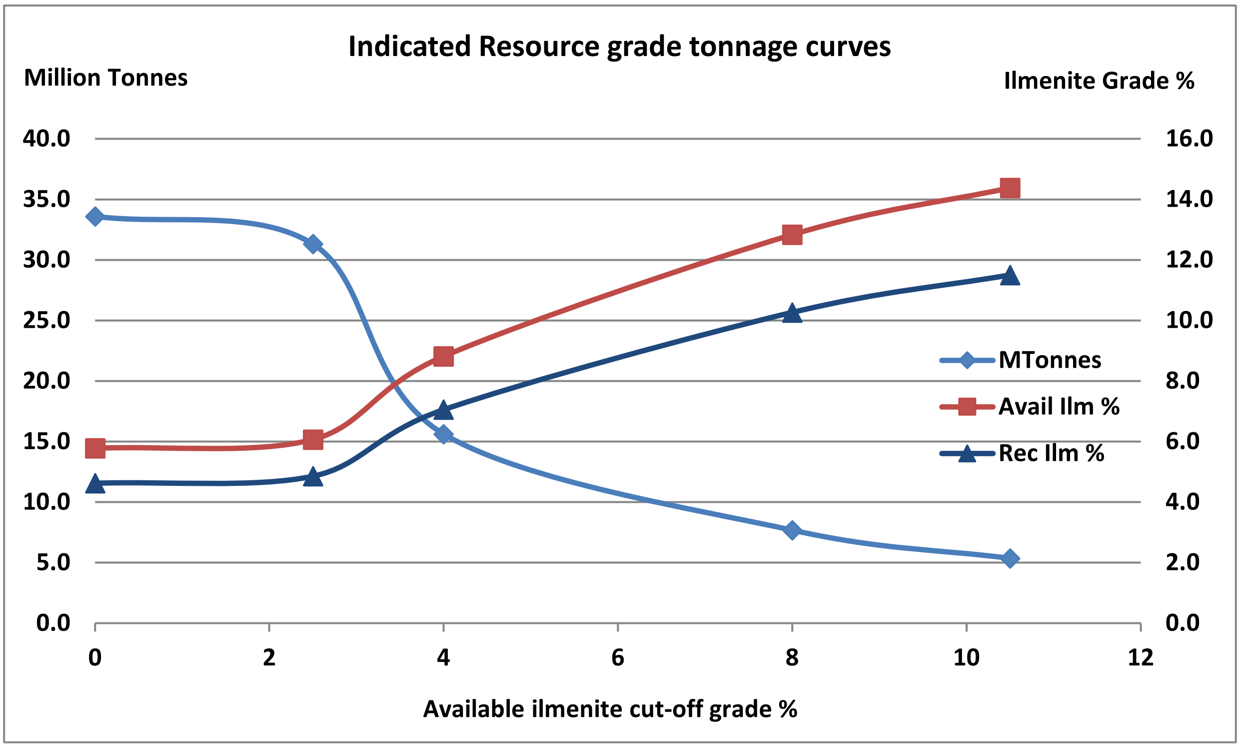
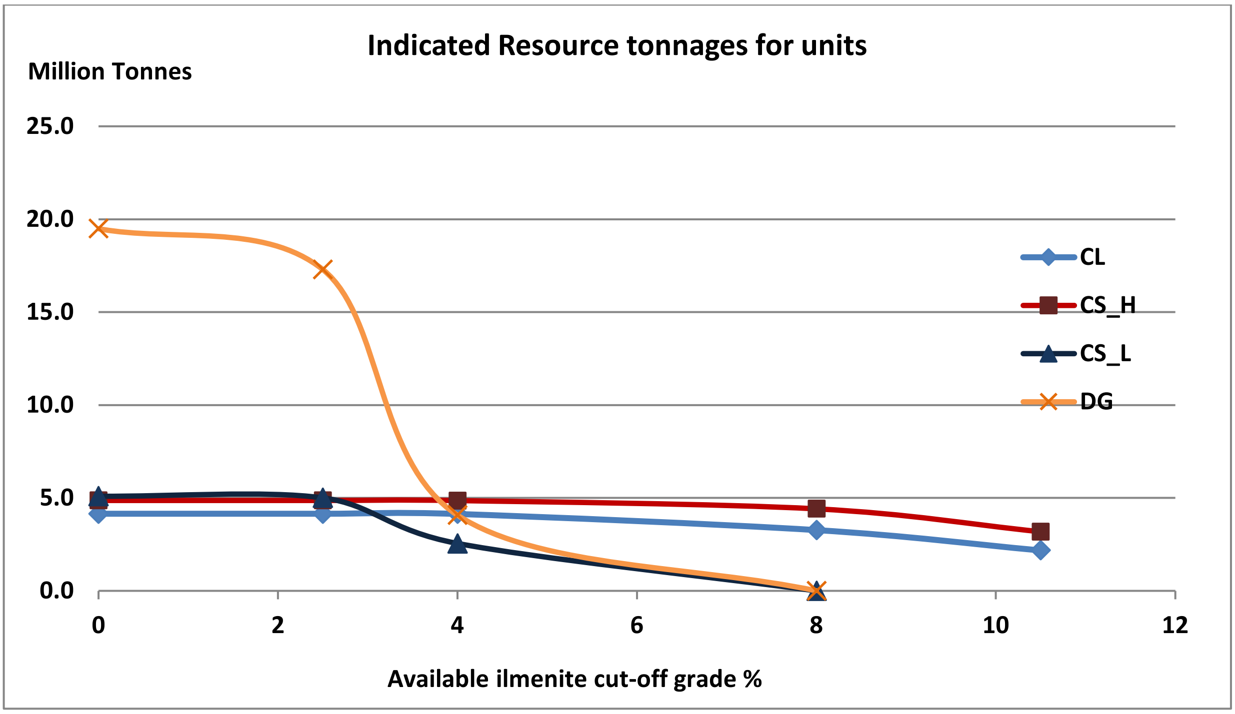


Figure 14.57 shows the tonnages for the different lithologies at different cut off grades.

Figure 14.57: ML Block Model Indicated Resource tonnage curves all lithologies



14.1.10 SL (Soil) sampling

Earlier in this report mention was made of the preservation of the top 0.2metre of soil for ground rehabilitation after mining. This 20cm of soil material was a separate sample in each drillhole, the SL lithology code was used, but for the purposes of modelling was composited as part of the first 1metresample of each hole. This chapter provides some detail of that soil layer as it may have an impact on any mine scheduling.

Figure 14.58 shows a plot of the available ilmenite grades for the SL samples; there is only one sample per drillhole. There is some weak zonation to the ilmenite grades mostly related to the underlying CS_H unit.

Figure 14.58: ML Plot of SL sample grades available ilmenite

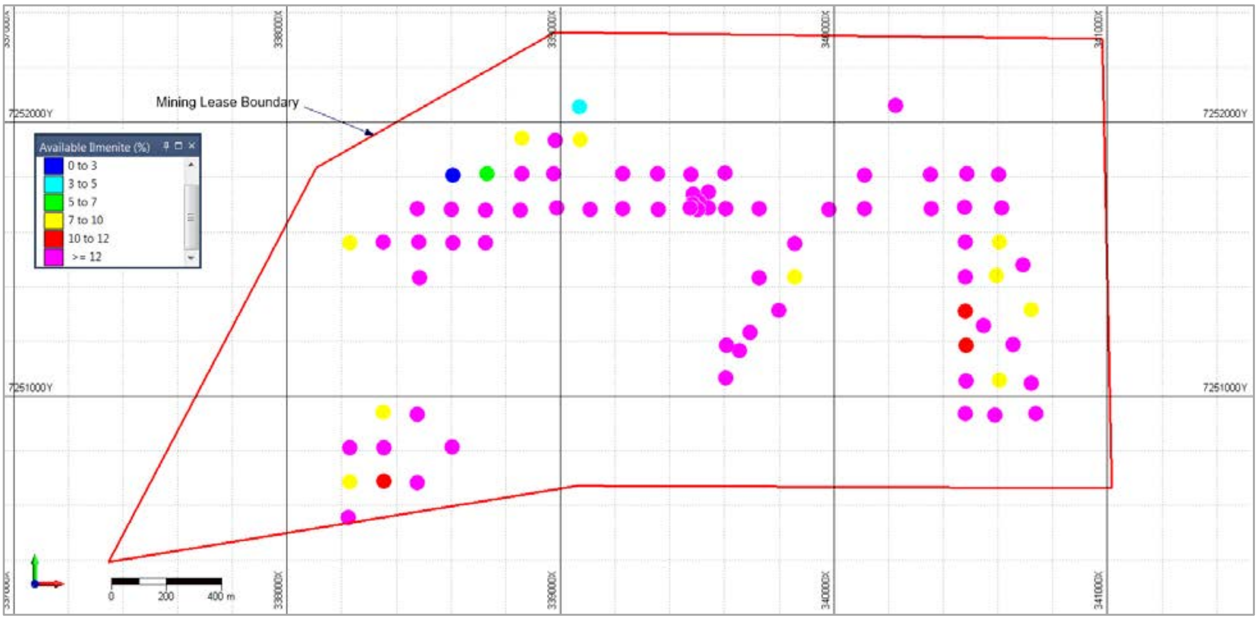


Table 14.17 contains the summary statistics for the SL unit. It quite clearly shows that the ilmenite grades are significantly higher for the SL unit than all the other lithology units. This presumably is because of recent weathering and erosion has removed finer grained, lighter material upgrading the heavy mineral content of the soil including the ilmenite content.

Table 14.17: SL Unit summary statistics

SL Unit	Available ilmenite (%)	Apatite	Slimes (%)
Count	78	224	224
Mean	20.8	1.47	40.1
Minimum	2.8	0.07	14.1
Maximum	42.4	6.46	66.5
Variance	92.6	1.81	120.5
Std Dev	9.6	1.34	11.0
CV	0.6	0.92	0.27

The SL samples may not fully reflect the ilmenite grade due to the difficulty in getting proper and good sample return for the first 0.5metre of aircore drilling. The samples collected with the 2009 drilling will almost certainly have underestimated the ilmenite content in the soil.

There is a moderate negative correlation between the available ilmenite and the slimes grades (*Table 14.18*). The available ilmenite and slimes content are not strictly independent variables as the available ilmenite is weighted by the 1mm to 53micron size fraction imparting the negative correlation.

Table 14.18: SL Unit mineral correlations

SL Unit	Ilmenite	Apatite	Slimes
Ilmenite	1		
Apatite	0.19	1	
Slimes	-0.66	0.04	1

The amount of SL material for the whole deposit is likely to be in the range of 600,000 to 800,000m^3 with a grade range of 13 to 20% ilmenite and 1.3 to 1.7% apatite.

14.2 MLA Resource estimates

Interpretation of the 1996-2000 drilling was completed on a 100m sectional basis (N-S sections). Lithology surfaces were interpreted by H&SC and generally comprised CS_H and DG with some modest amounts of CL and CS_L. Based on the ML work completed by H&SC in 2013/4 the CS_H, CL and SL were combined into a single unit, the CS, for grade interpolation purposes, whilst the CS_L and DG were combined into a DG unit. 3D surfaces were created for the base of the CS and the base of assaying in the drilling which generally occurred in the DG.

The 5.5AM and slimes composite data were modelled. A hard boundary was used to differentiate the CS from the DG units for the modelling. The resulting model was loaded into the Surpac mining software for resource estimate reporting and to facilitate any transition to future mining studies. To ensure grade interpolation right up to the ML boundary it was necessary to use some of the composited ML 5.5AM and slimes data.

The 5.5AM data was modelled without any ilmenite conversion factor applied. This was included as an additional field in the block model and applied to the modelled 5.5AM data to create an ilmenite grade.

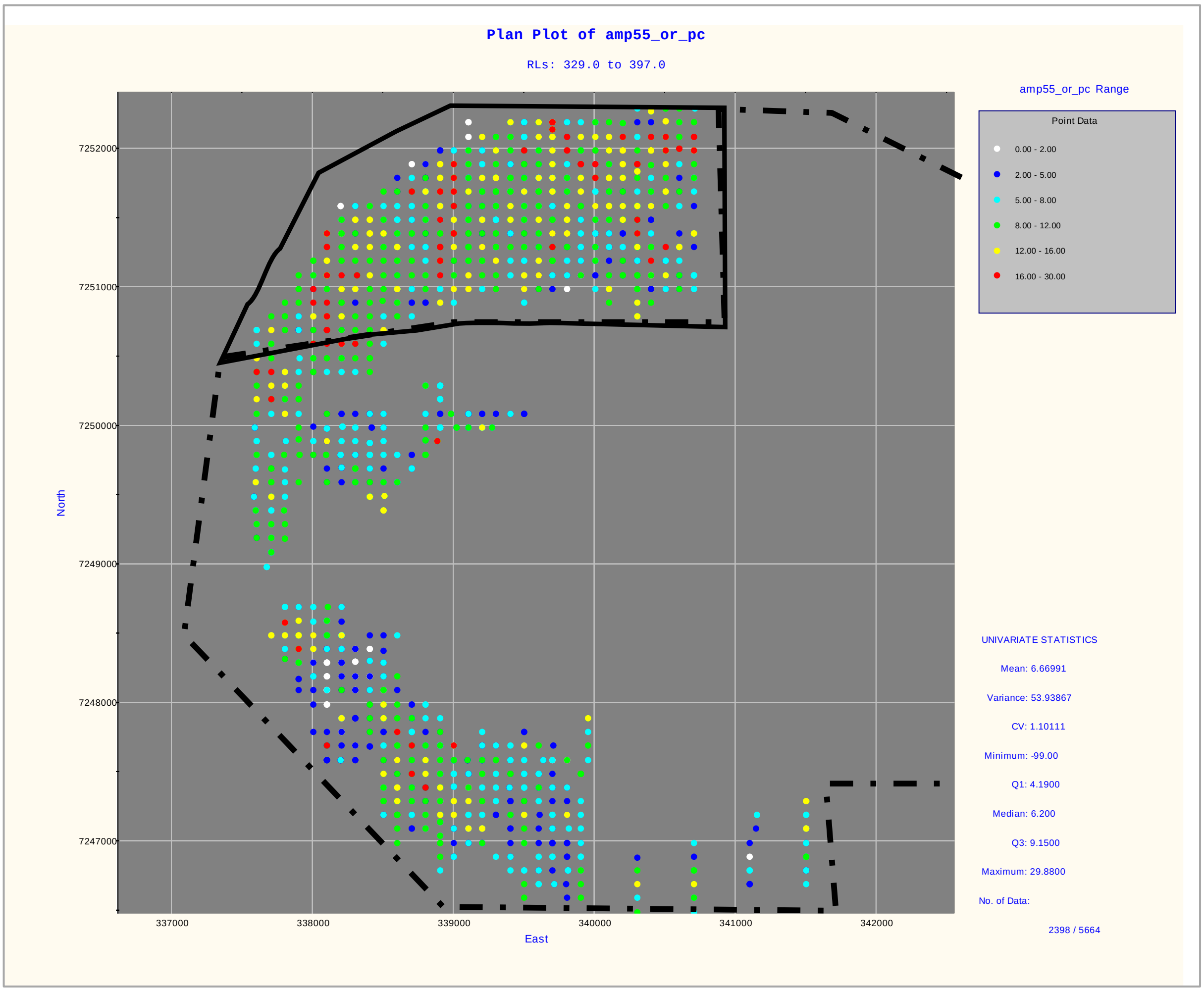
14.2.1 Composite data

Samples were composited to 1metreintervals within the mineralised zones with a minimum composite length of 0.5m. Each composite sample was assigned to the CL, CS_H, CS_L or DG zones. For the purpose of modelling the CL and CS_H data were combined with the SL sample and treated as the CS unit. A small amount of CS_L was delineated from the logging and was incorporated into the DG unit for grade interpolation purposes as previous work had highlighted similar visual and analysis properties between the two units. Any GA samples were also combined with the DG.

A total of 4,492 composites were generated for both the 5.5AM recovered magnetic fraction and the slimes. Of this 1,844 samples were for the MLA and 2,648 for the ML.

Figure 14.59 shows the plan distribution of the top sample for the CS for both the MLA and the ML. Generally speaking, the MLA ilmenite mineralisation is more scattered as localised smaller zones but nominally it is of similar grade to the bigger, more coherent ML mineralisation, especially if the perceived conservatism from the QAQC work is applied to the MLA data.

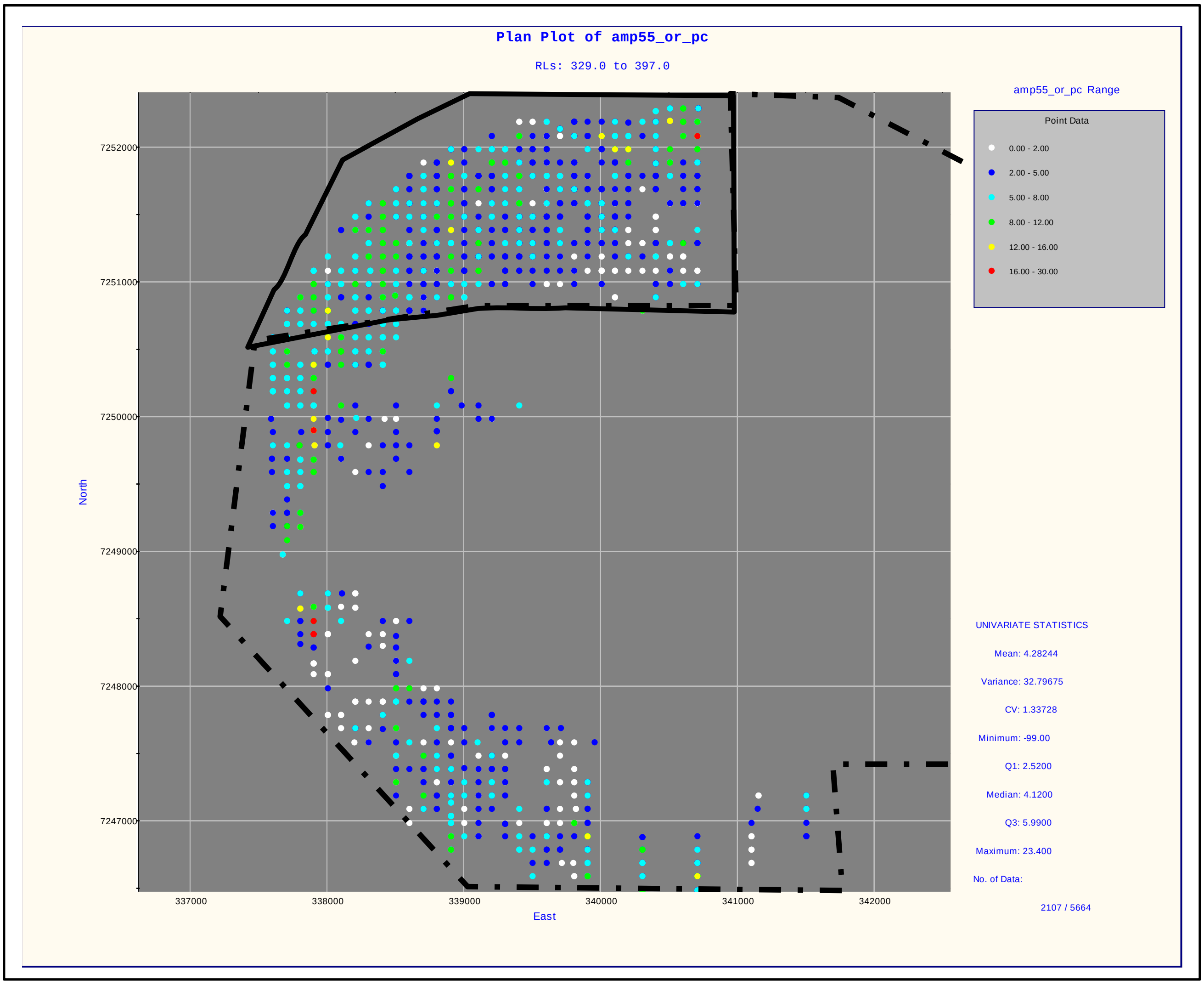
Figure 14.59: ML & MLA Composite Data 5.5AM recovered magnetic fraction CS Unit



(the black dash polygon for the MLA boundary, black solid for the ML boundary)

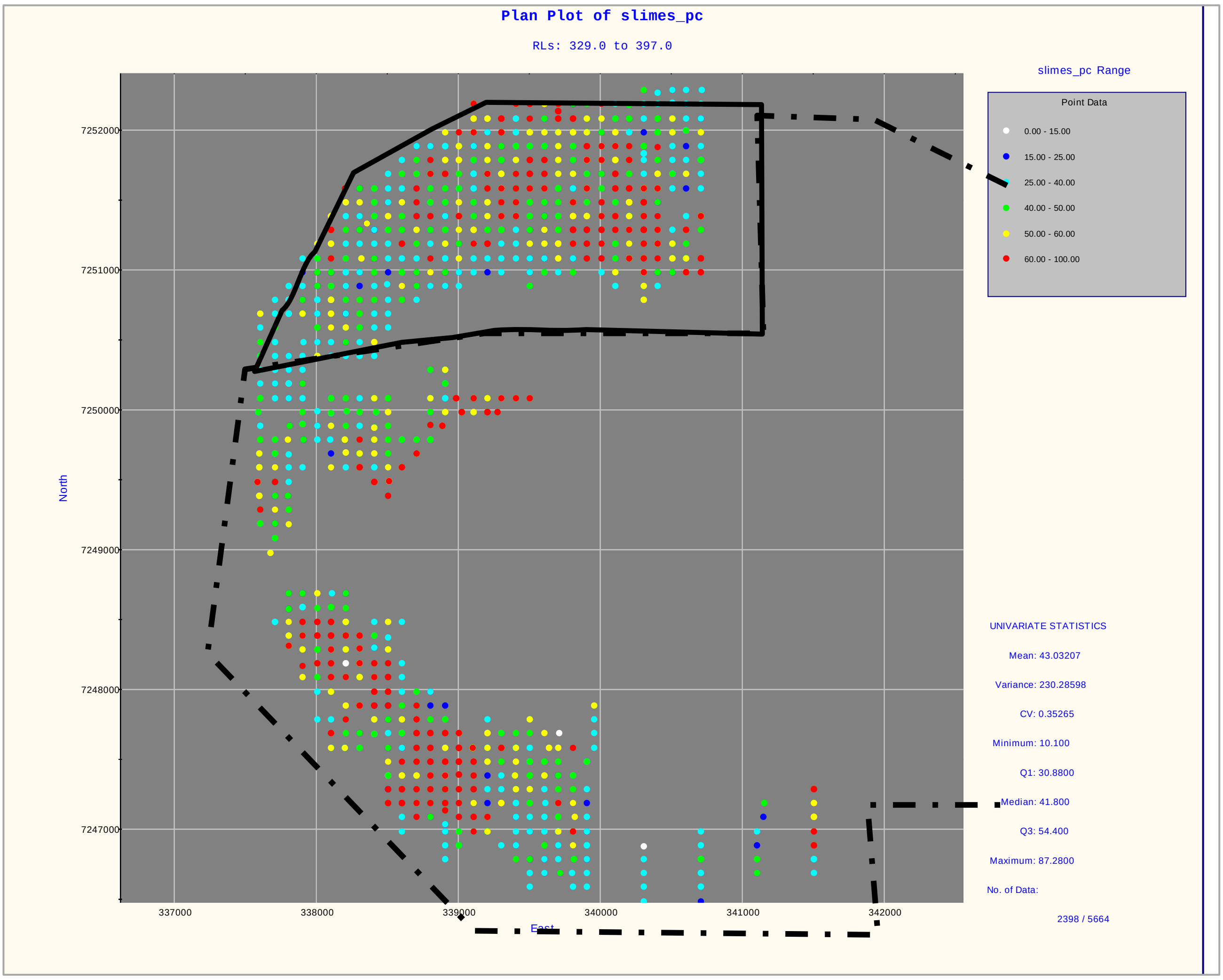
Figure 14.60 shows the plan distribution of the top sample for the DG for both the MLA and the ML. In both cases the DG has markedly lower 5.5AM values than the CS.

Figure 14.60: ML & MLA Composite Data 5.5AM recovered magnetic fraction DG Unit



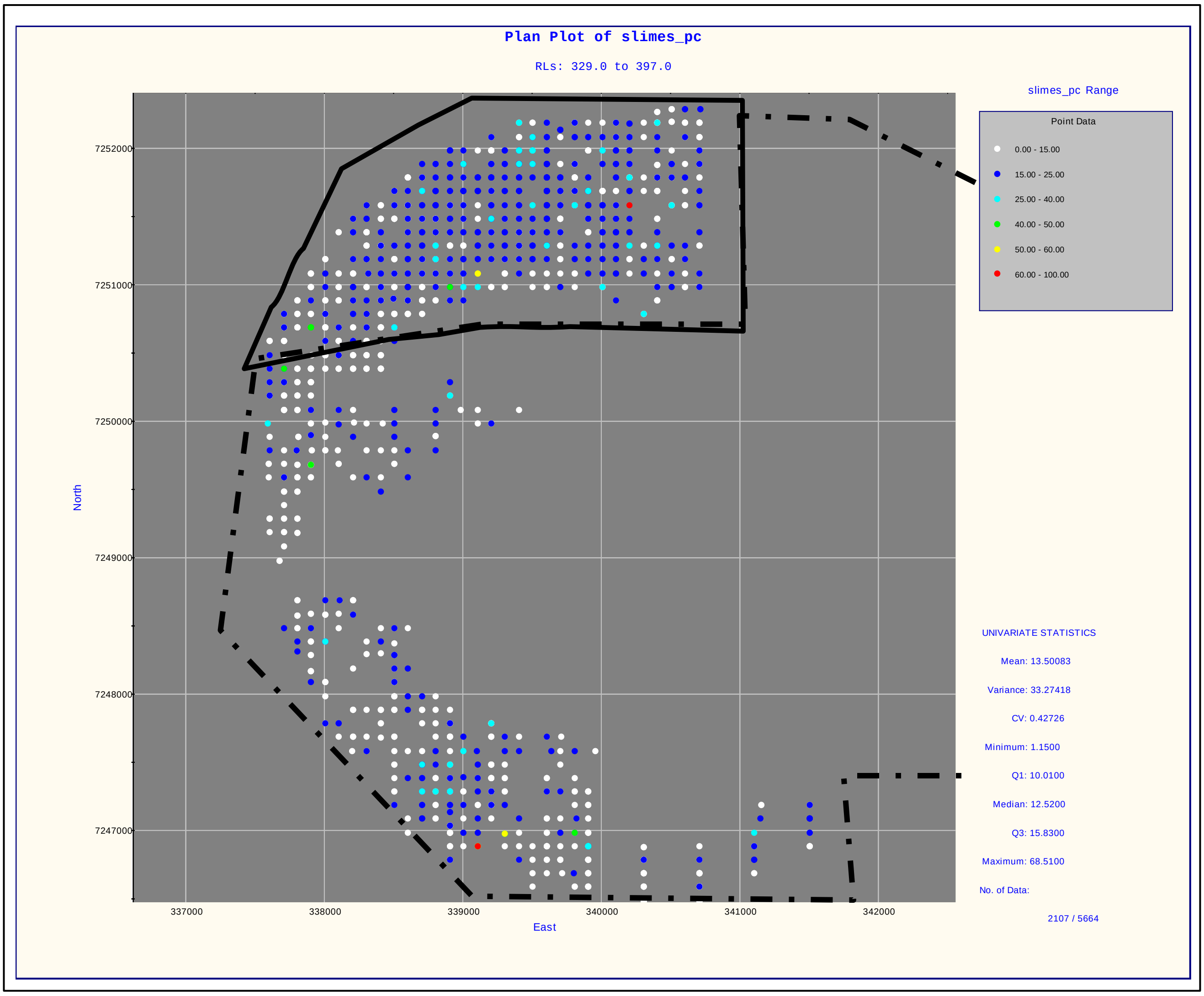
The slimes data for the CS shows widespread high grades with some zonation, possibly reflecting the impacts of topography and drainage rather than underlying lithology (*Figure 14.61*).

Figure 14.61: ML & MLA Composite Data slimes content CS Unit



The DG shows low slimes grades and is generally lower in the MLA than the ML but with no particular zonation on the MLA (*Figure 14.62*)

Figure 14.62: ML & MLA Composite Data slimes content DG Unit



From previous work on the ML composite grade variations across the interpreted CS_H & CS_L boundary indicated that the 'Available Ilmenite' and slimes grades showed a significant difference across the actual boundary. The available ilmenite in the CS_L unit was consistently low but the average increased steadily once into the CS_H unit. The percentage of slimes showed a marked difference across the boundary indicating an abrupt boundary with no suggestion of any gradation. H&SC had concluded that the base of CS_H should be a hard boundary for the estimation of both available ilmenite and slimes composites. The difference between grades of the CS_L and DG was much less pronounced and therefore no boundary between these two units was used in the estimation for either available ilmenite or slimes.

The above hard boundary strategy for the ML was used for the new MLA resource estimates.

14.2.1.1 Zone and domain characterisation

The geological domains from the sectional interpretation were based on a combination of the photo-geological interpretation, logging codes, the topographic surface and the 5.5AM and slimes assays. The division for the CS into high and low slimes was based on previous H&SC work (at a nominal 14% slimes). Recognising that contacts between two lithologies can exist in a single sample, geological sense was applied in interpreting the location of the lithological boundary(s) within the drillhole.

14.2.1.2 Univariate statistics

Summary statistics for the MLA composite samples from the drilling, split by rock type can be seen in *Table 14.19*.

The low coefficients of variation ('CV') indicate that the data is not skewed and that Ordinary Kriging ('OK') is a suitable modelling method.

Table 14.19: Univariate statistics for composites

5.5AM	CS	DG
No. Data:	1140	704
mean:	5.924	4.601
variance:	11.079	9.571
CV:	0.562	0.672
Minimum:	0.1	0.1
Q1:	3.6	2.3
Median:	5.4	4.12
Q3:	7.8	6.3
Maximum:	19.58	23.4
IQR:	4.2	4

Slimes	CS	DG
No. Data:	1140	704
mean:	44.037	12.323
variance:	235.146	43.599
CV:	0.348	0.536
Minimum:	10.1	3.55
Q1:	32	8.6
Median:	43	10.8
Q3:	55.1	14.2
Maximum:	82.4	63
IQR:	23.1	5.6

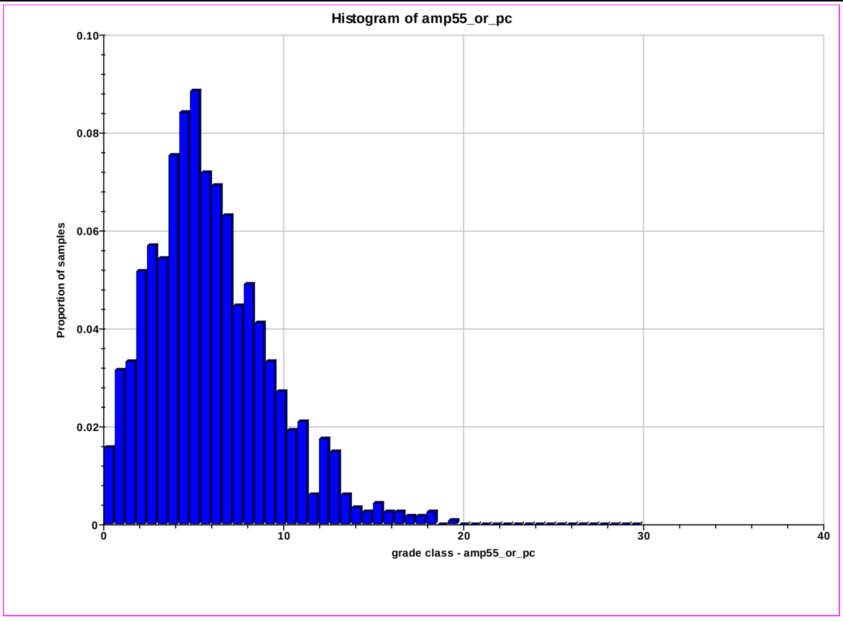
No top cuts were applied to the data as no extraordinary values were identified.

The summary statistics confirm the higher mean for the 5.5AM data for the CS over the DG. For the slimes data the CS has markedly higher values than the DG as would be expected. From H&SC's knowledge of the ML deposit there is limited difference between the ML and MLA indicating either uniformity of the primary rock and/or similar mode of geological weathering and processing. The difference in the 5.5AM material for the two areas may be due to landform preservation and/or fundamental differences in the nature of the underlying layered gabbro, for example, different ilmenite concentrations or a change in grain size/liberation characteristics.

Figure 14.63 contains histograms for the 5.5AM data for the two different lithologies for the MLA. There is no obvious difference between the populations for the CS and DG.

Figure 14.63: Histograms of 5.5AM composites

CS Unit : MLA

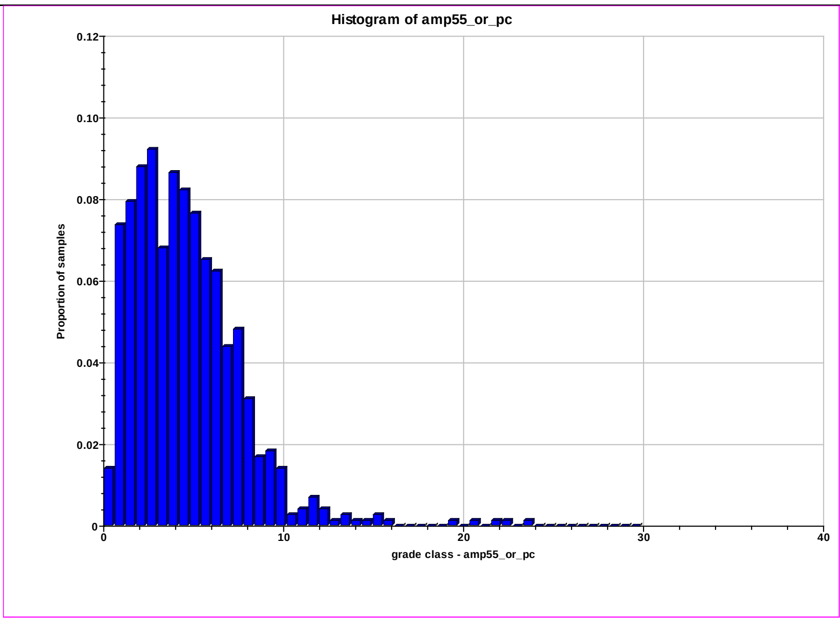


Univariate Statistics

Variable:	amp55_or_pc
Weighted by:	--
Mean:	5.924
Variance:	11.079
CV:	0.562
Minimum:	0.100
Q1:	3.600
Median:	5.400
Q3:	7.800
Maximum:	19.580
IQR:	4.200
No. Data:	1140 / 5664

(Data is sub-setted)

DG Unit : MLA



Univariate Statistics

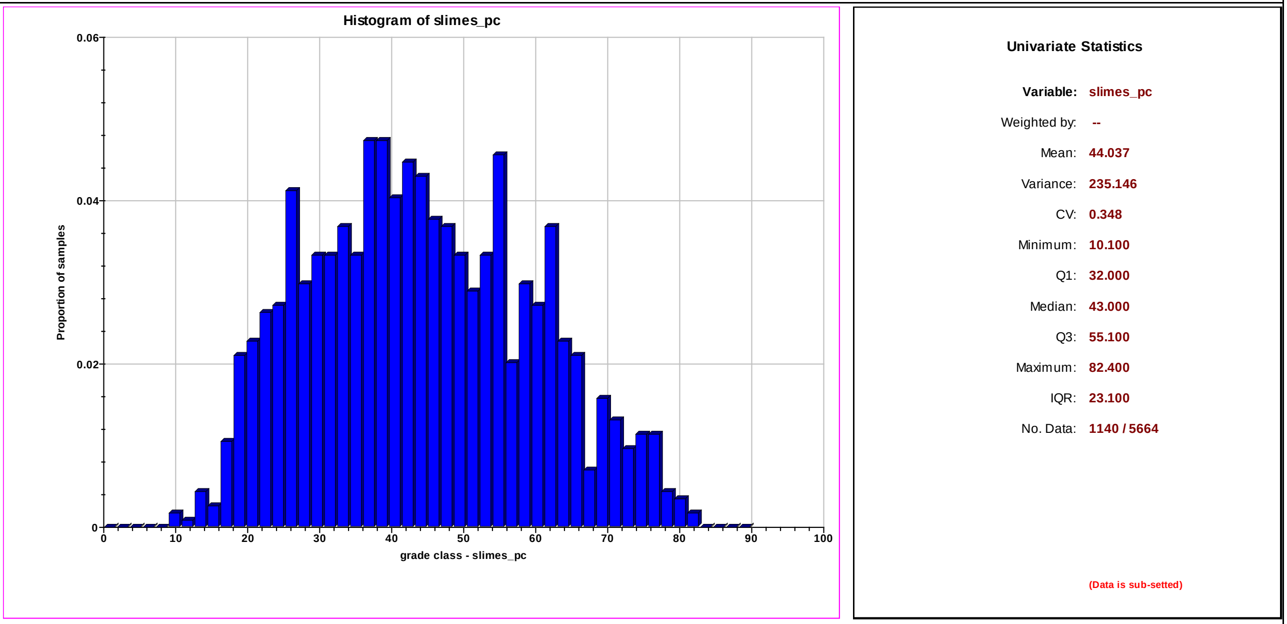
Variable:	amp55_or_pc
Weighted by:	--
Mean:	4.601
Variance:	9.571
CV:	0.672
Minimum:	0.100
Q1:	2.300
Median:	4.120
Q3:	6.300
Maximum:	23.400
IQR:	4.000
No. Data:	704 / 5664

(Data is sub-setted)

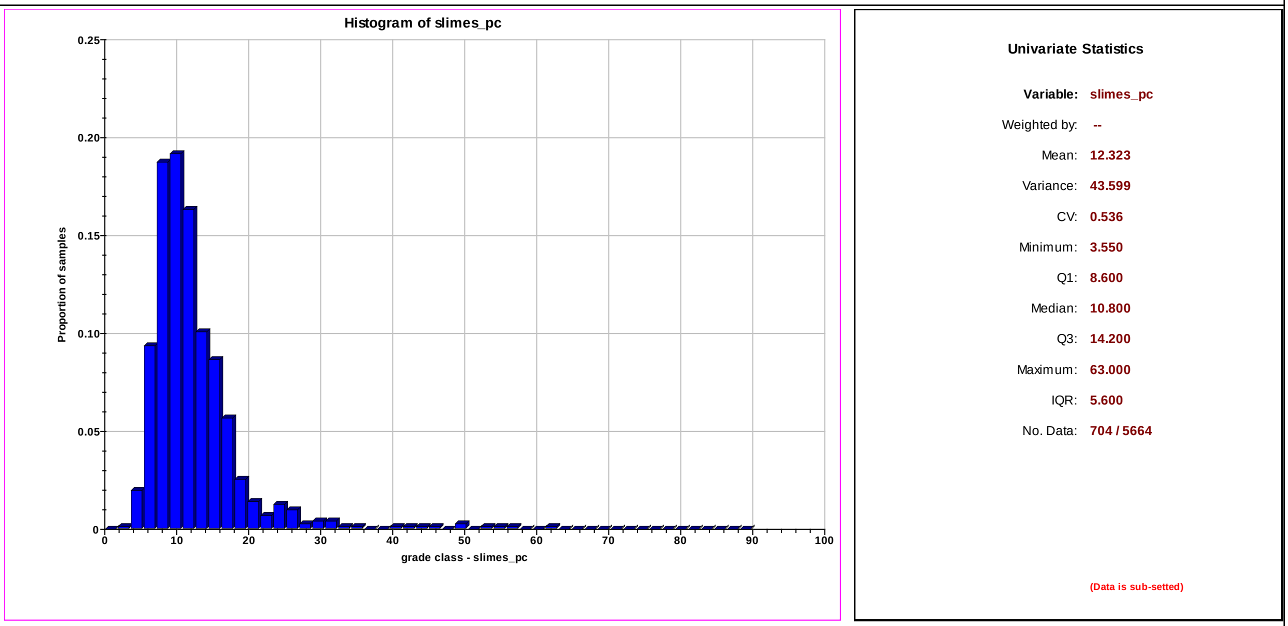
Figure 14.64 shows the histograms for the MLA slimes data for the different lithological units. Clearly there is population segregation between the CS and the DG. The former appears to contain more than one population, some of which might be due to mis-logging but H&SC suspects that it is due to the complex multiphase weathering and material transportation regimes.

Figure 14.64: Histograms of slimes composites

CS Unit : MLA



DG Unit : MLA



14.2.1.3 Bivariate statistics

There is no correlation between the 5.5AM data and the slimes data, as expected, due to the sample processing. The 5.5AM recovered magnetic fraction and slimes content are not strictly independent variables as the 5.5AM material is weighted by the 1mm to 53micron size fraction.

14.2.1.4 Spatial analysis

The approach being used to analyse the data and generate resource models in this study is essentially a geostatistical modelling method which necessarily uses spatial continuity functions or variograms as part of the modelling process.

In the analytical process, sample variograms are generated from the sampling data. The sample variograms like other statistical summaries provide a numerical measure of the spatial continuity of the element grades for specific populations of samples. The properties of sample variograms reflect both the spatial variation of the grades and the spatial limitations of the data sets. If a sample population has a limited or discontinuous spatial extent, this directly affects the ability to understand the spatial continuity. The variograms are used to generate a 3D variogram model.

Variogram models are required to serve as parameters for the OK modelling method with one variogram model required for each element per each spatial domain.

Variography, using the GS3M software, was completed on the flattened composite data for the ML 5.5AM material. This area was chosen as it represents the largest body of detailed drilling information and offered the best chance to establish structure to the data. It also occurs in the same geological position as the material from the MLA area. To make sure sufficient data was available for meaningful analysis and in recognition of the lack of a sharp change in grade across lithological boundaries, all lithological data was combined into a single file.

Figure 14.65 shows the direction variograms for the 5.5AM data for the CS in the ML area. The range of the vertical axis is much shorter, as to be expected from weathered residual deposits such as Goondicum.

Figure 14.66 shows the direction variograms for the 5.5AM data for the DG in the same area. There is a measure of consistency for the downhole 5.5AM grade.

A number of search domains for the MLA area were delineated to account for the arcuate nature of the mineral zone and the ML variogram models were adjusted to take into account the changes in strike direction.

The 5.5AM variogram models were used for the MLA slimes material. Some additional experimentation with variography might be justified for the slimes material.

Figure 14.65: Variograms for 5.5AM data CS Unit

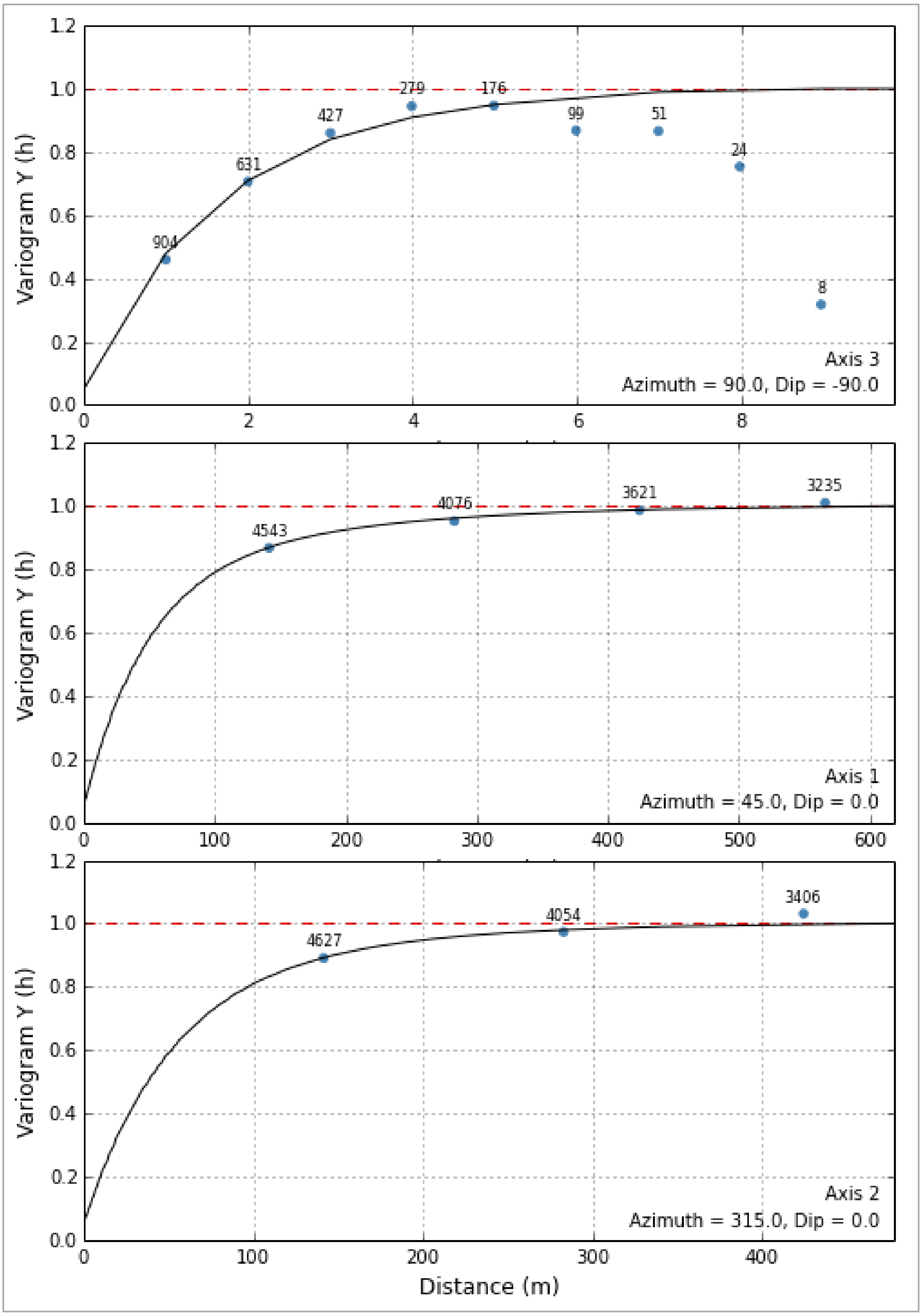
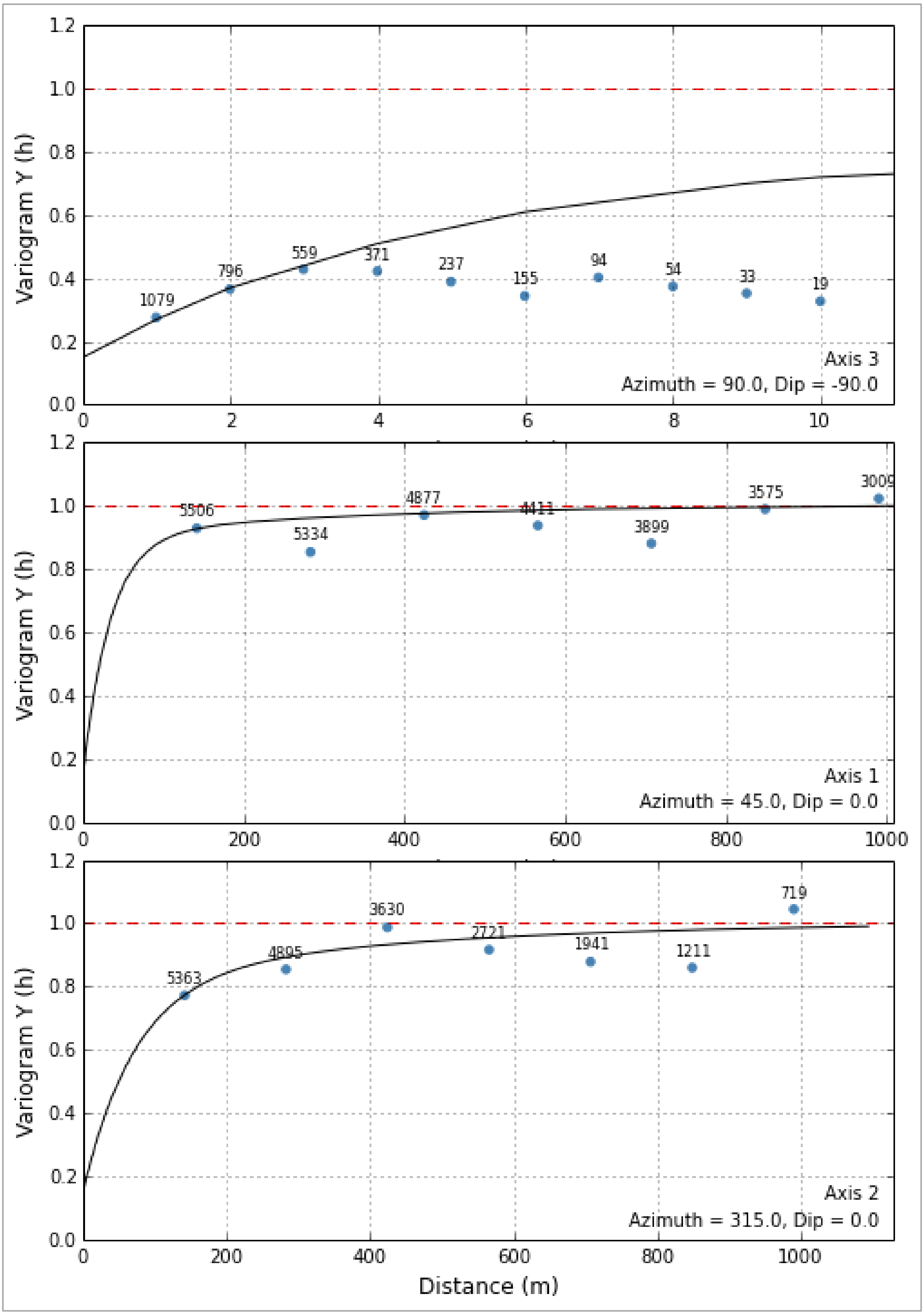


Figure 14.66: Variograms for 5.5AM data DG Unit



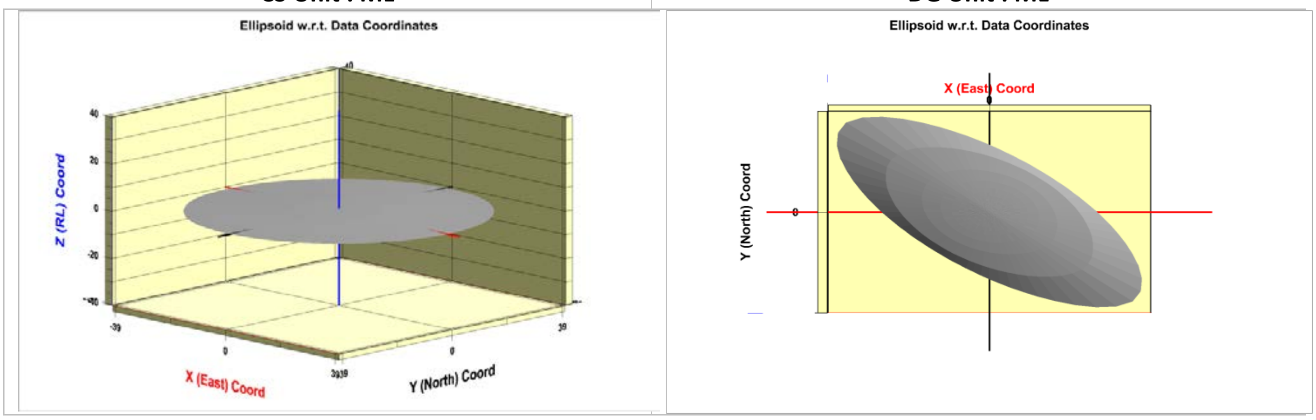
Details of the ML variogram models for the 5.5AM data for both units are included in *Table 14.20* and are represented as models in *Figure 14.67*. Because of the similarity of the mineral styles the ML variogram models were used for the MLA areas subject to axis rotations in line with the changing strike of the annular feature.

Table 14.20: Variogram models used for the MLA

		Goondicum ML				
Metal		**Nugget**	**c1**	**c2**	**c3**	
5.5AM			exp	exp	exp	
CS unit	variance	0.05	0.7	0.15	0.1	
ML	axis 1		140	445	505	
	axis 2		145	315	415	
	axis 3 (z)		5	5	5	
	Z Rotation					45
	Y Rotation					0
	X Rotation					0
5.5AM	type		exp	exp	exp	
DG unit	variance	0.15	0.65	0.1	0.1	
ML	axis 1		97	125	1005	
	axis 2		215	1000	1500	
	axis 3 (z)		15	1000	1550	
	Z Rotation					45
	Y Rotation					0
	X Rotation					0

Figure 14.67: Variogram Model for 5.5AM

CS Unit : ML **DG Unit : ML**



The CS model is indicative of broad, widespread distributed ilmenite grade consistent with a lateritic profile and any sheet flooding. The DG model represents a more across strike direction, probably related to the NW trend in the alluvial systems.

14.2.2 Block model dimensions

The block model was created under the assumption that mining on the MLA deposit will be conducted using shallow open pit mining methods. Details of the Surpac block model are included in *Table 14.21* with the minimum coordinates representing the bottom left corner of the model. The effective minimum mining dimensions are equal to the block size. The east-west and north-south block dimensions were selected primarily on drill hole spacing and the vertical dimension was chosen in recognition of the lithology thicknesses, horizontal layering and sample spacing. No sub-blocking was used.

Table 14.21: Block Model dimensions

Goondicum MLA Model			
gdm_reg_ok_working_301114.mdl			
Type	**Y**	**X**	**Z**
Minimum Coordinates	7246100	337200	299.5
Maximum Coordinates	7252600	341900	556.5
User Block Size (m)	50	50	1
Min. Block Size (m)	50	50	1
Rotation	0	0	0

The block model was restricted to the plan extents of the CS-DG boundary wireframes, which in turn are a function of the drilling, surface mapping and topography.

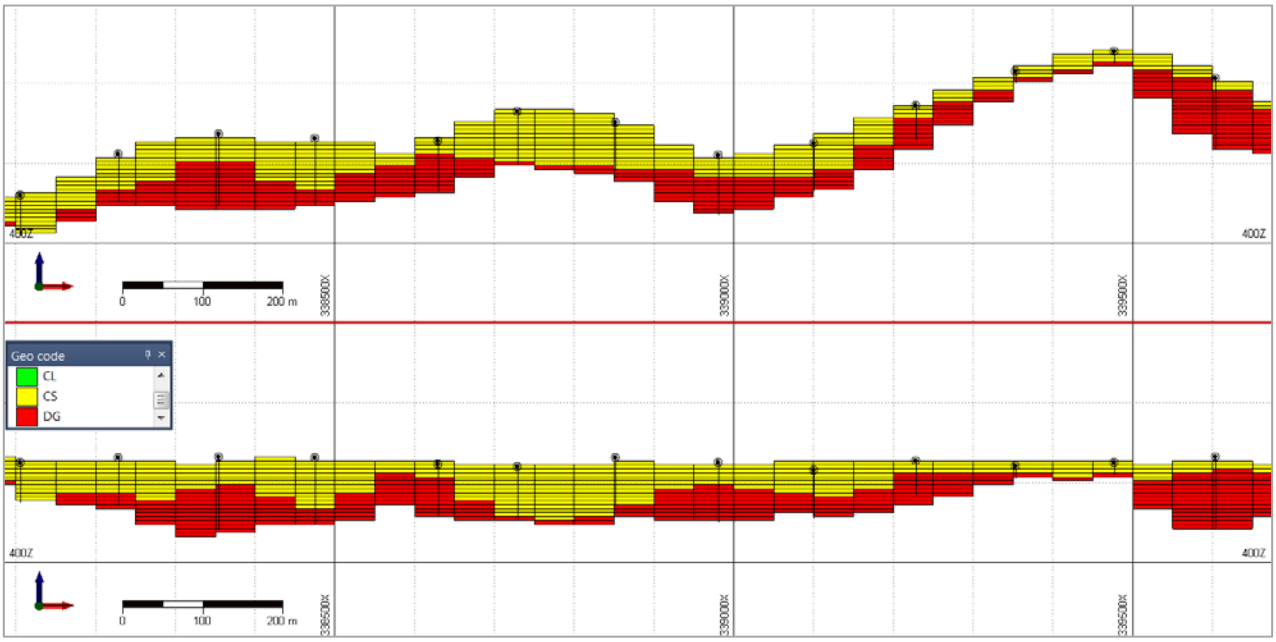
14.2.3 Model flattening

The thickness of the lithological units is relatively small compared to the variation in elevation of the base of each unit. The composite data and block model were therefore 'flattened' relative to the original topographic surface in order to remove the effects of topographic variation. This process effectively assigns each of the drillhole collars with a similar elevation

Figure 14.68 shows the effect of flattening the composite data on the block grade compilation.

The resulting model was 'unflattened' and then loaded into the Surpac mining software for resource estimate reporting and to facilitate any transition to mining use.

Figure 14.68: Example section of flattening



14.2.4 Search criteria

The search criteria used for the estimation can be seen in *Table 14.22* and consists of two search passes increasing in search radii and decreasing in data requirements. The search criteria were selected in recognition of the data spacing and the short vertical range shown in the variography. Declustering was carried out by the use of search sectors. Discretisation of blocks is based on 5 x 5 x 2 points (east, north and vertical respectively).

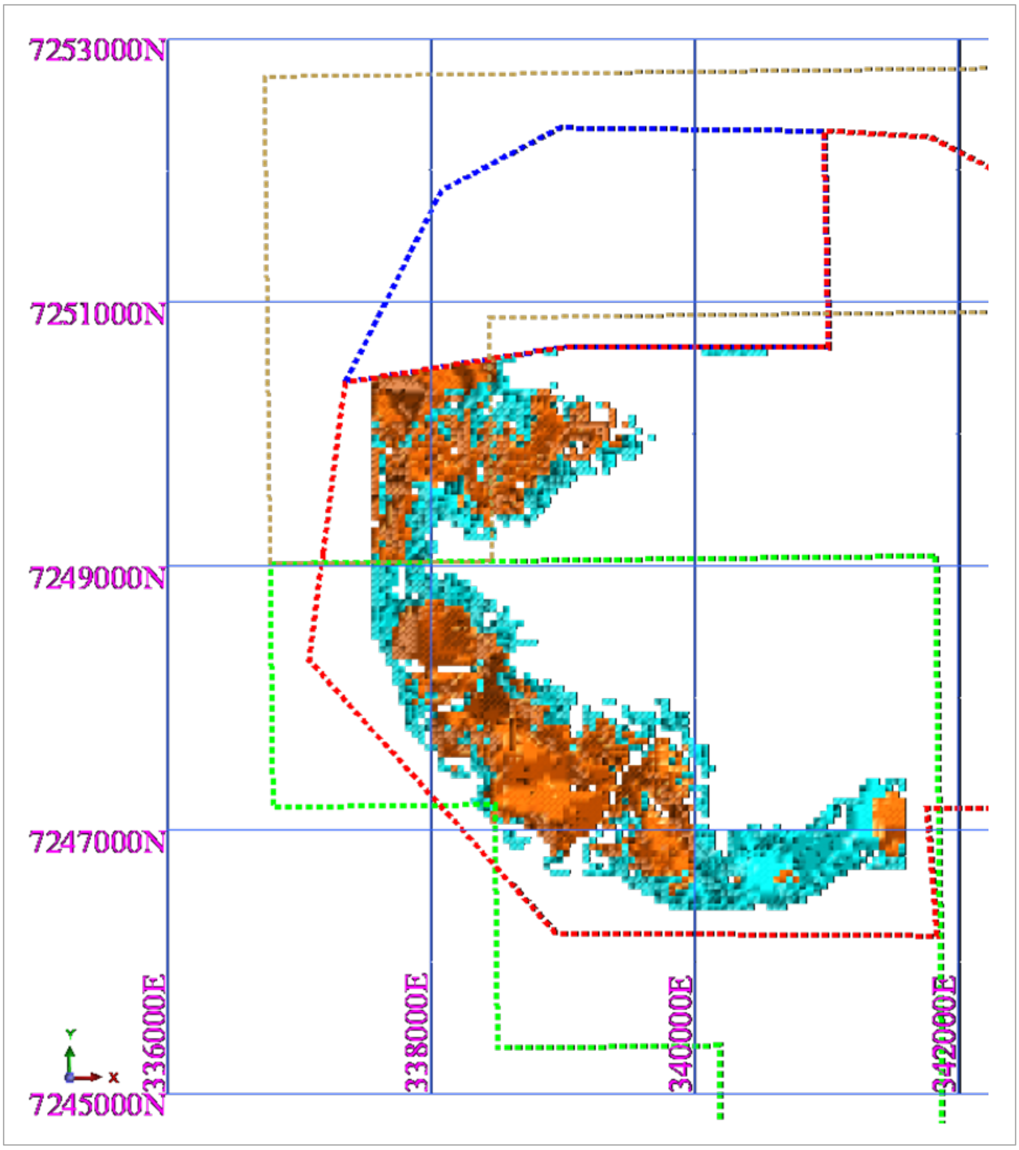
Table 14.22: Block Model search criteria

Axis	Pass 1	Pass 2
Axis 1	200m	300m
Axis 2	200m	300m
Axis 3	4m	6m
Composite Data Requirements		
Minimum data points (total)	8	4
Max points (total)	24	24
Sectors	4	4
Minimum drill holes	3	2
Maximum points per hole	4	6

Maximum extrapolation beyond the bounding drillholes was approximately 250metres, limited in part by the geological interpretation.

A plan view of the block model coloured by pass category shown in *Figure 14.69* with orange equal to Pass 1 and cyan equal to Pass 2. Additional lines represent the ML (blue), MLA (red) and EPM boundaries (brown and green) as per previous figures.

Figure 14.69: Block Model pass categories



14.2.5 Domaining

Lithological domaining of the block model was completed by using the lithological surfaces in relation to the block centroids.

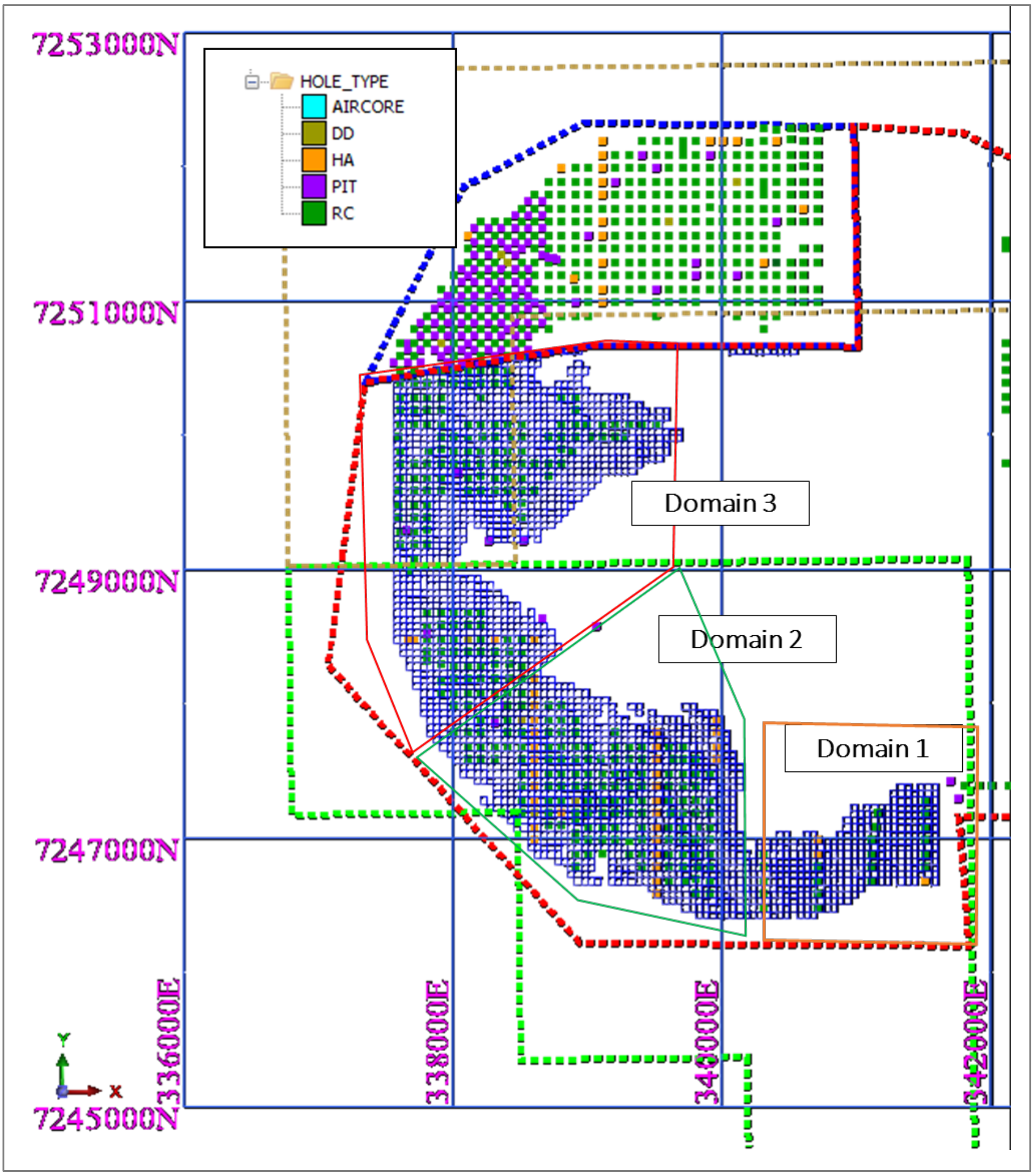
There were three area domains based on different search ellipse scenarios in the X-Y directions for three areas in the MLA (*Table 14.23*).

Table 14.23: Block Model domain search directions

	Axis 1 (x)		Axis 2 (y)		Axis 3 (z)	
Domain	Azimuth	Dip	Azimuth	Dip	Azimuth	Dip
1	255	0	345	0	165	90
2	307	0	37	0	217	90
3	0	0	90	0	270	90

For reference, a plan view of the block model (blue squares) in relation to the drillholes is shown in *Figure 14.70*. Also shown in the figure are the search domains.

Figure 14.70: Block Model in comparison with composite sites and search domains



14.2.6 Density model

Default densities from Monto Minerals 1996-2000 work were allocated to the blocks in the model using the geological domaining based on the block centroids (*Table 14.24*).

Table 14.24: Default densities

Lithotype	Density t/m^3
CL, CS_H, CS_L	1.6
DG	2.1

14.2.7 Ilmenite conversion factor

As part of the 1996-2000 Monto Minerals exploration work selected samples from different parts of the deposit were composited and subjected to laboratory testwork to determine the amount of ilmenite. The work enabled the generation of a series of ilmenite conversion factors to convert the 5.5AM recovered magnetic fraction to an ilmenite grade for different parts of the deposit and for the two main lithotypes. More details are in *Section 11.2*.

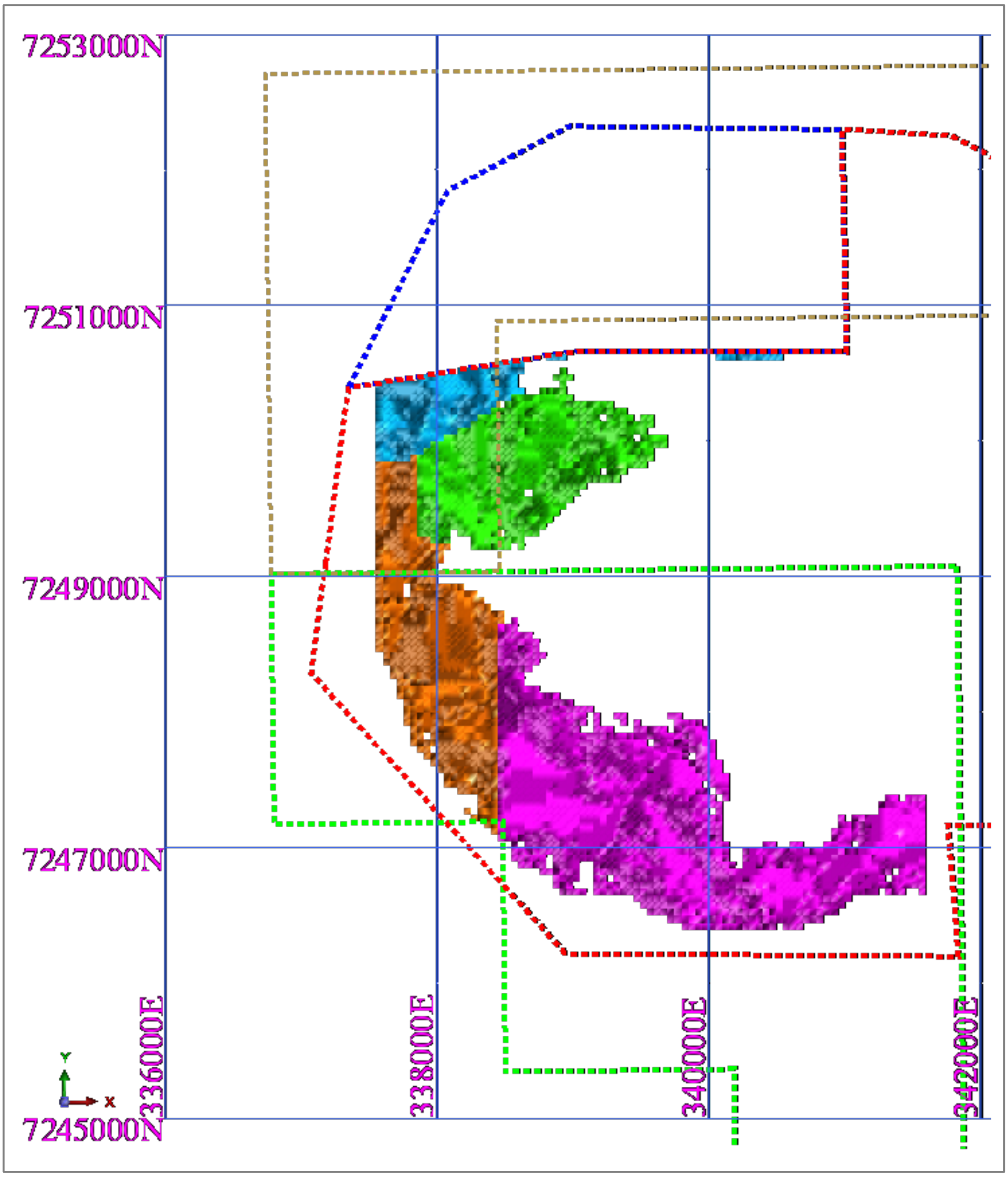
Table 14.25 shows which Monto areas were used to allocate the ilmenite conversion factors to the H&SC block model. The allocation used boundary strings digitised from the Monto work (see *Figure 11.3*).

Table 14.25: Ilmenite conversion factors

		Ilmenite Conversion Factors	
H&SC colour & no	**Monto Area**	**CL, CS_H & CS_L**	**DG**
Cyan 1	1,2,5 & 6	0.86	0.64
Green 2	13 & 14	0.90	0.79
Brown 3	7 & 8	0.89	0.62
Magenta 4	9, 10, 11 & 12	0.91	0.69

The 5.5AM block value is multiplied by the ilmenite conversion factor to give an ilmenite block grade. The result is an ilmenite grade anticipated to reflect likely recovery from any mill. *Figure 14.71* shows the distribution of the different conversion factor domains; block colours are from *Table 14.25*. Also shown are the MLA, ML and EPM boundaries.

Figure 14.71: Ilmenite conversion factor domains



14.2.8 Resource classification

The classification of the resource estimates is primarily based on the search pass parameters subject to the impact of other relevant aspects, for example, geological understanding, data quality especially including the QAQC etc. The classification of Passes 1 and 2 is included as *Table 14.26*. The resources are planned to be mined in an open pit scenario and classification is also based on this assumption.

Table 14.26: MLA Resource classification

Pass No	Classification
1	Indicated
2	Inferred

Aspects from the 1996/2000 exploration work that have had an impact on the classification of the resource estimates are included below:

Positives

- Regular drill pattern, accurately located holes, testing all lithological units
- Suitable drilling and sample processing methods
- Accurate topographic surfaces
- An improved geological understanding
- Reasonable horizontal geological continuity between drillholes for each lithology
- Use of a relatively sophisticated modelling method i.e. Ordinary Kriging, allowing for a greater interaction between sample points.
- Reasonable QAQC programme examining many aspects of sampling and analytical risk

Negatives

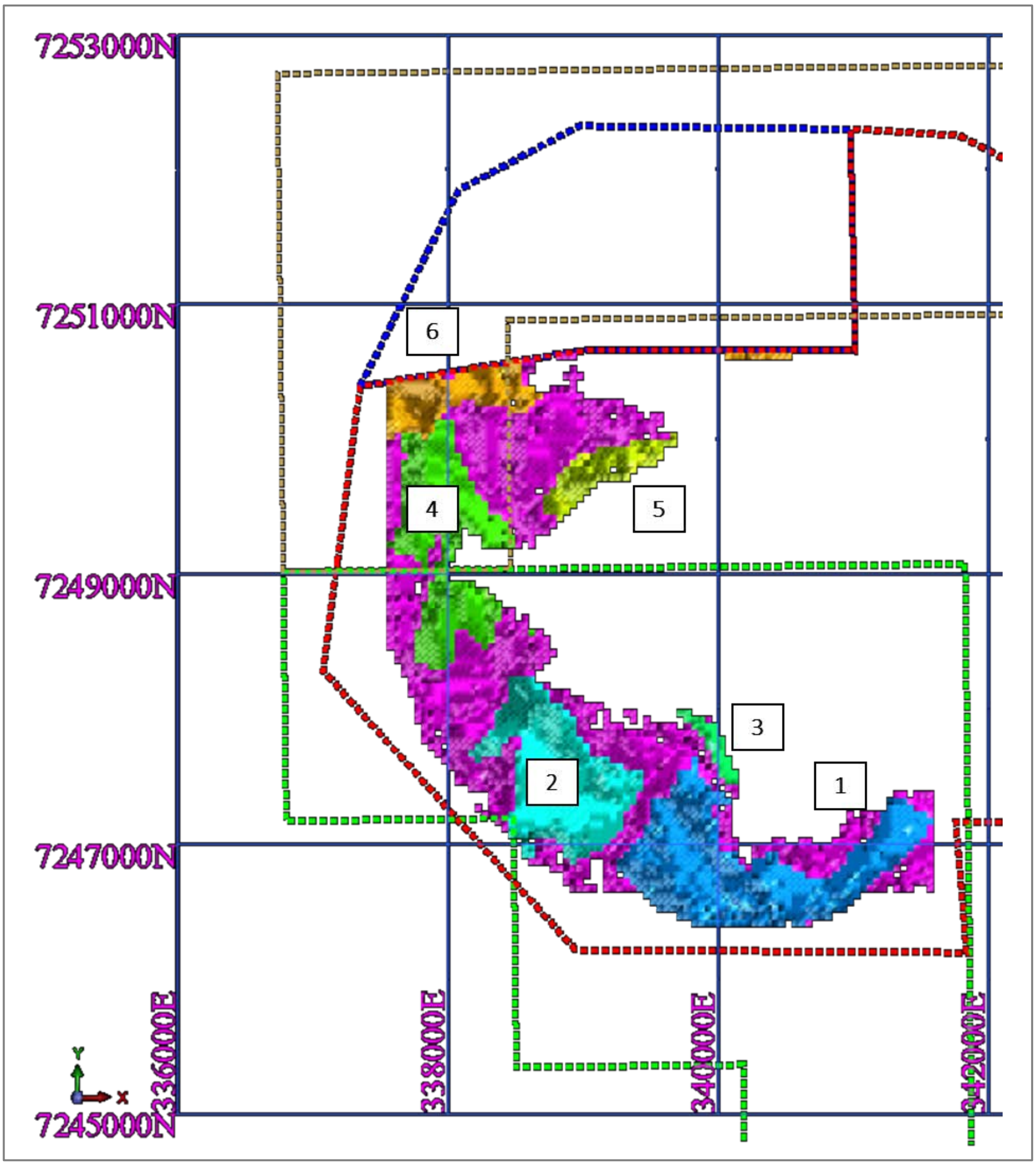
- Relatively wide drillhole spacing requiring large search parameters for modelling, the close spaced drilling only allows for moderate confidence in grade continuity
- Complex geology due to weathering and erosion, with units having local variations with ilmenite and slimes grades.
- QAQC outcomes including duplicate differences with sample prep at Readings Lab
- Different laboratories used in the sample processing
- The Readings laboratory that processed the 1999 drill samples is believed to have under-reported the 5.5AM recovered magnetic fraction by possibly 20% albeit offset by higher ilmenite conversion factors
- Composites used for Clerici testwork to determine ilmenite conversion factors included material from several drill holes and mixed minor amounts of CS_H and CS_L material
- Uncertain definition of geological boundaries between drillholes. The wide drillhole spacing means lithological contacts can only have an accuracy +/-100metres
- Limited density data; current density data determined from a selection of samples representing different lithotypes applied over the whole resource rather than being determined from individual samples recovered

A Measured Resource could be reported if the negative points listed above are more fully addressed. These points could be addressed as a part of a programme, instituted on an annual basis, ahead of mining ultimately aimed at determining Proved Reserves.

14.2.9 Estimation results

The resource estimates for the MLA are reported by lithology for the prospective areas of interest interpreted by R. Dawney. *Figure 14.72* shows the prospective areas in relation to blocks with an interpolated 5.5AM grade for all lithologies and includes the MLA, ML & EPM boundaries. The magenta area has been interpreted as not prospective but has sufficient drilling for block grades to be interpolated. The boxed numbers refer to the different target areas labelled in the block model.

Figure 14.72: Prospective areas of interest for the MLA (Dawney 2014)



The resource estimates are reported for a 2.5% ilmenite cut-off grade with a block correction factor (a partial percent volume adjustment) based on blocks cutting topography and blocks cutting the base-of-assaying surface (*Table 14.27*). A small part of the resource in the central zone (area 5 on the figure above) lies outside the two EPMs but inside the MLA area.

Table 14.27: H&SC Block Model Goondicum MLA Resource estimates by classification

Category	Tonnes (Mt)	Ilmenite (%)	Slimes (%)	Ilmenite (Kt)	Slimes (Kt)
Indicated	15.6	5.1	29.5	789	4,600
Inferred	12.3	5.2	27.3	640	3,368

(minor rounding errors)

The estimated resources for the Goondicum MLA deposit are presented in *Table 14.28* by lithology.

Table 14.28: H&SC Block Model Goondicum MLA Resource estimates by lithology

Litho	Category	Mt	Ilmenite %	Slimes %	Ilmenite Kt	Slimes Kt
CS	Indicated	8.7	6.1	43.8	530	3,811
DG	Indicated	6.9	3.7	11.4	259	789
	Total	**15.6**	**5.1**	**29.5**	**789**	**4,600**
CS	Inferred	7.5	6.1	37.9	461	2,846
DG	Inferred	4.8	3.7	10.8	178	522
	Total	**12.3**	**5.2**	**27.3**	**640**	**3,368**

(minor rounding errors)

There appears to be a natural cut off at about 2.5% ilmenite for the resource as a whole, which is believed due to the primary concentration of ilmenite in the underlying gabbro.

Figure 14.73 and *Figure 14.74* show plan views of the ilmenite block grade distribution for a zero percent ilmenite cut-off grade for the two different lithologies (note that only the top block of each column of blocks for each unit is showing in both cases).

Figure 14.73 shows the distribution of the blocks for the CS. It shows higher grade mineralisation extending southwards from the ML. Otherwise mineralisation elsewhere appears to be patchy, although it should be noted that some of the prospective areas' boundaries exhibit a sharp cut off in higher grade mineralisation, which might suggest the area could be expanded. This could be viewed as exploration potential.

Figure 14.73: H&SC Block Model MLA Resources plan view CS Unit ilmenite %

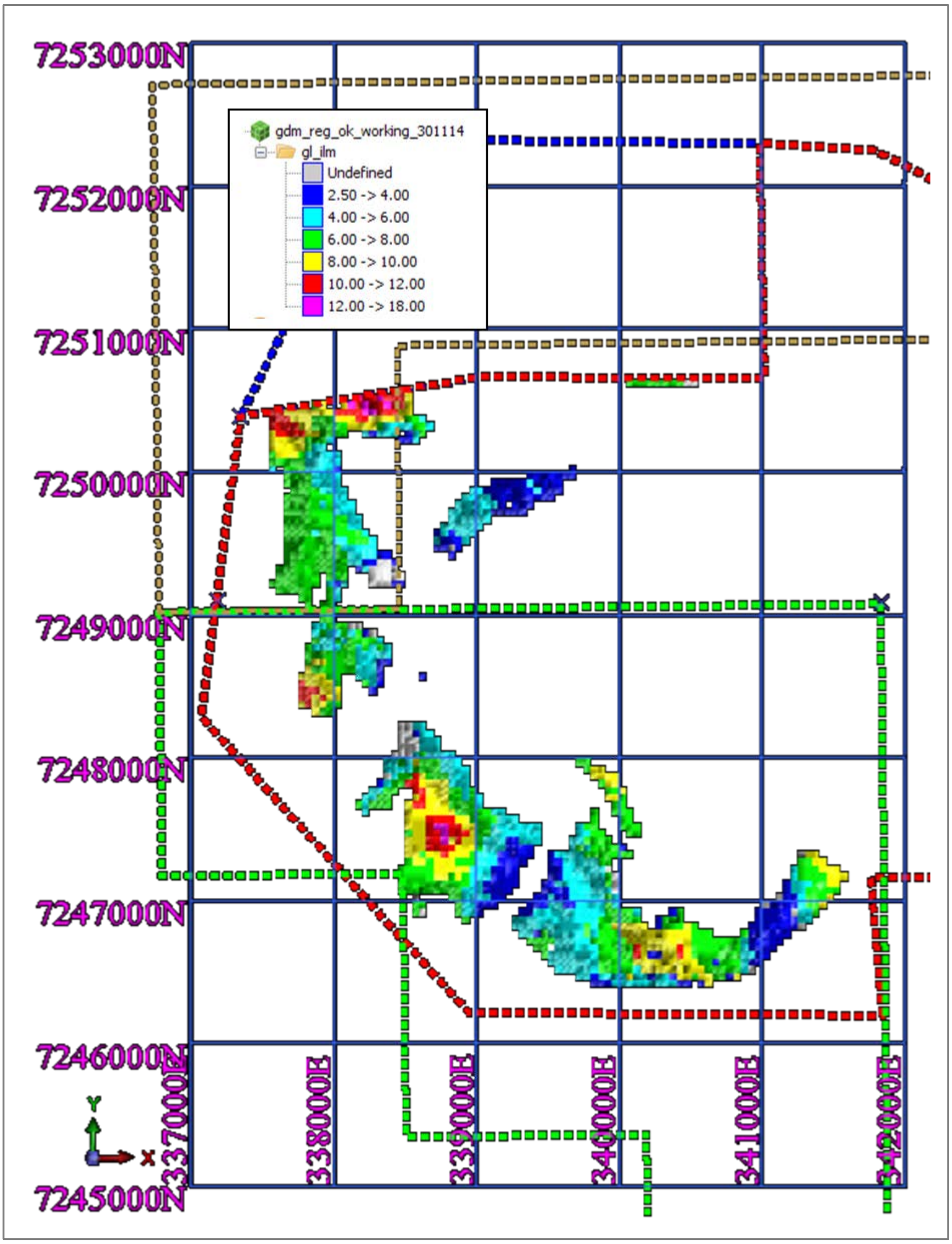


Figure 14.74 shows the ilmenite distribution for the DG and shows that the DG is low grade although there is some moderate grade mineralisation extending south from the ML. Some of this could be a function of including some CS_L material which is known to exist in that area. Other patches of higher grade material may be due to the position of the actual contact boundary in the drillhole sample.

Figure 14.74: H&SC Block Model MLA Resources plan view DG Unit ilmenite %

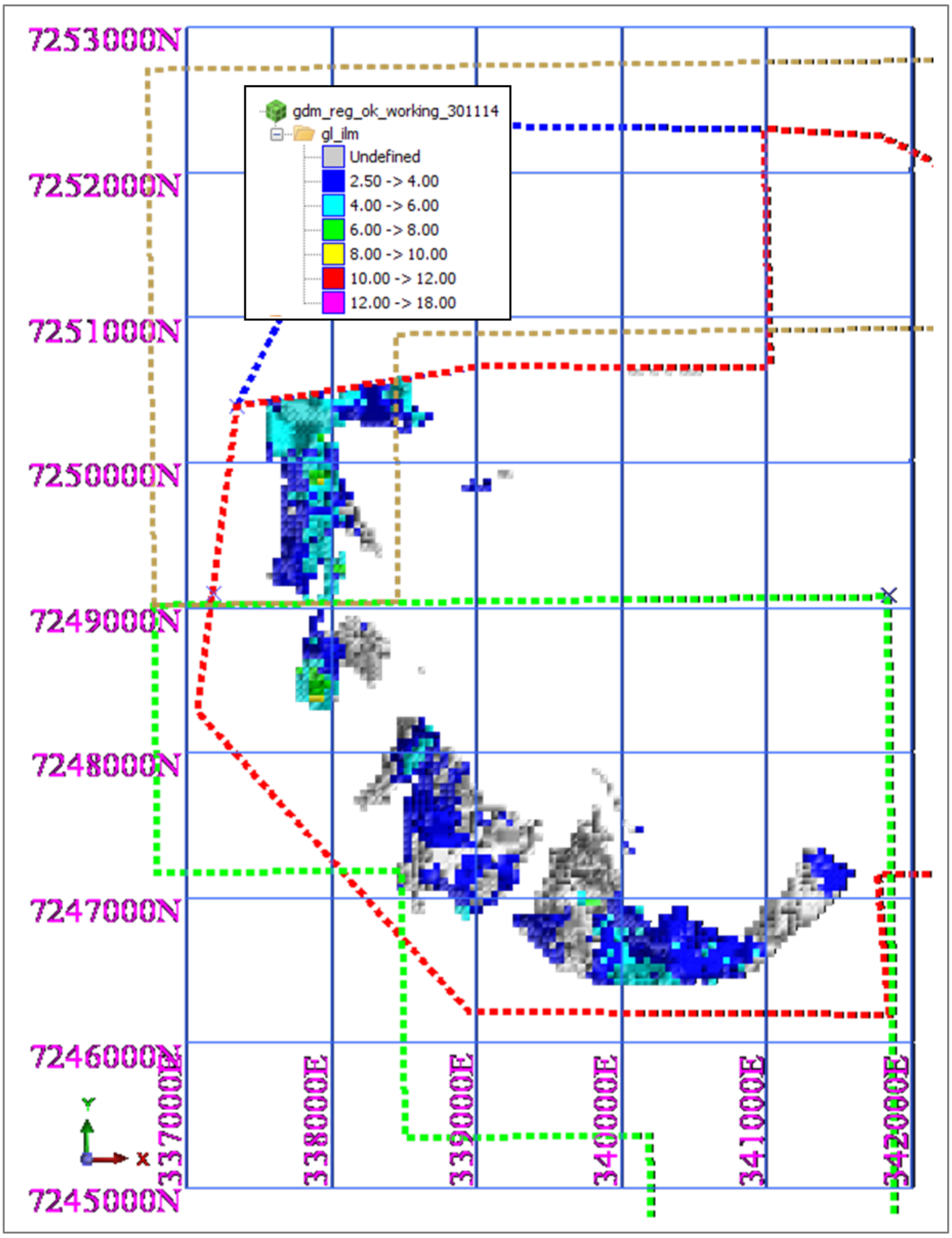


Figure 14.75 shows the slimes block grade distribution for the CS and clearly shows areas of abundant clay material.

Figure 14.75: H&SC Block Model MLA Resources plan view CS Unit slimes %

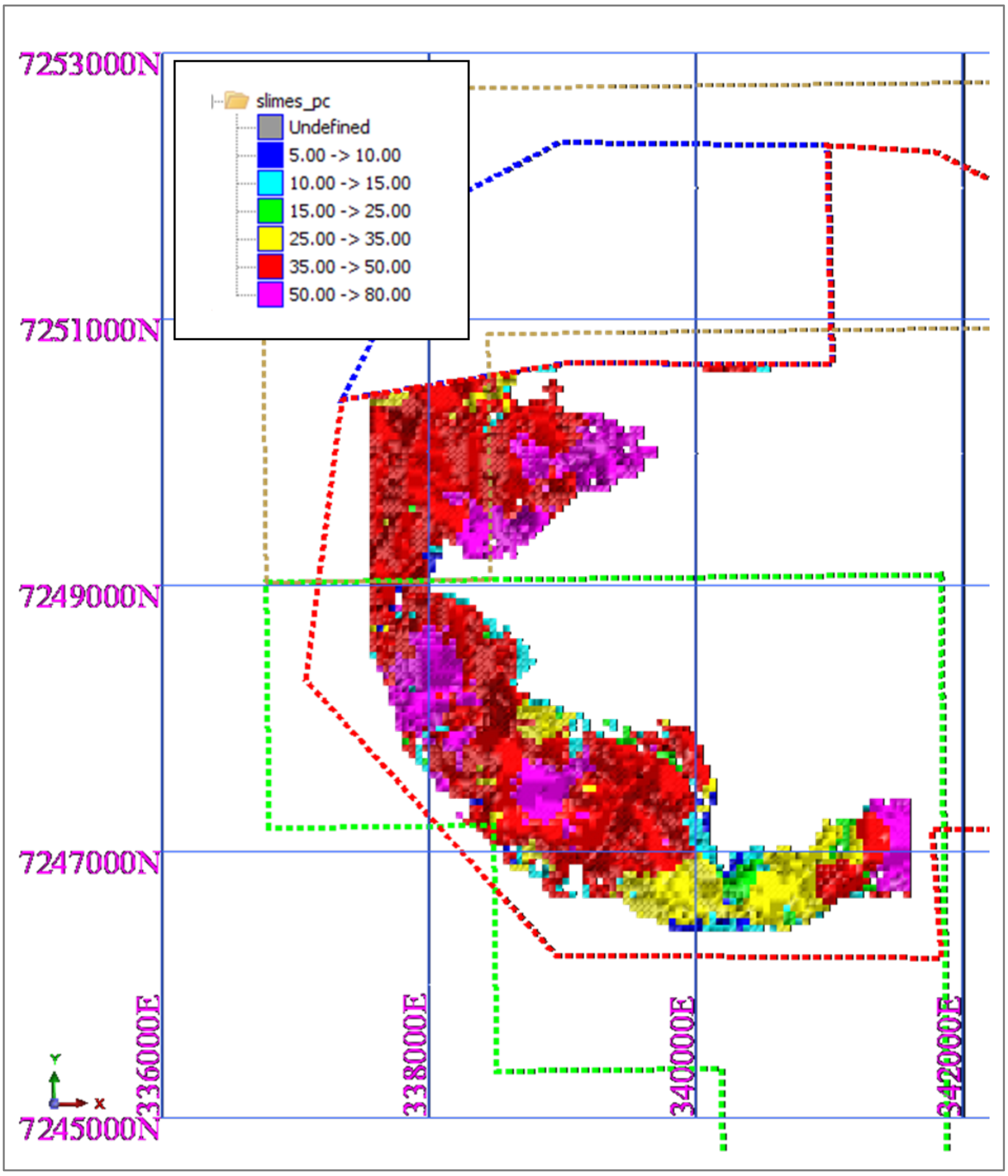
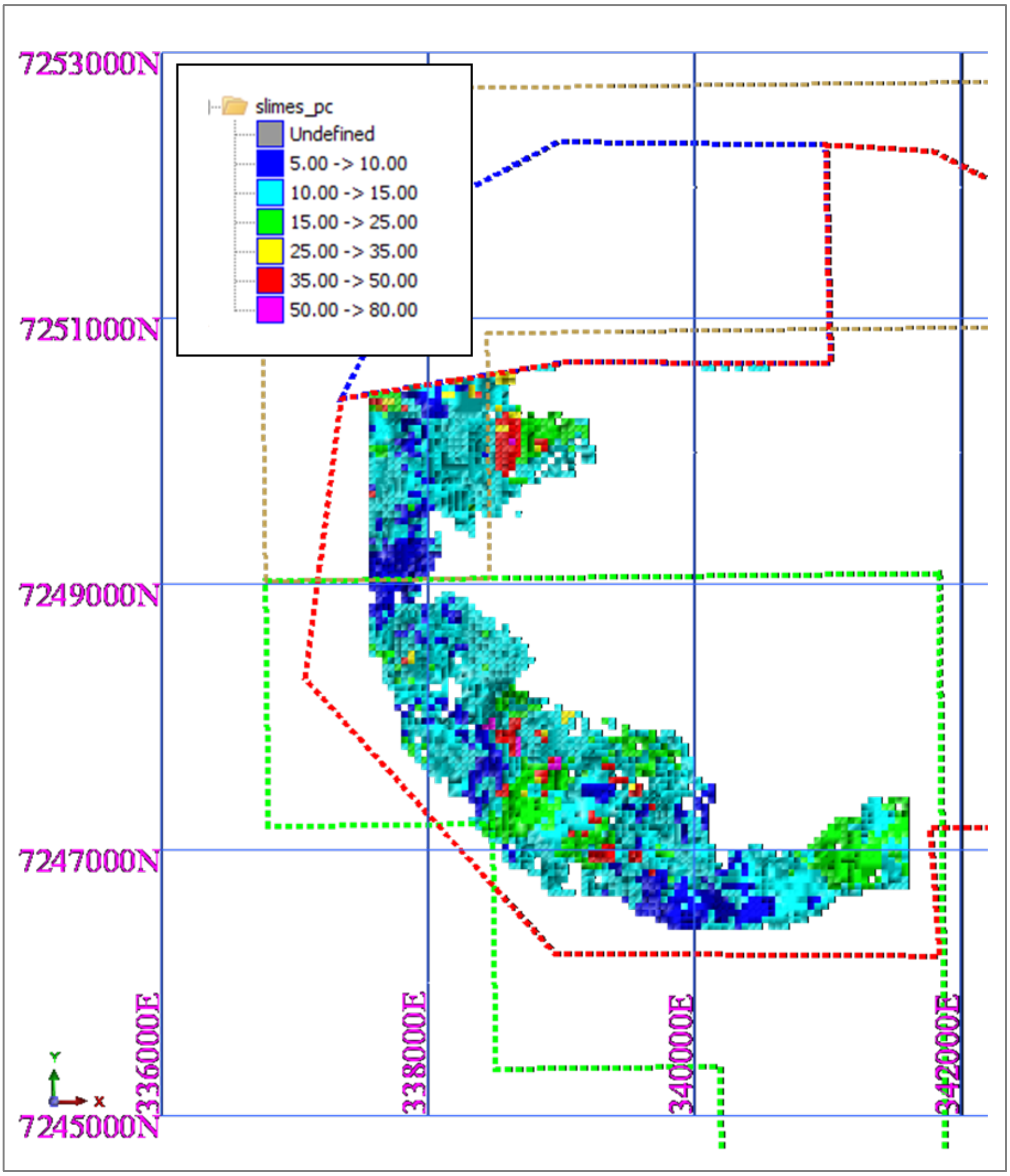


Figure 14.76 shows the slimes block grade distribution for the DG and clearly shows a much lower abundance of slimes material relative to the CS. There are patches of higher grade which may either be due to more incisive down-cutting by alluvial systems or can be a result of the high and low slimes contact occurring within the individual drillhole sample (the figure shows the top block for each column of blocks of the DG).

Figure 14.76: H&SC Block Model MLA Resources plan view DG Unit slimes %



14.2.10 Block model validation

Validation of the block model consisted of visual comparison of block grades with the drillhole data, a review of global statistics for the composites and the block grades and a comparison with previous modelling outcomes.

14.2.10.1 Block grade visualisation

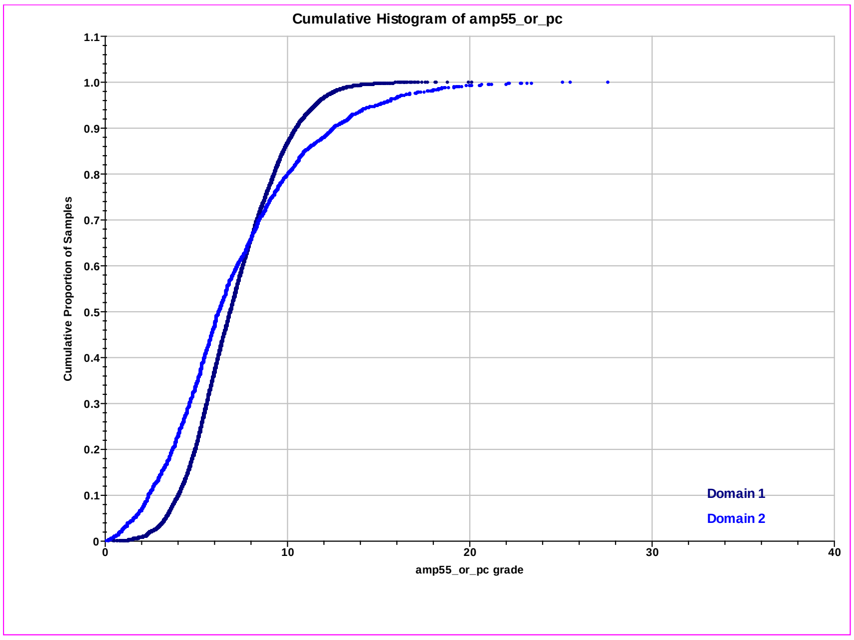
A sectional review was completed of block grades against both assay grades and geological domaining. It indicated no issues with the modelling.

14.2.10.2 *Composite/Block Grade Comparison*

Comparison of the global 5.5AM block grades with composite values for the different lithologies is included as *Figure 14.77*. The graphs show the cumulative frequency of the block grades (dark blue line) with the cumulative frequency of the composite values (light blue line). The patterns displayed indicate no problems with the modelled 5.5AM grades.

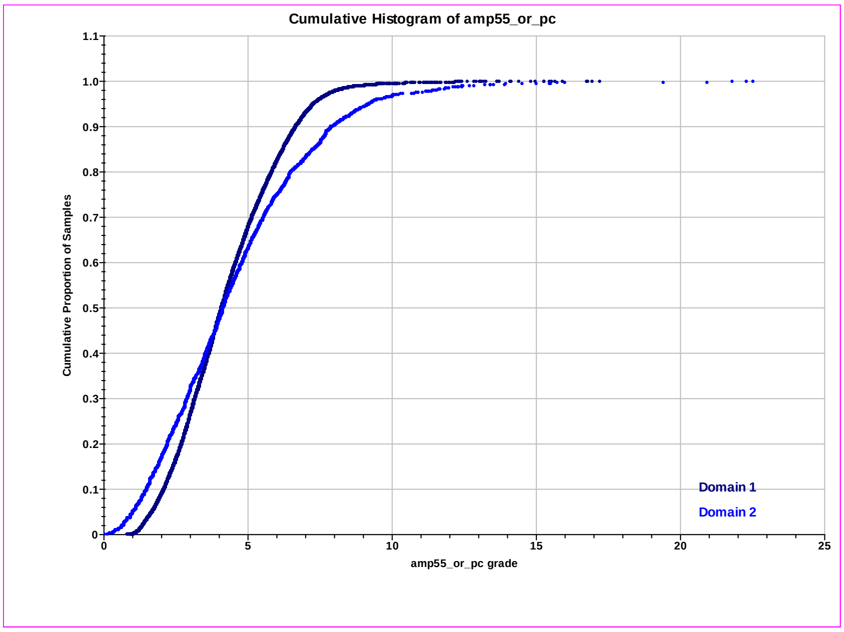
Figure 14.77: Composite-Block grade comparisons 5.5AM

CS Unit – 5.5AM



Domain 1 = Block grades; Domain 2 = Composite grades

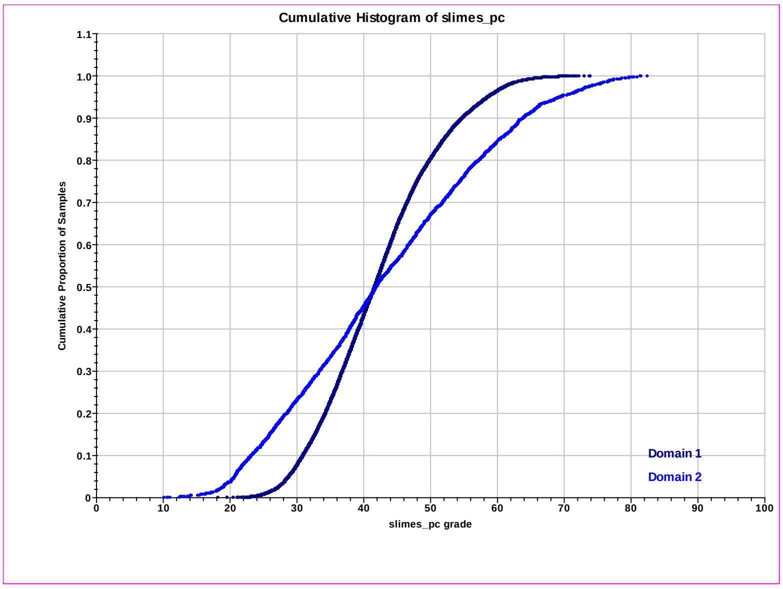
DG Unit – 5.5AM



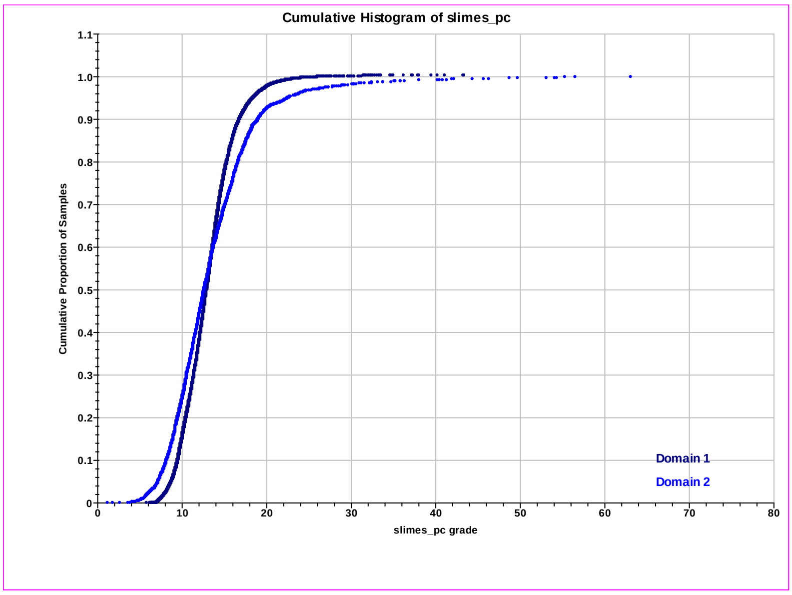
Comparison of slimes global block grades with composite grades for the different lithologies is included as *Figure 14.78*. There appears to be no issue with the modelling.

Figure 14.78: Composite Block grade comparisons slimes

CS Unit - slimes



DG unit - slimes



14.2.10.3 Summary statistics for block grades and composites

A simple check on the grade interpolation is to compare summary statistics for the composite values with the global block grades. Generally, in this type of deposit the composite means will be marginally higher than the block grade means. *Table 14.29* shows the comparisons for both lithologies for both the 5.5AM (upper section) and the slimes content (lower section).

For the CS the 5.5AM composite means are slightly lower, by roughly <7%, than the block means. This might suggest some over-smoothing effect in the modelling, particularly at the margins (likely to be the Inferred Resources and lower grade), however H&SC does not consider the scale of the differences to be significant. Otherwise the DG behaves in an expected manner with the mean composite grades slightly higher than the mean block grades.

The slimes data shows mean values in accordance with expectations.

Table 14.29: Summary statistics for block grades and composites

5.5AM	CS Unit		DG Unit	
	Comp	Block	Comp	Block
No. Data:	1140	14601	704	11028
mean:	5.924	6.277	4.601	4.189
variance:	11.079	4.549	9.571	3.452
CV:	0.562	0.34	0.672	0.444
Minimum:	0.1	0.602	0.1	0.819
Q1:	3.6	4.834	2.3	2.757
Median:	5.4	6.11	4.12	3.999
Q3:	7.8	7.638	6.3	5.439
Maximum:	19.58	14.71	23.4	15.954
IQR:	4.2	2.804	4	2.682

Slimes	CS Unit		DG Unit	
	Comp	Block	Comp	Block
No. Data:	1140	14601	704	11028
mean:	44.037	42.564	12.323	12.042
variance:	235.146	85.225	43.599	7.531
CV:	0.348	0.217	0.536	0.228
Minimum:	10.1	19.791	3.55	6.015
Q1:	32	35.626	8.6	9.953
Median:	43	41.913	10.8	11.744
Q3:	55.1	48.686	14.2	13.678
Maximum:	82.4	71.772	63	32.974
IQR:	23.1	13.06	5.6	3.725

14.2.10.4 Comparison with previous estimates

Comparison can be made with the Monto Minerals Mineral Resource completed in 2000. In addition, despite being sourced from different data, a comparison can be made with H&SC's 2014 Mineral Resource for the ML. It should be noted that at this stage work completed by H&SC on the 1996-2000 and 2009 drilling data suggests that the two datasets are not comparable and cannot be used together. Further work is required to confirm this.

Monto Minerals 2000

The previous Monto resource estimates for the MLA are based on a set of sub-areas i.e. Central West, South West, South and Southern. These areas do not match exactly the prospective areas identified by Dawney. Despite this, some comparisons between the two sets of global figures can be made using the areally-related ilmenite conversion factor boundaries drawn by Monto. The overall figures show very similar amounts of contained ilmenite material with comparable overall tonnages and grades (*Table 14.30*). The lithology split is also comparable lending strength to the confidence of the new estimates. This is to be expected as both models essentially used the same data.

Table 14.30: Comparison of global estimate figures

H&SC	Monto		Monto			H&SC		
GAOI	**Area**	**Lithology**	**Mt**	**Ilm%**	**Ilm Mt**	**Mt**	**Ilm%**	**Ilm Mt**
2 & 3	SW & S	CS	6.94	6.3	0.44	4.91	5.9	0.29
4, 5 & 6	Cent West	CS	4.28	4.8	0.21	6.83	6.1	0.42
1	South	CS	4.78	5.2	0.25	4.42	6.4	0.28
		Sub-total	**16.00**	**5.6**	**0.90**	**16.16**	**6.1**	**0.99**
			Monto			**H&SC**		
2 & 3	SW & S	DG	6.13	4.3	0.26	1.93	3.0	0.06
4, 5 & 6	Cent West	DG	0.58	4.0	0.02	4.94	4.1	0.20
1	South	DG	6.32	3.8	0.24	4.88	3.6	0.18
		Sub-total	**13.03**	**4.0**	**0.52**	**11.75**	**3.7**	**0.44**
		Total	**29.03**	**4.9**	**1.42**	**27.91**	**5.1**	**1.43**

(GAOI = prospective areas; Ilm = Ilmenite)

H&SC 2014 ML Resource Estimates

Despite different datasets comparing the MLA deposit with the ML deposit is reasonably justified as both occur in the same geological position, have used the same drilling type and have used the same resource estimation strategy albeit on different and incomparable composite data. It should be noted that the ML appears to have suffered less erosion and disruption to the lateritic profile than the MLA and that the sample processing is different. For the Indicated Resource material obviously tonnage is smaller for the MLA, reflecting the smaller area, but the ilmenite grades are comparable especially if a metallurgical recovery factor is applied to the available ilmenite block grades from the ML set of figures is compared to the MLA ilmenite grade (<5% difference). This would suggest that the MLA grade interpolation strategy is reasonable.

14.2.10.5 Grade-tonnage data

Table 14.31 contains the Indicated and Inferred Resource estimates for a range of ilmenite cut-off grades for both lithologies.

Table 14.31: Grade tonnage data for different Resource categories and lithologies

CS						
Ilm Cut Off %	**Category**	**Mt (Ind)**	**Ilm % (Ind)**	**Slimes %**	**Ilm (Kt)**	**Slimes (Mt)**
0	Indicated	8.7	6.1	43.8	531.0	3.82
2.5	Indicated	8.7	6.1	43.8	530.6	3.81
4	Indicated	7.8	6.4	43.3	500.3	3.38
6	Indicated	4.2	7.5	43.5	314.3	1.82
8	Indicated	1.2	9.1	43.2	113.1	0.54

Ilm Cut Off	Category	Mt (Inf)	Ilm % (Inf)	Slimes %	Ilm (Kt)	Slimes (Mt)
0	Inferred	7.7	6.0	37.9	466.4	2.93
2.5	Inferred	7.5	6.1	37.9	461.7	2.85
4	Inferred	6.5	6.6	36.1	428.3	2.36
6	Inferred	4.0	7.5	33.6	301.8	1.36
8	Inferred	1.2	8.7	31.4	105.3	0.38

DG						
Ilm Cut Off	**Category**	**Mt (Ind)**	**Ilm % (Ind)**	**Slimes %**	**Ilm (Kt)**	**Slimes (Mt)**
0	Indicated	8.9	3.3	11.5	298.3	1.03
2.5	Indicated	6.9	3.7	11.4	259.2	0.79
4	Indicated	2.3	4.7	11.2	110.9	0.26
6	Indicated	0.2	7.3	11.7	11.5	0.02
8	Indicated	<0.1	8.9	12.0	3.2	0.01

Ilm Cut Off	Category	Mt	Ilm % (Inf)	Slimes %	Ilm (Kt)	Slimes (Mt)
0	Inferred	7.8	2.9	11.7	230.0	0.92
2.5	Inferred	4.8	3.7	10.8	178.3	0.52
4	Inferred	1.6	4.6	10.1	74.9	0.17
6	Inferred	0.1	6.7	12.9	4.3	0.08
8	Inferred	<0.1	8.7	12.5	0.3	0.01

(minor rounding errors)

Figure 14.79 shows the grade-tonnage information for Indicated and Inferred Resources for the CS.

Figure 14.79: Grade-tonnage graph for CS Unit

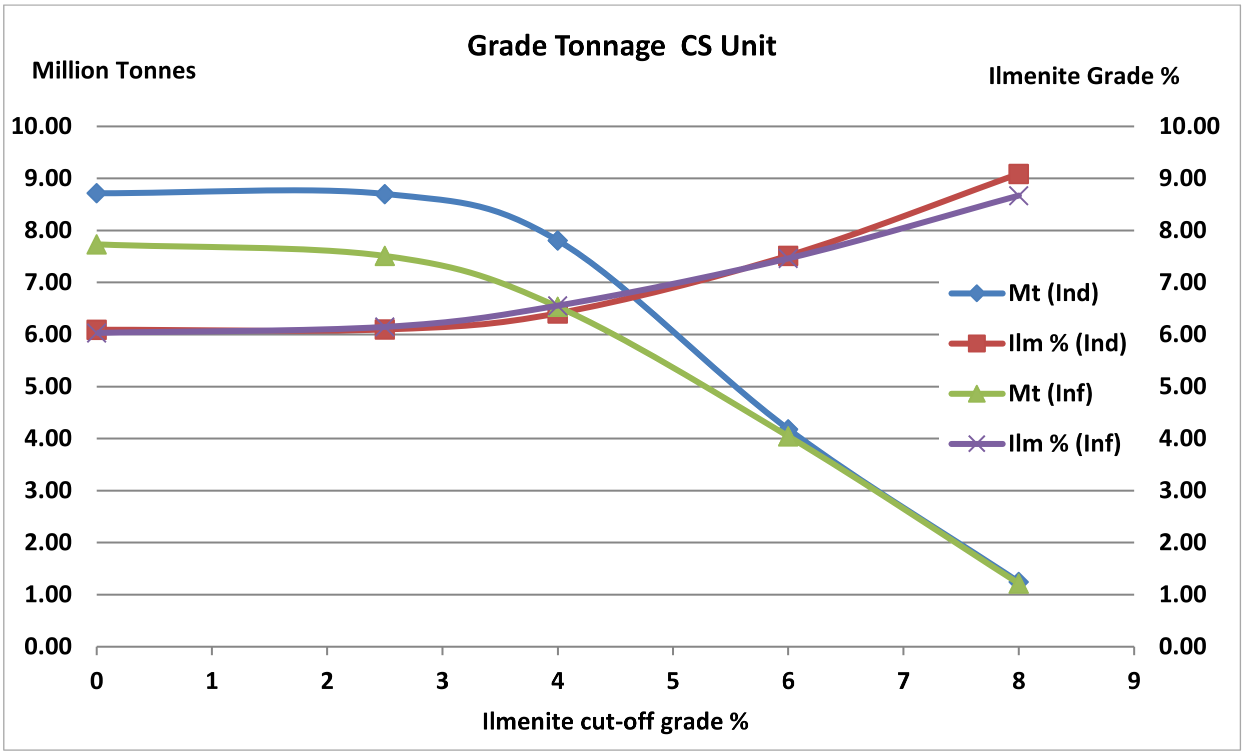
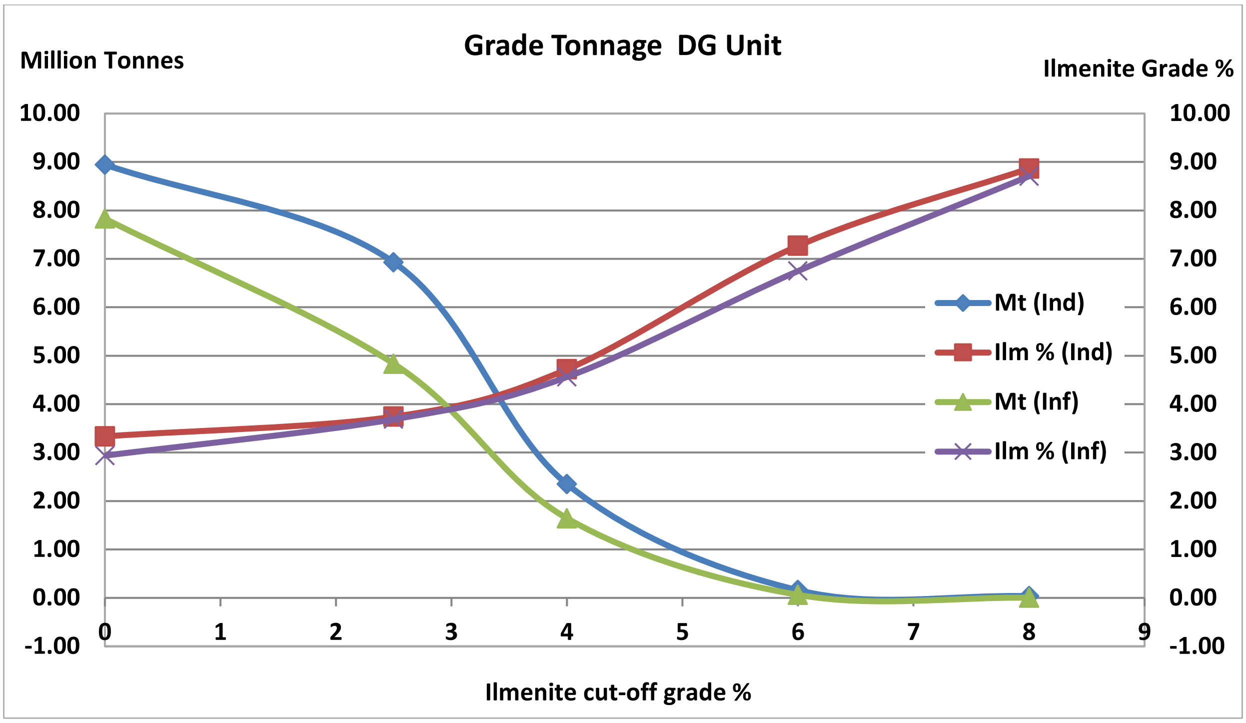


Figure 14.80 shows the grade tonnage information for Indicated and Inferred Resources for the DG.

Figure 14.80: Grade tonnage graph for DG Unit



14.3 Exploration targets

H&SC considers that there is very little exploration opportunity on the ML save for a minor extension of the current resource eastwards to the ML boundary.

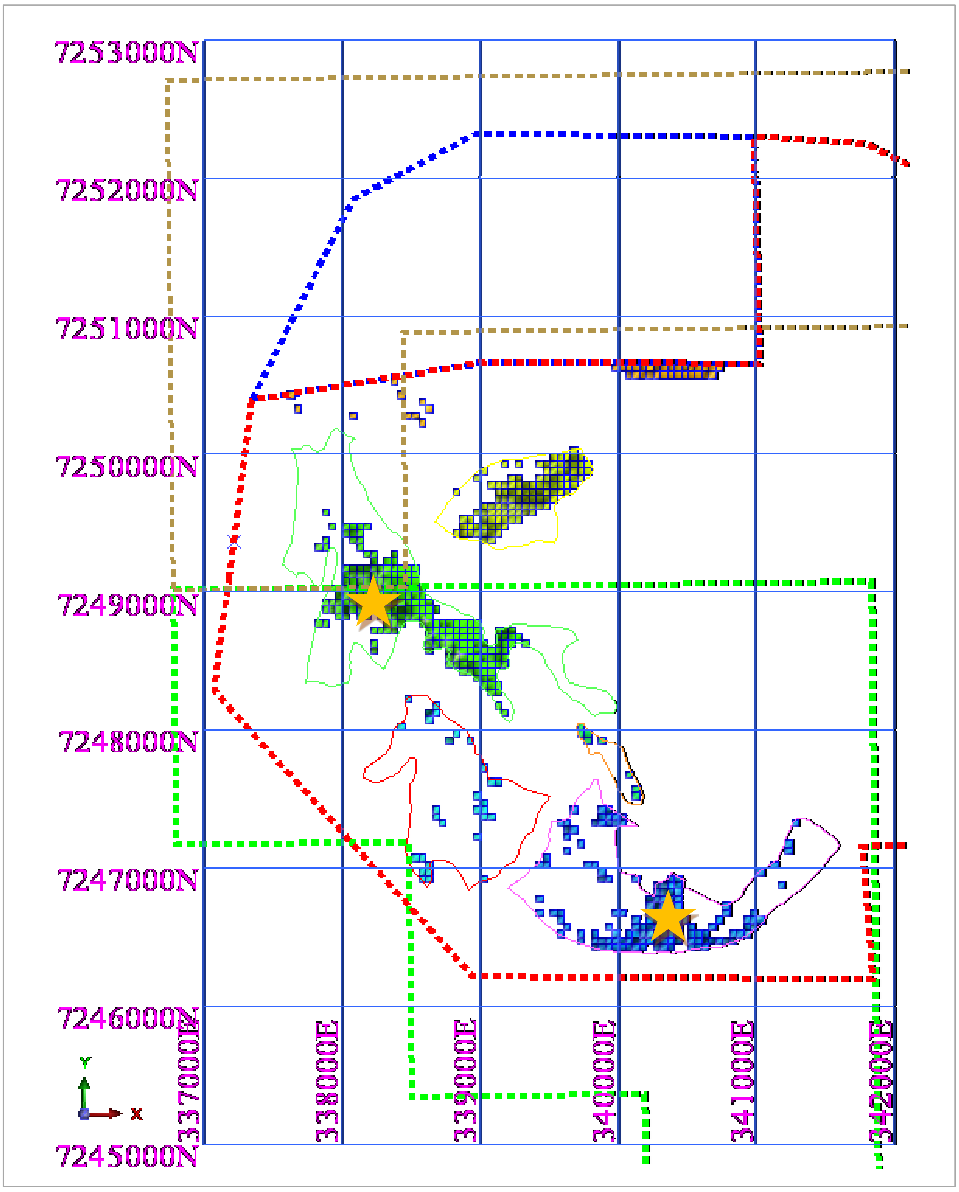
Based on investigations conducted by Monto Minerals there is potential for resources in addition to those that are the subject of this report, see Lee (2000).

The potential quantity and grade of the Exploration Target is conceptual in nature and there has been insufficient exploration to define a Mineral Resource. It is uncertain if further exploration will result in the determination of a Mineral Resource.

A review of the data suggests that exploration potential for the MLA consists of three parts:

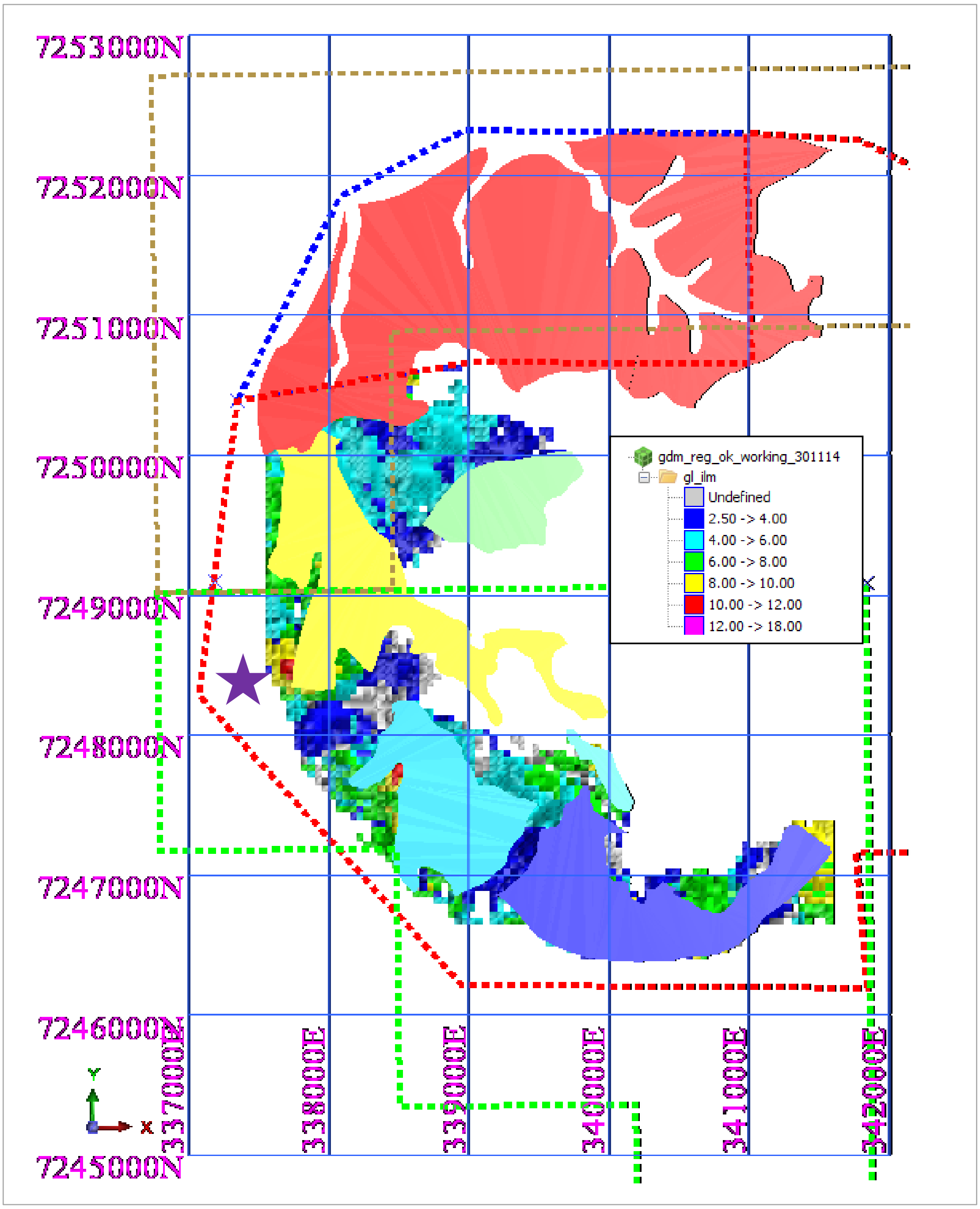
1. Zones inside the prospective areas that have no interpolated block grades due to a lack of drilling. *Figure 14.81* shows blocks with no grade within the prospective areas' outlines. The orange stars are targets for planned infill drilling on a 100 x 200metre grid.

Figure 14.81: Exploration potential infill drilling targets



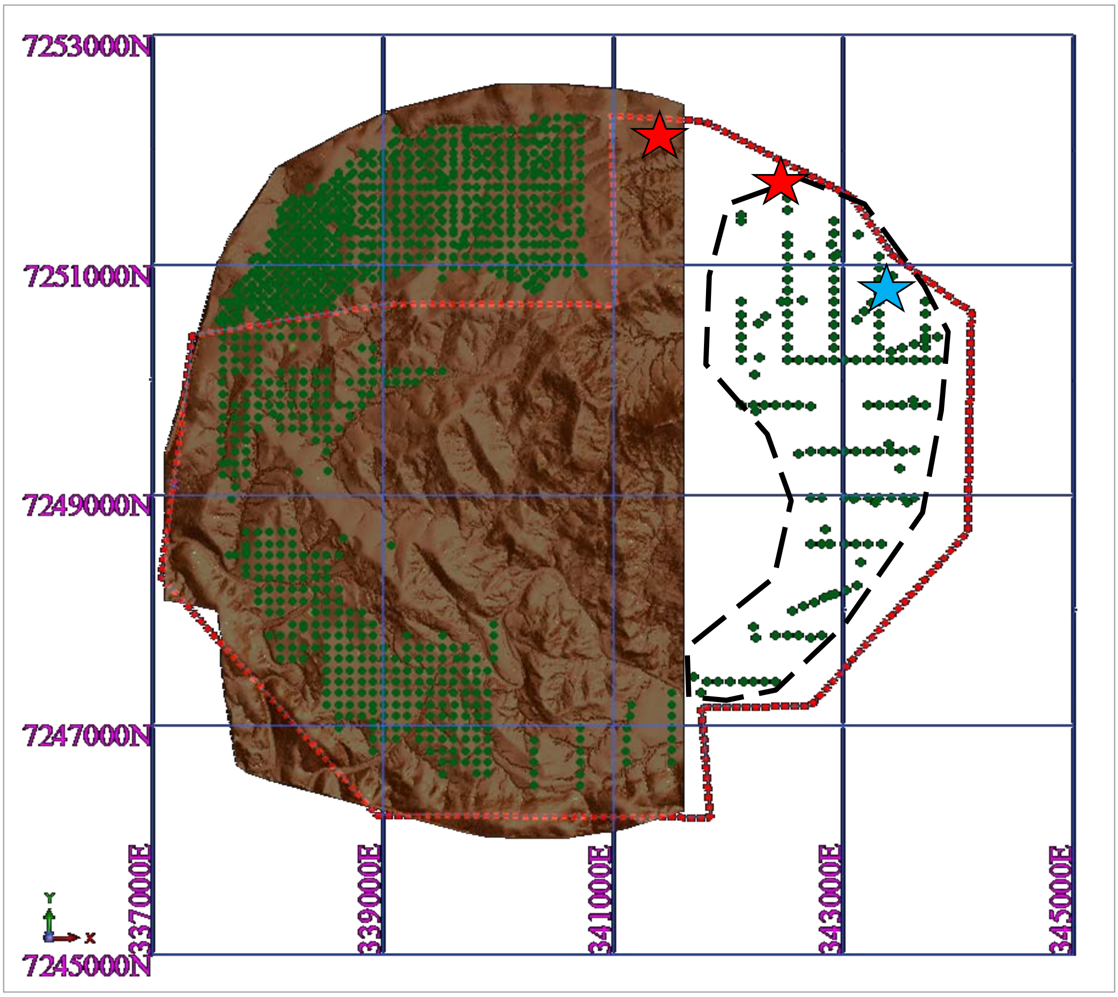
2. Zones outside the prospective areas that have had interpolated grades (*Figure 14.82*). These areas need field inspection to confirm prospectivity; positive affirmations would result in infill drilling, on a 100 x 100metre grid, to better define mineralisation. The planned drilling of high grade material is marked by the purple star.

Figure 14.82: Exploration potential peripheral interpolated grade areas



3. Additional areas in the eastern half of the MLA (area of interest is shown by black dash polygon - *Figure 14.83*). The Monto drilling identified anomalous mineralisation associated with the blue star and R. Dawney identified prospective terrain associated with the red stars. Infill drilling on a 100x 200metre or 100 x 400metres grid would be required.

Figure 14.83: Eastern areas for further exploration drilling



14.4 Impacts on resource estimates

The size and classification of the resource estimates are unlikely to be unaffected by any non-geological factors. Additional infill drilling could result in a change of the classification of the deposit but is unlikely to affect the resource size. Extensional drilling around the periphery of the deposit could make for a moderately larger resource.

In respect to impacts on the resource estimates of known environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors the following can be stated.

- Australia and the state of Queensland are politically and socially stable with an established mining culture and a strong mining law.
- Environmental permits have been granted for the project with the approval of the mine lease and environmental surveys have indicated no protected species or threatened habitats
- The mining lease has been granted; revocation of a mining lease is very rare in Australia

- The local population is supportive of the project
- The are no pending legal threats to the project
- The product is a bulk commodity with a track record of saleability. A plunge in the commodity price of the ilmenite or apatite at some point in the future could affect any reserves generated from the resource estimates. Usually the product is sold under long lasting supply agreements
- The current Australian federal government is unlikely to impose any new taxes on any aspect of mining company profits.

15.0 Mineral Reserves estimates

No Mineral Reserves have been generated.

16.0 Mining methods

TZMI has based this section of the report on various internal Melior consultant reports from Australian Mine Design and Development Pty Ltd (AMDAD) and Axe Valley Mining Consultants Ltd. These consultancies have undertaken considerable work in reviewing and developing appropriate mining methods, as well as mine schedules.

16.1 Deposit characteristics

The Goondicum deposit located on ML8044 covers an area of approximately 4.5km^2 and occurs from surface to a depth of between 2metre and 10metreThe deposit is thicker in the gully areas and thinner on the higher terrain.

In general, the deposit has the highest ilmenite grades at surface and decreasing with depth. Similarly, the apatite grade is generally lower at surface and increases with depth. The deposit is high in slimes, with the highest slimes at surface and decreasing with depth. Typical characteristics near surface in the deposit are 11% ilmenite, 1% apatite and 53% slimes, while at the base of the deposit the mineralisation is typically 4% ilmenite, 2% apatite and 11% slimes.

There is significant organic material in the topsoil and the CL unit. This organic material largely consists of roots of trees and grasses.

There is no overburden and the deposit is free digging.

16.2 Mining method

Goondicum has previously been in operation for three short periods over the last 10 years. In each occasion dry mining open pit methods have been used. These operating periods have allowed the material handling issues to be considered and addressed in the mining method chosen for this study. The following is a description of how the proposed mining for the ML will proceed.

The land is cleared of vegetation (trees and grass) using a bulldozer to prepare the area for mining. Approximately 20cm of topsoil is removed and stockpiled for later rehabilitation.

A dry open pit mining method is proposed for ore mining using a combination of scrapers, and an excavator and truck model. The mineralisation is relatively easy digging for an excavator.

Normal mining practice will be for the excavator to sit on top of the mineralisation being mined and load trucks in the pit below the excavator. This reduces the cycle time of the excavator to maximise excavation efficiency. Four 40 tonne 6WD trucks will be used to haul the mineralisation from the excavator to the ore stockpile at the feed preparation plant (FPP). The average haul distance for the ML will be 300metres and the maximum haul distance will be 2,000metres.

The mining operation will also utilise scrapers on short haul, low vertical lift cycles to remove the mineralisation and deliver it to the FPP. The scrapers are more suitable for mining the thinner material which is outside the gullies. Two scrapers will be used mostly for mining in the shallow areas, while the excavator and trucks will concentrate in the gullies.

Figure 16.1 and Figure 16.2 illustrate mining and some of the equipment used in 2015. A similar mining method is proposed for the Goondicum PEA.

Figure 16.1: Mining in 2015

Figure 16.2: Cat 740 articulated dump truck

The mining fleet is planned to be supplied by a mining contractor on a dry hire basis. The dry hire cost includes full maintenance by the mining contractor. The planned mining fleet is outlined in *Table 16.1*.

Table 16.1: Planned mining fleet

Equipment	Number
Komatsu PC1250 Excavator	1
CAT740 articulated dump trucks	4
CAT D10 Dozer	1
CAT639 Scrapers	3
CAT980 front-end loader	1

Given that the maximum plant throughput is estimated to be 375tph, the capacity of the mining fleet is planned to be less than 500tph. This assumes that mining will be undertaken on a 24-hour basis.

At this stage these is no facility to direct dump ore from trucks or scrapers into the FPP. Therefore, ore will be delivered to the run of mine (ROM) stockpile and then fed into the FPP by a loader. Ore will be placed in various stockpiles related to geology. This will allow for blending of the feed to the FPP. It is important that an appropriate blend is fed into the FPP which is not too high in slimes or the CL unit. Ideally direct dumping of ore into the FPP would be available to reduce rehandling costs. This option is to be reviewed once operations commence.

Appropriate mine planning and grade control will be essential to ensure that the designed optimal feed blend is provided to the FPP. Grade control drilling and face sampling will be used to give advance warning of potential changes to the feed quality. GPS technology may be used during mining to recognise the bottom of the mineralisation to avoid digging too deep. GPS coordinates of the geological drill holes will help to identify different grade material prior to mining.

During normal operations sand tailings from the wet concentrator plant will be pumped back to the mine to fill in the mine void. A tailings stacker/cyclone unit will recover and recycle water from the tailings as it is deposited and will be relocated regularly as the void is filled. A dozer will be available to prepare and manage the tails stacking area, perform stacker moves and profile the tailings. The water will recycle back to the plant process water reservoir. The landform will be contoured to a shape that will restore the original drainage patterns.

Once mining is sufficiently advanced, the stored topsoil will be spread over the sand tailing filled mining void. Rehabilitation activities will then proceed to stabilise the topsoil and initiate revegetation.

16.3 Mining schedule

Developing a mining schedule for the Goondicum project is a complex task. The following factors need to be considered when developing the mine schedule:

- Mining grade – typically a mining profile has the highest grades in the early years to maximise cashflow and capital payback.
- Mill throughput – target a mining rate of 2.8 million tpa on a dry basis.
- Slimes – slimes levels to the FPP should not exceed 40%. Higher slime levels impact plant performance, water usage and availability.
- Colluvium blend – the percentage of CL in FPP feed should be less than 15%. CL has high slimes and organics which impact plant performance.
- CL/CS_L ratio – the ratio of these two geological units in the FPP feed must be at or lower than 1:1. The CL slimes are difficult to settle due to the higher organics. The CL percentage must be at least matched with the CS_L percentage as it assists CL slimes settling.

- Tails dams – developing tailings dams to hold slimes output is on the critical path. The mineralisation must be mined first in the tails dam catchments so that mineralisation is not sterilised.

The current mine schedule was developed by Axe Valley Mining Limited prior to the 2015 operating run. This schedule is titled Sched05 Final_Inc Annual Summary (002) and is based on the Resources outlined in this report. This schedule takes into account, where possible, the factors outlined above. TZMI has modified this schedule slightly to take account of the material mined in the 2015 operating campaign, as well as the forecast ramp-up schedule. The ramp-up schedule has been based on previous operating history at Goondicum as well as TZMI's experience at similar operations.

Table 16.2 summarised the modified mine schedule used in this PEA. This ML life of mine plan is preliminary and does not constitute a Mineral Reserve Estimate.

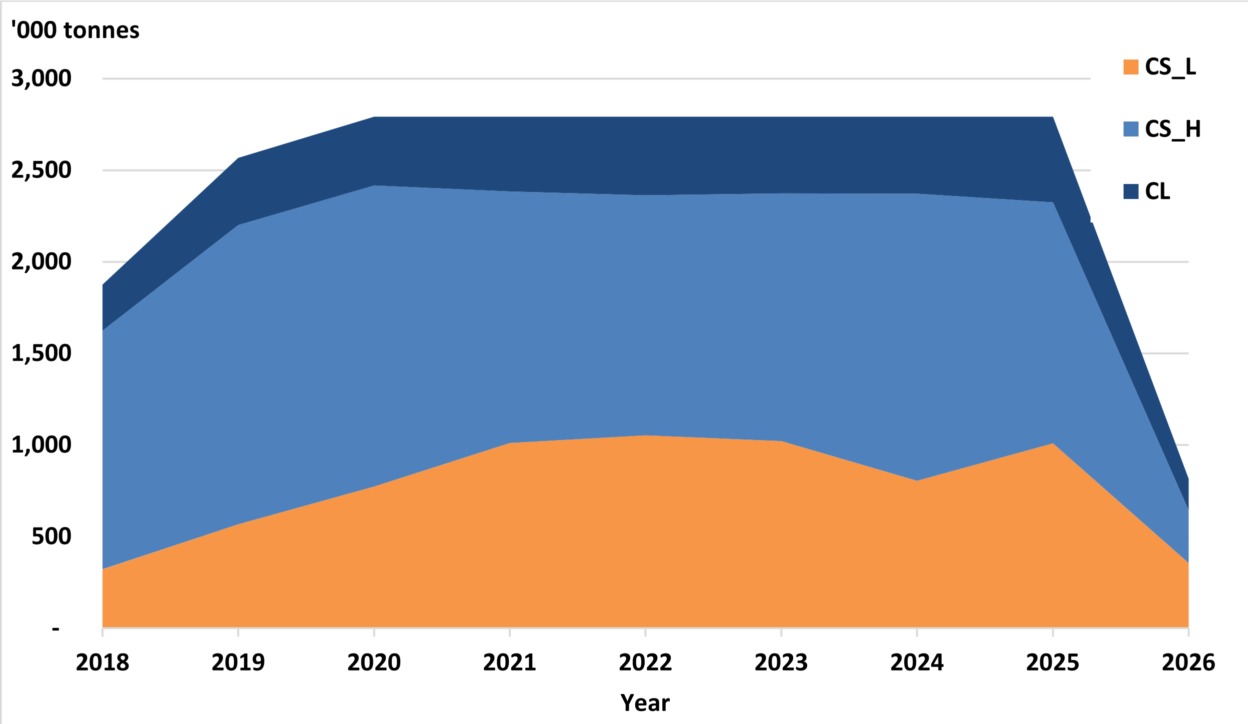
Table 16.2: ML LOM Schedule

Parameter	Units	2018	2019	2020	2021	2022	2023	2024	2025	2026	Total
Mill feed	Mt (dry)	1.88	2.57	2.79	2.79	2.79	2.79	2.79	2.79	0.82	**22.01**
Ilmenite	%	10.7	10.5	10.5	10.1	9.7	9.2	9.3	8.2	8.6	**9.7**
Apatite	%	1.5	1.7	1.6	1.8	2.0	1.9	1.9	1.9	1.7	**1.8**
Slimes	%	40	40	40	35	34	37	39	35	35	**37**

The mine schedule sees the deposit high graded and assumes a total mined quantity of 22 million tonnes comprising predominantly colluvium (CL) and Clay-Sands (CS Unit). No decomposed gabbro (DG) is incorporated in this schedule. The schedule mines approximately 71% of the stated CL and CS Resources, not mining some of the lower grade material. The current processing plant lies within the deposit but in a low grade area and has not been included in the mine schedule. Indicated Resources comprise approximately 45% of the mine schedule with the remainder comprised of Inferred Resources.

Figure 16.3 illustrates the ratio of geological units mined in the mining sequence. Importantly, the CL unit ratio is kept at or below 15% of the feed for all years except the last two years. In these final years the CL unit reaches 17% and 21% of the feed respectively.

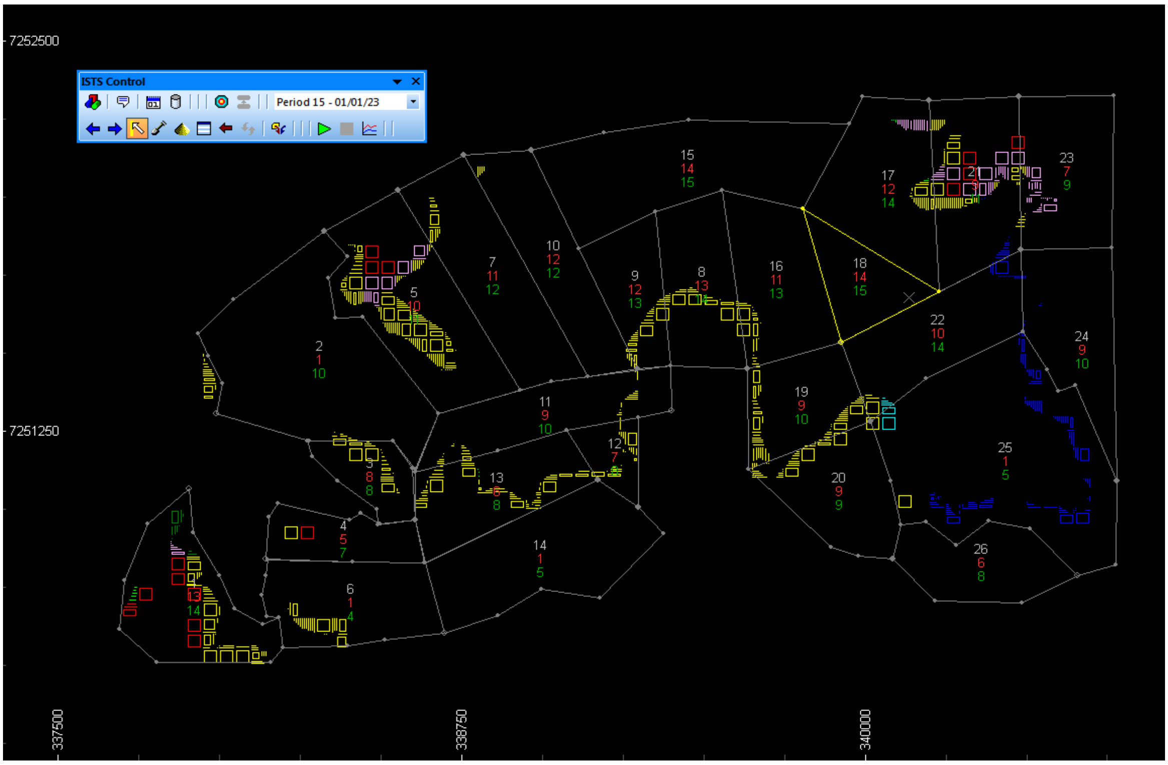
Figure 16.3: Mine schedule – geological units



The schedule has been sequenced on the basis that mining would progress in 50 x 50metre zones corresponding to the Resource model blocks. The schedule does not incorporate any additional adjustment of the Resource for mining dilution and loss at the bottom and lateral extents of excavation. The mining sequence is shown in *Figure 16.4* with mining blocks highlighting the timing of mining (white numbers 1 to 38).

The initial mining is sequenced to take place in the north-west tailings dam area (blocks 1 to 7). This is to ensure that mining in the area is completed prior to the dam being required. Mining then moves to the east tails dam area and finishes in the west of the deposit. Note that some of the initial stages of the sequence were mined in the 2015 mining campaign (refer to *Figure 14.55)*. The material mined in 2015 has been taken into account in the modified mine schedule presented in this report.

Figure 16.4: ML Mining schedule



16.4 Tailings

Tailings from the processing plants comprising non-toxic, unaltered, coarse and fine sand streams will be pumped back to the mine area in the form of a slurry. Provision has been made for the establishment of several tailings storage facilities (tailings dams) into which sand tailings (coarse and fine sand as well as slimes) will be pumped.

Past mining has worked on the principle that the tailings will be stored within previously mined areas. It is planned that this procedure will be continued with future tailings management and will consist of:

- Thickening of the FPP slimes (-53micron material) in a large 34metre diameter high rate thickener with an underflow density of approximately 28% solids;
- Deposition of the FPP slimes in a series of tailings impoundments designed to match the ore extraction sequence as well as result in a final landform that can be readily rehabilitated back into usable cattle grazing country;
- Coarse sand tailings from the WCP will be pumped out to the tails area where they will be used to build the tailings dam walls as well as being mixed with the slimes tailings to form more manageable tailings with the potential for higher settled densities in the tailings impoundments.
- The possible use of off-lease tailings deposition sites to augment on-lease deposition outcomes (longer drying times and cycles) as well as assist in scheduling of tailings deposition where there are periodic shortfalls in available on-lease void.

Figure 16.5 shows a photograph of the existing west tailings dam which was used during the previous operational period.

Figure 16.5: Goondicum tailings dam

Source: Goondium Resources

The volume of tailings produced will depend on mining rate, slimes content, and mineral grades in the incoming feed. *Table 16.3* outlines the expected tails to be produced based on the current mine plan.

Table 16.3: Tailing schedule

Parameter	Units	2018	2019	2020	2021	2022	2023	2024	2025	2026	Total
Coarse tails	Mt (dry)	1.0	1.3	1.4	1.6	1.6	1.5	1.5	1.6	0.5	**11.9**
Fine tails	Mt (dry)	0.7	1.0	1.1	1.0	1.0	1.0	1.1	1.0	0.3	**8.2**

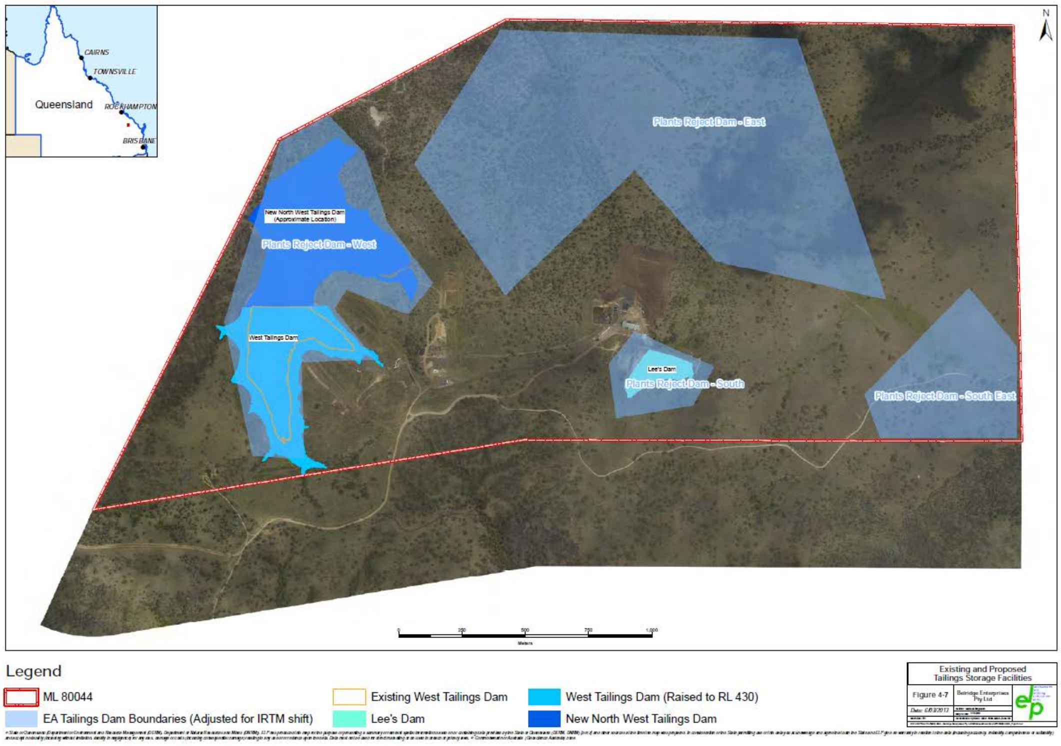
The tailings management plan involves creating dams for containment and settling of slimes. Water will be recovered from the tailings dams and reused in the plant.

The raised embankment type tailings dams are commonly used in the mining industry. Periodically, the embankment will need to be raised to keep pace with the rising level of tailings in the impoundment.

The majority of tailings generated during the wet processing operation is planned to be discharged from the plant through pipes as two distinct types of slurry. There will be fine tailings (slimes) and coarse tailings which is a slurry of sand sized particles. The slimes will be pumped into the slimes dam, from which water can be recovered and recycled back to the plant. The sand tailings will be pumped to the tailings dam wall and used as dam wall construction material by being deposited on the dam wall as a cyclone underflow. The deposited material can be compacted to the design engineering standard.

The 'West Tailings dam' and 'South Dam' will be the initial tailings dams while a void is created in the 'North West Dam' area for future tailings disposal. *Figure 16.6* shows the planned locations of the tailings dams. Detailed production scheduling will be applied to the sequential mining and tailings areas to ensure that sufficient void is created for future tailings disposal.

Figure 16.6: Planned Location of tailings dams



Source: Goondicum Resources (Note: red line corresponds to ML 80044)

The plant is planned to produce oversize material from screening processes albeit in much lower quantities. The coarse material from the Double Deck Screen in the FPP is rejected as coarse solids which are loaded into trucks and returned to the mine void. These coarse oversize rejects are used for rehabilitation of the mined out areas.

The tailings disposal system has been reported as being 'for the most part simple and robust'. The tailings dam methods used to retain tailings on site are well designed and should operate effectively, as long as they are constructed and maintained in accordance with the recommendations of experienced consultants.

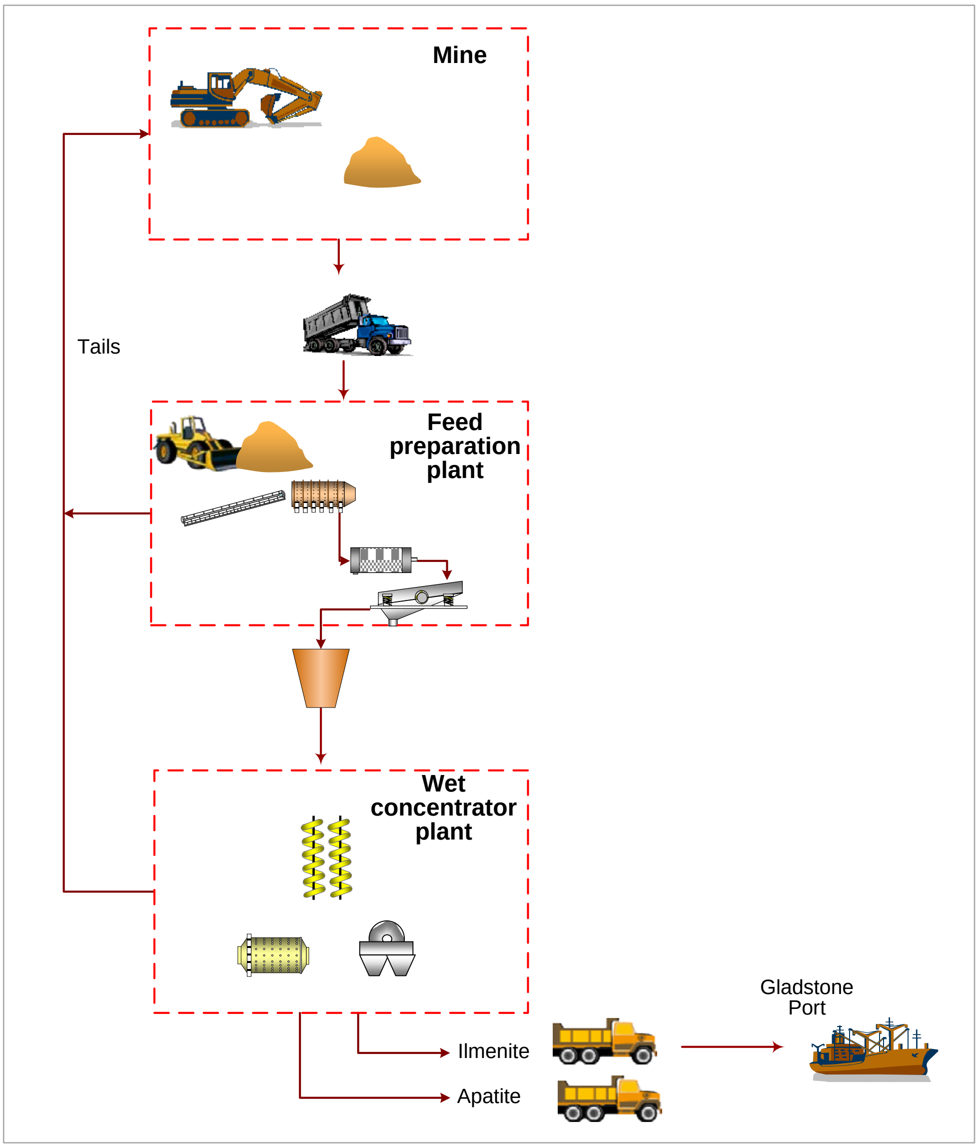
17.0 Recovery methods

17.1 Operating facility and treatment flowsheet

The mining and recovery processes are similar to that typically employed in many mineral sands processing operations around the world. The ore is dry mined and fed into a feed preparation plant where the contained minerals are liberated from clay matrix through a series of washing and scrubbing stages. The deslimed material is then pumped as a slurry into a wet concentrator plant where conventional mineral sands processing equipment is used to separate the minerals into final products by exploiting the differences in their physical properties. After separation the ilmenite concentrate is dried before transporting to the port of Gladstone for export. The apatite product is stockpiled and drained before being loaded onto trucks on site for delivery to the customer on a FOT basis.

The tailings from the mineral processing operations are returned to the mine area and deposited into a tailings retention system (TRS). Coarse rejects are also returned to the mine void. An overview of the mining and processing flowsheet for the Goondicum operation is shown in *Figure 17.1*.

Figure 17.1: Overview of the Goondicum flowsheet



The separation process does not require the addition of any chemicals and the minerals produced are not chemically modified in any way.

Mine site process water is recovered and recycled where possible using dewatering cyclones and by recovering excess water from the tailings retention systems. Water recovery for reuse in the process is maximised by use of flocculent to settle the fine solids thus rapidly releasing a large portion of the water. Make-up water is supplied from a groundwater bore located in the Mulgildie bore fields under water licence.

17.2 Design basis

The recent plant upgrade saw the throughput increase to make best use of the available infrastructure (power and water).

Table 17.1 shows the anticipated production parameters once the planned apatite circuit reconfiguration has been completed:

Table 17.1: Expected plant performance parameters

Plant area	Units	Overall
Availability	%	85
FPP Feedrate	dry t/h	375
Slimes content	%	30-40%
WCP Feedrate	dry t/h	180-200
Ilmenite production	tpa	200,000
Apatite production	tpa	40,000

17.3 Process description

The plant was initially designed and built to process 250tph of dry feed but was upgraded by Goondicum Resources Pty Ltd as part of the 2014 restart increasing plant throughput by 50% to 2.8 million tonnes pa of dry feed (375tph). This upgrade saw the scrubber capacity doubled to 500tph, an intermediate trommel relocated and the inclusion of a 700tonnesCD tank ahead of the wet concentrator plant. The plant was operated at this rate in 2014 to 2015 and was able to achieve close to design throughput for periods of time (22/23 June and 23 July 2015) until the plant was put on care and maintenance due to the falling ilmenite price.

While some parts of the process flowsheet have evolved since the initial start up the overall processing philosophy has essentially remained unchanged and involves a conventional extraction process incorporating scrubbers, screens, cyclones, spirals and (LIMS and WHIMS) magnetic separators to produce ilmenite and apatite.

Broadly speaking the processing facility can be divided into two main areas:

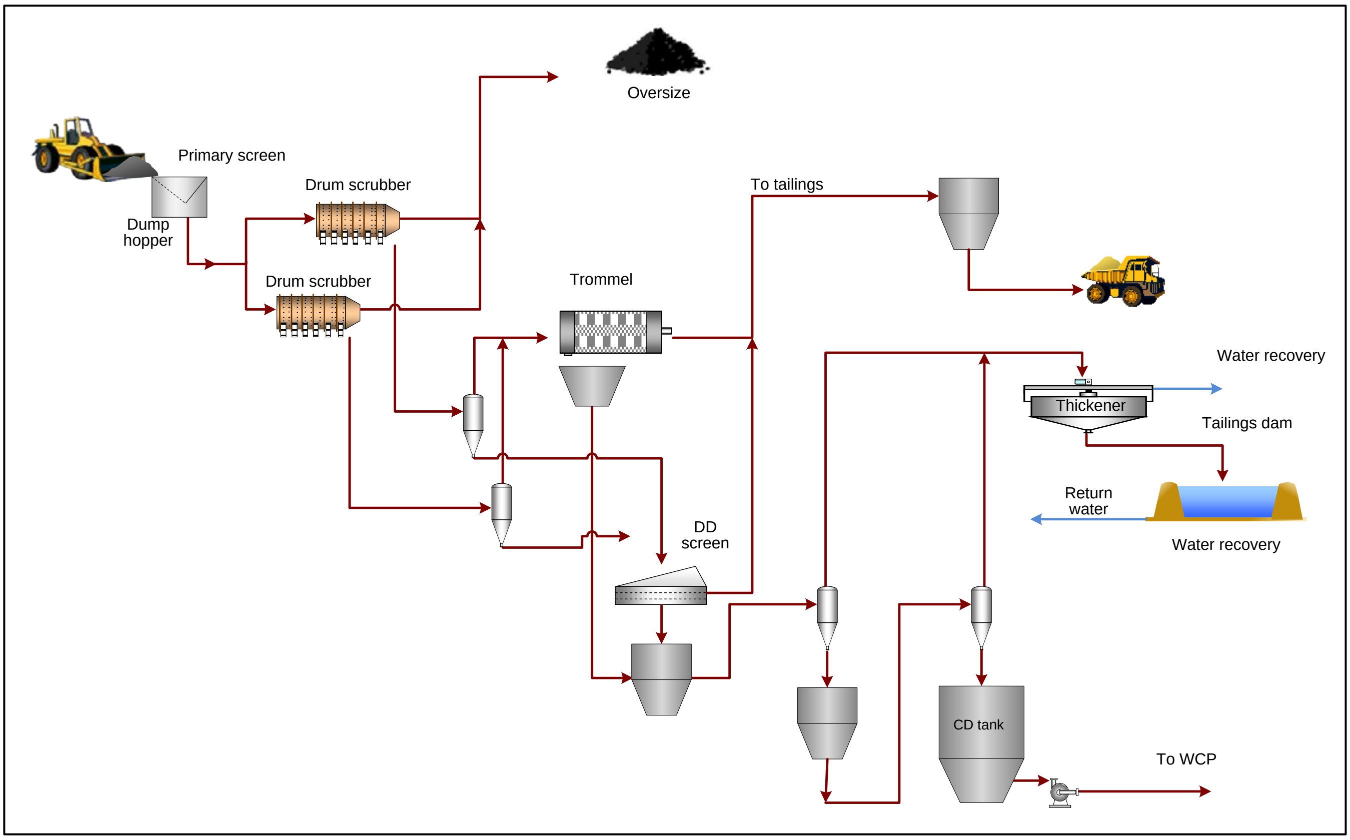
- Feed preparation plant (FPP)
- Wet concentrator plant (WCP)

17.3.1 Feed preparation area

The feed to the plant comprises mineralised sand grains including ilmenite, magnetite, apatite and feldspar as both discreet and composite particles held within a barren clay matrix. Characterisation work done as part of project development showed that the valuable heavy minerals present in the feed can be recovered from the -1mm +53micron size fraction using conventional heavy mineral sands processing equipment. Once the minerals are liberated the separation processes at the wet concentrator plant are able to reject gangue minerals while recovering ilmenite and apatite product streams by exploiting the differences in their physical properties. The differing behaviour of the geological domains (CL, CSH, CSL, DG) through the process flowsheet means that the ROM material needs to be stockpiled ahead of the plant and blended before being loaded into a feed receival unit with a frontend loader.

The first processing stage comprises screening, deagglomeration and water recovery in the feed preparation area. A schematic of the feed preparation area is shown in *Figure 17.2*.

Figure 17.2: Goondicum feed preparation plant flowsheet



Key operational aspects highlighted for improvement in the feed preparation area during previous plant upgrades focused on breaking up and deagglomeration of the clay matrix in an autogenous scrubber with water and rocks to liberate the minerals. The current plant incorporates a fit for purpose feed preparation plant bought from the Iluka Yoganup operation located in Western Australia.

In the current design a front loader feeds a predetermined blend of ROM into a dump hopper which flows into a mobile vibrating grizzly screening plant (*Figure 17.3*).

Figure 17.3: Feed preparation area ore receival unit

The +200mm material from the grizzly is transferred to rejects via an oversize conveyor for returning to the mining void while the undersize travels up an inclined conveyor into one of two 250tph autogenous rotary scrubbers. The scrubber oversize is stockpiled before returning to the mine void while the undersize is pumped to a secondary screening stage via a cyclone cluster. The underflow from the cyclones discharge onto a Joest double deck screen with 3mm and 1mm apertures while the overflow is routed to a trommel which serves a primary function of removing grass that would otherwise disrupt downstream processing equipment. The undersize from the trommel and double deck screen are combined and pumped through a series of desliming cyclones before flowing into a 700tonne CD tank. The 1mm screen cut-off was selected based on the wet concentrator and WHIMS specifications which have been designed to process <2mm material. The CD tank was installed during the recent 375tph upgrade and ensures that there is sufficient buffer capacity between the feed preparation plant and wet concentrator plant for a steady supply of constant density feed to the spiral circuit.

Figure 17.4: Feed preparation area dual scrubbing units

The overflow from the cyclones reports to the water recovery circuit where the slimes are thickened before being pumped out to the tailings storage facility at the mine site.

While the trommel and scrubber were purchased second hand and are in the order of 20 years old, TZMI believes that the equipment is fit for purpose and will be capable of lasting the life of the project with an appropriate maintenance plan, as is the case for any active mining and processing operation. TZMI is aware of other operations in Western Australia that used similar equipment to successfully treat high slimes (~30%) material and as a result believe that the feed preparation equipment installed at Goondicum will perform as expected.

Figure 17.5: Feed preparation plant (scrubber in the foreground and trommel in the background)

The wet mineral extraction process circuits generates large volumes of water containing very fine solids (slimes). The water is clarified for re-use and the slimes recovered as a thickened slurry for pumping to a tailings dam. Clarification can be achieved in batch settling tanks. However this is a very slow and expensive process, often involving very large settling tanks. Thickeners provide a rapid and continuous method for removal of fine solids, particularly slimes, from mineral process water, thus allowing the water to be recycled and the slimes solids to be recovered on a much more economic basis.

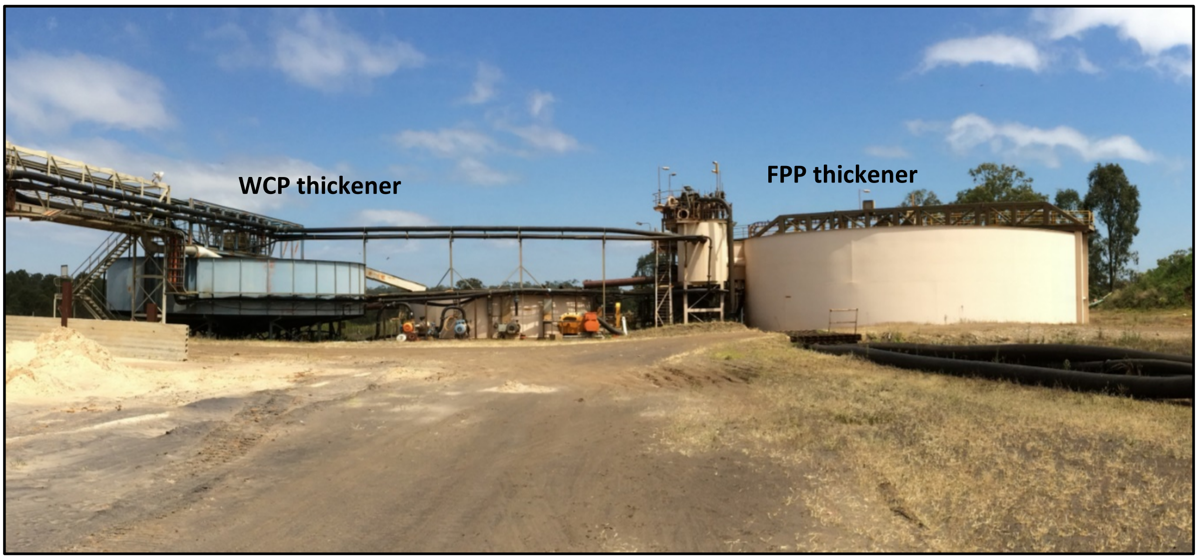
Two thickeners are used in the Goondicum operation (*Figure 17.6*)

- WCP thickener (12-TH-01): A conventional 16metre diameter conical-based thickener used for the collection and desliming of process water generated in the WCP.
- FPP thickener (10-TH-01): A flat-bottomed 22metre diameter thickener used for the collection and desliming of process water generated in the FPP.

Clarified water recovered by these thickeners is collected in a common storage tank for recycle to either plant and underflow slurry is pumped to tails.

The design flux of 0.2tph/m^2 was assumed for the FPP thickener design. While this is slightly more optimistic than the industry rule of thumb it is consistent with TZMI experience.

Figure 17.6: Goondicum water recovery plant

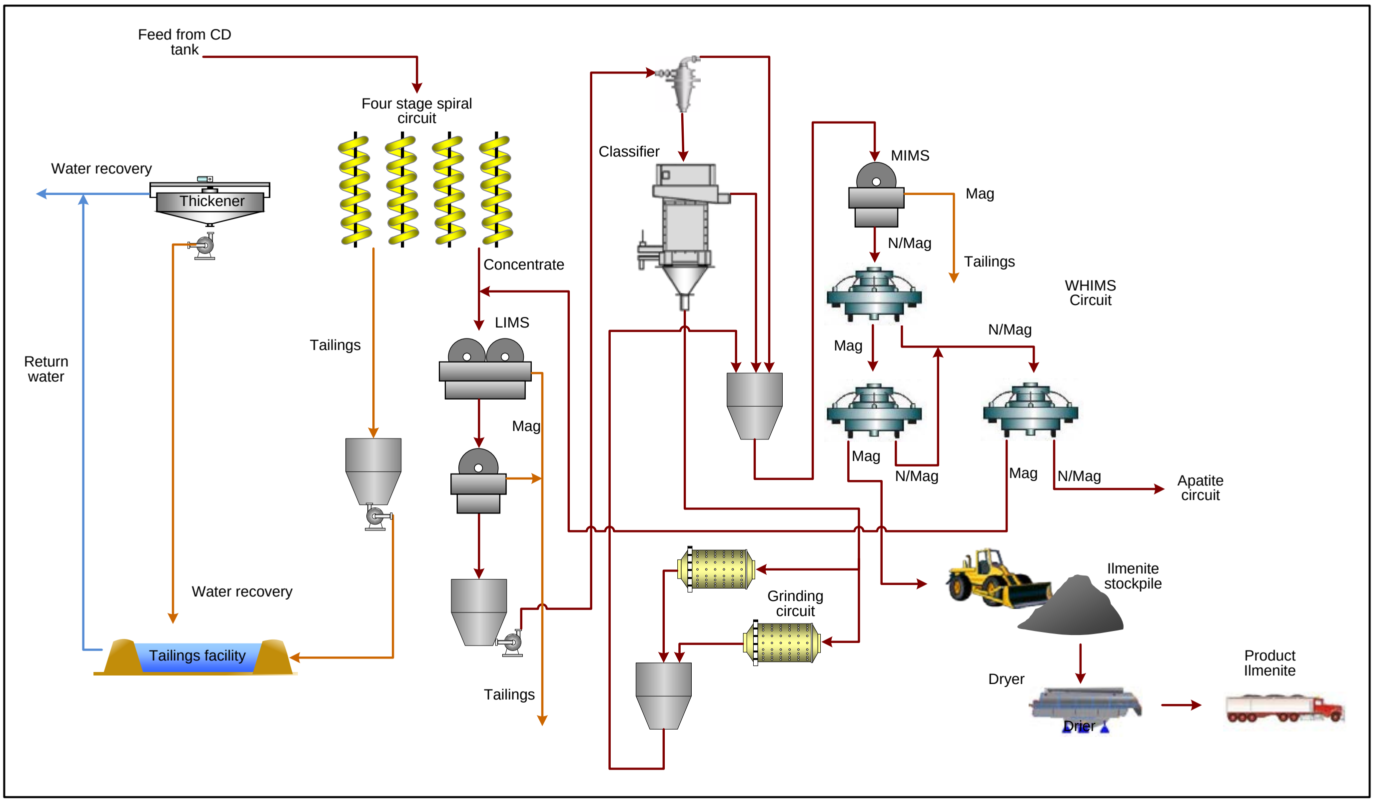


17.3.2 Wet concentrator plant

The second stage of processing at the WCP employs a series of gravity (spirals) and magnetic (LIMS, WHIMS) circuits to separate the valuable heavy minerals and reject the gangue minerals producing final products of ilmenite and apatite. The gangue minerals are captured into the various tailings streams and returned to the mine area to refill the void.

A simplified flowsheet depicting the Goondicum wet concentrator flowsheet is presented in *Figure 17.7*.

Figure 17.7: Schematic of the Goondicum wet concentrator plant



The underflow from the constant density tank feeds into the wet concentrator plant at a rate of approximately 200tph of dry solids. Since the initial design the ilmenite flowsheet has been expanded to cope with the increased throughputs and the addition of a second ball mill.

During the initial stages of the project the feldspar content had been valued and later also the apatite content. In addition, the titanomagnetite content was anticipated to find value in the regionally nearby coal washing industry. The focus on producing multiple products lead to a complex separation plant and attention diverted to meeting a wide range of production targets resulted in the overall poor performance of the plant. With the revised operating strategy to focus on ilmenite and apatite the other minerals will no longer be considered as products and the circuit has been revised to focus on the recovery of ilmenite and apatite products only.

The incoming feed, pre-screened to -1mm, using a double deck screen, results in a particle size distribution suitable for the wet concentrator and WHIMS which can accept mineral less than 2mm. The overflow from the secondary desliming cyclone reports to the 16metre thickener while the underflow flows into the CD tank which feeds the primary spirals in the gravity concentration circuit.

The concentrator feed is processed through one of two spiral concentrator plants in parallel each configured as a four stage circuit employing a conventional heavy mineral sands gravity separation technique. In the first stage (primary circuit), a super concentrate is generated which flows directly to the WHIMS circuit feed pump while the concentrate stream is diverted to the upgrade circuit for further cleaning. The middlings stream flows into the middlings circuit slurry bin and tailings from the primary circuit is routed to the scavenger. The concentrate from the middlings circuit is pumped to the upgrade circuit while the middlings is recirculated. The concentrate from the scavenger circuit feeds into the middlings circuit. Final concentrate is made up of the super concentrate from the primary circuit and concentrate steam from the upgrade circuit. The final tails are made up of tailings from the middlings circuit which is combined with the middlings and tailings from the scavenger circuit.

The majority of the feldspar and some of the apatite are rejected in the primary concentration circuit. Apatite has a higher sg (3.3) than feldspar (2.7) and so tends to report to the spiral concentrate with the ilmenite. The concentrate from the gravity circuit is routed to a two stage low intensity magnet (LIM) separator in a non-mags cleaner configuration where the highly susceptible material (magnetite) is rejected to tailings. The non-magnetic stream passes through an up current classifier with the overflow, which contains the -180micron material, being pumped to the medium intensity magnetic separator (MIMS) via a cyclone. The non-magnetic mineral from the MIMS flows into a wet high intensity magnetic separator (WHIMS) with the magnetic product being fed into a secondary WHIMS. The magnetic stream from the secondary WHIMS flows into the ilmenite final product bin while the middlings are recirculated. The non-magnetics streams from both stages of WHIMS, comprising mostly apatite, are routed to the final WHIMS stage via a cyclone, with the non-magnetic fraction from this stage feeding into the apatite circuit. The magnetics fraction from the final WHIMS stage is routed back to the classifier feed bin.

The +180micron material which reports to the underflow of the up current classifier containing the agglomerated ilmenite/apatite particles is fed into one of two ball mills operated in parallel with the objective of breaking up the particles to liberate the ilmenite grains. The product from the ball mill is routed to the slurry bin ahead of the MIMS via a cyclone.

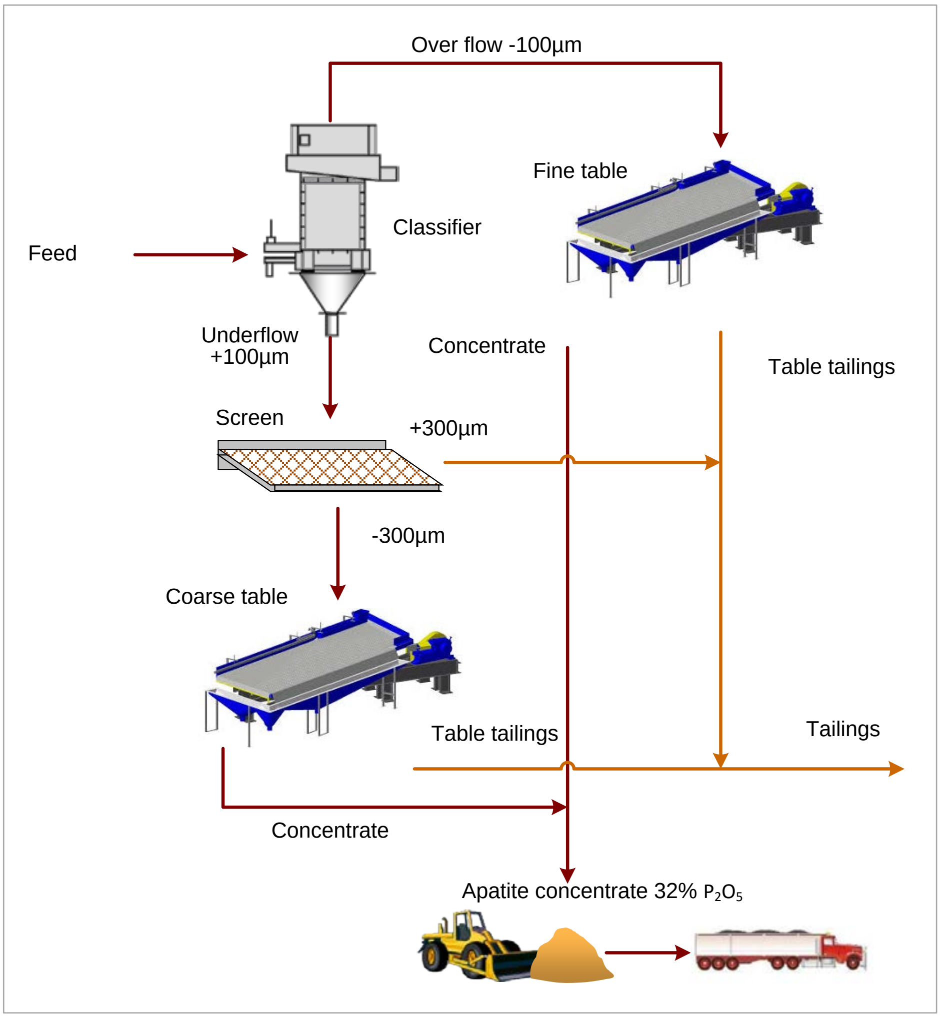
Feeding of WHIMS with pre-classified material is critical, and product recoveries are dependent on this. The ability to mill more intensely is key to achieving ilmenite product quality and maximising recovery, although this will be mitigated by the current mine plan which only mines CS (clay sand) ore.

The magnetics fraction from the WHIMS plant comprising the ilmenite concentrate produced is stockpiled via a cyclone and drained before being fed into the ilmenite drying plant while the non-magnetics fraction is diverted to the apatite circuit for further upgrading. The drying plant consists of a vacuum filter and gas fired vibrating fluid bed dryer where the ilmenite is dried and fed into the ilmenite product silo before being loaded onto a truck for transport to the port of Gladstone.

The feed to the apatite circuit passes through a further stage of WHIMS (narrow rotor) with the magnetic fraction diverted to the final tailings bin. In the current plant configuration the non-magnetic fraction is pumped to a single final spiral gravity separation stage. The tailings from the gravity circuit are diverted to final tails while the middlings are recirculated to the apatite circuit feed bin.

It is currently proposed that the unused wet shaking tables, previously employed in the feldspar circuit, be incorporated into the apatite circuit to improve recovery. In the planned upgraded circuit the feed into the apatite circuit will pumped into an up current classifier operated at 100micron cut point. The +100micron underflow will be passed over a 300micron screen with the -300micron undersize being fed onto the coarse wet shaking table. The overfllow from the up current classifier feeds directly onto the fines shaking table. The concentrate streams generated by the wet tables are combined to produce the 32% P_2O_5 product while the lighter minerals are rejected as tailings. The magnetic rejects and table tailings streams are combined and pumped into the final tailings bin. The final process flowsheet for the upgraded circuit will be confirmed after the restart and necessary modifications made to the pipework and equipment configured. The currently proposed upgraded apatite circuit is shown in *Figure 17.8.*

Figure 17.8: Proposed apatite circuit



17.4 Expected recovery

Geometallurgical artefacts frequently result in differences in metallurgical behaviour of material sourced from the same deposit. Early testwork showed that the response of the minerals sourced from various zones within the Goondicum deposit exhibited varying processing characteristics and consequently recoveries to final product. While the current mine plan assumes that only material sourced from the CS and CL units will be processed, the DG sand unit has been the subject of previous testwork with process recoveries being reported for various feed blends. Earlier project development work assumed that both DG and CS would be treated at the same time and supporting testwork programs were developed to test feed blends at different ratios.

Various metallurgical testwork trials were conducted as part of flowsheet development, the results of which clearly demonstrated that ilmenite and apatite products could be successfully recovered from each of the geological domains within the deposit, albeit at different recoveries. More recently actual plant operating data has further confirmed the performance of the process flowsheet with the production and sale of products to local and international markets.

The plant has been operated intermittently since it was first commissioned in 2007 and a number of improvements made since the initial start-up which have largely focused on the preparation of feed material for the wet concentrator plant. The process has also been simplified with the focus being shifted from producing four products to two products, which should translate into improvements in ilmenite and apatite recovery.

Of the three brief operating periods the metallurgical performance data for the 2012/2013 period is believed to be most representative of what might be expected once the plant is fully operational, albeit with a slightly modified wet concentrator plant configuration. Poorly calibrated instrumentation and high losses of fine valuable mineral to the thickeners resulted in lower than expected recovery during the 2015 operating period.

Various product recoveries have been quoted in the test reports and plant production statistics. A detailed review undertaken by TZMI has estimated product recoveries based on the available data and industry experience. The product recoveries used for the economic evaluation have been included in *Table 17.2* for the current FPP/ilmenite flowsheet and proposed apatite circuit.

On start-up it is expected that the product recoveries will be towards the lower end of the range and increase to the upper end as the plant is ramped up to full production and the process is optimised for the feed blend. Ultimately the product recoveries should settle at the upper value quoted.

Table 17.2: Product recoveries

Product	Recovery (%)
Ilmenite	55 to 78
Apatite	40 to 75

Note: Apatite recovery is quoted for an apatite feed analysis assuming a 42% P_2O_5 content and for a final apatite product assaying 32% P_2O_5.

Previous testwork showed poor recovery of fine apatite (<75micron) over spirals, with significantly improved recovery using shaking tables. The current plant configuration makes use of spirals in the apatite circuit. An upgrade is planned to include a classification stage at 100micron with the overflow and underflow streams being passed over coarse and fine shaking tables respectively. It is estimated that the upgrade will cost US$470,000 and will include detailed process design work, shaking table vibration reduction, WHIMS upgrades as well as rerouting of pipe work and various pump and motor upgrades. Given the results of previous work showed significantly improved recoveries of apatite through the incorporation of shaking tables. Recovery of apatite to final product has been estimated at 75% for the economic evaluation.

Based on the extensive metallurgical testwork programs conducted over the years, ilmenite recovery is expected to be around 80%. These expected recoveries are based on substantial laboratory based gravity and magnetic separation testwork completed by Downer Mineral Technologies (Report number MS.01/80354/1, 07/03/2001 & Report no. 09/81947/1 – 23/3/09) and reported by Stanmore.

After eight months of operation under Monto Minerals Ltd and nine months under Belridge Enterprises, metallurgical recoveries of 73% were achieved. Operations under Goondicum Resources Pty Ltd only ran for three months and recorded an average recovery of ilmenite to feed of 53%.

18.0 Project infrastructure

The Goondicum deposit lies in a relatively non-remote area of SE Queensland within 30km of the small town and major population centre of Monto. The Monto township is located in the North Burnett Region, and has a population of about 1,250 people with another 1,250 people living within the Shire boundaries. The community is well serviced with a hospital (two permanent doctors) and an ambulance station with two ambulance vehicles. The Monto all-weather airstrip provides 24-hour availability for the air ambulance. Monto is 50km by road from the minesite and employees are able to commute by road with no accommodation required onsite.

Power is available to the area from the national grid and the project area is linked to Monto and the port city Gladstone by a series of sealed and unsealed access roads. Gladstone is a major port with facilities for the export of mineral products from which Goondicum previously shipped the ilmenite product.

The site is supplied water from a bore at Mulgildie via a 36km water pipeline that has a design capacity of 2,000ML per annum.

The surface rights and the dimensions of the ML allow sufficient access to the deposit for mining purposes.

The book value of the projects assets, including currently held mining and plant machinery and equipment as provided by Goondicum Resources is estimated at approximately A$105 million (prior to any write downs).

18.1 Site layout plans

Figure 18.1 shows the general surface layout of the existing processing facility and supporting infrastructure.

Figure 18.1: Site layout

18.2 Site access

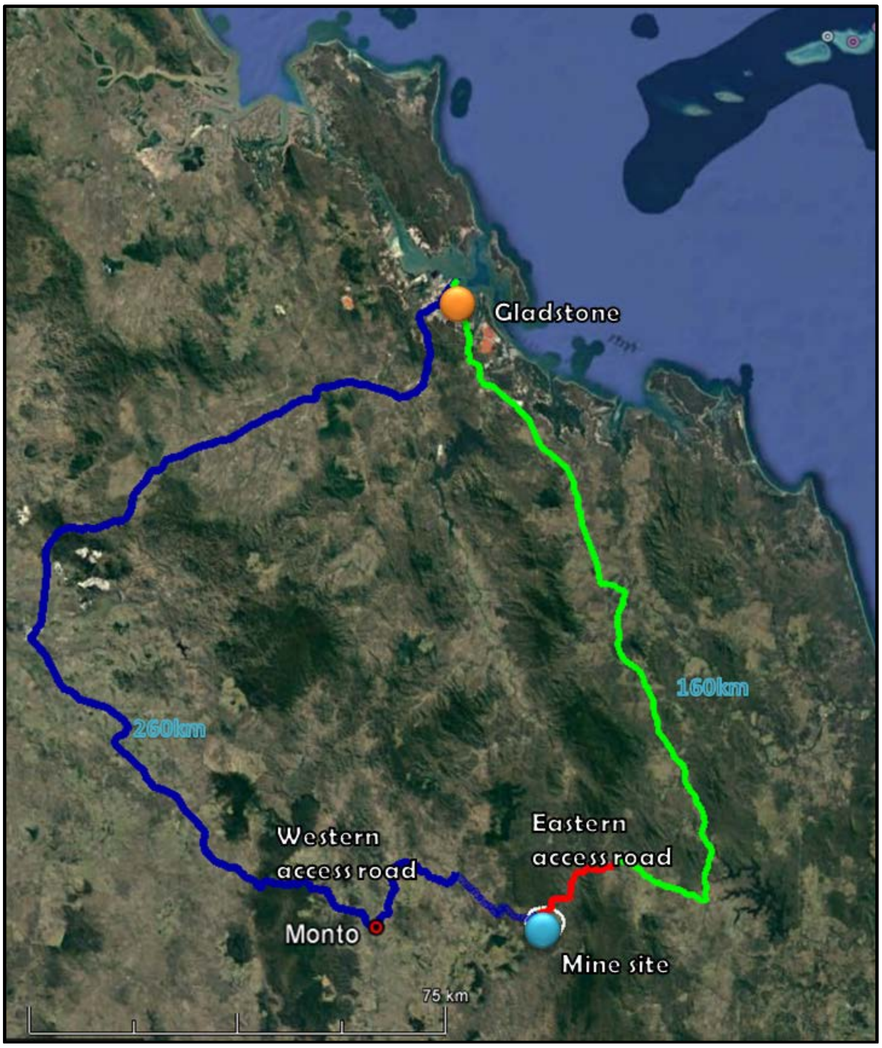
The Goondicum Industrial Minerals Project is well located with respect to infrastructure and services. The region is a developed rural area with a network of highways, roads, rail lines and electricity transmission corridors.

The Goondicum mine site is accessible via a public road which is suitable for light vehicles and low intensity heavy vehicle use. A state government controlled main road connects Monto and Gladstone. The mine is approximately 24km east of the Mono-Gladstone road and can be accessed by taking the Bancroft turn-off on to Cannindah Road. From that point there is a site access gravel road which climbs around 200m to the top of a range and then descends to the site. The access road has been upgraded to handle haulage trucks. Four creek crossings have been built by the project in addition to around 7km of road widening and 5km of road sealing.

During the previous operating period ilmenite product from the Goondicum mine was road hauled 260km from the mine site via Monto and Biloela to the port of Gladstone where it was shipped to international export markets. There is potential to reduce this haulage distance down to 160km with the construction of a new 22km access road to an existing gravel road linking up to the Bruce Highway, lowering off-site logistics' costs significantly. About 5km of the 22km link road has been upgraded so far with the remainder planned to be completed following the restart.

The two main access routes to site are shown in *Figure 18.2*.

Figure 18.2: Site access routes



18.3 Processing plant

Treatment of the Goondicum mineralised material will be performed at the processing facility located adjacent the mine. The facility is accessed via all-weather roads from both the mine and the nearby town of Monto. The facility includes a feed preparation plant and wet processing plant with related equipment and infrastructure. The facility has been operated on several occasions previously and will be restarted with some minor changes to the flowsheet to improve the recovery of apatite. Use will be made of existing equipment.

The plant will have an operating availability of 85% and will be manned 24 hours/day for 365 days of the year.

The mining and processing of ore at the mine site will use the physical processes of screening, gravity and magnetic separation. Mining will be by excavation to an average depth of approximately 7metres. The ore will be loaded directly onto trucks to be transported approximately 500metres to the feed preparation section, which then pumps the feed as a slurry up to the processing plant. The plant is situated at an elevated location near the southern boundary of the lease, *Figure 18.3*. Mine site process water will be recovered and recycled where possible using dewatering cyclones and by recovering excess water from the tailings storage facility. High rate thickeners are used to achieve rapid recovery of process water at the plant.

Figure 18.3: Goondicum operating area

Further details on the processing facility infrastructure are included within *Section 13.0*.

18.4 Camp

Given the proximity to Monto no accommodation or special transportation arrangements are required for the workers. There are no requirements for a permanent or temporary camp.

18.5 Buildings and workshop

Site offices are provided for by five demountables which have already been erected on site. A large storage shed has been constructed to serve as a workshop and for the storage of spares and there is a laydown area to the south of the wet concentrator plant that is used for the storage of large items of equipment. A covered area is also available for maintenance of the mobile equipment.

18.6 Site based analytical facilities

Allowance has been made for a basic laboratory and analytical services. These services would provide basic process control and analytical data to allow operation of the mine and wet concentrator plant. Any complex or non-routine analyses and final product samples would be sent to an accredited off-site laboratory.

18.7 Power

The Project previously built and retains ownership of a 23km 66kV powerline which connects the mine to Ergon's main 66kV line at Dakiel. Power enters the mine site at 66kV and a substation at the mine transforms the 66kV to 11kV for distribution around the site. The installation has a capacity of 5MW which has surplus capacity to the likely mine peak requirements of approximately 4MW. The current agreement with Ergon is for an uptake of 4MW. The power line mostly follows the council road easement wherever possible, affording good access for line maintenance.

On site power transformers and reticulation are installed and commissioned and currently maintained under a contracted service.

18.8 Water

As the Project is situated in the uppermost reaches of the catchment, there is minimal flow of water onto the Project site and as a result there are no permanent rivers or creeks in the area. In wet weather, water predominately runs northwest along various drainage lines which flow for a short distance off lease until meeting the West Burnett River.

Groundwater suitable for extraction by bore is scarce and flows will only sustain small stock water supplies. The landowner has installed a very low flow bore for stock water supply but it is subject to seasonal variation. Groundwater is sourced from small fractures in the gabbro up to 30metres depth and the bore flows are generally in the order of 0.3L/s or less and only suitable for intermittent pumping for stock water.

The boreholes are planned to be removed during the mining operation and GR will provide the landholder with a replacement stock bore. On completion of mining and tailings activities in the area of the waterhole, the surface of the land will be reshaped to provide a replacement borehole.

A series of seven monitoring bores have been installed in addition to the two pre-existing bores. The installed bores are small diameter shallow monitoring bores up to 20m in depth. These are used for monitoring groundwater levels and quality.

As with most mineral sands plants water is not consumed in the process but large volumes of water are required as a processing medium and to transport the minerals around the plant in the form of a slurry. Only a small proportion of the total volume utilised around the plant is lost to tailings streams and process water is recovered and recycled where possible using dewatering cyclones and by recovering excess water from the tailings retention system. Water recovery for reuse in the process is maximised by use of flocculent to settle the fine solids thus rapidly releasing a large portion of the water.

Water supply for the Project site is not provided by onsite groundwater but is sourced from the Mulgildie borefield under license (74220M) which allows for drawing up to 3,000ML per annum of water from the Mulgildie borefield. The existing bore is allowed to draw 1,500ML of water per annum, which is sufficient to sustain the current plant when it is in operation. The abstraction point, referred to as Evans Road Bore (Figure 18.4, is located approximately half way between Monto and Mulgildie on Evans Road within Lot A on AP16416.

Figure 18.4: Evans road bore

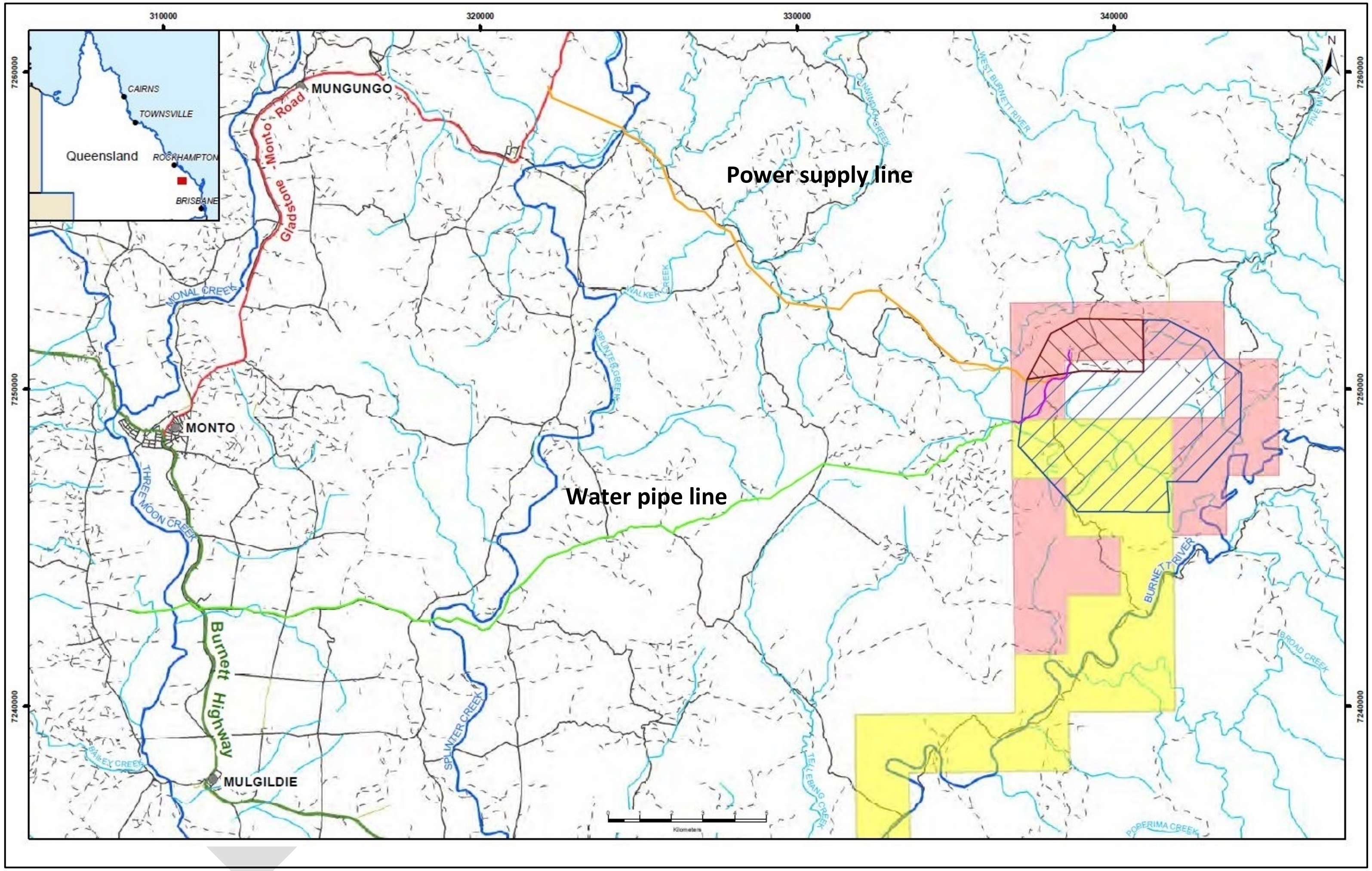
Make-up water is pumped to site via the 36km pipeline originally built by a government subsidiary with ownership subsequently transferred to Goondicum Resources. The bore is developed to a depth of 640m with water abstracted from the Precipice Formation of the Great Artesian Basin. The aquifer has considerable pressure and the bore is controlled by telemetry from the remote control system.

Water is stored in a 1.6ML header tank at the pump station and then pumped to a staging pump approximately 16km away. Since initial commissioning in 2007 the pipeline has been upgraded which involved completing the aeration plant at the pump station, building a staging facility approximately 16km from the main pump station. Operating experience, following the upgrade, showed that the bore has had few problems. The water pipeline from Mulgildie has a design capacity of 2,000ML per annum and has been tested briefly to 1,700ML per annum. The locations of the power line and water pipeline are shown in *Figure 18.5*.

Water demand for the mine is mainly determined by the plant throughput and the slimes content of the ore. The slimes are deposited into the slimes/tailings dam as thickened slurry and anecdotally settle to a final density of 50% solids. The sand tailings from the wet concentration plant is relatively free draining and most of the water used to transport sand tailings is recovered and reused in the processing plant.

Make up water requirements are estimated at 0.55 per tonne of dry feed to the plant (1.55 GL per annum).

Figure 18.5: Water and power supply routes



18.9 Gas

Liquified Natural Gas (LNG) is supplied from an 80,000litre on site storage vessel and associated equipment supplied by Elgas and is used for drying of the final ilmenite product down to <0.5% moisture to meet market requirements. The ilmenite is dried using a vibrating fluidised bed and the gas consumption is estimated to be 0.22 GJ/tonne of ilmenite.

The gas is bought under an existing contract with Elgas for the provision of gas and rental of the gas tank and associated equipment. The contract was originally signed for a nominal five year period commencing in November 2014 but continually rolls over until the minimum contracted sales volume (157,505GJ) has been purchased. The rental of the gas supply equipment is covered by a monthly facility fee. Termination of the contract would also involve the payment of liquidated damages and the costs associated with the removal of the Elgas equipment.

It is understood that the supply of gas for the operation can be resumed whenever the plant restarts.

18.10 Product shipping

Under the current restart plan the project will produce ilmenite and apatite final products for sale; ~200,000tpa and ~40,000tpa respectively.

The apatite will be sold into domestic markets FOT at the mine site and transportation of these products will be the responsibility of the customer. The ilmenite will be transported to the port of Gladstone for loading onto vessels and sold on an FOB basis to international markets.

The Gladstone Ports Commission (GPC) is the Gladstone port authority and terminal operator. GPC's Auckland Point wharf is a multi-user bulk commodities facility and has previously been used for exporting ilmenite. Small quantities of grain, calcite, and magnesite have also been shipped out through this facility and magnetite shipped in. The Port of Gladstone has a well established reputation gained over many years of operation catering for export of coal, mineral, and agricultural products and the import of raw materials, petroleum products, and general cargo. It is an efficient port with a good industrial relations record.

Goondicum resources has previously shipped ilmenite from Gladstone and rented a storage facility there with a capacity of 35,000tonnes. The rights to the storage facility have since been given up to save costs while the plant is on care and maintenance. The storage shed is currently unutilised and there is a high likelihood that a revised contract with the port authorities could be renegotiated.

Figure 18.6: Ilmenite storage shed at the port

Previously when the ilmenite product was shipped wet GR utilised a concrete pad built by the project and which was then leased from Gladstone Ports Corporation (GPC) for the storage of ilmenite. A canvas dome roof bought by the project can be used as a cover over the pad to allow for the ilmenite to be stored dry if the original shed is not available.

Bundaberg also has a port facility that may be amenable for shipping bulk ilmenite from.

Ship loading had previously been contracted to both Gladstone Ports Corporation (GPC) and Qube with GPC engaged during the 2013 operating period and Qube during the 2015 operating period. Ships were loaded at Barney Point under GPC using their fixed ship loader. During this time the product was stored on an exposed pad adjacent to hopper for the ship loader.

Construction of the Eastern Access Road will significantly reduce the cost of transporting product from the mine to the port.

Approval for the clearing of land for the first section of the Eastern Access Road under the federal Environment Protection and Biodiversity Conservation Act (EPBC) has been received. A referral for stage 2 was lodged but was assessed to be a non-controlled action which does not require further assessment. In addition to the EPBC approval the following approvals/permits will be required prior to construction:

- Riverine Protection Permit (RPP) for works within a relevant 'water area'
- Assessment of fish passage report to ensure water crossing designs are code compliant

These additional permits will be advanced once a decision to restart the project has been made as consultants will be required to lodge the applications and the RPP is only valid for the construction period.

The Eastern Access Road is to be built as a public road and as such will be constructed by Goondicum on behalf of the Bundaberg Regional Council (BRC). BRC approval is required to restart construction on the road.

19.0 Market studies and contracts

19.1 Ilmenite market

Ilmenite is a titanium-iron oxide mineral with an idealised formula of $FeTiO_3$. It is the most common titanium mineral and naturally-occurring ilmenite contains between 35% and 65% TiO_2.

19.1.1 Mineral sands market overview

The ilmenite market is used as a feedstock for the production of titanium dioxide (TiO_2) pigment and titanium metal. Other titanium feedstocks compete in these markets and include leucoxene, rutile, synthetic rutile and titanium slag.

The global TiO_2 pigment market accounts for around 90% of all titanium feedstock demand, and is therefore the dominant driver of offtake.

19.1.2 TiO_2 pigment market

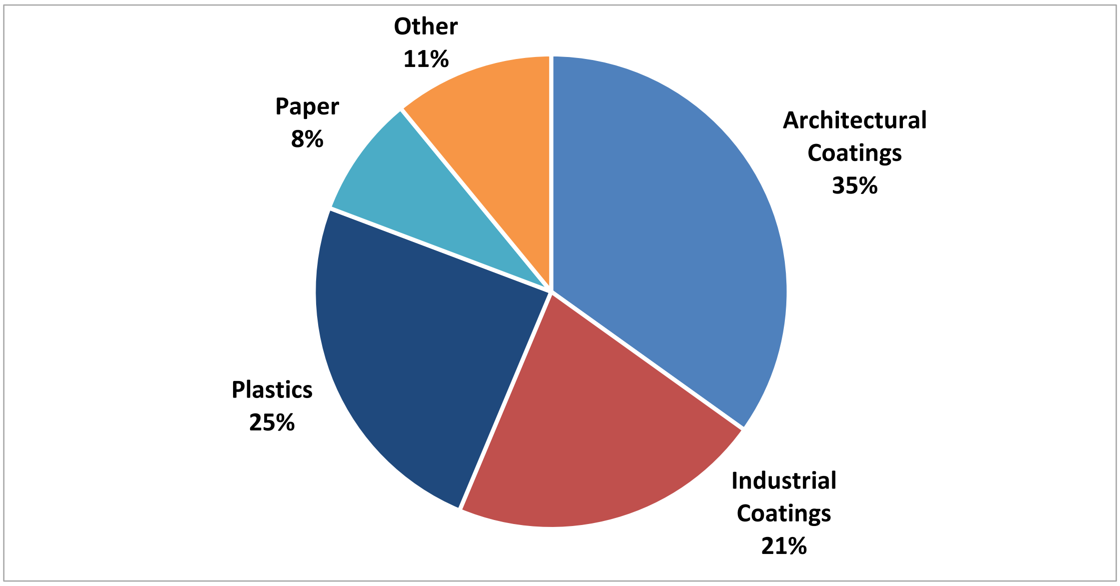
TiO_2 pigment is used predominantly in the production of high quality surface finishes, and is essentially a lifestyle product. Historically, its use has developed strongly in the most economically developed countries of the world where it is an essential component of basic consumer products, such as housing, motor vehicles and plastic products.

In mature economies, TiO_2 consumption generally increases as the rate of disposable income/credit availability increases, and as a result there is a close link between GDP growth and TiO_2 pigment consumption. In emerging economies, there is a stronger link between the rate of urbanisation at TiO_2 consumption. On a global scale, the growth rate of TiO_2 historically have been approximately 3.0–3.5% per annum, depending on the starting and ending dates and relative position in the business cycle. This historical pattern provides an indication that the long-term trend in future consumption of TiO_2 pigment will continue to show growth at rates that will be underpinned by world GDP growth and urbanisation increases.

Traditionally the main consuming regions for TiO_2 pigment are the major industrialised economies of North America, Europe and more recently the significantly increasing role played by China.

The segmentation of the TiO_2 pigment market by consuming industry in 2015 is shown in *Figure 19.1.* The coatings sector is the largest consumer of pigment averaging 56% of total pigment consumption, with architectural coatings (paint) representing approximately 60% of this end-use segment. Demand for architectural coatings is driven by factors such as existing home sales, new construction (residential and commercial), home maintenance and government spending on urban development. On the other hand, demand for industrial coatings is influenced largely by industrial production, disposable income/purchasing power parity, consumer confidence, infrastructure spending and unemployment levels – all factors that relate to the health of the overall economy, particularly the durable goods sector.

Figure 19.1: Global TiO_2 consumption by end-use sector: 2015



Source: TZMI

The plastics sector accounts for around 25%, while the remaining 19% is predominantly consumed in the production of paper, inks, fibres and other specialty materials.

TZMI estimates that global demand for TiO_2 pigment in 2015 reached 5.53 million tonnes, only marginally above the levels achieved in 2010. Over the period to 2025, TZMI is forecasting global TiO_2 demand to increase at 2.7% per annum, slightly lower than the anticipated global GDP growth across the same period. There are several reasons for the lower demand growth rate:

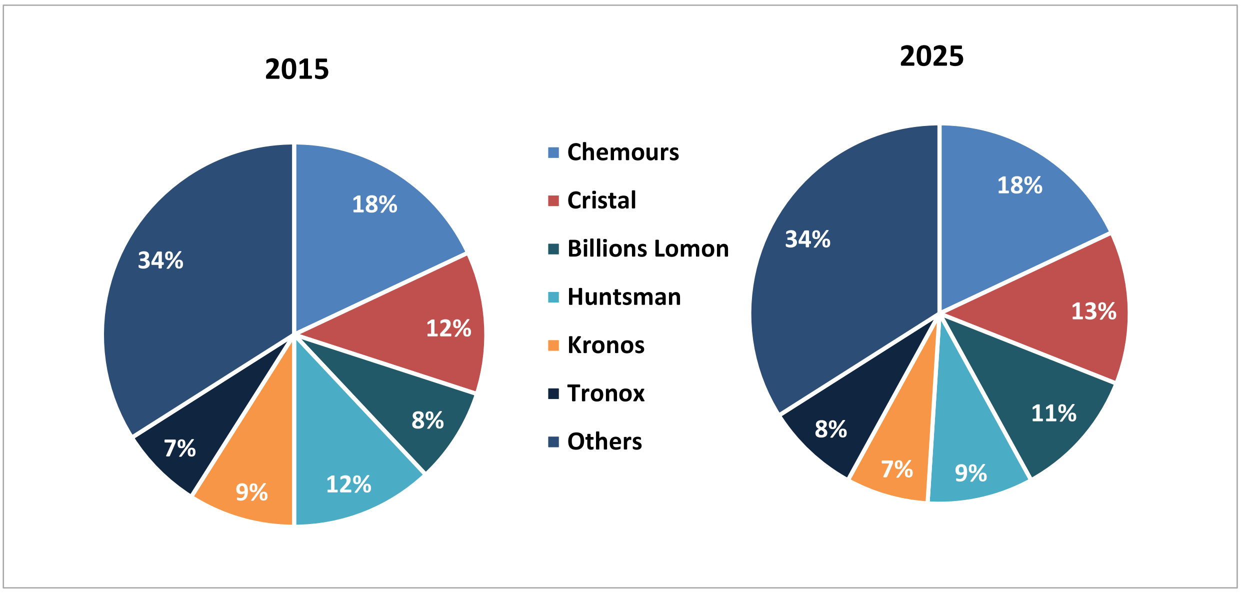
- Urban population growth is expected to continue to increase, but the rate of growth is likely to slow during the next decade;
- A shift to services spending in mature economies has largely decoupled demand growth from GDP in these regions;
- Fixed asset and infrastructure spending is likely to be scaled back in many debt-burdened emerging economies;
- Many emerging economies that have fuelled growth in domestic TiO_2 demand have relied on export market growth. The addressable market for these goods, while not saturated, will not likely grow at historical rates which have been unlike any trade growth seen in prior history; and
- Credit driven demand bubbles will be hard to sustain in the next five years due to tighter lending standards that are being rolled out in many economies and lack of long term monetary stimulus programs.

In terms of pigment supply, global pigment production capacity grew from 5.4 million tonnes in 2005 to 6.7 million tonnes in 2010 and 7.2 million tonnes in 2015. The industry is dominated by six producers of which five operate in multiple regions. These six producers account for approximately 61% of global capacity.

TZMI is forecasting global TiO_2 pigment supply to reach around 6.3 million tonnes by 2020 and 7.3 million tonnes by 2025, a growth rate of approximately 2.6% per annum. It is expected that Chinese pigment production will display the highest growth rates globally.

Figure 19.2 shows the share of total TiO_2 production by the major global producers in 2015 and 2025 respectively, as estimated by TZMI. The relative increase in share of global production by Chinese and other producers is driven mainly by the fact that forecast production growth in China outstrips that in other parts of the world.

Figure 19.2: Producer global TiO_2 production: 2015 and 2025



Source: TZMI

China will therefore have a marked influence on titanium feedstock demand, in particular sulfate ilmenite (either as a direct feed or for titanium slag production), to meet its future TiO_2 pigment requirements.

19.1.3 Titanium feedstock market

Feedstock demand in the long-term, for both the sulfate and chloride pigment production routes, is expected to show strong growth. In particular, demand for sulfate feedstocks, led by China's requirement to meet fast growing domestic pigment production, is forecast to grow at a 3.5% CAGR over the period between 2015 and 2025. The total feedstock demand is forecast to increase by almost 2.1 million TiO_2 units during this period and will approach 8.8 million TiO_2 units by 2025, with sulfate feedstock demand expected to account for more than 60% of the total growth.

The continuing strong growth experienced by the Chinese domestic TiO_2 pigment industry, together with a buoyant titanium metal sector and increased focus on ilmenite beneficiation to titanium slag, is further impacting on the country's titanium feedstock demand.

On the supply side, global feedstock production is estimated at around 6.64 million TiO_2 units in 2015, down approximately 5.5% from 2014 levels, predominantly driven by lower output of sulfate ilmenite and sulfate slag in response to weak offtake and declining prices.

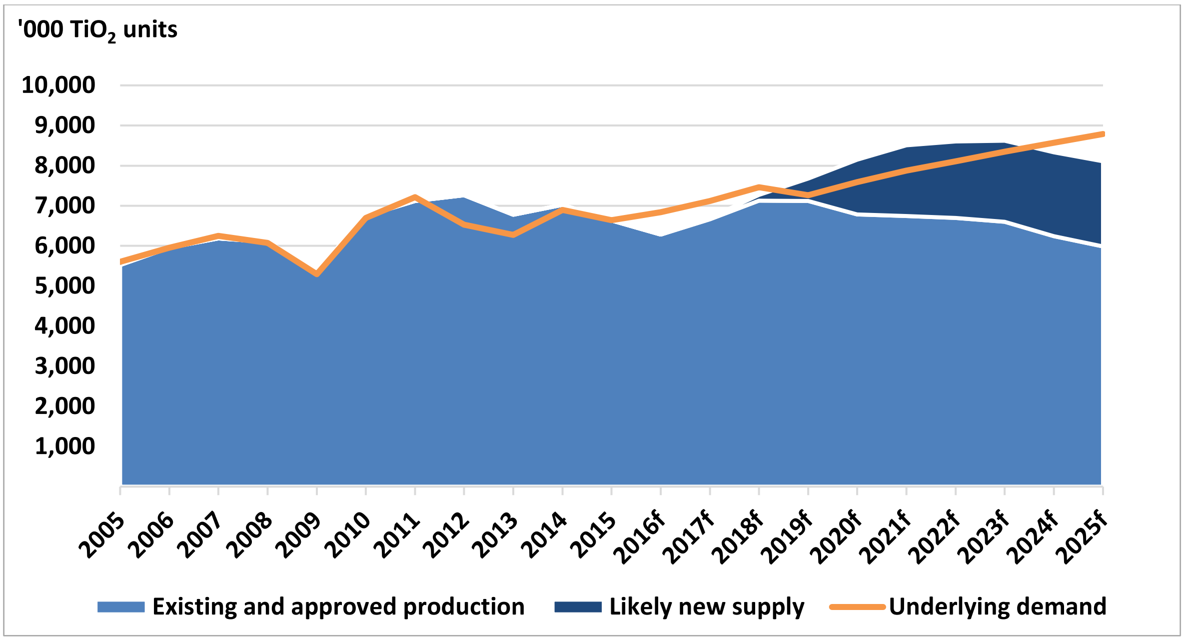
In 2016, global supply of titanium feedstock is projected to fall 5.4% to reach 6.28 million TiO_2 units, back to output levels that prevailed in 2007/08. TZMI's current forecasts suggest a supply recovery during 2017 and 2018, as market conditions improve, with output of most feedstocks projected to move higher. In particular, output of chloride slag is forecast to rise considerably, underpinned by the production ramp up at TiZir Tyssedal, improved utilisation rates in South Africa, and higher output at Cristal Jazan.

In addition, higher sulfate ilmenite output from China is anticipated during the forecast period as progressively higher sulfate ilmenite prices are being achieved, prompting some vanadium titano-magnetite (VTM) producers and processing plants to restart idled operations. Higher furnace utilisation rates at Canada is also expected to contribute to supply growth in the medium term.

Over the longer term, global supply of feedstocks is expected to decline progressively as a result of resource depletion and declining ore grades in the deposits. Without considering new supply from likely new projects, TZMI anticipates that global feedstock supply will decline to 6.0 million TiO_2 units by 2025.

Figure 19.3 shows the supply/demand balances for the global titanium feedstock market from 2005 to 2025. TZMI forecasts indicate that based on supply from existing producers and approved new projects, the overall market is expected to remain tight through to 2018. It is only with the onset of likely new projects that will move the market into a moderate surplus position during the period 2019 to 2022, and any delay in bringing such new supply on stream would obviously reduce the potential market surplus. The global market for all titanium feedstocks is expected to be in supply deficit beyond 2016 unless a significant volume of supply from new projects can be commissioned.

Figure 19.3: Total titanium feedstock supply/demand balance: 2005 – 2025



Source: TZMI

19.1.3.1 Sulfate ilmenite

TZMI's estimates indicate that global 'net' sulfate ilmenite production in 2015 was approximately 2.95 million TiO_2 units, an increase of 37% from 2010 levels. A significant portion of the growth can be attributed to increased ilmenite output in China. The 'net' supply reflects ilmenite available as a feed for sulfate TiO_2 pigment manufacture, having allowed for ilmenite use in the production of titanium slag. Although South Africa and Canada are the two largest sulfate ilmenite producing countries globally, virtually all the ilmenite produced is consumed internally for slag manufacture.

Notwithstanding actual output of gross ilmenite, in the longer term, global net availability of sulfate ilmenite for pigment end-use is expected to decline progressively due to the increasing use of merchant ilmenite for slag manufacture, particularly in China and Saudi Arabia from 2017. TZMI's current forecast indicates net supply to fall further during the forecast period to 2020, with global net supply expected to reach 2.40 million TiO_2 units by 2020 and 1.89 million TiO_2 units by 2025. Resource depletion also has an impact for several countries or regions, including, Australia, CIS and Africa.

As far as demand is concerned, TZMI forecasts that global consumption of sulfate ilmenite (net of beneficiation) will grow at approximately 1% per annum from 2.75 million TiO_2 units in 2015 to 3.0 million TiO_2 units in 2025, with China expected to account for most of the forecast growth. While the growth in global sulfate pigment production is anticipated at 2.2% CAGR, TZMI has assumed a lower growth rate for sulfate ilmenite as it is anticipated that Chinese sulfate pigment plants will consume an increasing proportion of sulfate slag in the feed blend over time to manage waste disposals in order to comply with stricter environmental regulations.

This total excludes ilmenite used in the manufacture of titanium slag, which is largely captive ilmenite outside of China. Most of this global offtake is for the manufacture of sulfate route TiO_2 pigment, with some small tonnages consumed for other uses.

Demand for sulfate ilmenite in western pigment plants is expected to remain relatively stable through to 2025, with no capacity additions anticipated during the forecast period. However, a few plant closures are anticipated in Asia-Pacific but this will be partially offset by new capacity to be commissioned.

Based on TZMI's estimates, total sulfate ilmenite inventory in the system is estimated at 1.5 million TiO_2 units at the end of 2015, some 490,000 TiO_2 units above normal inventory level. However, as 2016 progresses, signs of supply tightening are becoming more evident given the extent of the price increases achieved by feedstock producers, both for China domestic producers and western producers. The global sulfate ilmenite market will begin to experience tight market conditions again in 2017 as total inventory falls below normal levels. The downside risk to this forecast is the rising sulfate ilmenite prices may motivate higher supply from existing operations, such as in Vietnam and China, than currently forecast.

Nevertheless, the global sulfate ilmenite market is expected to move into progressively larger deficit beyond 2017 if no new supply is brought online to meet the demand for the product. Without new supply from likely new projects, TZMI's current projections assume that the supply gap could reach 1.1 million TiO_2 units by 2025.

As far as prices are concerned, prices of sulfate ilmenite started the year in the low US$60s per tonne FOB but recovered strongly in Q3 following the spike in spot prices in the Chinese domestic market. Prices of domestic ilmenite in China's Sichuan Province rose by more than 70% between February and October 2016, underpinned by a tightening of supply following the reduction in output from the VTM mines. It is understood that spot prices have jumped considerably again in November 2016, with one VTM producer announcing a price increase of RMB200 per tonne, taking the spot asking price of domestic ilmenite in Panzhihua to RMB1,100 (US$160) per tonne ex-works.

Western ilmenite producers followed the price increases in China with increased prices from May/June 2016. Depending on the ilmenite source, and quality of product, price increases of US$25-50 per tonne have been achieved during Q3. It is understood that producers will continue to push for price increases in Q4 given the buoyant market conditions in China.

Higher prices are anticipated in 2017. TZMI's current forecast indicates a global weighted average price of US$150 per tonne FOB in 2017. The long term price for sulfate ilmenite remains at US$189 per tonne FOB (real 2017 dollars) and it is expected that prices will trend toward this level by 2019.

19.2 Apatite market

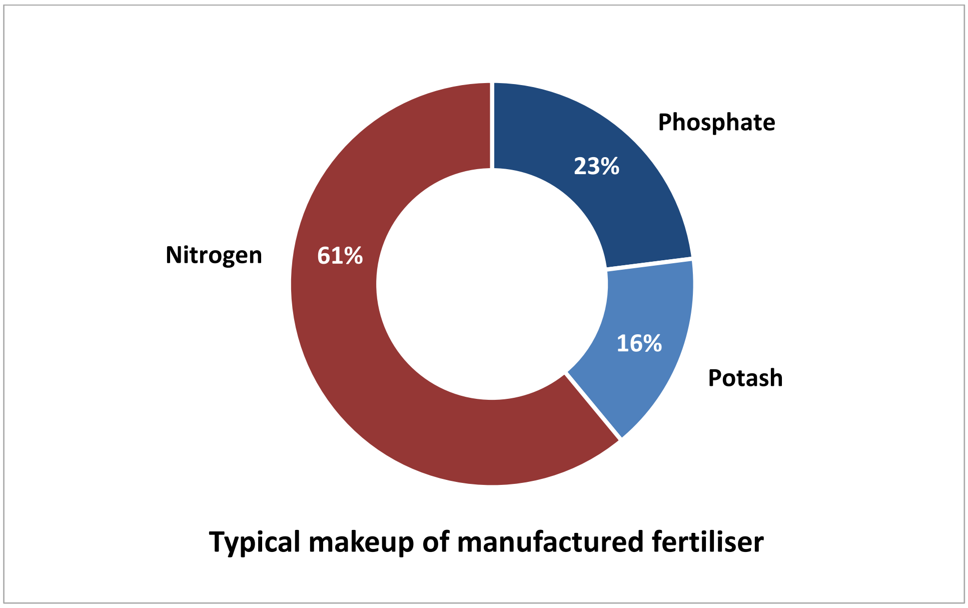
Apatite is the name given to group of phosphate minerals which includes; Fluoroapatite - $Ca_5(PO_4)_3F$, Chloroapatite - $Ca_5(PO_4)_3Cl$ and Hydroxylapatite – $Ca_5(PO_4)_3OH$.

19.2.1 Demand

Approximately 85% of global phosphate production is used in the manufacture of fertiliser. The balance of 9% is used for technical phosphates (detergents, personal care, food products, medical and water treatment) and 6% for animal feed.

Fertilisers provide essential nutrients to soils, livestock and people resulting in more food, better nutrition and healthier lives. The global fertiliser production is dominated by nitrogen-based products (61%), with the balance being phosphates (23%) and potash (16%) as depicted in *Figure 19.4*.

Figure 19.4: Typical fertiliser composition



Source: Avenira Ltd

There is a steady and predictable demand growth for phosphates as fertilizer consumption is closely correlated to world population growth. World population has steadily increased in the past 60 years and is expected to reach 9.2 billion in 2050 (source: United Nations) up from 7.4 billion currently. An additional factor to fertiliser consumption growth is the worldwide increasing calorie intake per capita. This phenomenon is particularly strong in the developing world with China and India leading the change. As arable land expansion is being superseded by population growth, the only possibility left is an increase in agricultural production yields. Since more food is required from less land, fertilisers that support increased yields are increasingly demanded.

The global fertiliser market is valued at approximately US$172 billion. According to the International Fertilizer Industry Association (IFA), phosphate-based fertiliser consumption in 2016 is forecast to grow by 0.8 million tonnes, or 2%, to 41.6 million tonnes of P_2O_5. Looking ahead to 2020, the growth in phosphate-based fertilisers consumption is expected to average 2.1% pa, reaching 45.3 million tonnes of P_2O_5 by 2020. The highest consumption growth rates are forecast in Latin America (4.2% pa), Africa (3.9% pa) and Southern Asia (3.6% pa).

19.2.2 Supply

More than 80% of global phosphate supply is from sedimentary rocks (China, US, Morocco and Western Sahara), with igneous rock phosphate being sourced from Russia, South Africa and Brazil. A small amount of phosphate mineral is sourced from bird droppings (guano). The largest global production capacity of phosphate rock comes from two companies - Mosaic in the US and OCP (Morocco).

The US and China are the largest exporting countries of phosphate-based fertilisers and India and Brazil are the largest importing countries. Australia is a net importer of phosphate-based fertilisers (DAP/MAP/TSP) and this trend is expected to continue into the foreseeable future.

Moroccan phosphate rock export pricing is commonly used to indicate benchmark pricing for the industry. Prior to the price spike from late-2007 to late-2008, phosphate rock exports from Morocco traded in a tight band around US$60 per tonne (CIF). Prices rose from around US$100 per tonne CIF in early 2010 to over US$200 per tonne CIF by early 2012, before dropping slowly over the following 4.5 years back to 2010 levels. TZMI believe that the future prices of phosphate rock will trade in the range of US$100–150 per tonne FOB over the forecast period to 2025.

Figure 19.5: Moroccan rock phosphate export price

Source: GTA

19.3 Planned Goondicum product quality and target markets

TZMI has assessed the specifications of the planned Goondicum sulfate ilmenite and apatite product and can confirm that they meet the generally accepted quality considerations for most end-use applications. As such, from a quality perspective, there should be no impediment from marketing the planned volume of Goondicum ilmenite and apatite products in the global marketplace.

For sulfate ilmenite, the product is suitable as a feedstock for sulfate route TiO_2 pigment production and this will be the main target market for the product, in particular China given the tremendous growth the country has experienced over the last five years. The indicative product quality of the Goondicum ilmenite is shown in *Table 19.1.*

Table 19.1: Goondicum sulfate ilmenite product quality

Chemical composition	(%)
TiO_2	49.5
FeO	37.4
Fe_2O_3	8.7
$FeO:Fe_2O_3$	4.3
SiO_2	0.73
Al_2O_3	0.43
MnO	0.92
P_2O_5	0.16
SO_3	0.012
ZrO_2	0.03

Chemical composition	(%)
CaO	0.24
Nb_2O_5	0.02
MgO	2.69
Cr_2O_3	0.009
V_2O_5	0.08
Pb	<0.001
As	<0.001
LOI	-3.93
U+Th (ppm)	<10

Annual sulfate ilmenite imports into China are between 1.5 and 2.0 million tonnes and this is expected to grow over the next few years, underpinned by higher pigment output as well as an increasing requirement for ilmenite for titanium slag production.

China's TiO_2 pigment production is predominantly based on the sulfate route process. Total China's pigment output in 2015 is estimated at 1.76 million tonnes, an increase of 10% CAGR since 2005 and sulfate route pigment accounted for approximately 98% of total output. TZMI's current projection for total pigment output in 2025 is 2.58 million tonnes, a further increase of 823,000tonnes during the next 10 years. So clearly, China would be a key target market for the Goondicum sulfate ilmenite.

As far as pricing is concerned, TZMI estimates that the Goondicum ilmenite should achieve a price consistent with TZMI's long term price of sulfate ilmenite of US$189 per tonne FOB (real 2017 dollars).

For apatite, the Goondicum product is suitable for use in the fertiliser manufacture.

Table 19.2 shows the indicative quality of the Goondicum apatite.

Table 19.2: Goondicum apatite product quality

Chemical composition	(%)
P_2O_5	30.6
Fe_2O_3	1.18
CaO	42.7
TiO_2	0.29
LOI	0.38

BPL (Bone Phosphate of Lime) is a common measurement term used to describe the phosphate content. It is a measure of the weight percent of calcium phosphate contained in the product. For fertiliser (superphosphate) manufacture, the general requirement is for a minimum of 70% BPL, although 63-65% BPL is also being used sometimes. Iron and alumina content should be as low as possible as they unnecessarily consume too much of the sulfuric acid and result in reversion of water soluble phosphoric acid in superphosphate.

Heavy metals are also a concern for any fertiliser going into the food production cycle. Limits vary by country, but typically limits in fertilisers containing more than 5% P_2O_5 are around 55mg/kg of P_2O_5. The Goondicum apatite contains no measurable level of cadmium, one of the key heavy metals which are limited.

Given the planned output for apatite, TZMI is of the opinion that this volume can be easily absorbed within the Australian domestic market. In fact, a potential customer has indicated willingness to secure the entire planned volume of apatite from Goondicum once the project is restarted, at an indicative price of A$150 per tonne ex-works.

In addition, a leading farm inputs company based in New Zealand had previously indicated willingness to develop a long term commercial relationship with Goondicum. TZMI has sighted the Memorandum of Understanding (MoU) signed between the two parties. For the export market, TZMI estimates that the Goondicum apatite should achieve a price consistent with the price rock phosphate ex Morocco, in the range of US$100-150 per tonne FOB.

19.4 Contracts

There are currently no contracts in place between Melior and other entities regarding the off-take for the Goondicum Project.

20.0 Environmental studies, permitting and social and community impact

A soil study that was carried out by Environmental Earth Science (Report 713022 July 2013) indicated no significant differences in drainage patterns between topsoil and the tailings and rejects from the processing plant.

Areas that have been previously mined and rehabilitated indicate excellent *Sceptre lucerne* and wind-born grass species growth within the tailings area, although investigation will continue throughout the life of the Project to ensure rehabilitation criteria are met.

The water table in the area of mining is expected to temporarily rise due to water being imported to the crater from artesian bores. No adverse impacts of this rise in water level can be foreseen and a benefit will be potentially better flows from the landholders' bores. The quality of the water in the bores has remained constant as expected as the quality of the artesian water is not expected to adversely affect existing crater groundwater. Crater groundwater levels and quality are expected to return to normal following completion of mining.

The initial pilot plant, plus actual production under Monto Minerals and GR showed that the slimes will settle to at least 50% solids at a 2metre depth of slimes. The Environmental Authority (EA) has approved these tailings dams (EAMIM80017060603 for ML80044). The project has conservatively allowed extra area to accommodate the slimes.

Future mining is planned to use local contractors, service providers and employees, providing a significant economic impetus to an area that is struggling to maintain population and facilities. Anecdotally, the unemployment rate for the region is higher than the Queensland average due to the shutting down of most local industry in the last few years.

The majority of employees would be recruited locally and have their own accommodation in the local area. Given that families of employees live in the local area, there would not be any notable increase in demand on schools or other local infrastructure.

Various levels of government will obtain considerable revenue from direct and indirect taxation, royalties, port charges, stamp duty and other government charges.

21.0 Capital and operating costs

21.1 Capital costs

The estimated capital costs for the Goondicum PEA were developed by TZMI after taking account of:

- condition of the existing plant and equipment based on the site visit
- Melior capital estimates
- TZMI independent experience in similar operations
- Reviewing available quotes
- Planned upgrades as part of the next restart

The estimated capital costs include a contingency of 30%. The accuracy range for the project estimate is ±40%. All capital costs are provided in US dollars and the nominal exchange rate applied is US$0.78 per A$1.00. The estimate is given in real terms with a base date of 01 January 2017.

The total project direct capital cost estimates are shown in *Table 21.1*.

Table 21.1: Capital cost summary

Item	Start-up (US$'000)	Sustaining (US$'000)	Closure (US$'000)	Total (US$'000)
Restart	750			750
Apatite circuit	470			470
Western Access road	200			200
Eastern access road	3,130			3,130
Port storage	40			40
Subtotal	**4,590**	**-**	**-**	**4,590**
Sustaining capital	-	11,390	-	11,390
Subtotal	**4,590**	**11,390**	**-**	**15,980**
Closure costs	-	-	970	970
Subtotal	**4,590**	**11,390**	**970**	**16,950**
Contingency (30%)	1,380	-	-	1,380
Totals	**5,960**	**11,390**	**970**	**18,320**

1 - Eastern access road is developed during the first year of operation.
2 – Costs are rounded to the nearest US$10,000. Rounding errors may occur.

21.1.1 Plant restart

The plant was last operated in July 2015 when it was put on care and maintenance due to poor market conditions at the time. The care and maintenance program focusses on three main areas:

- maintenance
- compliance
- development.

Maintenance primarily focussed on minimising deterioration of the plant through lack of use and exposure to the elements. Two maintenance personnel (fitters) have been retained to ensure this is done and various mechanical equipment (pumps and motors) is run regularly and greased to minimise internal components ceasing or distorting. There is an ongoing maintenance schedule with minor repairs completed at the time and more major repairs added to the restart schedule.

A number of maintenance activities and minor modifications based on recommendations by various consultants will need to be completed ahead of the restart. Included in the allowance of US$750,000 is a list of repairs/maintenance activities that need to be undertaken before the plant can be started as well as a number of critical spares that must be ordered.

21.1.2 Apatite circuit upgrade

A number of investigations have been undertaken to look at upgrading the apatite circuit as part of the restart to improve the recovery of apatite to final product. Use will be made of the existing shaking tables which will be added to the existing apatite circuit. The processing equipment is already on site and allowance of US$470,000 has been made for re-routing of the piping and adding the necessary pumps.

21.1.3 Access road upgrades

Upgrades to the Western and Eastern Access roads, as discussed in Section 18, are planned to reduce the cost of transporting the ilmenite final product to the port. It is estimated that the cost of upgrading the Western access road will be US$200,000 which will include

- Completion of the design drawings and estimates
- Construction of the new intersection at Cannindah Road to allow for the use of a B-double truck configuration.

A further US$3.13 million has been allowed to complete the upgrade of the Eastern access road and includes construction as well as consultant and final design charges.

21.1.4 Port storage facility

The rights to the storage facility at the Gladstone Port previously used by the operation have been given up to save costs. While it is understood that there is a high likelihood that use of the shed can be re-negotiated with the port authorities an allowance of US$40,000 has been made to erect a previously purchased canvas dome over an existing pad in case the original shed can no longer be used.

21.1.5 Sustaining Capital

The sustaining capital is calculated as 2% the cost of the Goondicum assets.

21.1.6 Closure costs

As the mine is progressively rehabilitated during mining operations, the closure costs relate to;

- Demolition and rehabilitation of the processing facilities and associated infrastructure;
- Rehabilitation of the final mine pit; and
- Rehabilitation of the final tailings dams.

Melior has obtained quotes for these closure costs as part of the state government Financial Assurance (FA) or bond process. The current FA for the ML at Goondicum is A$1,212,727. TZMI has used this figure for the closure costs of the Goondicum operation at the end of operations.

21.2 Operating costs

The estimated operating costs for the Goondicum PEA were developed by TZMI after taking account of:

- Previous operating history

- Labour numbers and current labour rates
- Melior estimates
- TZMI independent experience in similar operations
- Reviewing available quotes

The accuracy range for the operating cost estimate is ±40%. All operating costs are provided in US dollars and the exchange rate applied is US$0.78 per A$1.00 (nominal). The costs are expressed in real terms with a base date of 01 January 2017.

Table 21.2: Operating cost summary

Item	LOM Total (US$ '000)	Unit cost (US$/t ore)	Unit cost (US$/t product)
Mining	55,780	2.50	29.30
Processing	68,430	3.10	35.90
Product transport	32,290	1.50	17.00
Product storage and ship loading	15,060	0.70	7.90
Administration and marketing	28,680	1.30	15.10
Royalties	20,180	0.90	10.60
Totals	**220,420**	**10.00**	**115.80**

Costs are rounded to the nearest US$10,000. Addition errors may occur due to rounding.

Over the life of the operation fixed costs represent 26% of operating costs while variable costs account for 74% of costs.

21.2.1 Mining costs

The mining operating cost assumptions included in this PEA include the following cost components:

- Dry hire of the mining equipment (refer to *Table 16.1*):
- Maintenance costs associated with the mining equipment;
- Rehandle costs at the ROM stockpile associated with loader hire and operation;
- Labour required to operate and manage mining operations (Melior employees).

Estimates are based on previous performance at Goondicum and taking account of recent movements in mining costs. The average mining cost assumed for the PEA is US$2.50/tonne ore.

The workforce assumed for mining operations is shown in *Table 21.3*.

Table 21.3: Mining workforce

Item	Units	Employees
Manager	number	1
Shift supervisors	number	3
Operators	number	17
Totals	**number**	**21**

21.2.2 Processing costs

The key drivers for the processing costs are energy (electrical power and gas) and flocculent. The largest input cost component for the processing section is power which is available off the grid for A$155/MWh. Total annual site power consumption is estimated to be approximately 30GWh including the power required for the supply of water to the plant. Flocculent will be added to the incoming thickener stream to assist with settling of the slimes. A flocculent dosing rate of 130g/tonne of slimes has been assumed.

Natural gas will be used to dry the final ilmenite product. The gas will be delivered to site under an existing contract with Elgas. A gas consumption rate of 0.22GJ/tonne of ilmenite has been used.

21.2.3 Product transport costs

Under the current restart plan the ilmenite and apatite will be sold as final products. The apatite will be delivered FOT at the Goondicum site while the ilmenite will be road hauled to the Gladstone port for delivery FOB. Initially when the plant starts up the ilmenite will be transported 260km by road to the port at a cost of A$35.50/tonne. Once the 22km Eastern access road has been upgraded the transport distance will be reduced to 160km decreasing the product transport cost to A$23.50/tonne.

21.2.4 Product storage and ship loading costs

The ilmenite will be transported to the port of Gladstone and stored dry before being loaded FOB in bulk onto handysize vessels. Based on discussions with operations personnel port handling costs including harbour dues, ship loading and ancillary costs are estimated to amount to A$10/tonne. An additional monthly cost of A$22,500 has been allowed for rental of a storage facility at the Port.

21.2.5 Labour cost estimate

Labour costs are estimated to account for approximately US$4.7 million per annum or 17% of the total operating cost estimate.

The mine, concentrator plant and mineral separation plant will be continuously operated on a 24hour per day, 7 day per week basis. A 12 hour shift system is envisaged to maintain operations. Management, administration staff and day crew will work 8 hour days to support the shift workers. *Table 21.4* presents the estimated staffing requirements to support the operation.

Table 21.4: Labour compliment

Description	Compliment
Mining	21
FPP and concentrator	16
Technical Services	4
Maintenance	6
Administration & marketing	7
Total compliment	**54**

21.2.6 Administration and marketing costs

The administration and marketing cost assumptions included in this PEA include the following cost components:

- Costs associated with various site vehicles;
- Environment and safety;
- Other overheads such as compliance costs, consultants, IT, insurance, legal, office and staff amenities and training;
- Selling costs;
- Labour required to manage and administer the operation with associated on-costs.

Estimates are based on previous performance at Goondicum, recent movements in salaries and taking account of the organisational structure. Administration and marketing costs account for approximately 9% of the Goondicum operating costs.

The workforce assumed for administration and marketing is shown in *Table 21.5*.

Table 21.5: Administration and marketing workforce

Item	Units	Employees
General manager	number	1
Commercial manager	number	1
Maintenance manager	number	1
HSE manager	number	1
Finance/administration	number	1
Accounts/clerical	number	2
Totals	**number**	**7**

21.2.7 Royalty costs

The QPs have relied on the following information provided by Melior in relation to the royalties to be paid on Goondicum production:

- Government royalties
  - 5% royalty is to be paid on the FOB revenue from ilmenite sales;
  - The apatite royalty is the higher of A$0.80/tonne of sales or value per tonne adjusted for the published price of Moroccan phosphate rock against an index value. The A$0.80/tonne royalty has been applied in the economic model.
- Finder royalties – these are royalties to be paid to the original finders of the Goondicum deposit:
  - 1.25% royalty is to be paid on the FOB revenue from ilmenite and apatite sales.

22.0 Economic analysis

22.1 Introduction

The economic evaluation was prepared using the standard discounted cashflow methodology (DCF) on the following basis:

- Unleveraged (pre-finance).
- Mid-year discounting.
- 1 January 2017 valuation date.
- Dollars are reported on a real basis with the base date of 1 January 2017.
- Revenue is recognised at the time of production.

This preliminary economic assessment is preliminary in nature. It includes Inferred Mineral Resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorised as Mineral Reserves. There is no certainty that this preliminary economic assessment will be realised.

This Technical Report, and this section in particular, contains information and statements that are 'forward-looking' in nature. Any forward-looking statement in this Report are necessarily based on opinions and estimates made by the relevant Qualified Persons responsible for the statement at the date the statements were made. Forward-looking statements include, but are not limited to, statements with respect to:

- Mineral Resource estimates
- cost and timing of execution of the Goondicum project
- proposed mine plan
- proposed processing methodology
- associated production and throughput rates
- metallurgical recoveries and overall processing performance
- infrastructure requirements
- cost estimates (capital and operating)
- product price forecasts
- Net Present Value (NPV), Internal Rate of Return (IRR) and payback period of capital.

Although the Qualified Persons believe the expectations reflected in the forward-looking statements to be reasonable, they collectively do not guarantee future results, levels of activity, performance or achievements.

22.2 Key assumptions

They key input assumptions for the economic analysis are shown in *Table 22.1*

Table 22.1: Key assumptions

Assumption description	Units	Assumption value
Mining		
Material mined	Mt	22.0
Ilmenite grade	%	9.7
Apatite grade	%	1.8
Slimes grade	%	37

Continued next page

Assumption description	Units	Assumption value
Processing		
Ilmenite recovery (average)	%	76
Apatite recovery (average)	%	70
Revenue		
Ilmenite price (average)	US$/t FOB	192
Apatite price (average)	US$/t FOT	119
Capital costs		
Start-up	US$ '000	5,960
Sustaining (LOM)	US$ '000	11,390
Closure	US$''000	970
Operating costs		
Mining	US$/t product	29.30
Processing	US$/t product	35.90
Product transport	US$/t product	17.00
Product storage and ship loading	US$/t product	7.90
Administration and marketing	US$/t product	15.10
Royalties	US$/t product	10.60
Tax		
Corporate tax rate	%	28.5
Economic		
Discount rate	% real	10
Exchange rate	US$:A$ (nominal)	0.78

Note that tax assumptions have been provided by Melior. All other assumptions have been developed by the QP.

22.2.1 Tax assumptions

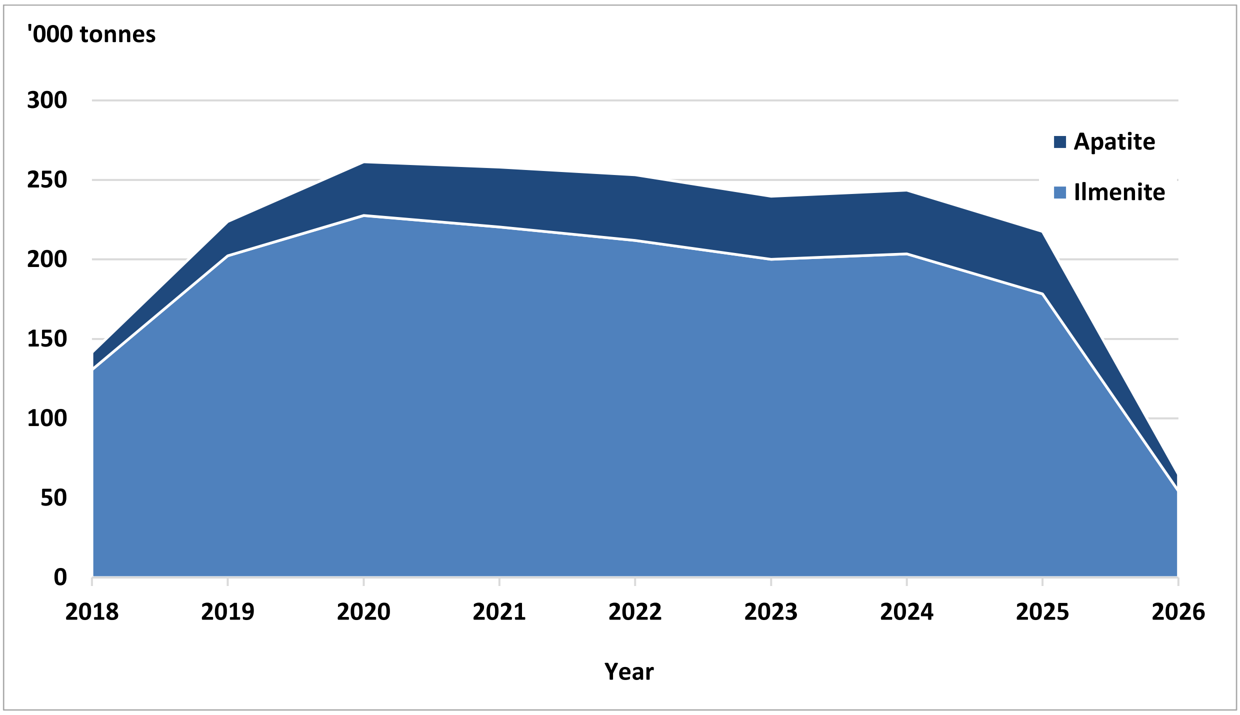
The QPs have relied on the following information supplied by Melior in relation to the tax assumptions used in the economic model:

- Depreciation – The starting written down value is A$18 million. Depreciable capital is fully depreciated over the life of the mine.
- Tax losses – Carry forward tax losses at the start of the model are A$25 million.
- A corporate tax rate of 28.5% applies.

22.3 Production

The annual production profile derived for the PEA is based on the mine plan and the physical assumption as outlined in *Table 22.1*. The resulting production for ilmenite and apatite is shown in *Figure 22.1*.

Figure 22.1: Production profile

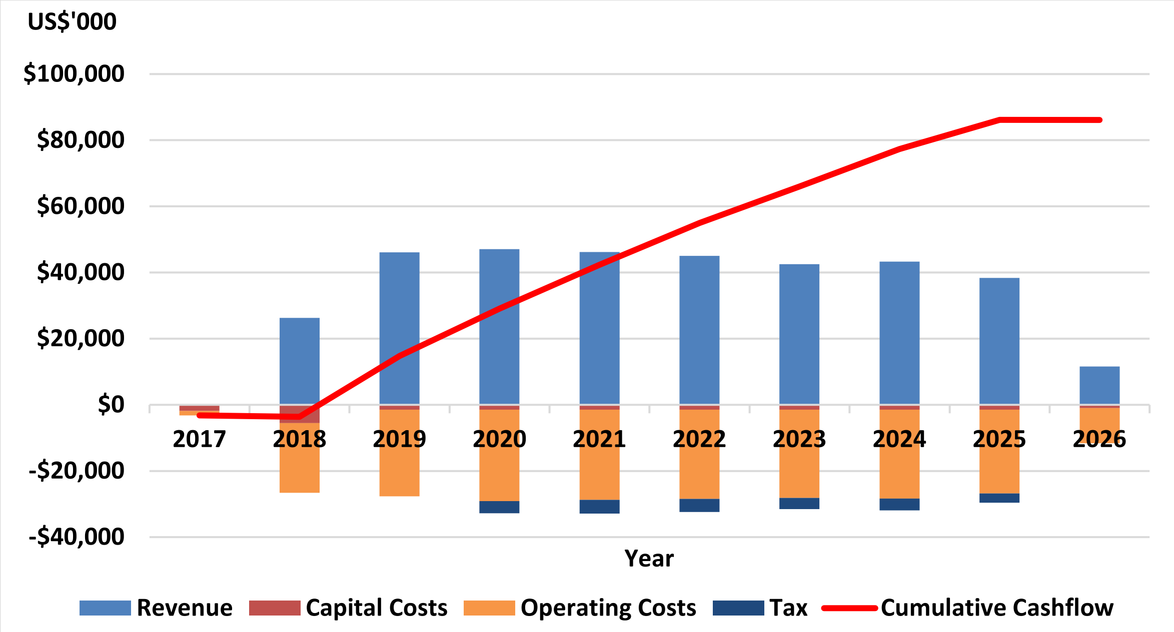


Total production over the life of the mine is forecast to be 1.6 million tonnes of ilmenite and 275,000 tonnes of apatite. The average annual production is 181,000 tonnes of ilmenite and 31,000 tonnes of apatite. Peak production is in the year 2020 with 228,000 tonnes of ilmenite and 34,000 tonnes of apatite produced. Production is lower in the first two year associated with the ramp-up in production, the result of lower utilisation and recoveries. Production decreases in later years due to declining ore grades.

22.4 Cashflow

The annual profile of cashflows is shown in *Figure 22.2 and Table 22.2.*

Figure 22.2: Forecast cashflow profile



The cashflow chart highlights the minimal capital required to restart the Goondicum project. This is in contrast to new greenfield projects which require significant investment in plant and infrastructure prior to operations. At Goondicum only minor amounts of capital is required to restart operations and upgrade some facilities and infrastructure. Cashflow from the operation is forecast to payback the upfront capital associated with the restart early in the second year of operation.

Corporate tax is not paid in the early years of the operation during the period when accumulated tax losses are depleted. Corporate tax is forecast to be paid in the third year of operation.

TZMI's prime measure of industry competitiveness is the revenue to cash cost ratio (R/C). TZMI uses this measure rather than costs alone due to widely different product values and the varying influence of co-products. Therefore, account needs to be taken of the revenue earned and its relationship to total cost. The average Goondicum R/C ratio as measured in this economic analysis is 1.57, with a high of 1.76. This places Goondicum near the middle of the TZMI 2020 R/C curve in which 36 existing mineral sands operations are modelled.

Table 22.2: Forecast annualised cashflow

Description	Units	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Revenue	**US$M**	**-**	**26.24**	**46.05**	**47.03**	**46.15**	**45.00**	**42.57**	**43.26**	**38.41**	**11.55**
Capital Costs											
Growth	US$M	1.46	3.13								
Sustaining	US$M		1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	
Closure	US$M										0.97
Contingency	US$M	0.44	0.94								
Total Capital Costs	**US$M**	**1.90**	**5.49**	**1.42**	**1.42**	**1.42**	**1.42**	**1.42**	**1.42**	**1.42**	**0.97**
Operating Costs											
Mining	US$M	0.43	5.43	6.40	6.74	6.78	6.81	6.81	6.81	6.81	2.76
Processing	US$M	0.50	6.36	8.08	8.49	8.31	8.31	8.57	8.61	8.19	3.02

Continued next page

Description	Units	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Product Transport	US$M	-	3.71	3.81	4.30	4.19	4.05	3.83	3.89	3.42	1.10
Storage/Ship loading	US$M	-	1.23	1.80	2.01	1.96	1.91	1.81	1.84	1.64	0.65
SG&A	US$M	0.42	2.82	3.38	3.38	3.35	3.31	3.24	3.26	3.12	2.41
Royalties	US$M	-	1.58	2.77	2.76	2.69	2.59	2.45	2.49	2.91	0.67
Total Operating Costs	**US$M**	**1.35**	**21.13**	**26.24**	**27.68**	**27.26**	**26.97**	**26.71**	**26.89**	**25.36**	**10.61**
Cash Flow before tax	**US$M**	**-3.24**	**-0.38**	**18.39**	**17.93**	**17.45**	**16.61**	**14.43**	**14.94**	**11.63**	**-0.03**
Income tax	US$M	-	-	-	3.65	4.16	3.98	3.44	3.59	2.79	-
Cash Flow after tax	**US$M**	**-3.24**	**-0.38**	**18.39**	**14.28**	**13.31**	**12.63**	**10.99**	**11.35**	**8.83**	**-0.03**

Addition errors may occur due to rounding.

22.5 Economic measures

The key economic measures for the Project are presented in *Table 22.3*.

Table 22.3: Economic results

Measure	Units	Result
Before tax		
NPV	US$ '000	65,360
IRR	%	187
Payback period	Years	1.2
After tax		
NPV	US$ '000	52,830
IRR	%	178
Payback period	Years	1.2

The economic results of this PEA indicate a robust project given the assumptions used in this report. The IRR of the project is high which is consistent with the brownfield nature of the project and low restart capital costs. This is also reflected in in short payback period.

22.6 Sensitivity analysis

TZMI has conducted a sensitivity analysis on the Goondicum PEA economic model. This analysis is summarised in *Figure 22.3*.

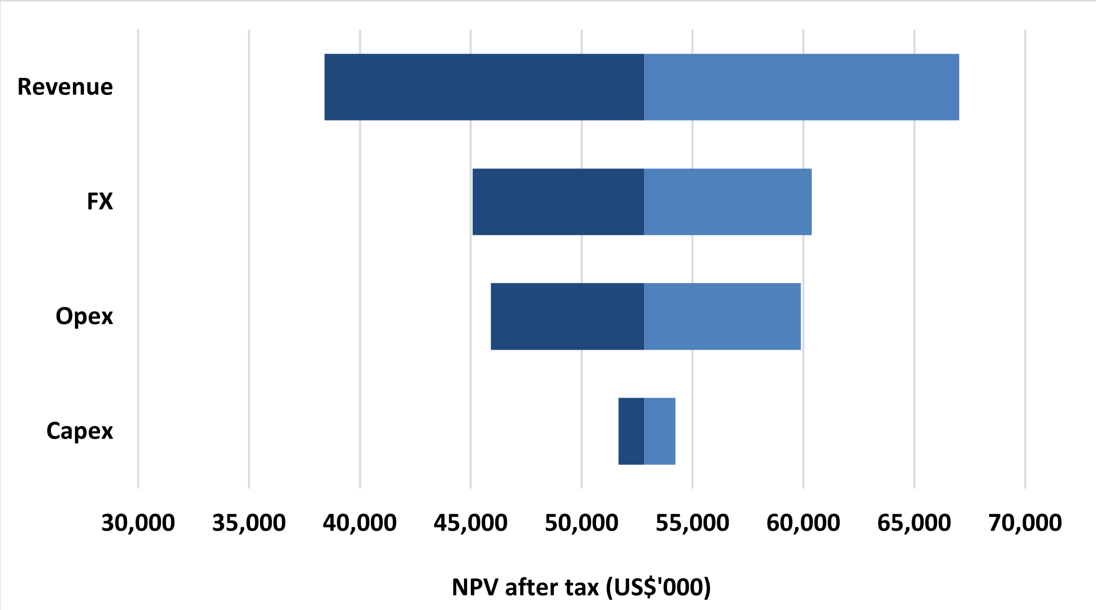
Four key areas have been tested in the sensitivity analysis; revenue, foreign exchange rate (FX), operating costs and capital costs. Each component has been flexed by plus and minus 10%.

The project after tax NPV is most sensitive to changes in revenue. A 10% change in revenue results in approximately a US$14 million difference in the mid case project NPV. Changes in revenue can be brought about by various factors including; product prices, ore grades, operating rates and product recoveries.

The FX rate is the second most sensitive variable. A 10% change in the FX rate results in approximately a US$7.5 million delta to the mid case NPV. A strengthening in the Australian dollar by 10% results in a decrease of the NPV in US dollar term. As the ilmenite is assumed to be sold in US dollars, changing the FX rate only impacts the following drivers; apatite revenues, operating costs and capital costs.

A 10% change in operating costs results in approximately a US$7.0 million delta to the mid case NPV. While a similar change to the capital costs impact the mid case NPV by approximately US$1.2 million. The lack of sensitivity to capital costs is consistent with the low capital required to restart the Goondicum project.

Figure 22.3: Sensitivity tornado



23.0 Adjacent properties

There are no immediate adjacent mining leases or exploration permits to those held by GR for the Goondicum Crater. There are no mining leases, mine lease applications or exploration permits covering the Goondicum Crater other than those held by GR.

The deposit is considered unique to the general area.

24.0 Other relevant data and information

24.1 Risks

The following is a list of potential risks which future work on the project should address:

- The Mineral Resources used as the basis for the mine plan in this PEA contain a significant proportion on Inferred Resources. The use of Inferred Resources in the mine plan increases uncertainty. The uncertainty with the Mineral Resources in the mine plan would be reduced if they were upgraded to Measured and Indicated status.
- The sequencing and handling of tailings, particularly fine tailings, is critical to sequencing of the mine plan and production performance. Poor sequencing of mining and tails dam development could impact production levels.
- Treating of the CS material only will increase the amount of incoming slimes which will add load to the slimes rejection and water recovery circuits when compared to treating the CS and DG together. The heavy mineral feedrate to the concentrator plant WHIMS/LIMS plant will also increase significantly potentially reducing the separation performance by overloading certain parts of the circuit.
- The process recovery assumptions used to forecast product output have in part been based on previous operating performance. Previous plant operation was interrupted and consistent plant operation was not achieved with reported recoveries below expected levels. The recovery assumptions have been estimated based on a review of previous testwork results, actual operating data and TZMI industry experience. There is a risk that actual recoveries will be less than those forecast.
- Water consumption is primarily a function of the incoming ore slimes content and efficiency of the water recovery processes. The increased proportion of the high slimes CS/CL material in the incoming feed will increase the overall make-up water requirements and there is a risk that the current water supply infrastructure may become limiting.
- Completion of the Eastern access road is dependent on granting of the necessary environmental approvals. While it is understood that this is a matter of process the risk exists that the approvals are denied or delayed which will increase the operating cost.

24.2 Opportunities

The following is a list of potential opportunities which could add value to the Goondicum project:

- The current mine plan only includes the Mineral Resources contained on the ML. Value could be added to the Project if the mine plan included the Mineral Resources contained on the adjacent MLA.
- The dry density assumed for the Goondicum deposit, particularly for the CS unit, could be underestimated based on TZMI experience at similar deposits. Further work could result in an increase in the density assumptions and the resultant Mineral Resource tonnes.
- The mining method assumed in this study includes double handling of ore at the ROM stockpile. This double handling adds significant cost. Therefore, there is an opportunity to reduce costs by directly feeding ore into the hopper without double handling.
- Feeding DG material has been seen to have a beneficial impact on overall plant operation by diluting slimes content and also reducing the overall loading on the downstream circuits. Ilmenite recovery from DG material may be greater than anticipated through the liberation of ilmenite from composite grains that was not reported by the drill sample analytical method. The total amount of material in the mine plan available for processing would be increased at the same time.
- The Goondicum deposit has two other potential products; titanomagnetite and feldspar. Hence with further development there is potential to increase the product suite and potentially revenue.

- The current apatite circuit employs a single spiral separation stage. Recovery of fine (<75micron) apatite to final product was shown to improve through the use of a wet shaking table stage. The current restart plan makes provision for the inclusion of shaking tables in the apatite circuit which should translate into a recovery improvement. This benefit has been incorporated into the recovery assumptions used for the production forecast.

25.0 Interpretation and conclusions

The Goondicum PEA is preliminary in nature and includes an economic analysis that is based, in part, on Inferred Mineral Resources. Inferred Mineral Resources are considered too speculative geologically to have the economic considerations applied to them that would allow them to be categorised as Mineral Reserves, and there is no certainty that the results will be realised. Mineral Resources do not have demonstrated economic viability and are not Mineral Reserves.

The Goondicum PEA has identified a positive business case and it is recommended that the Goondicum project is restarted when appropriate. The economic results for this PEA are robust (refer to *Table 25.1*) and are consistent with a brownfield project redevelopment.

Table 25.1: Economic results

Measure	Units	Result
Before tax		
NPV	US$'000	65,360
IRR	%	187
Payback period	Years	1.2
After tax		
NPV	US$'000	52,830
IRR	%	178
Payback period	Years	1.2

The key sensitivity to the economic outcomes in this PEA are assumptions associated with revenue (for example; product prices, ore grades, productivity and recoveries). The FX and operating cost assumptions are also important to project outcomes.

There are a number of areas that should be further examined to address potential risks and opportunities. These key areas of further work are listed below:

- Upgrade the Mineral Resources on both the ML and MLA to reduce uncertainty in the current estimates
- Explore the Goondicum Crater to determine if the Mineral Resources can be further expanded
- Incorporate the MLA Mineral Resources into the Goondicum mine plan to potentially increase mine life and project value
- Review the density assumptions for the various units in the Goondicum deposit, especially the CS unit. There is potential to increase tonnages in the Mineral Resource and mine plan.
- Investigate the option of including DG material in the mine plan to potentially extend mine life.
- Review the potential to produce further by-products (for example; titanomagnetite and feldspar).
- Investigate the opportunity to further increase plant throughput using existing infrastructure;
- Undertake further market development work for the apatite product and flowsheet improvements to improve apatite quality with the potential to penetrate new markets.

26.0 Recommendations

26.1 ML area resource work

The 2014 resource estimates for ilmenite used only 40% of the 2009 composite data due the available Clerici data and this was the major factor in the resource classification. Further proposed exploration on the property is designed to upgrade the classification of the resource estimates and can be split into two phases with the latter phase dependant on outcomes of the former (*Table 26.1*).

26.1.1 Phase 1

There is a substantial amount of data from the Monto Minerals work, in particular the 1996-2000 drilling information, surface mapping and the 2004 test pit sampling, which should be incorporated into the geological model and ultimately into new resource estimates.

A preliminary review of the 1996-2000 RC data indicated it was not possible to achieve directly comparable ilmenite grades from the 5.5AM grades with the 2013-14 ilmenite grades from the processed data from the 2009 drilling. It is worth investigating whether the 1996-2000 ilmenite data can have a constant factor applied to it in order to bring it into line with the 2013-14 data. The slimes data is more consistent and can be combined with the 2009 data for use in improving the lithological definition of the host units, particularly the segregation between CS_H and CS_L, which can subsequently be remodelled for the resource estimates.

A successful outcome will be the amalgamation of the 1996-2000 drilling data with the 2009 drilling data. This will double the number of drillholes on the property which can be used to update the geological model, produce a single slimes model and possibly allow for a re-running of the ilmenite resource model. I the latter is possible then this will lead to an upgrade in the classification of the resource estimates.

26.1.2 Phase 2

This is dependent on the outcomes of Phase 1. If that work is unsuccessful with the amalgamation of the 5.5AM/ilmenite data sets then infill drilling is required to upgrade the resource estimates. The infill work will be aircore drilling of approximately 114 holes at an average depth of 11metres, infilling the 125metres spaced 2009 drilling at 62.5metres for the northern arcuate section of the ML mineralisation, where there is generally better grade and tonnes. A map showing the proposed hole locations on an air photograph backdrop is included as *Figure 26.1.* The 2009 sampling and recovered magnetic fraction processing procedures will be implemented.

Ilmenite analysis of the recovered magnetic fraction for the 1metre samples from the infill drilling will be undertaken including QEMSCAN testing. This analysis will allow for the distinguishing of the different titanium minerals based on their titanium content and thus providing a more accurate measurement of ilmenite content in the samples. Some duplicate holes for the 2009 drilling will also be required to confirm consistency in the sampling process.

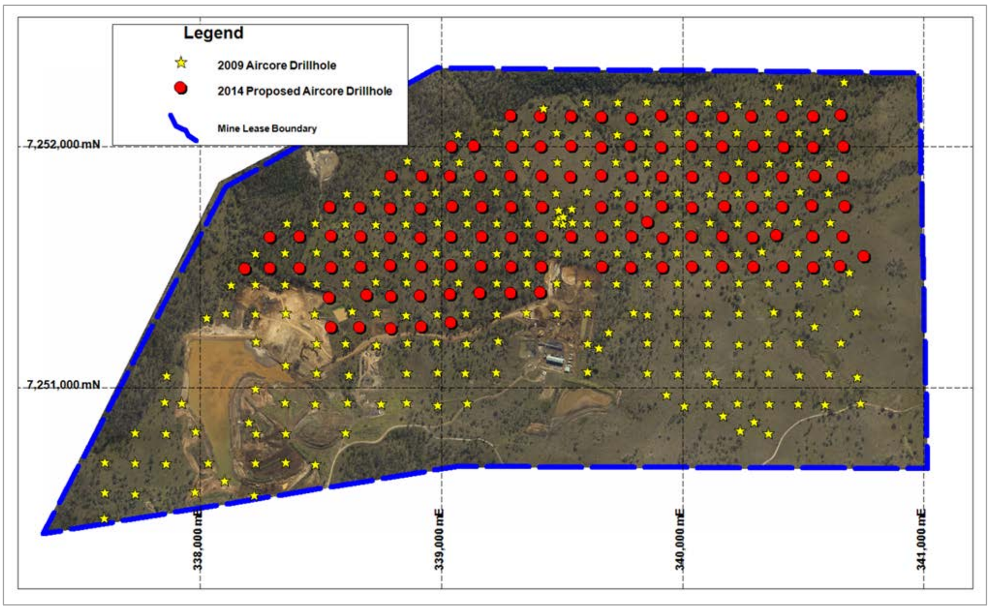
In addition, some diamond drilling is required to improve the quality of the density data and strengthen the geological interpretation.

Using the new drilling results an update to the geological model should be completed followed by the undertaking of a resource estimate using the new data. A successful comparison with the model reported in this report can lead to an upgrade in the classification of the resource estimates to include a significant increase in Indicated and possibly Measured Resource. Discrepancies in the resource model comparison may necessitate further QEMSCAN analysis of selected 2009 samples which would constitute a further phase of work.

Table 26.1: ML planned exploration budget

Activity	Rate	Number	Cost A$
Phase 1 : Desk Study for the Mining Lease			
Interrogate 1996-2004 data in order to convert ilmenite data for use with 2009 data	A$1,720/day	5 days	8,600
Upgrade geological model using the 1996-2004 data in particular redefine lithology boundaries eg CS_H & CS_L using 1996-2004 slimes data, pitting results and mapping information	A$1,720/day	10 days	17,200
Rerun resource model using new data and/or new geological models	A$1,720/day	10 days	17,200
Compile new resource estimation report	A$1,720/day	10 days	17,200
		Sub-total	**60,200**
Phase 2 : Infill Drilling to upgrade resource			
Aircore Drilling (approximately 114 holes – all in cost)	A$90/m	1,250	112,000
Sampling & magnetic fraction recovery inc personnel			40,000
QEMSCAN analysis for new drilling	A$280/sample	1,250	350,000
		Sub-total	**502,000**
Diamond Drilling of 4 holes, inc mobilisation etc	A$350/m	50	17,500
Core processing inc personnel			5,000
		Sub-total	**22,500**
Upgrade geological model using the new drilling data	A$1,720/day	5 days	8,600
Rerun resource model using new data and new geological models	A$1,720/day	10 days	17,200
Compile new resource estimation report	A$1,720/day	10 days	17,200
		Sub-total	**43,000**
		Total	627,700

Figure 26.1: ML Proposed aircore drill programme



26.2 MLA area resource work

Infill close spaced RC/aircore drilling is required to both expand and upgrade the classification of the resource. Several opportunities exist to expand the resource and in some places provide possible upgrades in the classification. This drilling needs to be targeted on undrilled prospective areas and to higher grade zones peripheral to the prospective areas.

1. Drilling on a 100m by 200m grid on some of the prospective areas identified by Dawney that are currently undrilled. The clusters of coloured blocks within the prospective areas outlined in *Figure 14.81* represent drilling targets with the orange stars signifying primary targets.
2. Drilling on 100m or 100 by 200m centres to extend the high grade area in west and south of the crater (see Figure *14.82*), subject to favourable field checking on the prospectivity of the ground.
3. Infill drilling on a 100m by 200m grid in the north eastern half of the Crater (red stars on *Figure 14.83*), based on anomalous drilling from the Monto work and prospective areas identified by R. Dawney.

The planned programme is approximately 92 holes at an average depth of 12m. The 1996-2000 sampling and recovered magnetic fraction processing procedures will be implemented.

In addition, some diamond drilling is recommended to improve the quality of the density data and strengthen the geological interpretation. This may depend on rig availability.

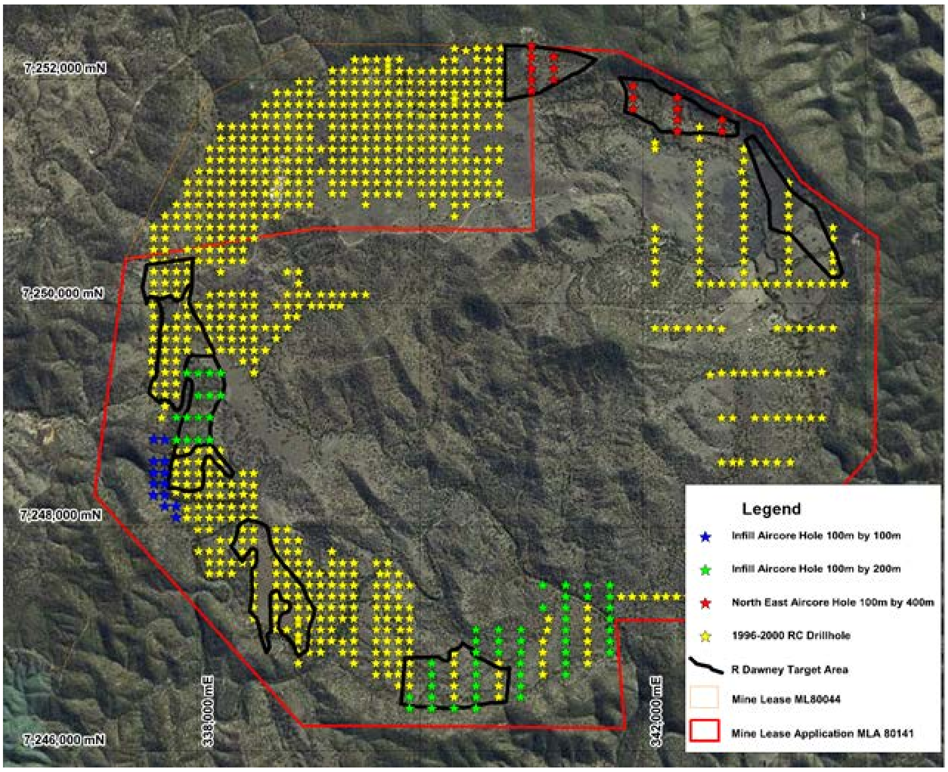
The new drilling results should be used to update the geological model followed by the undertaking of a resource estimate update. A successful drilling campaign can lead to an increase in the size of the resource. A planned exploration budget is included as *Table 26.2*.

Table 26.2: MLA planned exploration budget

Activity	Rate	Number	Cost A$
Aircore Drilling (approximately 114 holes – all in cost)	A$90/m	1,250	112,000
Sampling & magnetic fraction recovery inc personnel			40,000
QEMSCAN analysis for new drilling	A$280/sample	1,250	350,000
		Sub-total	**502,000**
Diamond Drilling of 4 holes, inc mobilisation & sundry costs	A$350/m	50	17,500
Core processing inc personnel			5,000
		Sub-total	**22,500**
Upgrade geological model using the new drilling data	A$1,720/day	5 days	8,600
Rerun resource model using new data and geology	A$1,720/day	10 days	17,200
Compile new resource estimation report	A$1,720/day	10 days	17,200
		Sub-total	**43,000**
		Total	**627,700**

A map showing the proposed hole locations on an air photograph backdrop is included as *Figure 26.2*.

Figure 26.2: MLA propose aircore drill programme



26.3 Mining

The current ROM management philosophy results in significant double handling of the incoming ore. There will be a significant cost advantage if the ore can be fed directly into the FPP from the dump trucks used to transport the ore from the mine. This may require minor modifications to be made to the ore receival system and options to accomplish this should be investigated.

Any new ore handling procedure and system will need to take account of the blending regime which is important to the performance of the process plant.

26.4 Process

Previous testwork showed poor recovery of fine apatite (<75micron) over spirals with significantly improved recovery using shaking tables. The current plant configuration makes use of spirals in the apatite circuit. An upgrade is planned to include a classification stage at 100micron with the overflow and underflow streams being passed over coarse and fine shaking tables respectively. Given most of the required equipment is already on site and the cost to modify the circuit is minimal this work should go ahead as a matter of priority to improve the recovery of apatite to final product.

Losses of ilmenite to the fines tails stream (slimes) was previously reported as a significant loss. A work program should be initiated to quantify this and implement process changes to address this.

The ilmenite and apatite recovery assumptions here are based on an analyses of testwork data available and supported by the TZMI knowledge base. Due to the significant variability in the feed and change in anticipated blends additional flowsheet development work should be done to finalise the optimum process flowsheet and process assumptions. In particular the effect of feeding CS material only should be investigated.

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27.3 Measurement units

Symbol	Description	Symbol	Description
AUD or A$	Australian dollars	km^2	square kilometres
'	seconds (geographic)	Kt	Thousand tonnes
‘	minutes (geographic)	kV	Thousand volts
#	number	kW	kilowatt
%	percent	m	metre
wt%	weight percent	m^3	cubic metre
/	per	m^3/hr	cubic metres per hour
>	greater than	Ma	million years ago
<	less than	Mm	million metres
A$	Australian dollar	mm	millimetre/millimetres
asl	above sea level	M	million
c.	circa	ML	Million litres
cm	centimetre	Mt	Million tonnes
C$	Canadian dollar	Mt/a	million tonnes per annum
ºC	degrees Celsius	MW	Million watts
g	gram	ppb	parts per billion
Ga	billion years ago	ppm	parts per million
g/cm^3	Grams per cubic centimetre	pH	measure of the acidity or alkalinity of a solution
GJ	Giga joule	t	metric tonne
GL	Giga litre	tpa	tonnes per annum (tonnes per year)
ha	hectares	t/d	tonnes per day
hr	hour	t/h or tph	tonnes per hour
kg/m^3	kilograms per cubic metre	t/m^3	Tonnes per cubic metre
km	kilometre	US$	United States dollar

27.4 Glossary

Some of the terms given in the below are specifically defined by NI 43-101 (2011) and CIM Definition Standards (2010); where this is the case this is indicated by the source given in the right hand column. Other terms are based on definitions obtained from public domain sources and industry standard usage.

Term	Definition	Source
5.5AM	Represents the power (amperes) applied to a magnet to generate a certain strength magnetic field. In this instance the strength of magnetic field is sufficient to separate ilmenite	Other
0.3AM	Represents the power (amperes) applied to a magnet to generate a certain strength magnetic field. In this instance the strength of magnetic field is sufficient to separate magnetite; used to extract highly susceptible magnetics	Other
acceptable foreign code	The JORC Code, the PERC Code, the SAMREC Code, SEC Industry Guide 7, the Certification Code, or any other code, generally accepted in a foreign jurisdiction, that defines mineral resources and mineral reserves in a manner that is consistent with mineral resource and mineral reserve definitions and categories as defined under NI 43-101	NI 43-101
adjacent property	A property in which the issuer does not have an interest; that has a boundary reasonably proximate to the property being reported on; and that has geological characteristics similar to those of the property being reported on (NI 43-101)	NI 43-101
advanced property	A property that has mineral reserves or mineral resources for which the potential economic viability is supported by a preliminary economic assessment, a pre-feasibility study or a feasibility study	NI 43-101
aircore	Aircore drilling and related methods use hardened steel or tungsten blades to bore a hole into unconsolidated ground. The drill bit has three blades arranged around the bit head, which cut the unconsolidated ground. The rods are hollow and contain an inner tube which sits inside the hollow outer rod barrel. The drill cuttings are removed by injection of compressed air into the hole via the annular area between the inner tube and the drill rod. The cuttings are then blown back to surface up the inner tube where they pass through the sample separating system and are collected if needed.	Other
alluvial	Of, relating to, or found in alluvium	Other
alluvium	Unconsolidated terrestrial sediment composed of sorted or unsorted sand, gravel, and clay that has been deposited by water	Other
apatite	A group of phosphate minerals, usually referring to hydroxylapatite, fluorapatite and chlorapatite	Other
aquifer	A geologic formation capable of transmitting significant quantities of groundwater under normal hydraulic gradients	Other
auger drill	A type of drill which uses a corkscrew type bit to recover samples from unconsolidated materials	Other
available ilmenite	represents the total amount of ilmenite present in the 5.5AM fraction	
azimuth	The direction of one object from another, usually expressed as an angle in degrees relative to true north. Azimuths are usually measured in the clockwise direction, thus an azimuth of 90 degrees indicates that the second object is due east of the first	Other
beneficiation	Physical treatment of crude ore to improve its quality for some specific purpose. Also called mineral processing	Other

Term	Definition	Source
block model	Refers to the process of creating a 3D spatial array of estimations. The parameter that is being estimated may be the thickness of the ore, the grade of the ore, or some other property that is useful for the evaluation of the resource. These estimations are based on a weighted average of the values associated with the surrounding control points. A variety of interpolation methods or 'algorithms' are available for performing these estimations. A popular technique is ordinary Kriging.	Other
bulk density	is the mass per unit volume of a solid, including the voids in a bulk sample of the material	Other
Clerici Sinks and Floats	A dense media separation technique	Other
coefficient of variation	A statistical term defined as the ratio of the standard deviation to the mean; also referred to as relative standard deviation. This provides a measure of the degree of skewness of a distribution of sample values.	Other
comminution, crushing, grinding	Crushing and/or grinding of ore by impact and abrasion. Usually, the word 'crushing' is used for dry methods and 'grinding' for wet methods. Also, 'crushing' usually denotes reducing the size of coarse rock while 'grinding' usually refers to the reduction of the fine sizes.	Other
concentrate	The concentrate is the valuable product from mineral processing, as opposed to the tailing, which contains the waste minerals. The concentrate represents a smaller volume than the original material that was processed	Other
cut-off grade	A grade level below which the material is not of economic interest and considered to be uneconomical to mine and process. The minimum grade of mineralisation used to establish reserves	Other
data verification	The process of confirming that data has been generated with proper procedures, has been accurately transcribed from the original source and is suitable to be used	NI 43-101
density	The mass per unit volume of a substance, commonly expressed in grams/cubic centimetre	Other
de-sliming	Removal of slimes (fine material) from a sample of unconsolidated material or finely ground material in a process plant. In this report the term is used mostly to refer to the removal of the -45µm (or sometimes the -25µm) sized material from pit and core samples using washing, disaggregation and sieving	Other
development	Often refers to the construction of a new mine or; Is the underground work carried out for the purpose of reaching and opening up a mineral deposit includes shaft sinking, cross-cutting, drifting and raising	Other
diamond drillhole	A drillhole which is drilled used a diamond impregnated bit so that a cylindrical sample of solid rock (drill core) can be recovered.	Other
dilution	Waste of low-grade rock which is unavoidably removed along with the ore in the mining process	Other
disclosure	any oral statement or written disclosure made by or on behalf of an issuer and intended to be, or reasonably likely to be, made available to the public in a jurisdiction of Canada, whether or not filed under securities legislation, but does not include written disclosure that is made available to the public only by reason of having been filed with a government or agency of government pursuant to a requirement of law other than securities legislation;	NI 43-101
drill core	The cylinder of material, normally solid rock, recovered from a diamond drillhole	Other
early stage exploration property	Under NI 43-101 this means a property for which the technical report being filed has no current mineral resources or mineral reserves defined; and no drilling or trenching proposed	NI 43-101

Term	Definition	Source
easement	A legal term meaning a certain right to use the real property of another without possessing it	Other
effective date	With reference to a technical report, this means the date of the most recent scientific or technical information included in the technical report. The effective date can precede the date of signing the technical report but if there is too long a period between these dates, the issuer is exposed to the risk that new material information could become available and the technical report would then not be current	NI 43-101& Companion Policy
eluvial deposits	Weathered material ('float') which is still at, or near, its point of formation.	Other
encumbrance	This is a legal term covering anything that affects or limits the title of a property, such as mortgages, leases, easements, liens, or restrictions. An encumbrance may diminish the value of ownership, but does not prevent the transfer of ownership. Mortgages, taxes and judgements are encumbrances known as liens. Restrictions, easements, and reservations are also encumbrances, although not liens	Other
erosion	Removal of surface material from the Earth's crust, primarily soil and rock debris, and the transportation of the eroded materials by natural agencies from the point of removal.	Other
exploration information	Geological, geophysical, geochemical, sampling, drilling, trenching, analytical testing, assaying, mineralogical, metallurgical and other similar information concerning a particular property that is derived from activities undertaken to locate, investigate, define or delineate a mineral prospect or mineral deposit.	CIM (2010)
feasibility study (FS)	A comprehensive technical and economic study of the selected development option for a mineral project that includes appropriately detailed assessments of realistically assumed mining, processing, metallurgical, economic, marketing, legal, environmental, social and governmental considerations together with any other relevant operational factors and detailed financial analysis, that are necessary to demonstrate at the time of reporting that extraction is reasonably justified (economically mineable). The results of the study may reasonably serve as the basis for a final decision by a proponent or financial institution to proceed with, or finance, the development of the project. The confidence level of the study will be higher than that of a Pre-Feasibility Study	CIM (2010)
flotation	Separation of minerals based on the interfacial chemistry of the mineral particles in solution. Reagents are added to the ore slurry to render the surface of selected minerals hydrophobic. Air bubbles are introduced to which the hydrophobic minerals attach. The selected minerals are levitated to the top of the flotation machine by their attachment to the bubbles and into a froth product, called the 'flotation concentrate.' If this froth carries more than one mineral as a designated main constituent, it is called a 'bulk float'. If it is selective to one constituent of the ore, where more than one will be floated, it is a 'differential' float.	Other
flowsheet	The sequence of operations, step by step, by which ore is treated in a milling, concentration, or smelting process	Other
FOB	Free on board	Other
FOT	Free on truck	Other
footwall	The wall or rock on the underside of a vein or other mineralised structure	Other
gabbro	Gabbro is a coarse-grained, dark-coloured, intrusive igneous rock. It is usually black or dark green in colour and composed mainly of the minerals plagioclase and augite.	Other
Global Positioning System GPS	A space-based global navigation satellite system that provides location and time information in all weather, anywhere on or near the Earth, where there is an unobstructed line of sight to four or more GPS satellites	Other

Term	Definition	Source
Differential Global Positioning System DGPS	A space-based global navigation satellite system that provides location and time information in all weather, anywhere on or near the Earth, where there is an unobstructed line of sight to four or more GPS satellites	Other
gravity separation	Exploitation of differences in the densities of particles to achieve separation. Machines utilizing gravity separation include jigs and shaking tables	Other
hanging wall	The wall or rock on the upper or top side of a vein or other mineralised structure.	Other
heavy liquid separation (HLS), heavy media separation (HMS)	Separation of minerals based on density differences using a dense heavy liquid or medium (mineral particles suspended in a liquid).	Other
heavy mineral concentrate (HMC)	Material containing denser minerals which have been separated from lighter minerals using a gravity separation method such as heavy liquid separation	Other
historical estimate	An estimate of the quantity, grade, or metal or mineral content of a deposit that an issuer has not verified as a current mineral resource or mineral reserve, and which was prepared before the issuer acquiring, or entering into an agreement to acquire, an interest in the property that contains the deposit;	NI 43-101
hornfels	A fine-grained metamorphic rock composed of quartz, feldspar, mica, and other minerals, formed by the action of intrusive rock upon sedimentary rock, especially shale.	Other
ilmenite	A black mineral found in igneous rocks as layered deposits and in veins. It is the chief source of titanium. Composition: iron titanium oxide. Formula: $FeTiO_3$. Crystal structure: hexagonal	Other
Ilmenite conversion factor	This is a factor determined by testwork applied to the recovered magnetic fraction to determine ilmenite grade from in part titanium oxide.	Other
Indicated Mineral Resource	That part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics, can be estimated with a level of confidence sufficient to allow the appropriate application of technical and economic parameters, to support mine planning and evaluation of the economic viability of the deposit. The estimate is based on detailed and reliable exploration and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes that are spaced closely enough for geological and grade continuity to be reasonably assumed	CIM (2010)
Industrial minerals	Geological materials which are mined for their commercial value, which are not fuel (fuel minerals or mineral fuels) and are not sources of metals (metallic minerals). They are used in their natural state or after beneficiation either as raw materials or as additives in a wide range of applications.	Other
Inferred Mineral Resource	That part of a Mineral Resource for which quantity and grade or quality can be estimated on the basis of geological evidence and limited sampling and reasonably assumed, but not verified, geological and grade continuity. The estimate is based on limited information and sampling gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes	CIM (2010)
initial public offering (IPO)	A corporation’s first offering of stock to the public, usually by subscription from a group of investment dealers	Other
JORC Code & Guidelines	Means the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves prepared by the Joint Ore Reserves Committee of the Australasian Institute of Mining and Metallurgy, Australian Institute of Geoscientists and Minerals Council of Australia, as amended; the 2012 Code has superseded the 2004 code	NI 43-101

Term	Definition	Source
lithology	The lithology of a rock unit is a description of its physical characteristics visible at outcrop, in hand or core samples or with low magnification microscopy, such as colour, texture, grain size, or composition.	Other
liberation	Freeing, by comminution, of particles of specific mineral from their interlock with other constituents of the ore	Other
life of mine (LOM)	Number of years that the operation is planning to mine and treat ore, and is taken from the current mine plan based on the current evaluation of ore reserves	Other
magnetic separation	Use of permanent or electro-magnets to remove relatively strong ferromagnetic particles from para- and dia-magnetic ores.	Other
Measured Mineral Resource	That part of a Mineral Resource for which quantity, grade or quality, densities, shape, and physical characteristics are so well established that they can be estimated with confidence sufficient to allow the appropriate application of technical and economic parameters, to support production planning and evaluation of the economic viability of the deposit. The estimate is based on detailed and reliable exploration, sampling and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes that are spaced closely enough to confirm both geological and grade continuity.	CIM (2010)
mill	Includes any ore mill, sampling works, concentration, and any crushing, grinding, or screening plant used at, and in connection with, an excavation or mine	Other
mineral project	Any exploration, development or production activity, including a royalty or similar interest in these activities, in respect of diamonds, natural solid inorganic material, or natural solid fossilized organic material including base and precious metals, coal, and industrial minerals	NI 43-101
Mineral Reserve	The economically mineable part of a Measured or Indicated Mineral Resource demonstrated by at least a Preliminary Feasibility Study. This Study must include adequate information on mining, processing, metallurgical, economic and other relevant factors that demonstrate, at the time of reporting, that economic extraction can be justified. A Mineral Reserve includes diluting materials and allowances for losses that may occur when the material is mined	CIM (2010)
Mineral Resource	A concentration or occurrence of diamonds, natural solid inorganic material, or natural solid fossilized organic material including base and precious metals, coal, and industrial minerals in or on the Earth's crust in such form and quantity and of such a grade or quality that it has reasonable prospects for economic extraction. The location, quantity, grade, geological characteristics and continuity of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge	CIM (2010)
mineral resource estimation	see resource estimation	Other
Miocene	Geological epoch from 5.3 to 26 million years ago	Other
National Instrument 43-101	Canadian National Instrument 43-101 'Standards of Disclosure for Mineral Projects'.	NI 43-101
open pit	A mine that is entirely on the surface. Also referred to as open-cut or opencast mine	Other
ordinary kriging	A geostatistical approach to geological modelling. Instead of weighting nearby data points by some power of their inverted distance, ordinary kriging relies on the spatial correlation structure of the data to determine the weighting values of each sample.	Other
ore mineral	A mineral of value containing economic elements of interest. Mineral processing is aimed as separating the ore and gangue minerals contained in mineralisation	Other

Term	Definition	Source
overburden	Material of any nature, consolidated or unconsolidated, that overlies a deposit of ore that is to be mined	Other
oxidation	A chemical reaction in which substances combine with oxygen for form an oxide. For example, the combination of iron with oxygen to form an iron oxide (rust) or copper and oxygen produce copper oxide; the green coating on old pennies. The opposite of oxidation is reduction.	Other
pilot plant	A pilot plant is a small scale plant which is operated to generate information about the behaviour of the system for use in design of larger facilities. Pilot plants are used to reduce the risk associated with construction of large process plants	Other
plant	A group of buildings, and especially to their contained equipment, in which a process or function is carried out; on a mine it will include warehouses, hoisting equipment, compressors, repair shops, offices, mill or concentrator.	Other
Pliocene	Geological epoch from 2.6 to 5.3 million years ago	Other
preliminary economic assessment	A study, other than a pre-feasibility or feasibility study, that includes an economic analysis of the potential viability of mineral resources. A preliminary economic assessment might be based on measured, indicated, or inferred mineral resources, or a combination of any of these. We consider these types of economic analyses to include disclosure of forecast mine production rates that might contain capital costs to develop and sustain the mining operation, operating costs, and projected cash flows	NI 43-101 & Companion Policy
preliminary feasibility study, pre-feasibility study (PFS)	A comprehensive study of a range of options for the technical and economic viability of a mineral project that has advanced to a stage where a preferred mining method, in the case of underground mining, or the pit configuration, in the case of an open pit, is established and an effective method of mineral processing is determined. It includes a financial analysis based on reasonable assumptions on mining, processing, metallurgical, economic, marketing, legal, environmental, social and governmental considerations and the evaluation of any other relevant factors which are sufficient for a Qualified Person, acting reasonably, to determine if all or part of the Mineral Resource may be classified as a Mineral Reserve	CIM (2010)
Probable Mineral Reserve	The economically mineable part of an Indicated and, in some circumstances, a Measured Mineral Resource demonstrated by at least a Preliminary Feasibility Study. This Study must include adequate information on mining, processing, metallurgical, economic, and other relevant factors that demonstrate, at the time of reporting, that economic extraction can be justified	CIM (2010)
producing issuer	An issuer with annual audited financial statements that disclose (a) gross revenue, derived from mining operations, of at least C$30 million for the issuer's most recently completed financial year; and (b) gross revenue, derived from mining operations, of at least C$90 million in the aggregate for the issuer's three most recently completed financial years;	NI 43-101
Professional Association	A self-regulatory organization of engineers, geoscientists or both engineers and geoscientists that fulfils certain criteria as defined in NI 43-101. The NI43-101 Companion Policy provides a list of currently recognised professional associations	NI 43-101 & Companion Policy
property	This is considered to include multiple mineral claims or other documents of title that are contiguous or in such close proximity that any underlying mineral deposits would likely be developed using common infrastructure. NI 43-101 defines two different types of properties (early stage exploration, advanced) and requires a technical report to summarize material information about the subject property.	NI 43-101 Companion Policy

Term	Definition	Source
Proven Mineral Reserve	The economically mineable part of a Measured Mineral Resource demonstrated by at least a Preliminary Feasibility Study. This Study must include adequate information on mining, processing, metallurgical, economic, and other relevant factors that demonstrate, at the time of reporting, that economic extraction is justified.	CIM (2010)
QAQC	Quality assurance and Quality control of the geological sample database.	Other
QEMSCAN	Is the name for an integrated automated mineralogy and petrography solution providing quantitative analysis of minerals, rocks and man-made materials. The integrated system comprises a Scanning Electron Microscope (SEM) with a large specimen chamber, up to four light-element Energy-dispersive X-ray spectroscopy (EDS) detectors, and proprietary software controlling automated data acquisition.	Other
Qualified Person (QP)	Refers to a qualified person as defined under NI 43-101. In summary this means an individual who is an engineer or geoscientist with at least five years of experience in mineral exploration, mine development or operation or mineral project assessment, or any combination of these; has experience relevant to the subject matter of the mineral project and the technical report; and is a member or licensee in good standing of a recognised professional association. A qualified person must also meet the specific requirements laid down in the more extensive definition which forms part of NI 43-101	CIM (2010) & NI 43-101
quantity	Either tonnage or volume, depending on which term is the standard in the mining industry for the type of mineral;	NI 43-101
Reconciliation (mine)	The process of making the block model from the resource estimate consistent or compatible with mine/mill production.	Other
Recovered magnetic fraction	Material from a sample that has been separated from its parent sample by use of a magnet. Usually it is magnetic minerals depending on mineral grain liberation.	Other
resource estimation	The process of using exploration data to generate models (usually three-dimensional) of a mineral resource for use in mine planning and in quantifying the tonnage and grades of mineral resources present	Other
Reverse Circulation drilling	A percussion drilling technique that produces chip samples that are removed from the drillhole by compressed air pushing the sample up the inside of the drill rods. Considered superior to aircore drilling; generating better quality samples	Other
right-of-way	A parcel of land granted by deed or easement for construction and maintenance according to a designated use. This may include highways, streets, canals, ditches, or other uses	Other
royalty	An amount of money paid at regular intervals by the lessee or operator of an exploration or mining property to the owner of the ground. Generally based on a specific amount per tonne or a percentage of the total production or profits. Also, the fee paid for the right to use a patented process	Other
run-of-mine (ROM)	A term used to describe ore of average grade for the deposit	Other
slimes	Fine material, generally < 45µm sized particles, which is usually removed from a sample and discarded during mineral processing. Different size specifications may apply depending on the processing method being used; for instance, a finer size would apply in flotation compared to gravity separation. In this report the term has generally been used to refer to the -45µm sized material obtained during processing of pit and drillcore samples	Other
specific gravity	The weight of a substance compared with the weight of an equal volume of pure water at 4°C	Other

Term	Definition	Source
standard reference material (SRM)	Homogenised finely ground sample material which has been analysed at a group of different laboratories in order to provide agreed ('true') values for the grades of the certified values. Such materials can be purchased commercially and are used to provide control samples for monitoring the accuracy of analyses during evaluation sampling	Other
strike length	The horizontal distance along the long axis of a structural surface, rock unit, mineral deposit or geochemical anomaly.	Other
tailings	Material rejected from a mill after the recoverable valuable minerals have been extracted	Other
technical report	A report prepared and filed in accordance with NI 43-101 and Form 43-101F1 Technical Report that includes, in summary form, all material scientific and technical information in respect of the subject property as of the effective date of the technical report. A report may constitute a 'technical report' as defined in the Instrument, even if prepared considerably before the date the technical report is required to be filed, provided the information in the technical report remains accurate and complete as at the required filing date. The qualified person is responsible for preparing the technical report. The qualified person, not the issuer, has the responsibility of determining the materiality of the scientific or technical information to be included in the technical report	Other
Tertiary	A Geological Age within the Cainozoic Era 2.6 to 65 million years ago	
titanomagnetite	A mineral containing oxides of titanium and iron.	Other
Universal Transverse Mercator (UTM)	The Universal Transverse Mercator projection is a map projection used to define horizontal positions world-wide by dividing the surface of the Earth into 6 degree zones, each mapped by the Transverse Mercator projection with a central meridian in the centre of the zone. UTM zone numbers designate 6 degree longitudinal strips extending from 80 degrees South latitude to 84 degrees North latitude. UTM zone characters designate 8 degree zones extending north and south from the equator	Other
variogram	A function of the distance and direction separating two locations that is used to quantify dependence. The variogram is defined as the variance of the difference between two variables at two locations. The variogram generally increases with distance and is described by nugget, sill, and range parameters. If the data is stationary, then the variogram and the covariance are theoretically related to each other.	Other
variogram model	A model that is the sum of two or more component models, such as nugget, spherical, etc. Adding a nugget component to one of the other models is the most common nested model, but more complex combinations are occasionally used.	Other
water well drill	A drilling machine used to drill holes for water supply. In such cases the hole is usually excavated using a percussive action with the rock being broken into fragments and flushed out of the hole to surface using air or water. Samples collected from such material tend to be less representative of the underlying rocks and are normally only used in early stage exploration since they are not suitable for use in resource estimation.	Other
weathering	Disintegration or alteration of rock in its natural or original position at or near the Earth's surface through physical, chemical, and biological processes induced or modified by wind, water, and climate.	Other
written disclosure	Includes any writing, picture, map, or other printed representation whether produced, stored or disseminated on paper or electronically, including websites.	NI 43-101

Appendix: Qualified Persons Certificates

T Z M I

TZ MINERALS INTERNATIONAL PTY LTD
ABN 99 003 492 519

Level 1, 11 Kitchener Avenue
Burswood WA 6100

PO Box 1252 Victoria Park East
WA 6981 Australia

Telephone: +61 8 9359 6000
Facsimile: +61 8 9359 6050
E-Mail: marketing@tzmi.com

Certificate of Qualified Person

I, Mark Jeffrey Dufty, BSc Hons (Geology) am employed as Principal Consultant by TZ Minerals International Pty Ltd (TZMI), Level 1, 11 Kitchener Avenue, Burswood, Western Australia 6100, Australia.

This certificate applies to the technical report titled "*Goondicum 2016 Preliminary Economic Assessment*" that has an effective date of 25 November 2016 (the "technical report").

I am a Fellow of the Australian Institute of Mining and Metallurgy (FAusIMM – 106196) and a Member of the Australian Institute of Geoscientists (MAIG – 6643). I graduated from the University of Melbourne, Australia, in 1983 with a Bachelor of Geology with Honours.

I have practiced my profession for over 30 years. I have worked as a mine, exploration and resource geologist. I have also assisted and managed numerous project studies, including scoping studies/ preliminary economic assessments, feasibility studies and due diligence studies. I have extensive valuation experience, having been responsible for valuation services in numerous transactions ranging from US$10 million to US$40 billion. I have over 20 years of mineral sands experience.

As a result of my experience and qualifications, I am a Qualified Person as defined in National Instrument 43-101 Standards of Disclosure of Mineral Projects (NI 43-101).

I have undertaken a site visit to the Goondicum Project on the 12th October 2016, which included a visit to the mine site and processing plant, related infrastructure and port facilities.

I am responsible for the following sections of the report: Sections 1, 2, 15, 16, 17, 18,19, 21, 22, 24, 25, 26, 27.

I am independent of Melior Resources Incorporated, as independence is described by Section 1.5 of NI 43-101.

Prior to this study I have had no involvement with the property that is the subject of the Technical Report.

I have read NI 43-101 and the sections of the technical report for which I am responsible have been prepared in compliance with that instrument.

As of the effective date of the technical report, to the best of my knowledge, information and belief, the sections of the technical report for which I am responsible contain all scientific and technical information that is required to be disclosed to make those sections of the technical report not misleading.

Dated: 25 November 2016

Mark Dufty
BSc Hons (Geology), FAusIMM, MAIG

GRAHAM LEE & ASSOCIATES PTY. LTD.

ABN 99 001 535 548

Mining & Geological Consultants
22 Grove Avenue
PENSHURST NSW 2222
e-mail: gjcorp@bigpond.com
(mobile) 0408 397 737

25th November 2016

Certificate of Qualified Person

Graham Lee

I, Graham Frederick Lee, BSc, FAusIMM, CP(Geo), MAIG, as a co-author of this report entitled Goondicum 2016 Preliminary Economic Assessment, SE Queensland, Australia, prepared for Melior Resources, effective date 25th November 2016, do herby certify that :

I am a Director and Consultant Geologist of Graham Lee and Associates Pty Ltd, of 22 Grove Avenue, PENSHURST, NSW, 2222.

I graduated from the University of New South Wales in 1974 with a BSc degree majoring in Geology.

I am a Fellow of the Australasian Institute of Mining and Metallurgy (Member No 101602) and registered as a Chartered Professional Geologist (CP(Geo)) with the Australasian Institute of Mining and Metallurgy. I am also a Member of the Australian Institute of Geoscientists (Member No 1990). I have worked as a geologist in the industrial minerals sector of the mining industry for over 40 years.

My relevant experience for the purpose of this Technical Report includes among other projects:

- Supervised geological investigations to assess the eluvial ilmenite resources associated within the Goondicum Gabbro near Monto, Queensland. Prepared resource estimate reports in 1996, 2000, and 2005
- As the project developed, it was recognised that co-product feldspar and apatite could be recovered from the feedstock and a programme of investigation and estimation of these resources was completed in 2005.
- In the early stages of the project, investigations focussed on the ilmenite bearing alluvial deposits along the Burnett River. These investigations were terminated in favour of the higher grades encountered in the eluvial deposits.
- Review of operations and resource assessments as a member of a team undertaking project reviews for banking and funding purposes in the Murray Basin were examined.
- A complete assessment and re-evaluation of mineral sand resources on King Island.
- Review of ilmenite bearing heavy mineral sand resources at Barrytown, New Zealand, followed by further detailed drilling and laboratory testing investigations and resource estimation/reporting.

- In conjunction with AMDEL Ltd, completed a desk review of the feasibility study for the Congolone, Mozambique, mineral sand project for the Commonwealth Secretariat acting for the Mozambique Government.
- Provided a variety of consulting services to Iluka Resources Ltd, on exploration projects.
- Re-evaluation of mineral sand tenements at Tea Gardens N.S.W., including:
  - Assessment of previous investigations which resulted in a successful N.S.W. Supreme Court hearing.
  - Re-drilling and testing of tenements led to defining a mineralised HM sand body.
  - Determination of contained reserves in this deposit.

Relevant publications include:

Lee, G. 1990.
Sample Testing and Metallurgical Flow sheet Development.
Lecture paper presented at Australian Mineral Sands Industry Symposium. February, 1990.

Johnson, L.G. and Lee, G.F. 1996.
Goondicum Ilmenite Deposits.
In, Mesozoic Geology of the Eastern Australian Plate Conference.
Geological Society of Australia Inc. Extended Abstracts No 43.

Lee, G. and Stephenson, P. 1999.
Observations on the Estimation and Reporting of Mineral Sands.
In, Murray Basin Mineral Sands Conference. Extended Abstracts.
Australian Institute of Geoscientists, Bulletin No 26.

Lee, G. 2000.
Mineral Sands. Some Aspects of Evaluation, Resource Estimation and Reporting.
In, Mineral Resource and Ore Reserve Estimation. The AusIMM Guide to Good Practice (Ed AC Edwards).
The Australasian Institute of Mining and Metallurgy, Melbourne. Monograph 23.

Stephenson, P.R. and Lee, G. 2003.
The Application of The JORC Code to the Public Reporting of Industrial Minerals.
Australian Industrial Minerals Conference, Brisbane, March 2003.
Australian Institute of Geoscientists Bulletin No 38.

I have provided technical assistance to Monto Minerals on the Goondicum Ilmenite project from 1995 through to 2005, when that company was operating the project.

I last visited the project's mining lease on a number of occasions between December 2004 and April 2005 amounting to approximately 14 days duration.

I have read the definition of "qualified person" set out in Section 1.1 of the national Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience on the project, I fulfill the requirements to be a qualified person for the purposes of this Technical Report.

I have had input into Sections 6, 8, 9, 10, 11, 25 & 26 of the Technical Report. I have read the technical report including the part that I am responsible for. I have assessed the accuracy and validity of the information presented through discussions with suitably qualified colleagues with H&S Consultants Pty Ltd, and from consideration of information sources available in the public domain and listed in Section 27.0 of the Technical Report.

I have read NI 43-101 and this Technical Report has been prepared in compliance with the version of NI43-101 that came into effect on 30 June 2011.

I am independent of the Issuer, Vendor and the property in accordance with the requirement set out in Section 1.5 of NI 43-101.

To the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical report not misleading.

Graham Lee

Date: 25th November 2016

25th November 2016

Certificate of Qualified Person

Simon Tear

I, Simon James Tear, BSc(Hons), P.Geo, EurGeol as a co-author of this report entitled Goondicum 2016 Preliminary Economic Assessment, SE Queensland, Australia, prepared for Melior Resources, effective date 25th November 2016, do herby certify that :

I am a Director and Consultant Geologist of H&S Consultants Pty Ltd, Level 4, 46 Edward Street, Brisbane, QLD 4000, Australia.

I graduated from the Royal School of Mines, Imperial College, London, UK in 1983 with a BSc (Hons) degree in Mining Geology.

I am registered as a Professional Geologist with the Institute of Geologists of Ireland (registration number 17) and as a European Geologist with the European Federation of Geologists (registration number 26). I have worked as a geologist in the mining industry for over 30 years. My relevant experience for the purpose of this Technical Report is:

I have extensive experience with a variety of different types of mineral deposits in Europe, Asia and Australia.

I have over 15 years' experience with the resource estimation process including 3.5 years minesite experience (open pit and underground), and have worked on feasibility studies. I have also been engaged to undertake property assessments for >15 deposits/projects.

I have completed over 100 resource estimations on a variety of deposit types including structural gold, nickel laterite, stratabound base metal including Iron Ore, industrial minerals.

I have completed over 25 reports that are in accordance with the JORC Code and Guidelines.

I have provided technical assistance to Goondicum Resources on the Goondicum Industrial Mineral Project since the middle of 2013.

I have visited the project's mining lease on one occasion dated 24th February 2014 for one day.

I have read the definition of "qualified person" set out in Section 1.1 of the national Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a qualified person for the purposes of this Technical Report.

I am responsible, either wholly or partly, for Sections 3, 4, 5, 7, 10, 11, 12, 14, 23, 25, 26 & 27 of the Technical Report. I have assessed the accuracy and validity of the information presented through discussions with suitably qualified colleagues with H&S Consultants and its associates, and from consideration of information sources available in the public domain and listed in Section 27.0 of the Technical Report.

I am independent of the Issuer, Vendor and the property in accordance with the requirement set out in Section 1.5 of NI 43-101.

Prior to 2013, I had no involvement with the property that is the subject of the Technical Report. Since July 2013 I have provided technical assistance to Goondicum Resources/Melior in their work on the property in the context of several separate consulting agreements between Melior and H&S Consultants.

I have read NI 43-101 and this Technical Report has been prepared in compliance with the version of NI43-101 that came into effect on 30 June 2011.

To the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Simon J Tear PGeo, EurGeol

Date: 25th November 2016